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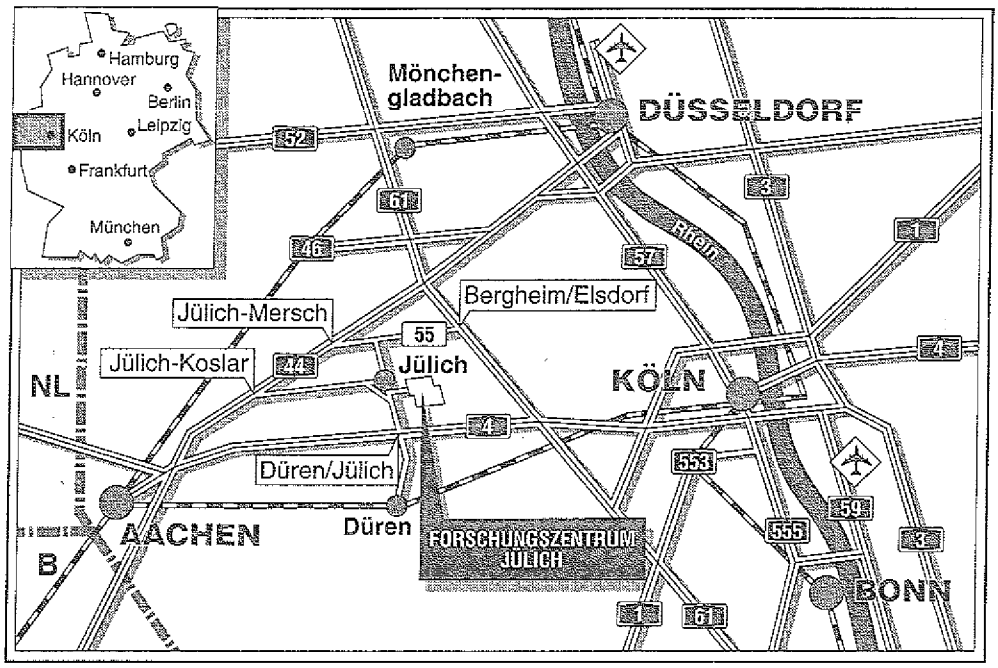
Institut für Chemie 2:
Chemie der Belasteten Atmosphäre

Ozone Profiles at Jülich and Schauinsland, FRG during 1990

H.G.J. Smit W. Sträter H. Loup D. Kley



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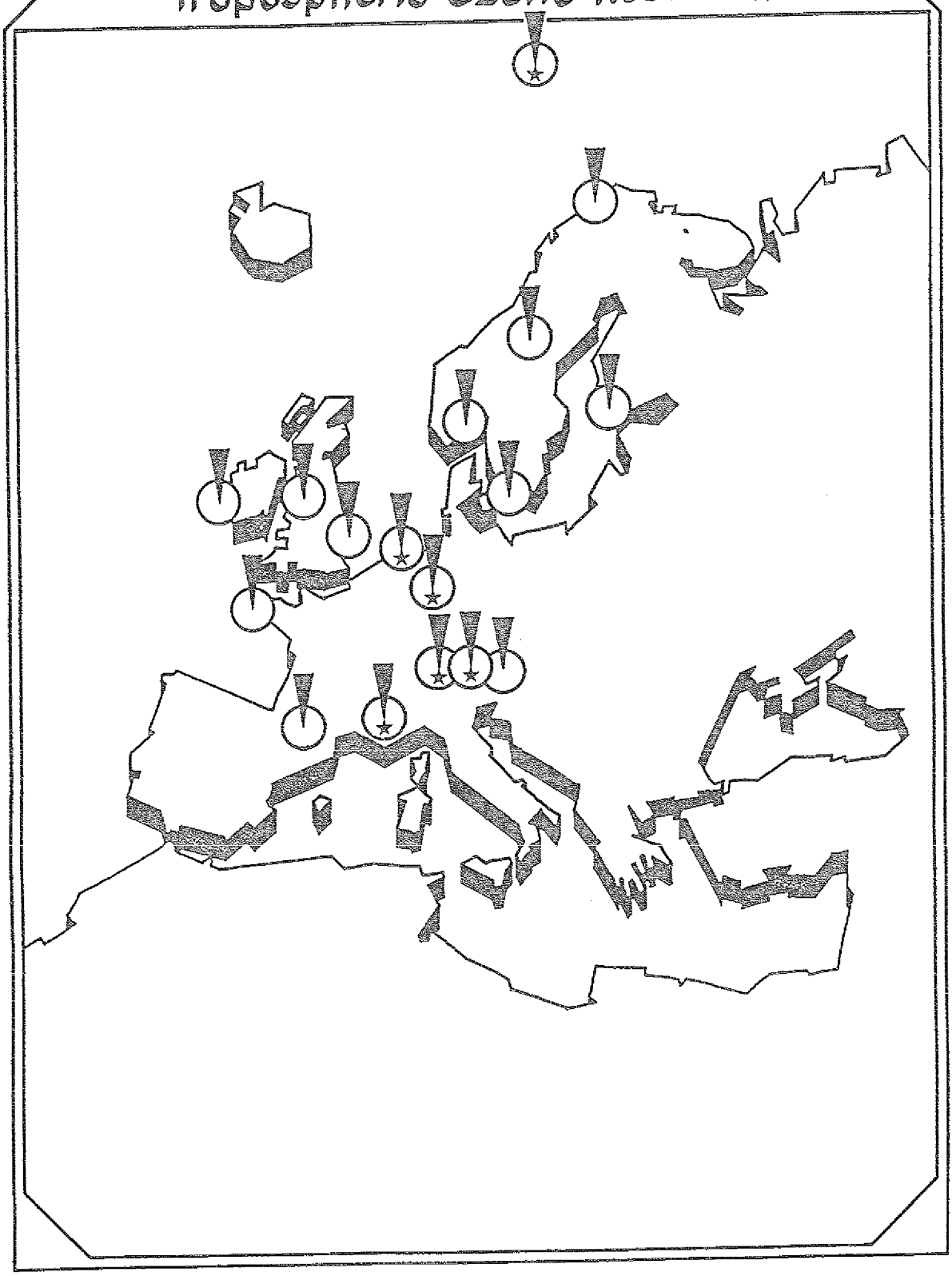
Summary

This second report of a series contains the individual measured vertical profiles of ozone and the meteorological parameters like pressure, temperature and relative humidity obtained from regular soundings at Jülich, FRG (50° 41' N, 6° 24' E) during 1990. It also includes vertical profiles measured incidental at the Schauinsland (Black Forest), FRG (47° 55' N, 7° 55' E) mainly during an intensiv field campaign in August 1990.

TOR

Tropospheric Ozone Research



1. Introduction

Tropospheric ozone plays a crucial role in tropospheric chemistry as a precursor for reactive radicals. As a significant absorber of infrared radiation it contributes to the greenhouse effect. Ozone is a toxic gas and especially at higher concentrations it will give damage to human–, animal– and plant life. Already at low concentrations it reduces the photochemical activity of green plants. Ozone is also thought to play an important role in the syndrom of forest damage.

Measurements of ozone from the last century up to now show that its concentrations near the ground as well as in the free troposphere are increasing at a rate of approximately 1% per year [Attmanspacher (1984), Feister (1987), Volz (1988)].
The chemistry, transport and budget of tropospheric ozone and other photooxidants is investigated as a major component of the EUROTRAC project TOR (Tropospheric Ozone Research).
Within TOR , a network of stations in Europe performs regular vertical soundings of ozone and meteorological parameters (pressure, temperature and relative humidity) to investigate the seasonal effects in the ozone distribution of the free troposphere over Europe and to characterize the role of stratosphere/troposphere exchange and transport from the atmospheric boundary layer into the free troposphere.

The sounding program at Jülich started in July 1988 with incidental flights, while regular flights with a frequency of one per week were started in July 1989. The results up to December 1989 were reported in the first volume of this series [Smit et al.(1989)]. In Januar 1990 the frequency of soundings was extended to two flights per week.

The ozone sounding system, instrumental set up and data processing, has been described in the first volume of these series [Smit et al.(1989)]. In this report we present the results obtained at Jülich during 1990, as well as the results of incidental soundings performed at the Schauinsland mainly during an intensive field campaign in August 1990.

2. Vertical Ozone profiles

The regular sounding program within the TOR project has been started in 1989 with one flight per week. However, in Januar 1990 this was extended to two soundings per week, normally launched every monday and thursday at a time around 12 (UTC) from the roof of our institute at an altitude of 80 m above sea level. Further, incidental ozone soundings were performed at Schauinsland (1100 m above sea level), mainly during an intensive field campaign at the groundbased monitoring station of the institute (TOR station no.11) in August 1990.
The results of the soundings performed during 1990 are presented in the form of individual vertical profiles of ozone and the simultanously measured meteorological parameters like pressure, temperature and relative humidity. For every flight two plots are presented. The first plot shows the complete profile during ascent up to the burst altitude of the balloon. This plot gives a standard ozonagram with the partial pressure of ozone (mPa), temperature (^{o}C) and relative humidity (%) on the abscissa as a function of pressure (hPa) on a logaritmic scale. The second plot presents the tropospheric part of the individual soundings in greater detail. Here, we use units of mixing ratio (ppbv) for ozone on the abscissa as a function of geometric altitude (km) where the altitude was computed step by step as the cumulative sum of the height difference between two successive pressure levels using the hydrostatic equation.

Acknowledgement

This work was supported as part of the EUROTRAC subproject TOR by the Bundesminister für Forschung und Technologie.
The authors wish to thank Umwelt Bundes Amt (UBA), especially Mr. R. Graul and his co–workers of the UBA–observatory at Schauinsland for their friendly hospitality and assistance during the field campaign in August 1990.
We thank Mr. O. Heißenbüttel and Mrs. C. Sohnemann for writing the graphics program, Mrs. R. von de Berg for assistance during the preparation of the ozone sondes and Mr. W. Petrick for modification of the radiosondes.

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Nature, 332, 240–242 (1988)

Individual vertical profiles at Jülich and Schauinsland

OZONE SOUNDINGS at JÜLICH

Flight-Number	Date dd-mm-year	Time hh:mm (UTC)	Page
126	21-12-1989	9:15	8
127	3- 1-1990	9:45	10
128	8- 1-1990	12:10	12
129	11- 1-1990	12: 5	14
130	15- 1-1990	12: 0	16
131	18- 1-1990	12: 5	18
132	22- 1-1990	12: 5	20
134	26- 1-1990	9:15	22
135	29- 1-1990	12:15	24
136	1- 2-1990	11:55	26
137	5- 2-1990	12:15	28
138	8- 2-1990	12:10	30
140	13- 2-1990	11:55	32
141	15- 2-1990	12:50	34
142	19- 2-1990	12: 0	36
143	22- 2-1990	10:45	38
145	1- 3-1990	12:10	40
147	6- 3-1990	12:10	42
149	12- 3-1990	12:30	44
150	15- 3-1990	12:15	46
151	19- 3-1990	12:10	48
152	22- 3-1990	12:15	50
153	26- 3-1990	12: 5	52
154	29- 3-1990	12:30	54
155	2- 4-1990	12:15	56
158	12- 4-1990	12:10	58
159	17- 4-1990	13: 0	60
160	19- 4-1990	12:10	62
161	23- 4-1990	12: 5	64
162	26- 4-1990	12:20	66
163	30- 4-1990	12: 5	68
165	7- 5-1990	12: 0	70
166	10- 5-1990	12: 0	72
171	14- 5-1990	12: 0	74
172	17- 5-1990	12:40	76
173	21- 5-1990	12:10	78
174	23- 5-1990	12:10	80
175	28- 5-1990	12: 0	82
176	31- 5-1990	12:20	84
177	5- 6-1990	11:55	86
178	7- 6-1990	11:55	88
179	11- 6-1990	12: 0	90
180	13- 6-1990	12: 0	92
181	18- 6-1990	12: 0	94
182	21- 6-1990	11:55	96
183	25- 6-1990	12:10	98
184	28- 6-1990	11:55	100

OZONE SOUNDINGS at JÜLICH

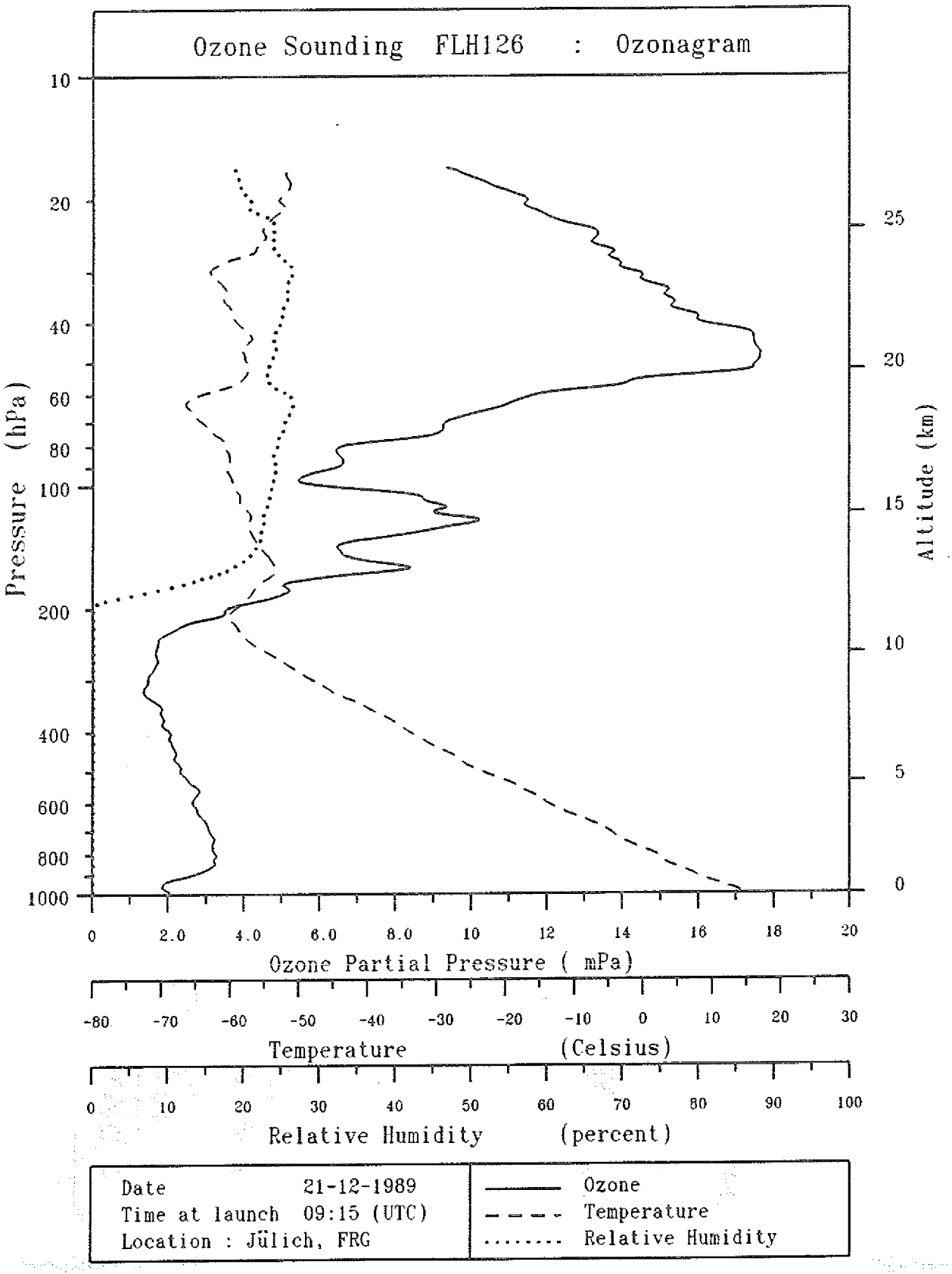
Flight-Number	Date dd-mm-year	Time hh:mm (UTC)	Page
185	2- 7-1990	11:57	102
186	5- 7-1990	12: 4	104
187	9- 7-1990	12: 1	106
188	12- 7-1990	11:57	108
189	16- 7-1990	11:52	110
190	19- 7-1990	11:55	112
191	23- 7-1990	12: 0	114
192	26- 7-1990	11:25	116
193	30- 7-1990	11:20	118
194	2- 8-1990	11:55	120
195	9- 8-1990	12:15	122
196	13- 8-1990	14: 0	124
197	16- 8-1990	12: 2	126
198	20- 8-1990	11:57	128
199	23- 8-1990	11:58	130
221	30- 8-1990	11:55	132
222	3- 9-1990	12: 5	134
223	6- 9-1990	12: 8	136
224	10- 9-1990	11:55	138
225	13- 9-1990	11:56	140
226	17- 9-1990	12: 0	142
227	20- 9-1990	11:58	144
228	24- 9-1990	11:56	146
229	27- 9-1990	11:52	148
231	4-10-1990	12:13	150
232	8-10-1990	12: 9	152
233	11-10-1990	12: 1	154
234	15-10-1990	12: 3	156
235	17-10-1990	15:13	158
236	22-10-1990	12:30	160
237	25-10-1990	12:10	162
238	29-10-1990	12: 4	164
240	5-11-1990	12:12	166
241	8-11-1990	12:13	168
242	12-11-1990	12:16	170
243	15-11-1990	12:36	172
244	19-11-1990	12: 1	174
245	22-11-1990	12:14	176
246	26-11-1990	12:26	178
247	29-11-1990	12: 9	180
248	3-12-1990	12: 5	182
249	6-12-1990	12:20	184
250	10-12-1990	12: 1	186
251	13-12-1990	12: 9	188
252	17-12-1990	12:17	190
253	20-12-1990	12:16	192

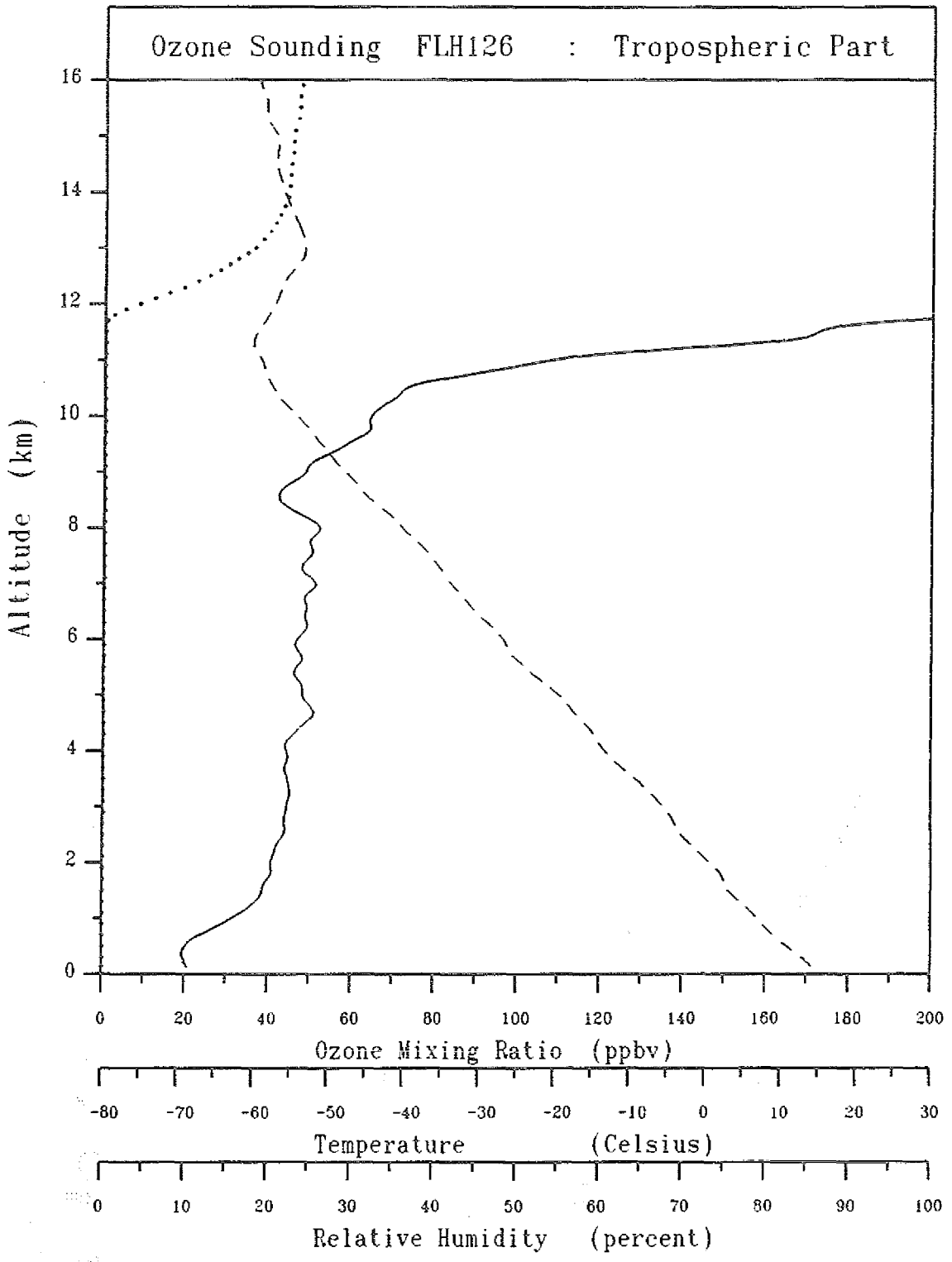
OZONE SOUNDINGS at SCHAUINSLAND

Flight-Number	Date dd-mm-year	Time hh:mm (UTC)	Page
167	9- 5-1990	8:42	194
168	10- 5-1990	6:26	196
169	10- 5-1990	8:40	198
170	10- 5-1990	14:13	200
202	15- 8-1990	6:10	202
203	15- 8-1990	9: 5	204
204	15- 8-1990	11:50	206
205	15- 8-1990	15:15	208
206	16- 8-1990	7: 5	210
207	16- 8-1990	9: 0	212
208	16- 8-1990	11:25	214
209	16- 8-1990	14: 0	216

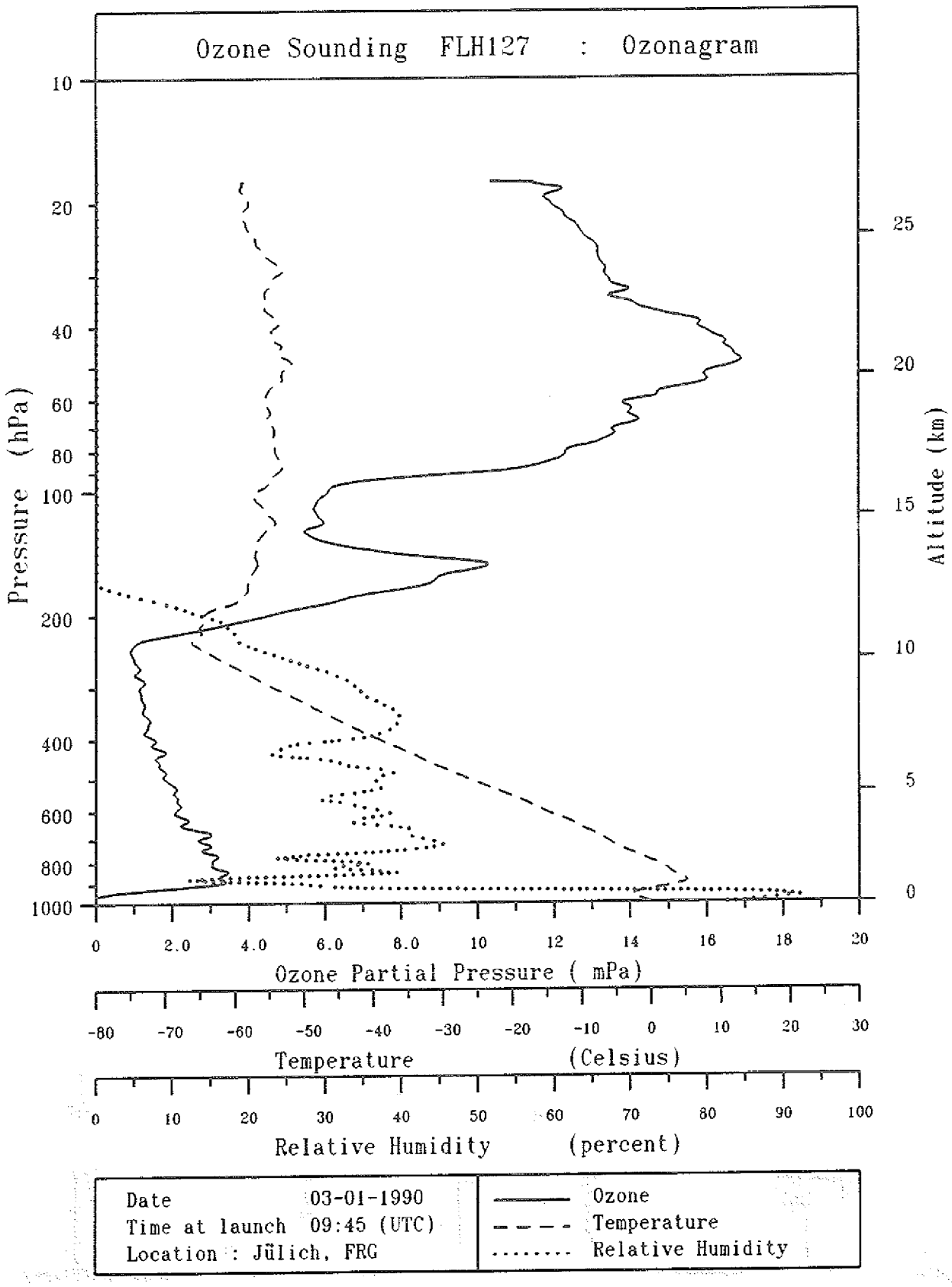
OZONE SOUNDINGS at SCHAUINSLAND

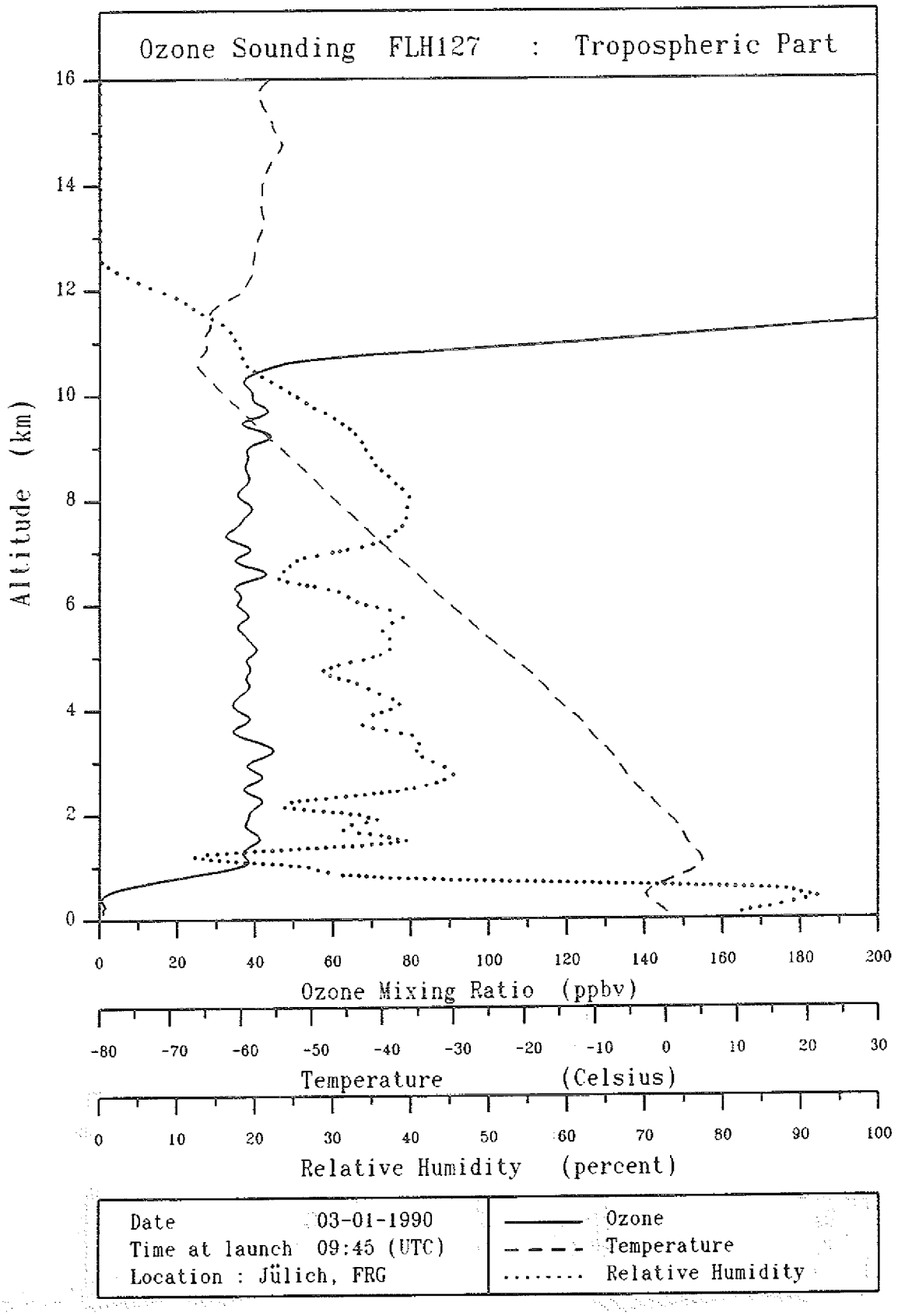
Flight-Number	Date dd-mm-year	Time hh:mm (UTC)	Page
210	21- 8-1990	8: 5	218
211	21- 8-1990	12:20	220
212	22- 8-1990	8: 0	222
213	22- 8-1990	10:55	224
214	22- 8-1990	14:15	226
215	23- 8-1990	5:52	228
216	23- 8-1990	8:32	230
217	23- 8-1990	11:30	232
218	23- 8-1990	14:31	234
219	24- 8-1990	16:28	236
220	25- 8-1990	4:12	238

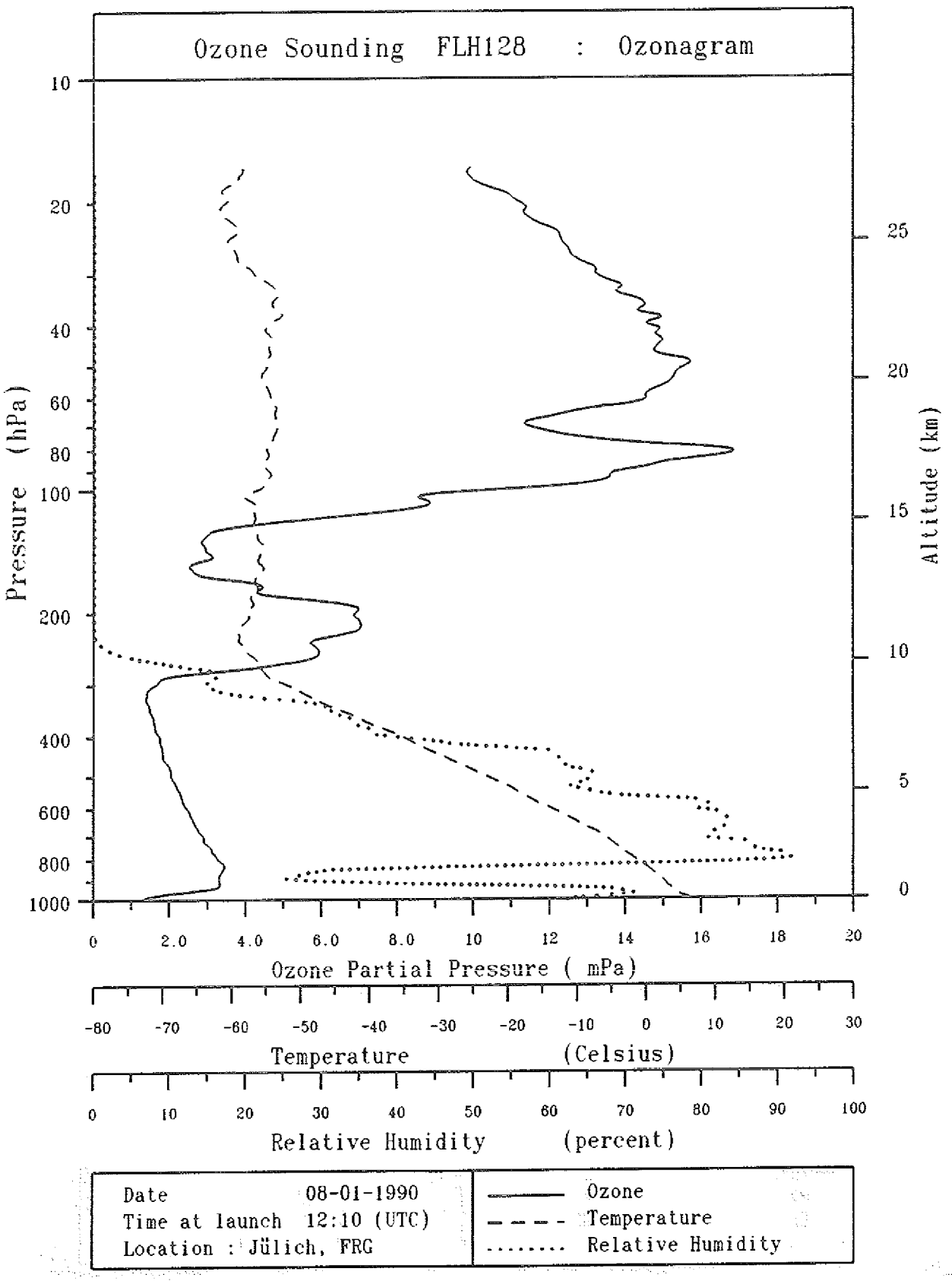

Ozone Sounding FLH126 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 21-12-1989
Time at launch 09:15 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

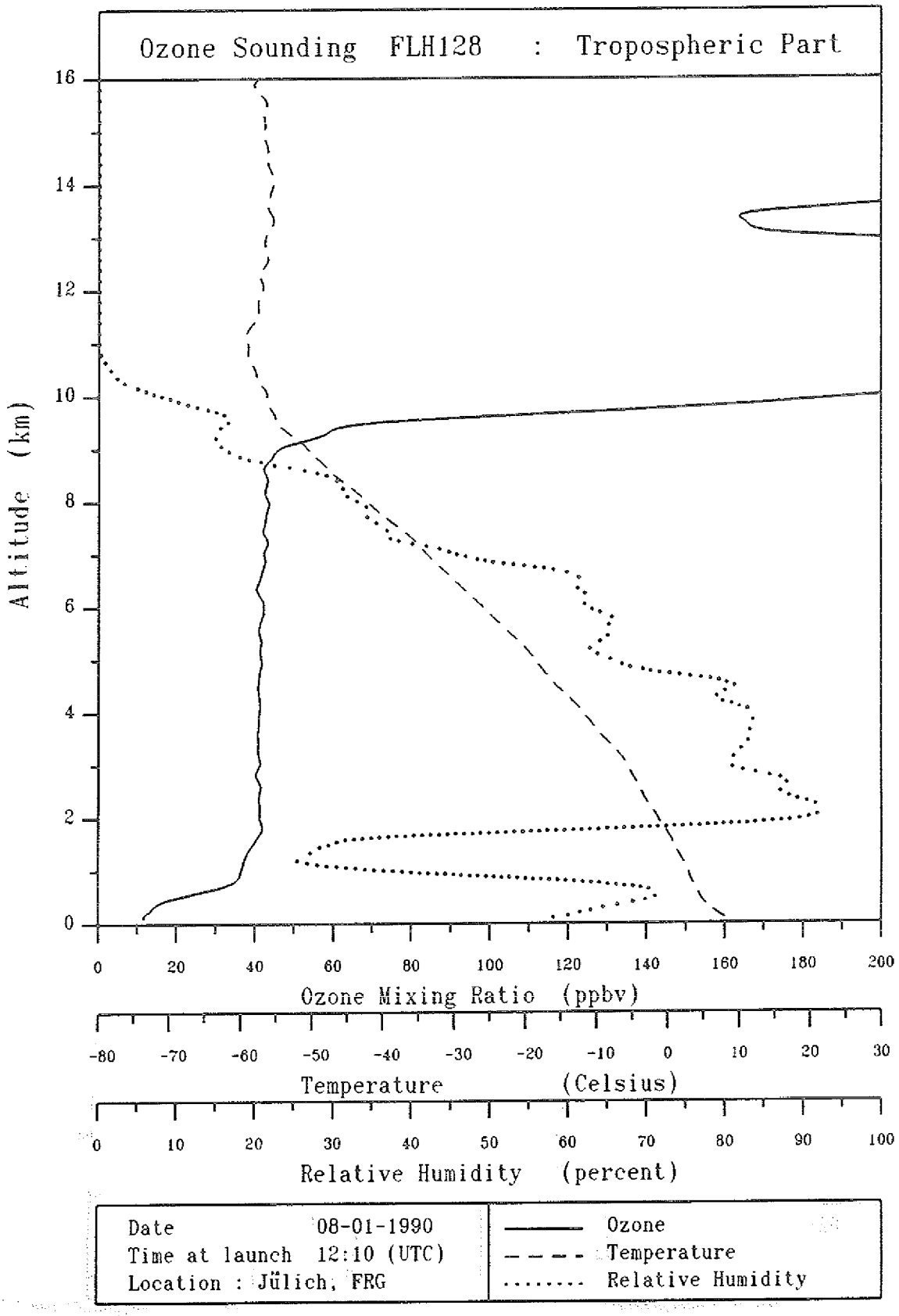


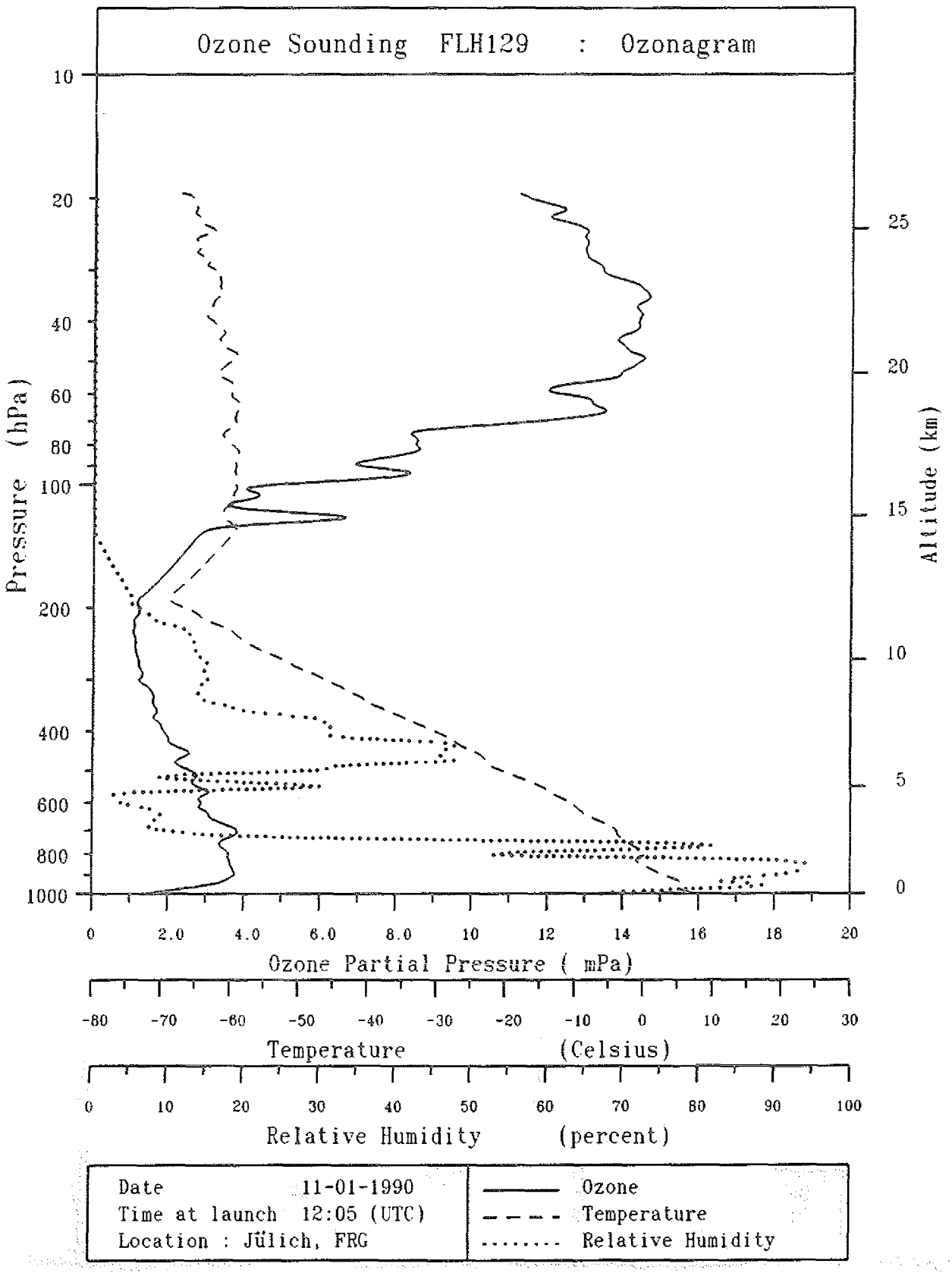
Date 21-12-1989	——— Ozone
Time at launch 09:15 (UTC)	- - - - Temperature
Location : Jülich, FRG	..... Relative Humidity

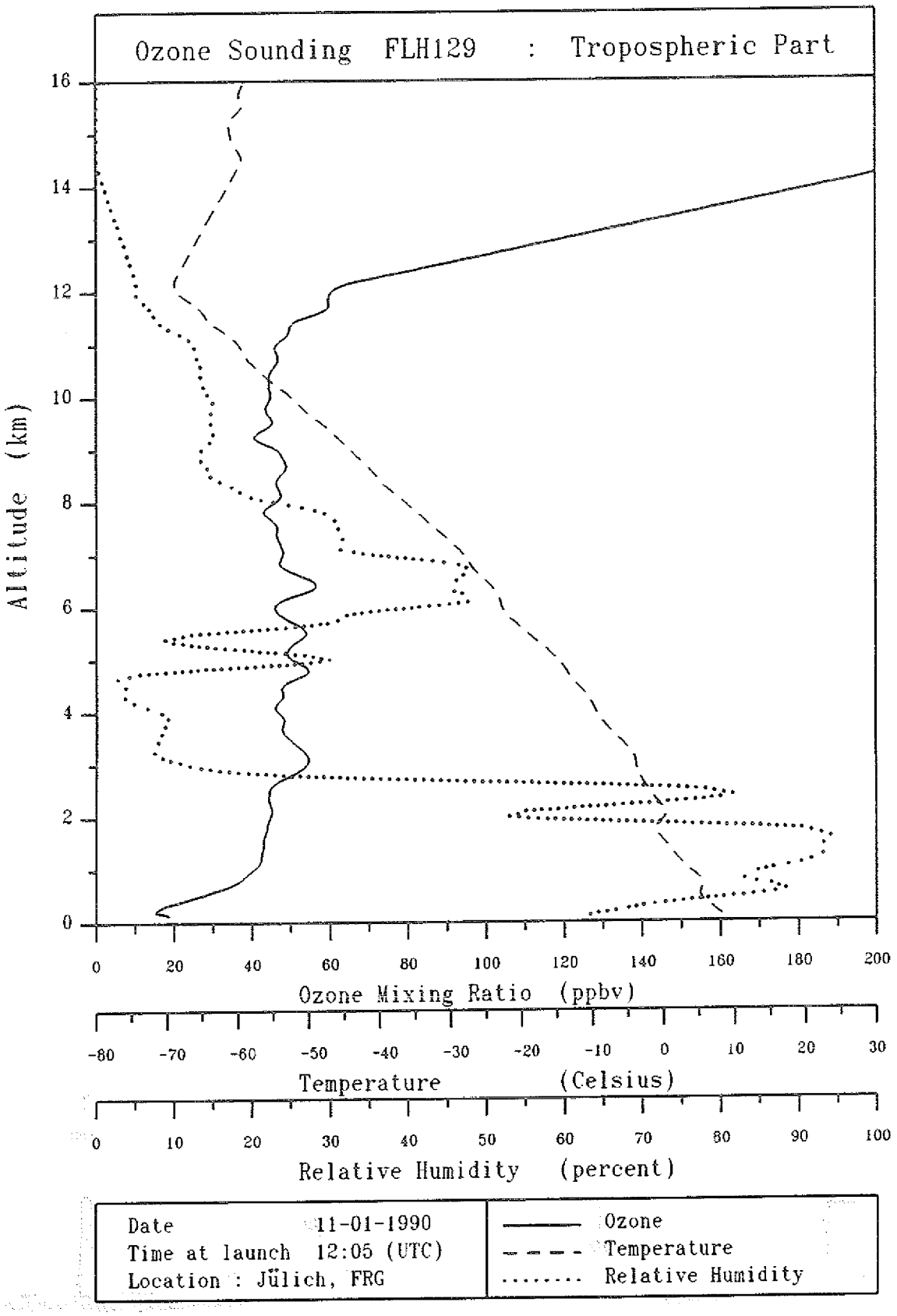

Ozone Sounding FLH127 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 03-01-1990
Time at launch 09:45 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

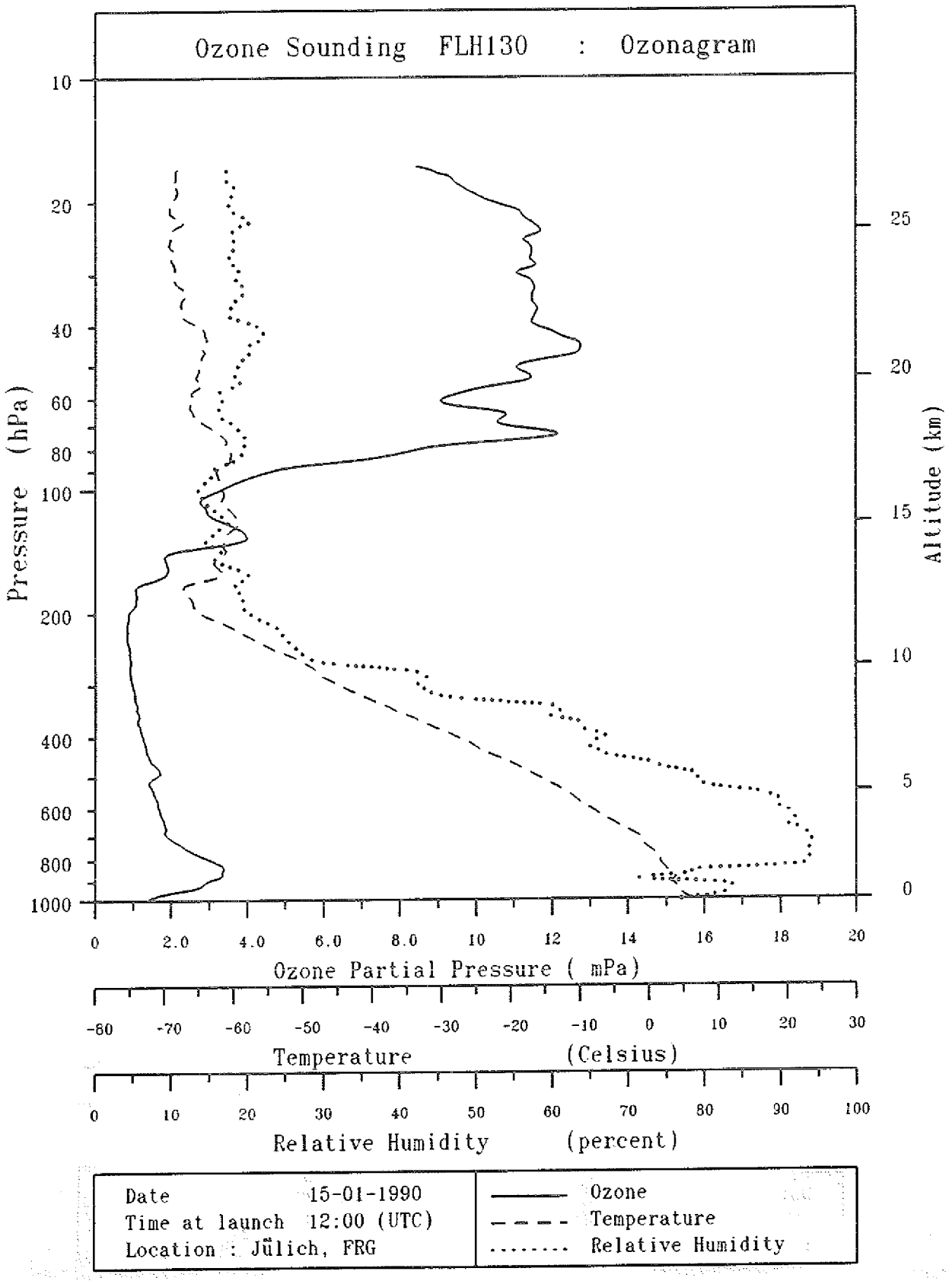

Ozone Sounding FLH127 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 03-01-1990
Time at launch 09:45 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

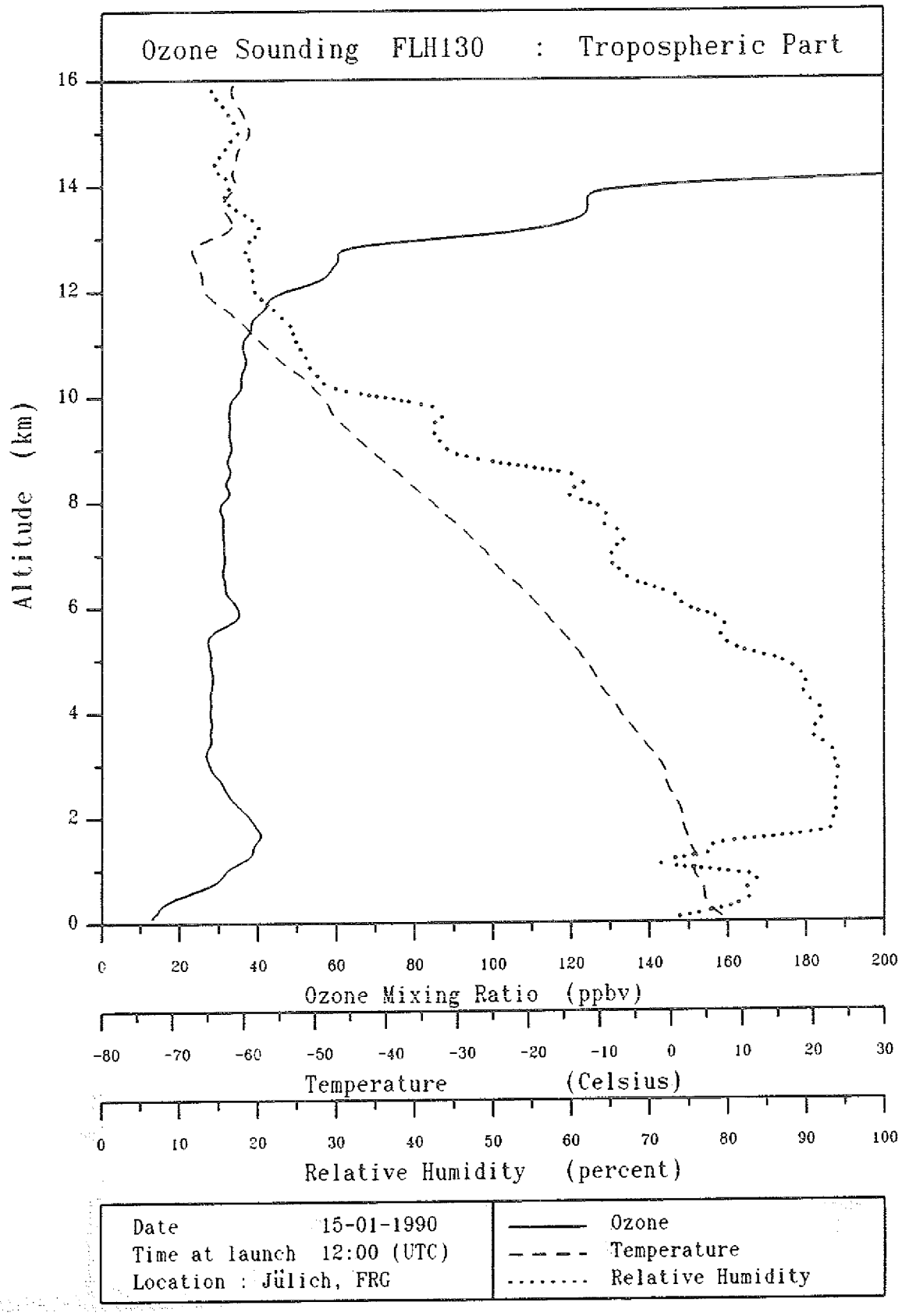

Ozone Sounding FLH128 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 08-01-1990
Time at launch 12:10 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

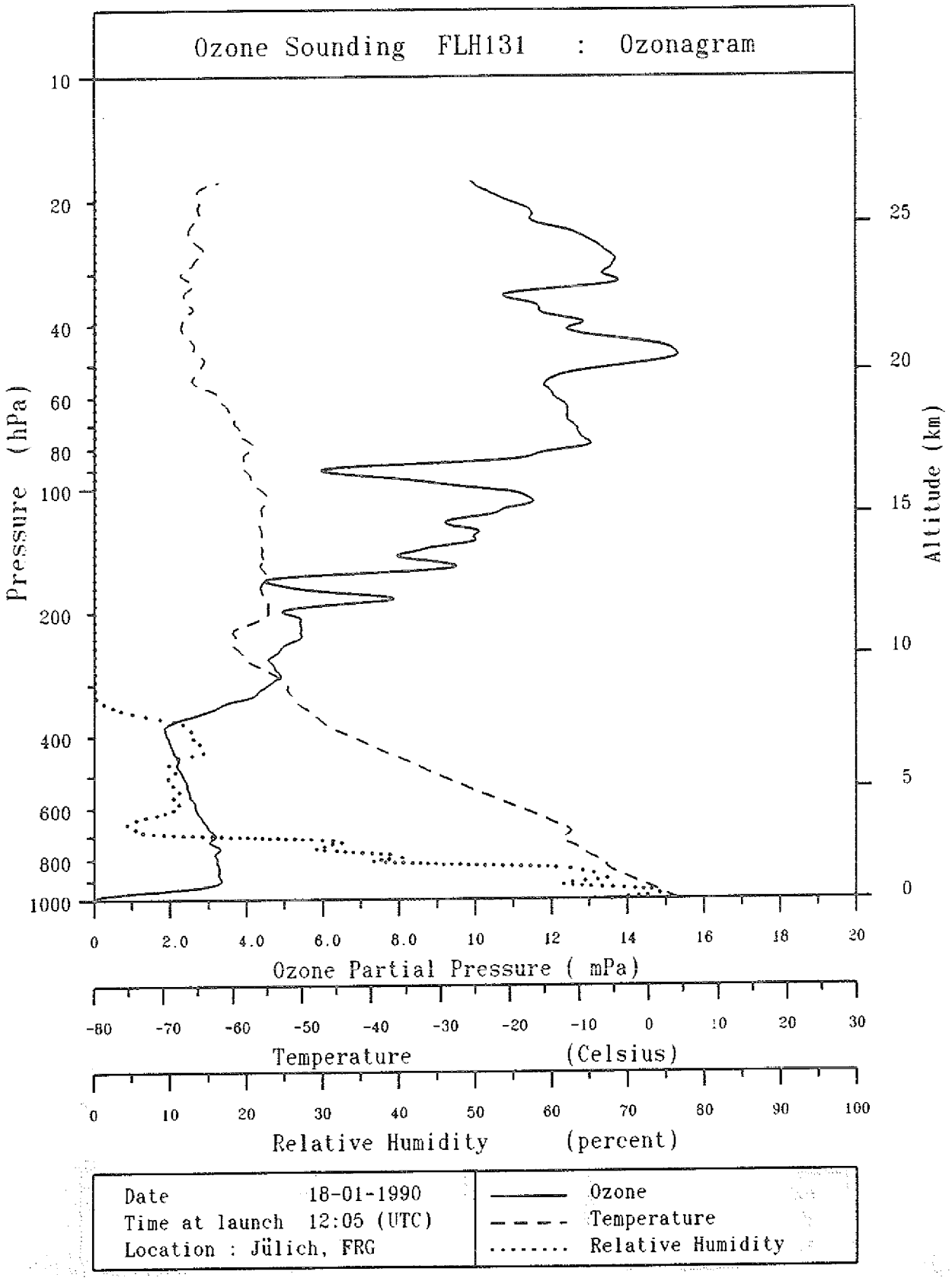

Ozone Sounding FLH128 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 08-01-1990
Time at launch 12:10 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

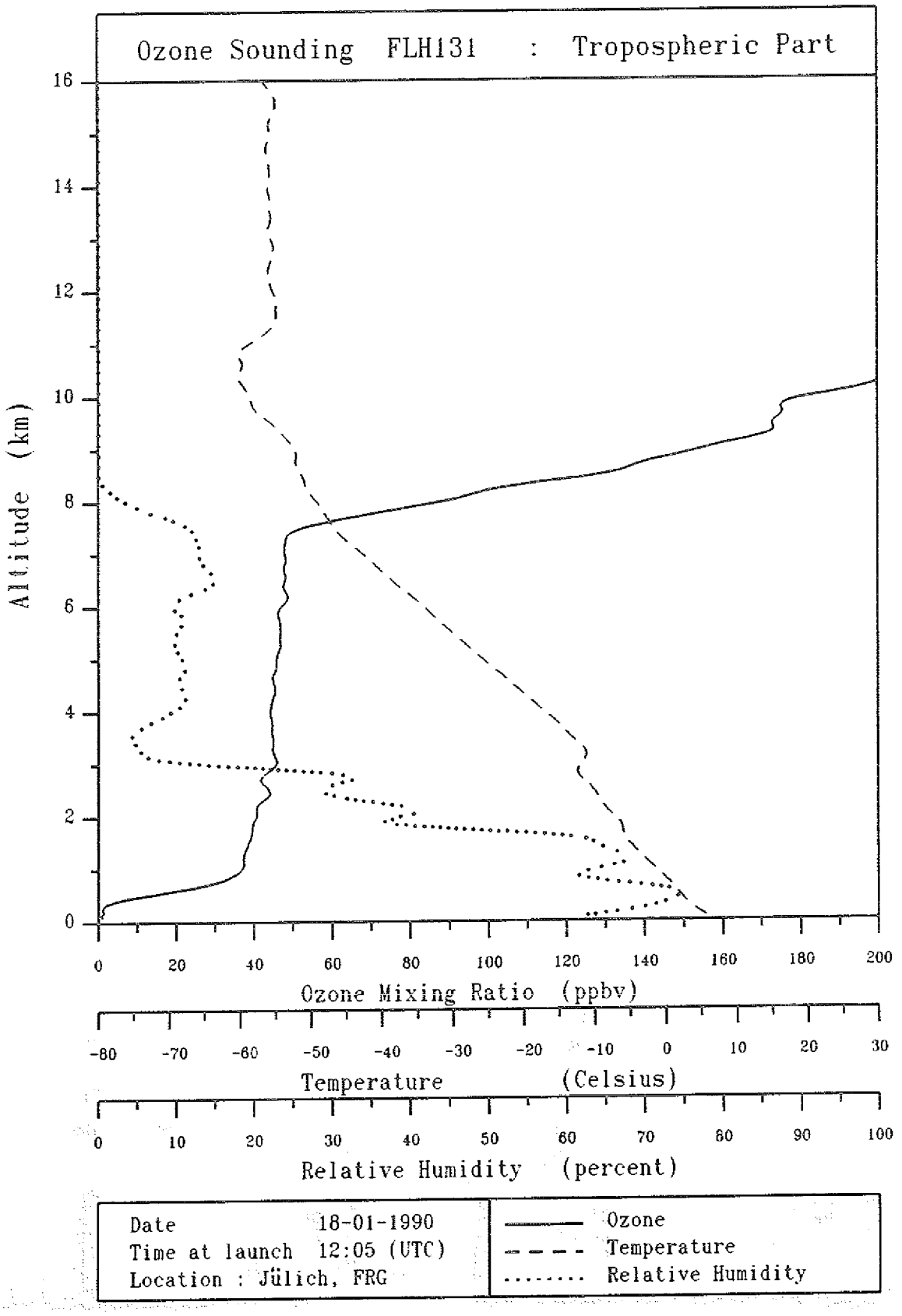

Ozone Sounding FLH129 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 11-01-1990
Time at launch 12:05 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

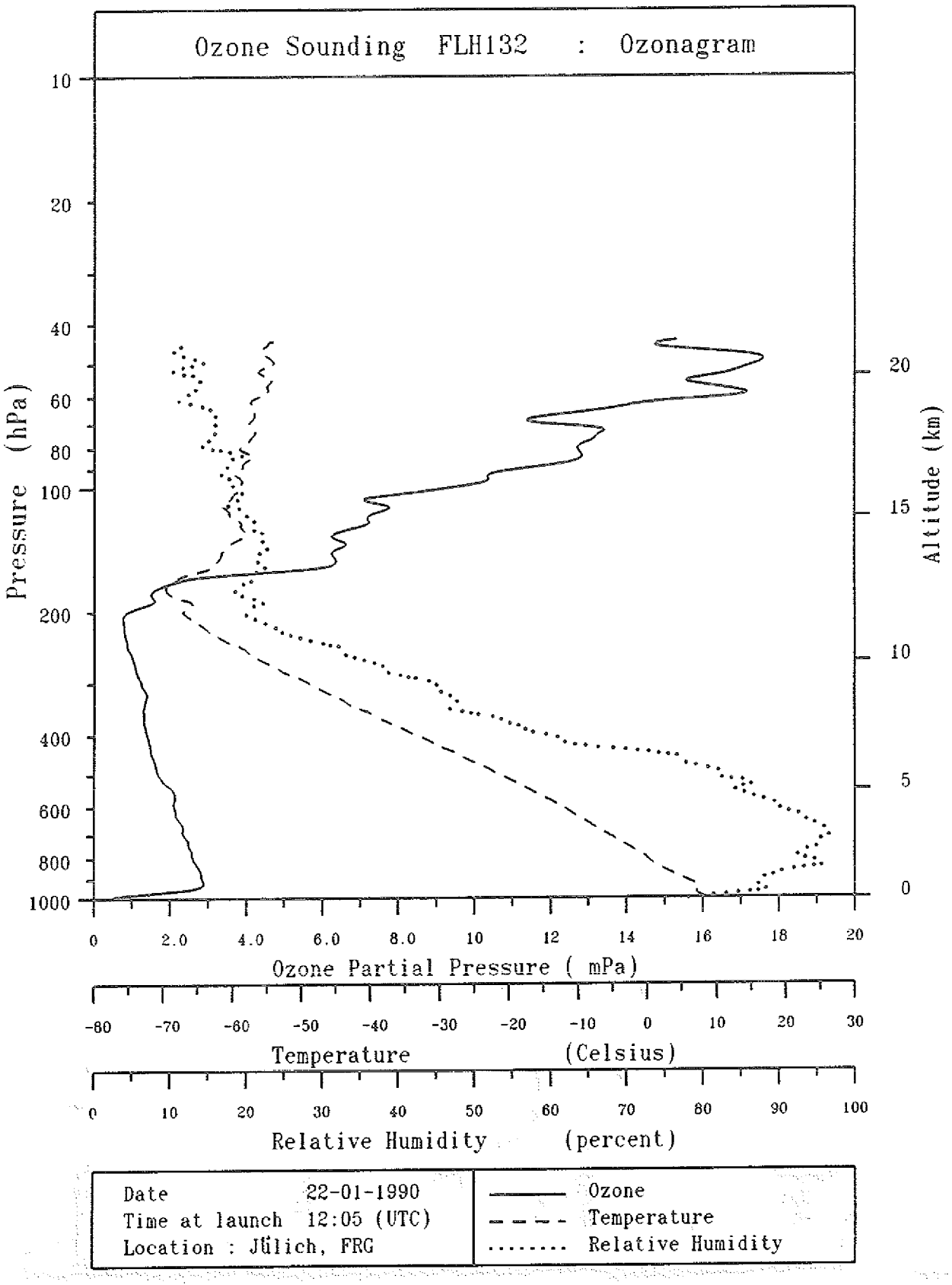

Ozone Sounding FLH129 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 11-01-1990
Time at launch 12:05 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH130 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 15-01-1990
Time at launch 12:00 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

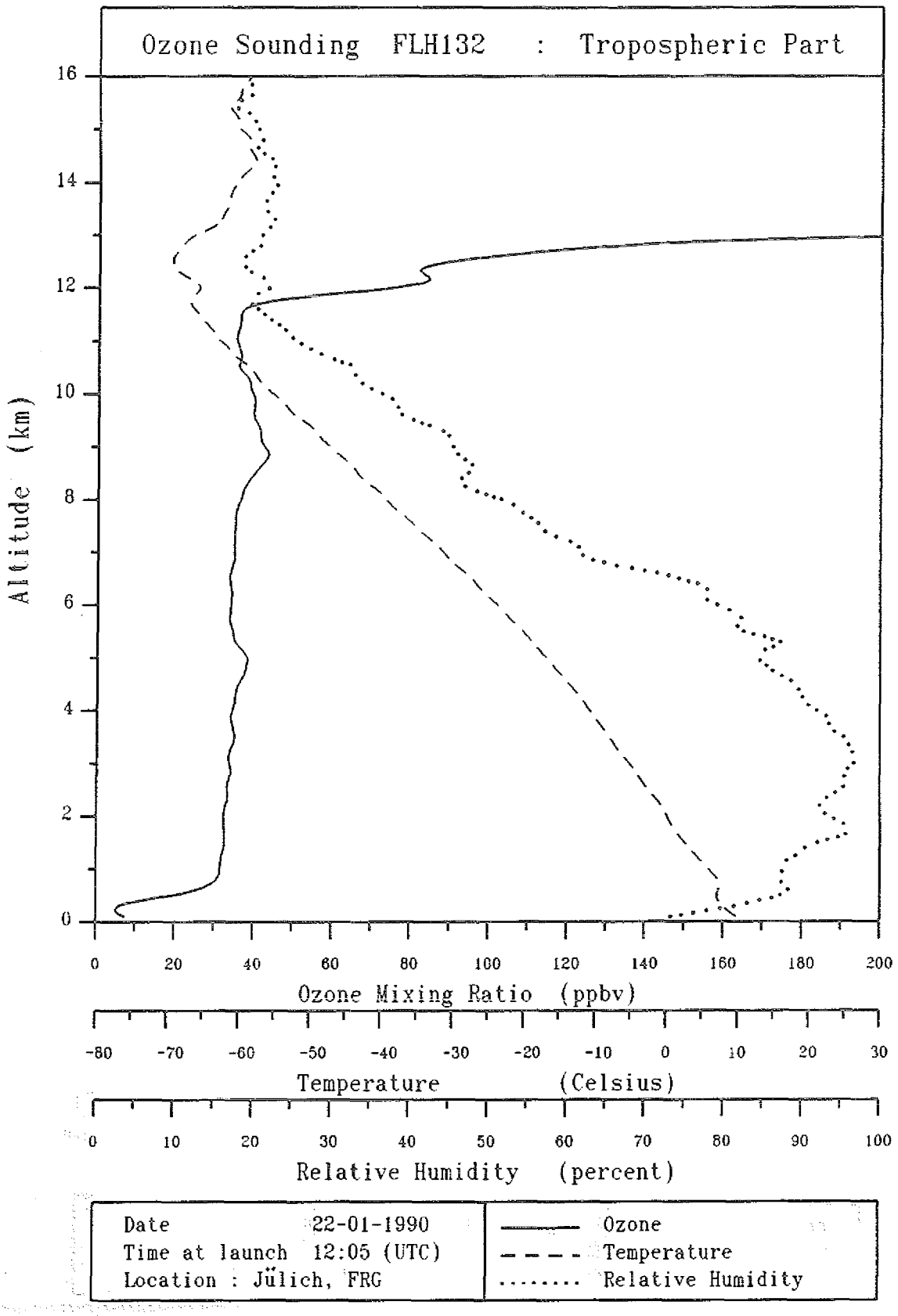

Ozone Sounding FLH130 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 15-01-1990
Time at launch 12:00 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

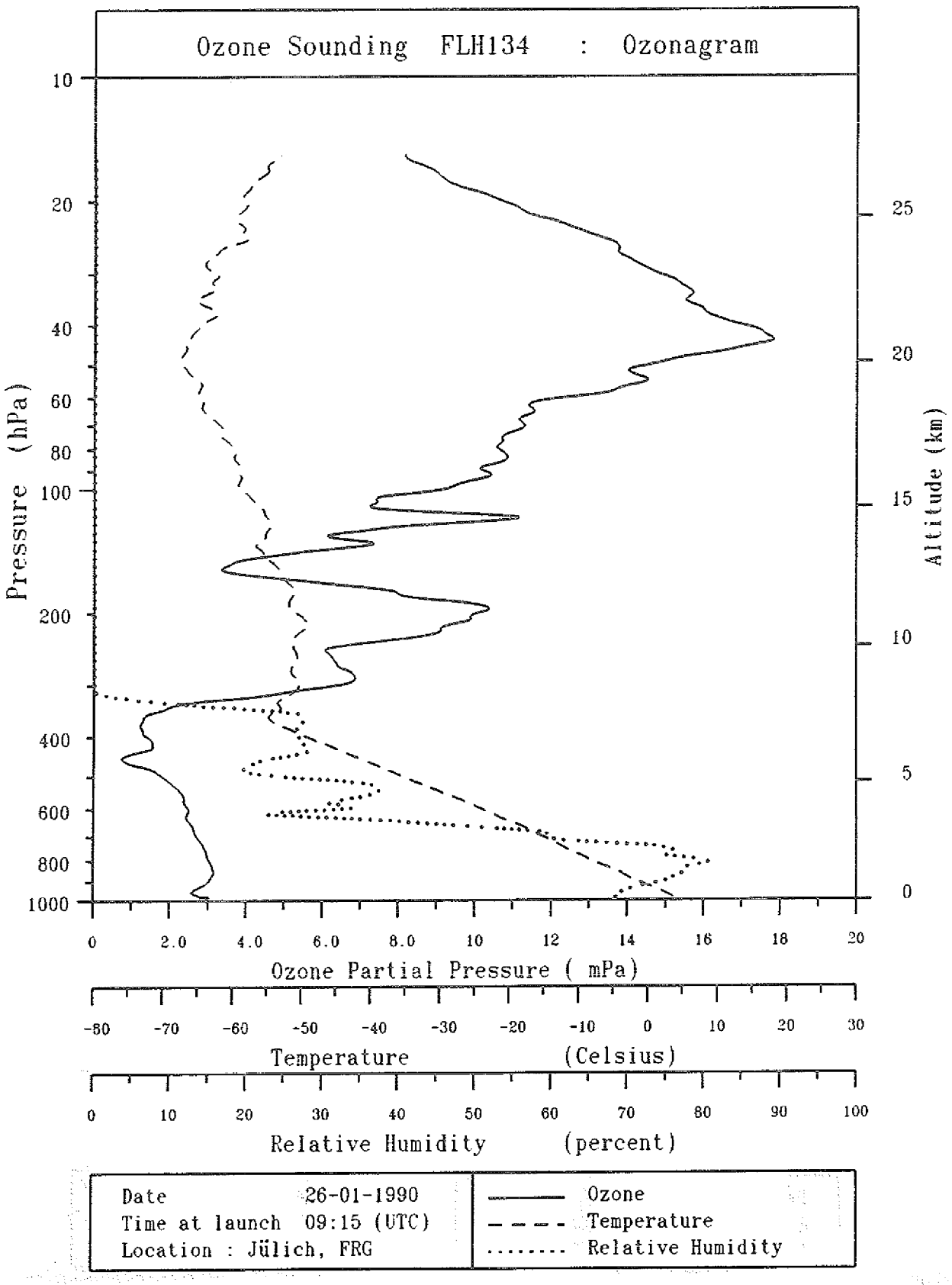

Ozone Sounding FLH131 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 18-01-1990
Time at launch 12:05 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

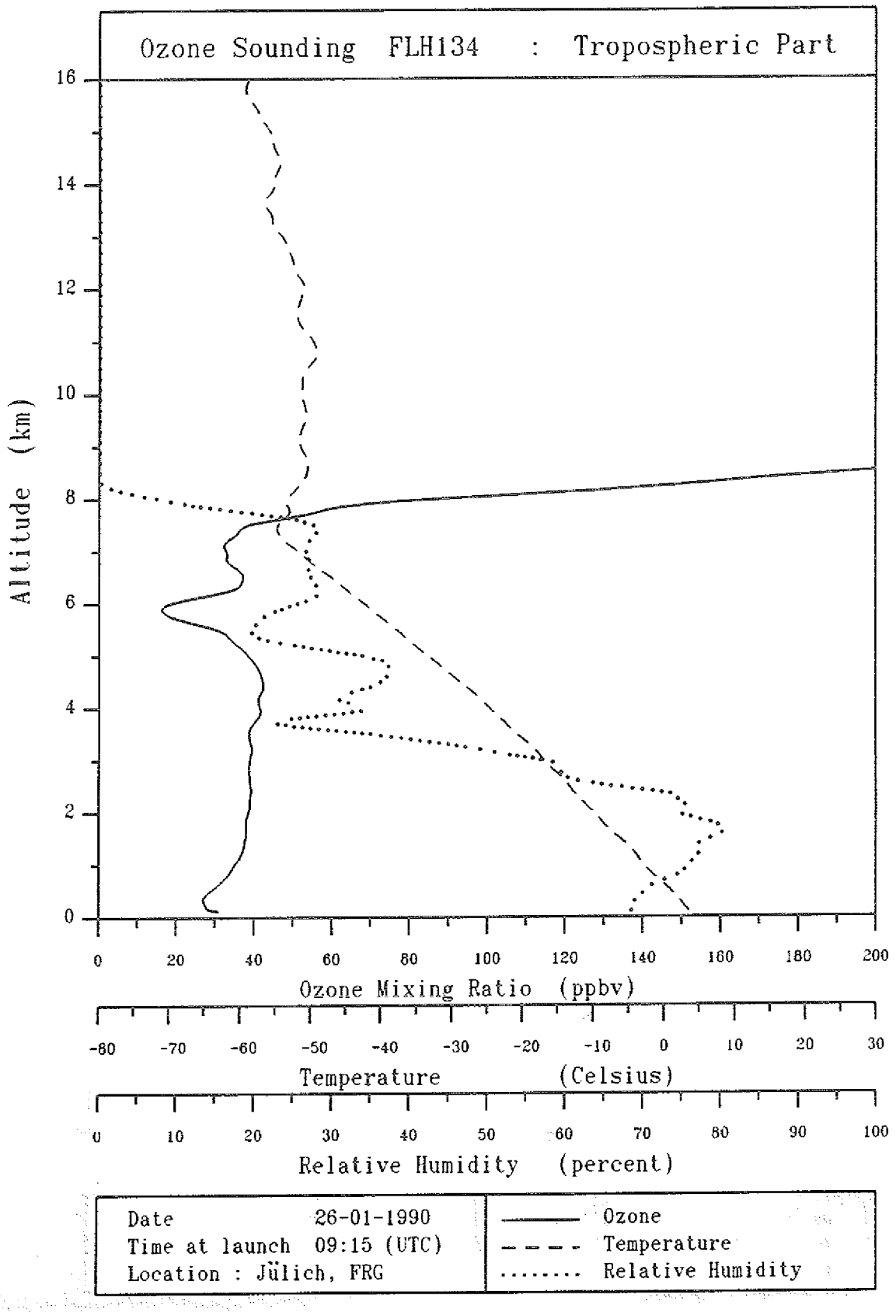

Ozone Sounding FLH131 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 18-01-1990
Time at launch 12:05 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

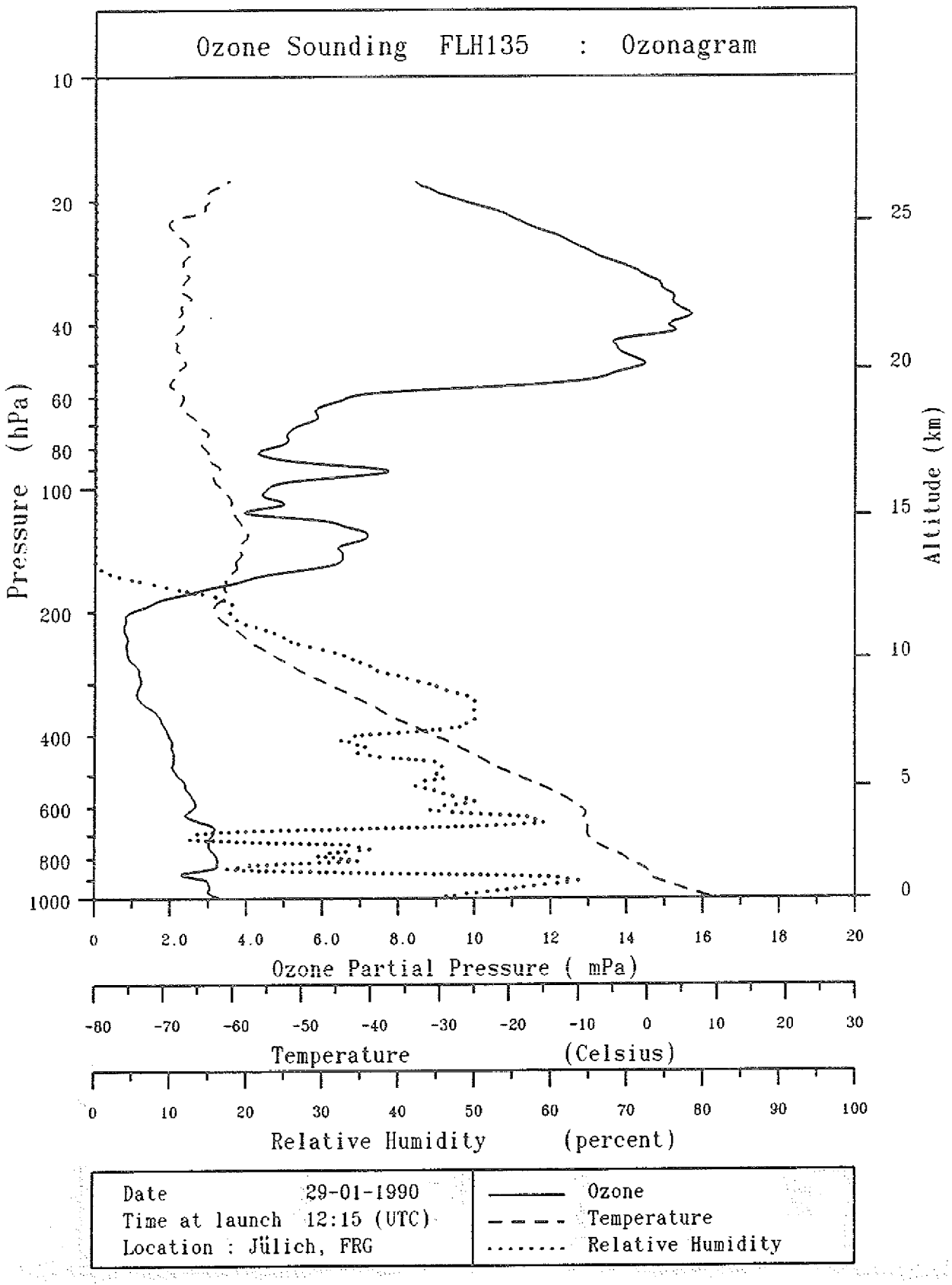


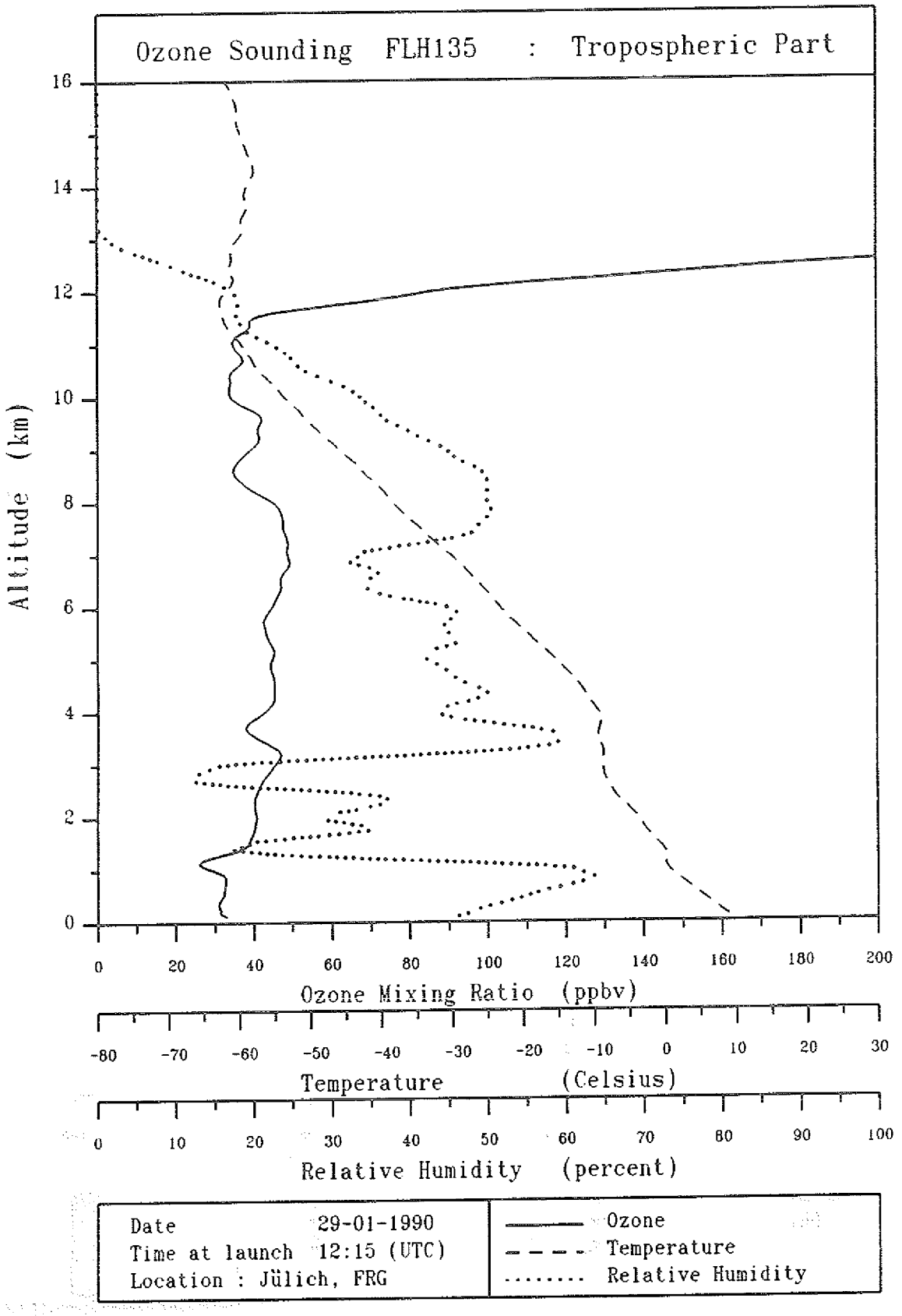
Date 22-01-1990	——— Ozone
Time at launch 12:05 (UTC)	- - - - Temperature
Location : Jülich, FRG	..... Relative Humidity

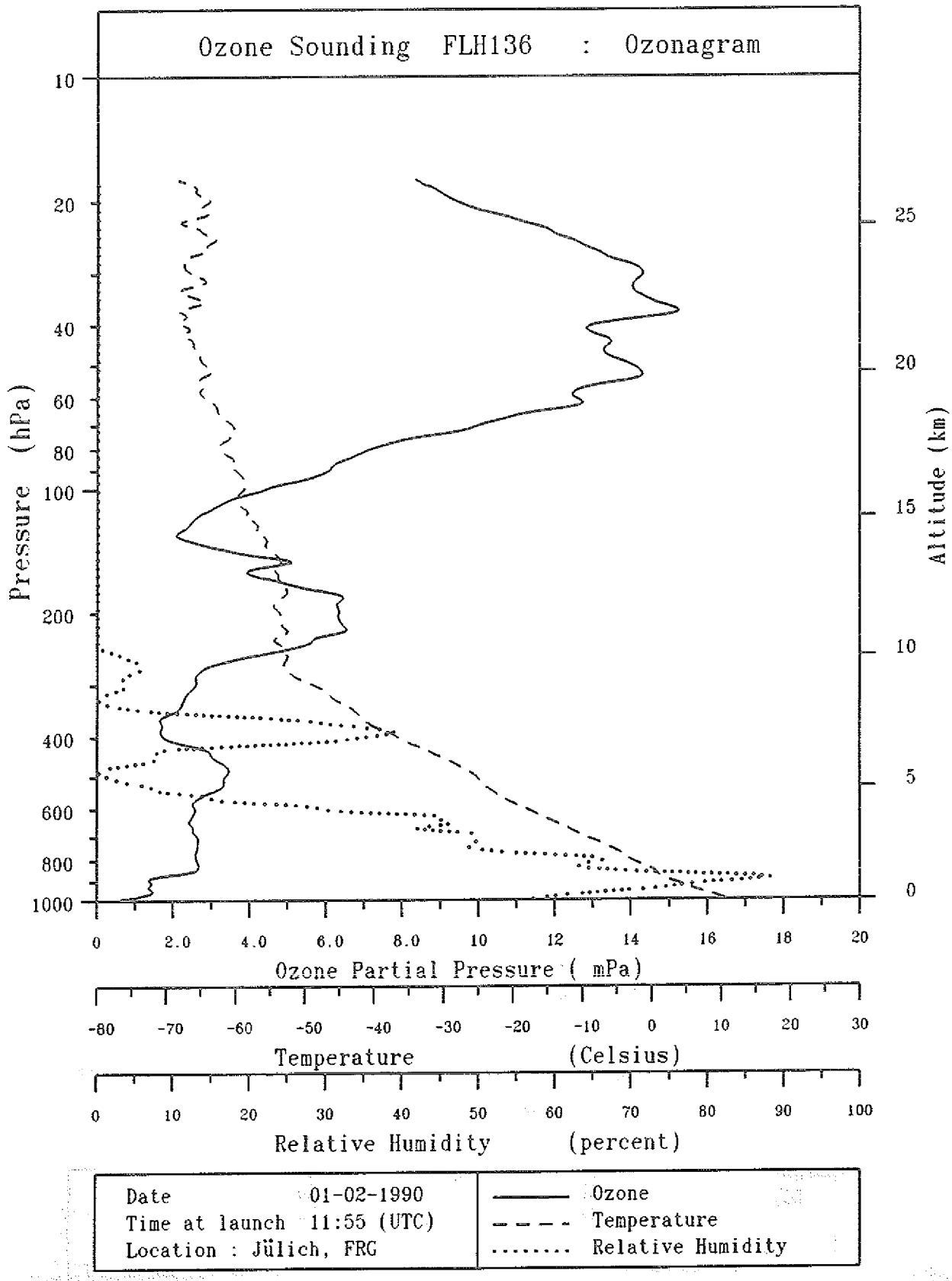

Ozone Sounding FLH132 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 22-01-1990
Time at launch 12:05 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH134 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 26-01-1990
Time at launch 09:15 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

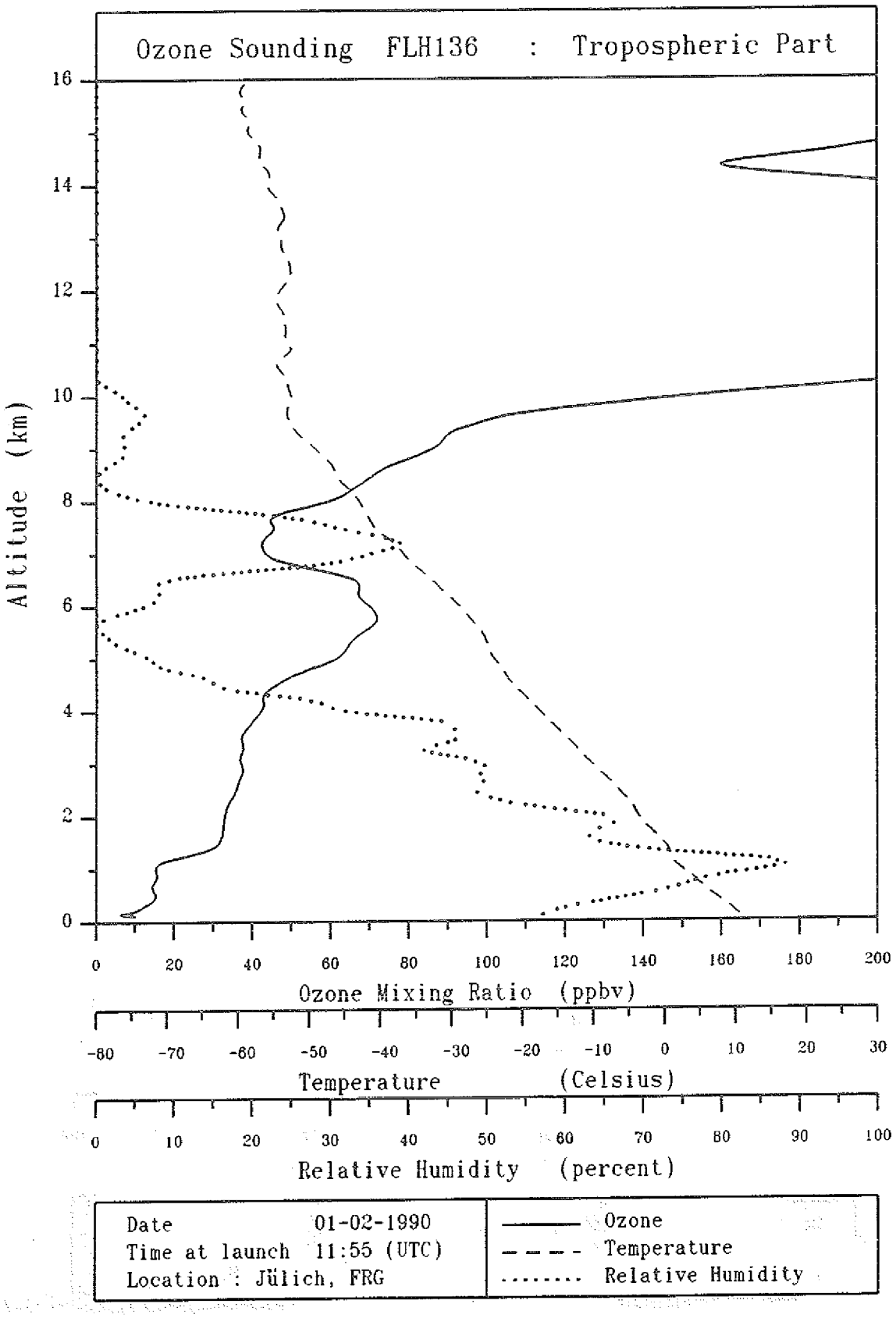

Ozone Sounding FLH134 : Tropospheric Part
Altitude (km)
16
14
12
10
8
6
4
2
0
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 26-01-1990
Time at launch 09:15 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH135 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 29-01-1990
Time at launch 12:15 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

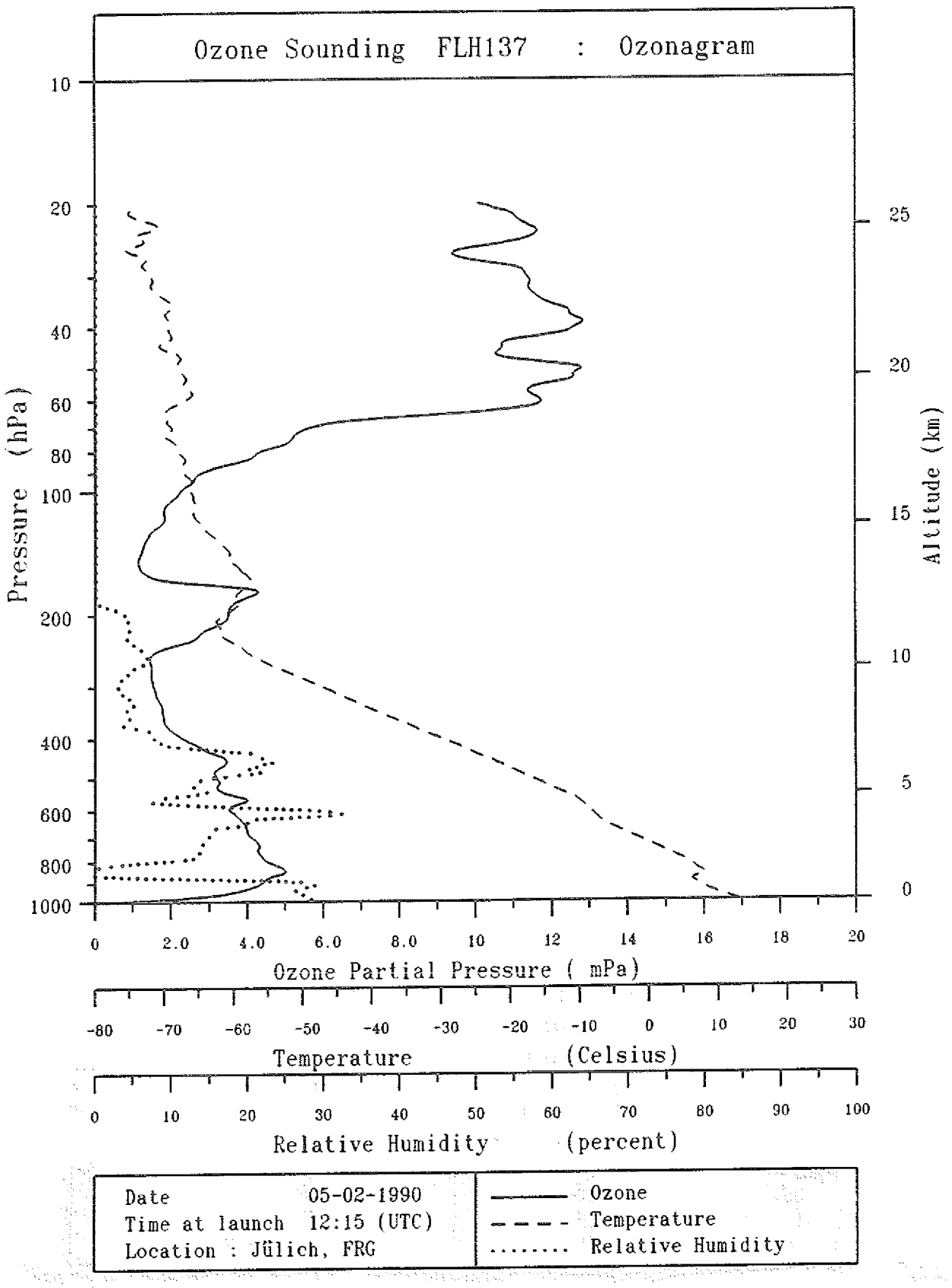

Ozone Sounding FLH135 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 29-01-1990
Time at launch 12:15 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

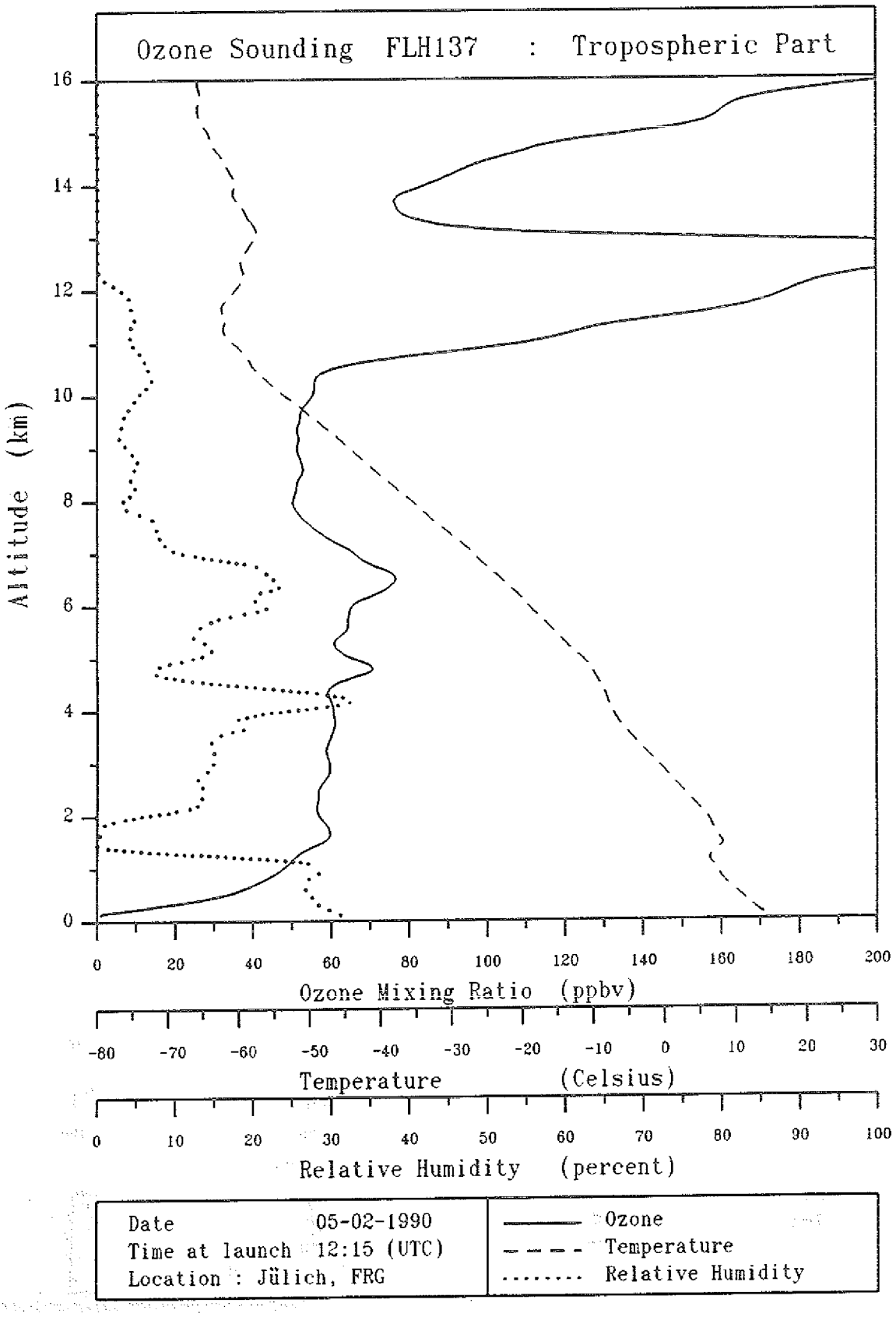


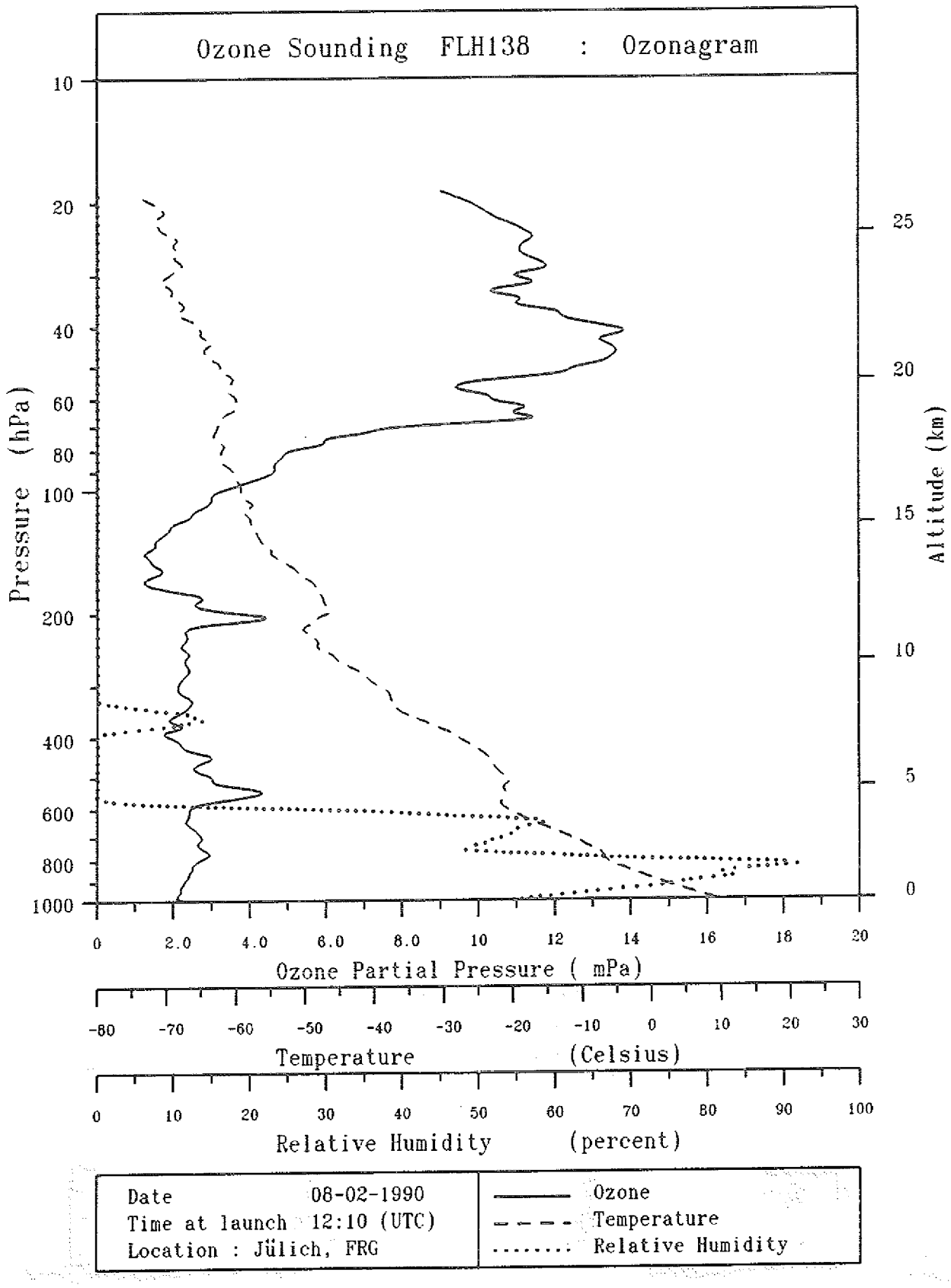
Date 01-02-1990	——— Ozone
Time at launch 11:55 (UTC)	– – – – Temperature
Location : Jülich, FRG	..... Relative Humidity

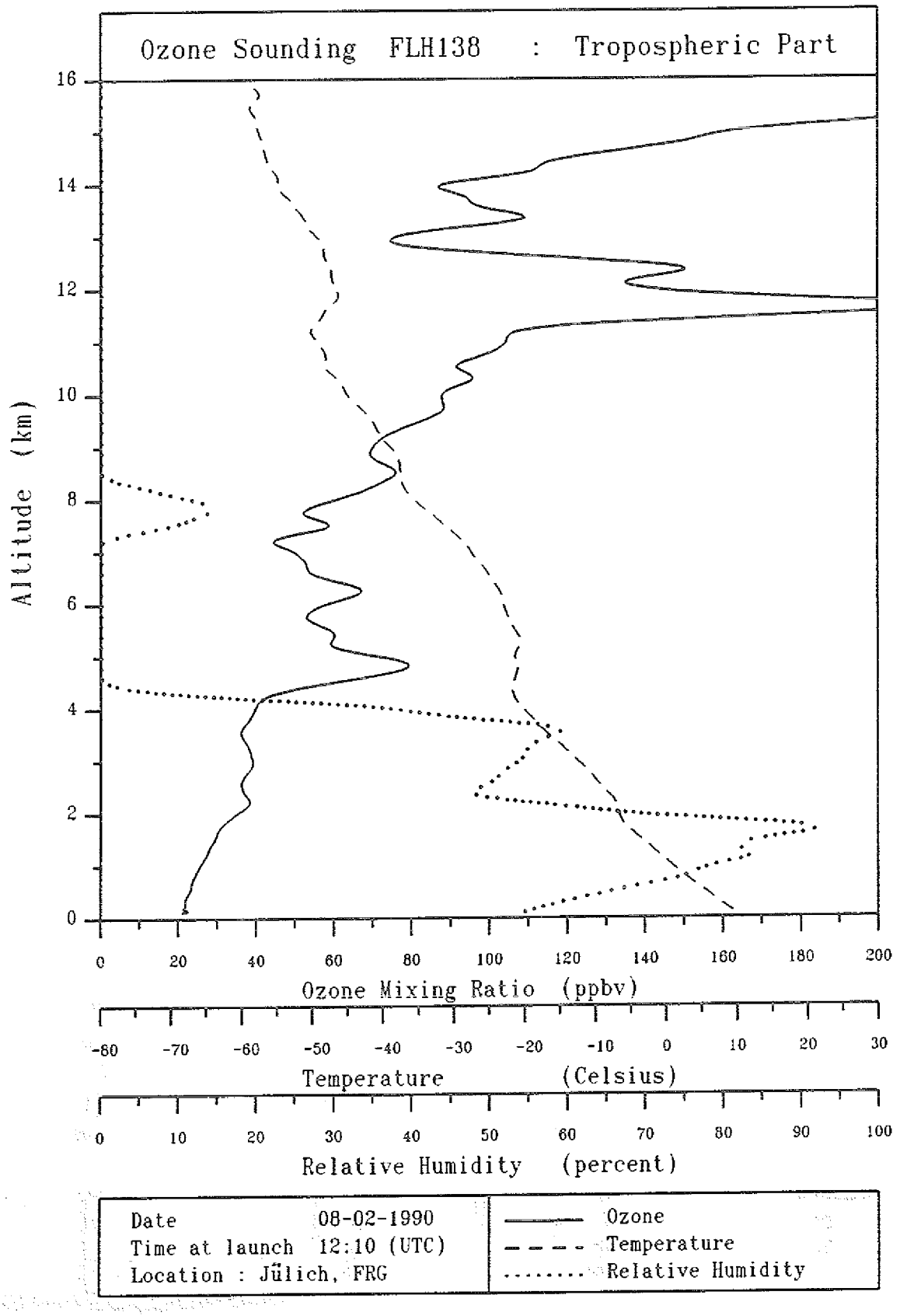


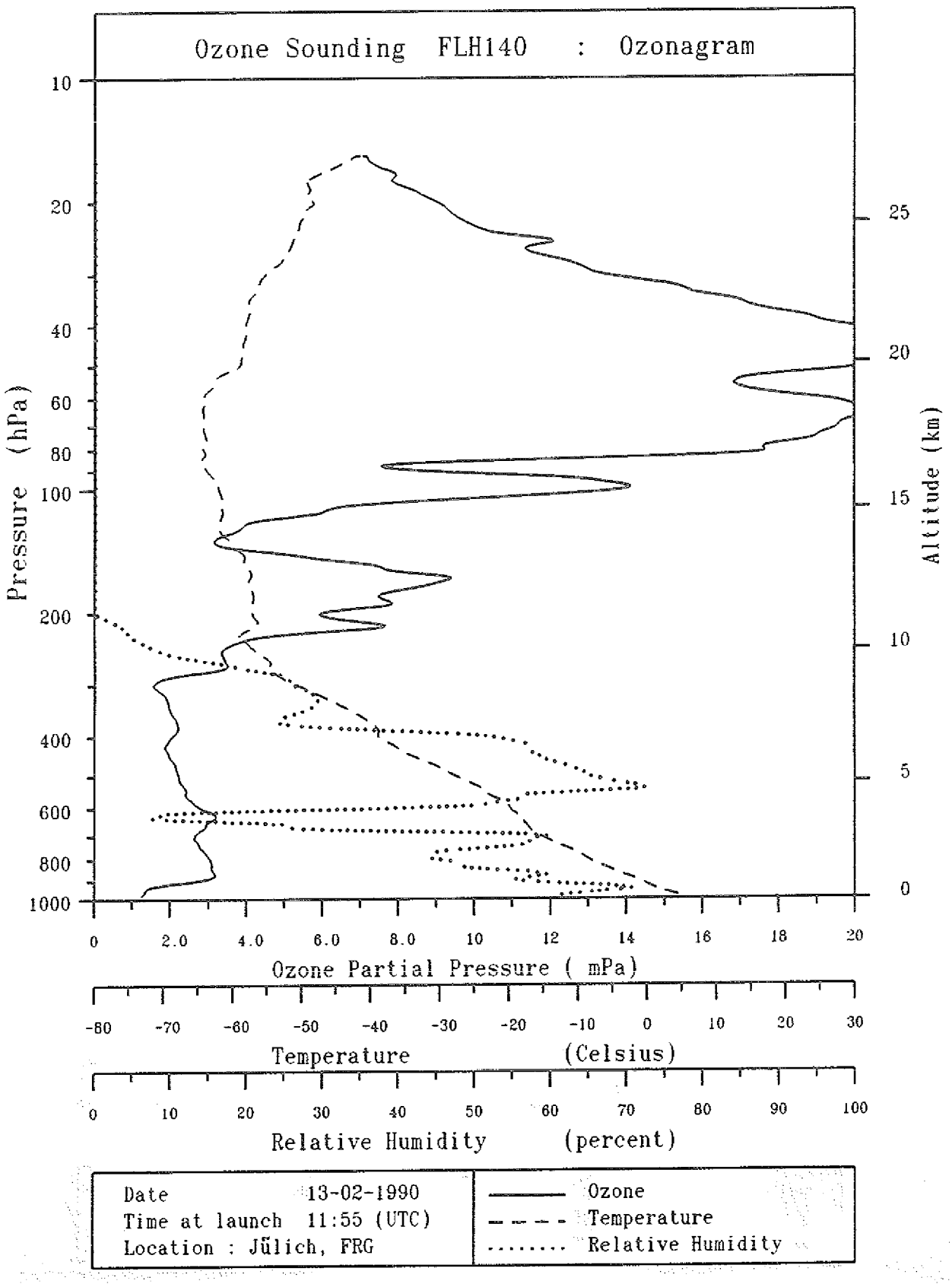
Date 01-02-1990	——— Ozone
Time at launch 11:55 (UTC)	- - - - Temperature
Location : Jülich, FRG	..... Relative Humidity

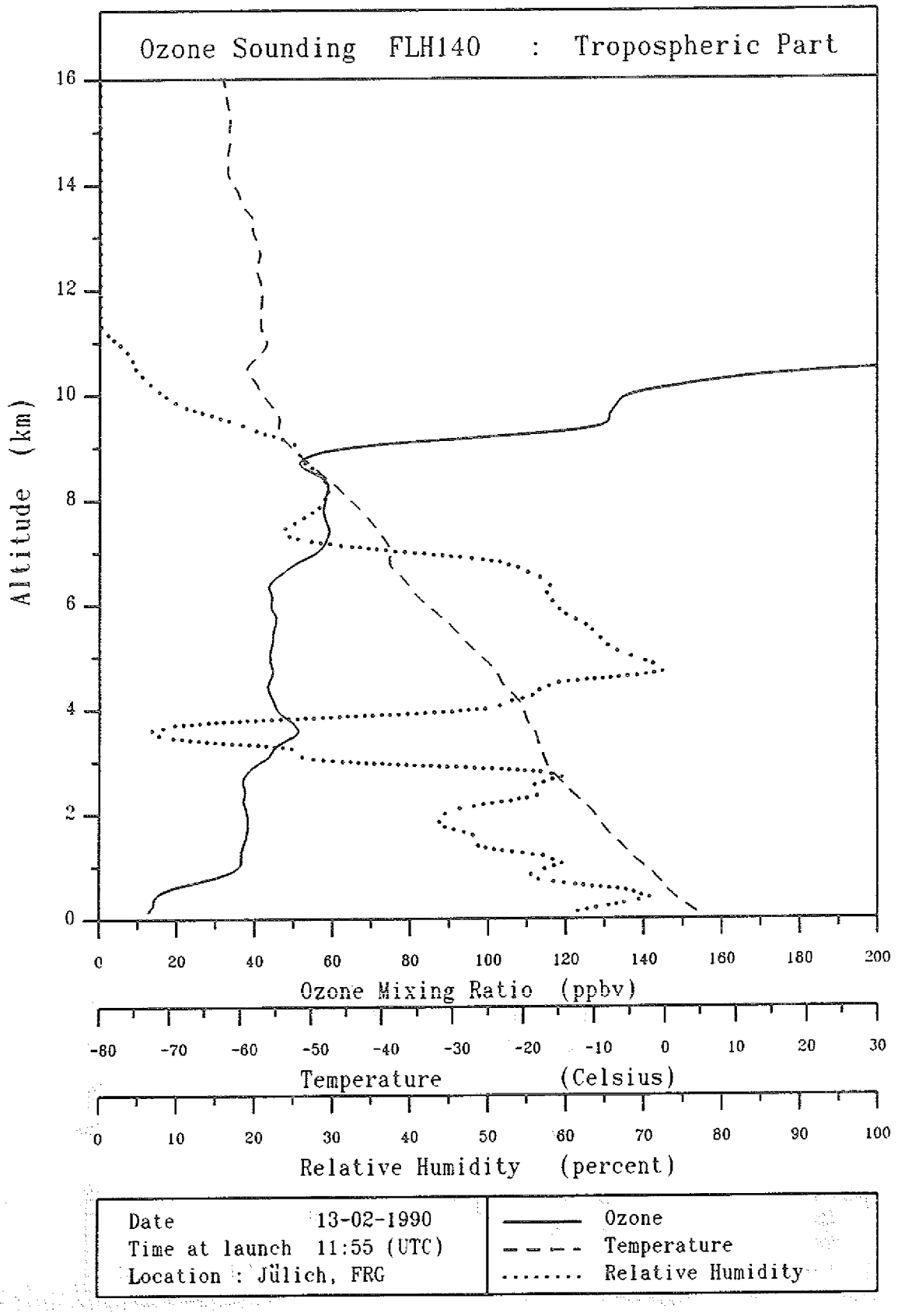

Ozone Sounding FLH137 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 05-02-1990
Time at launch 12:15 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

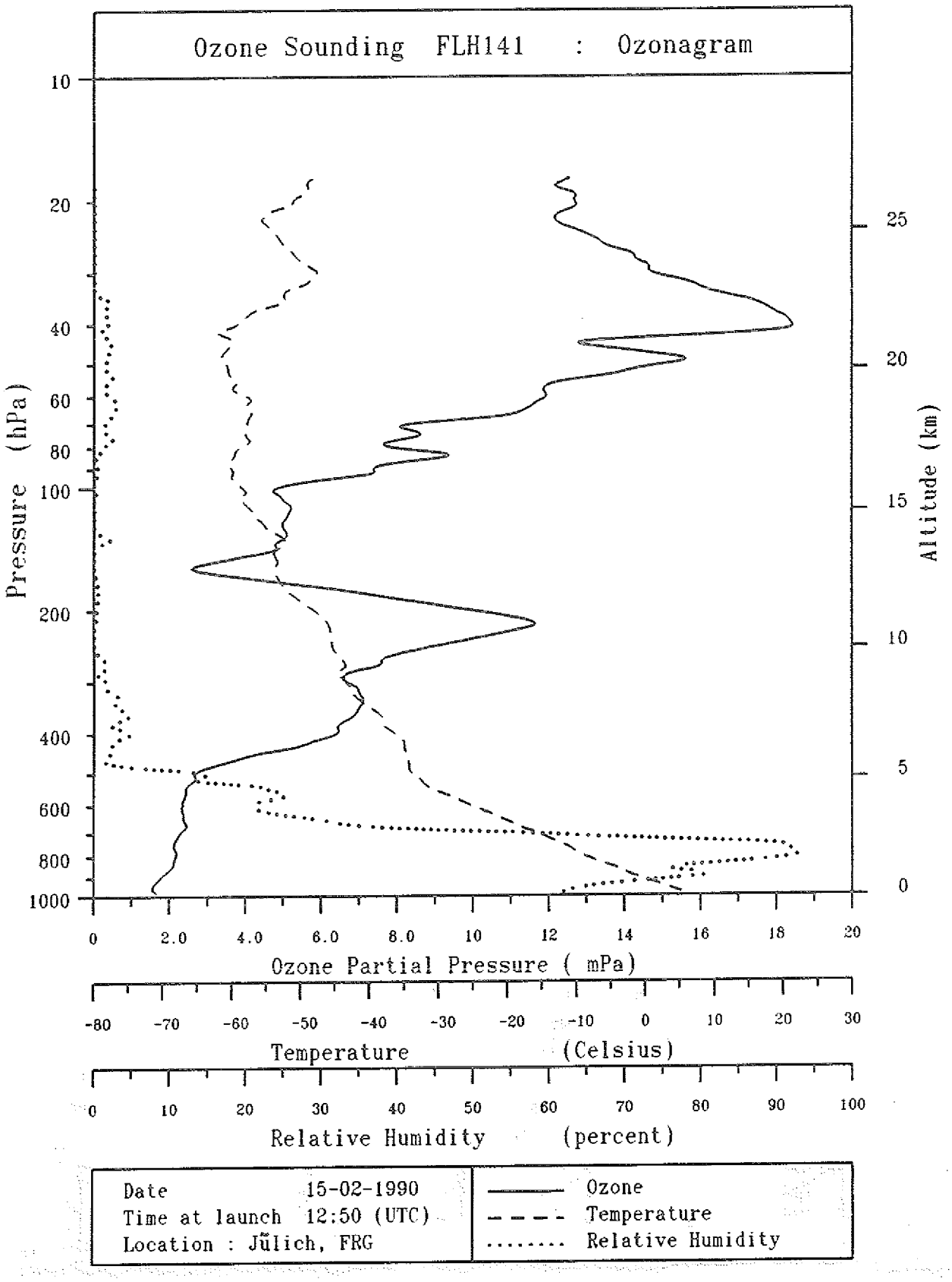

Ozone Sounding FLH137 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 05-02-1990
Time at launch 12:15 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

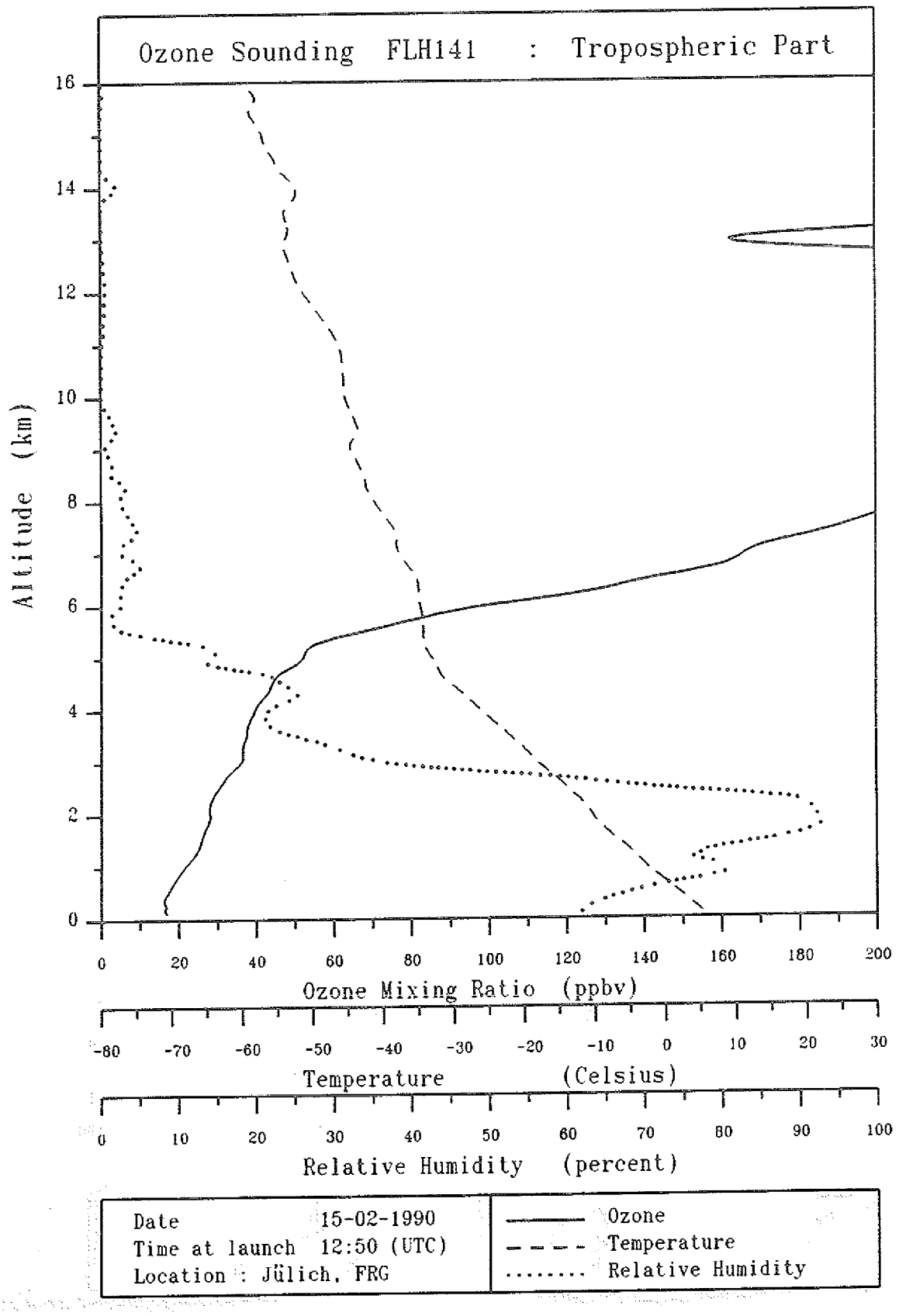

Ozone Sounding FLH138 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 08-02-1990
Time at launch 12:10 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

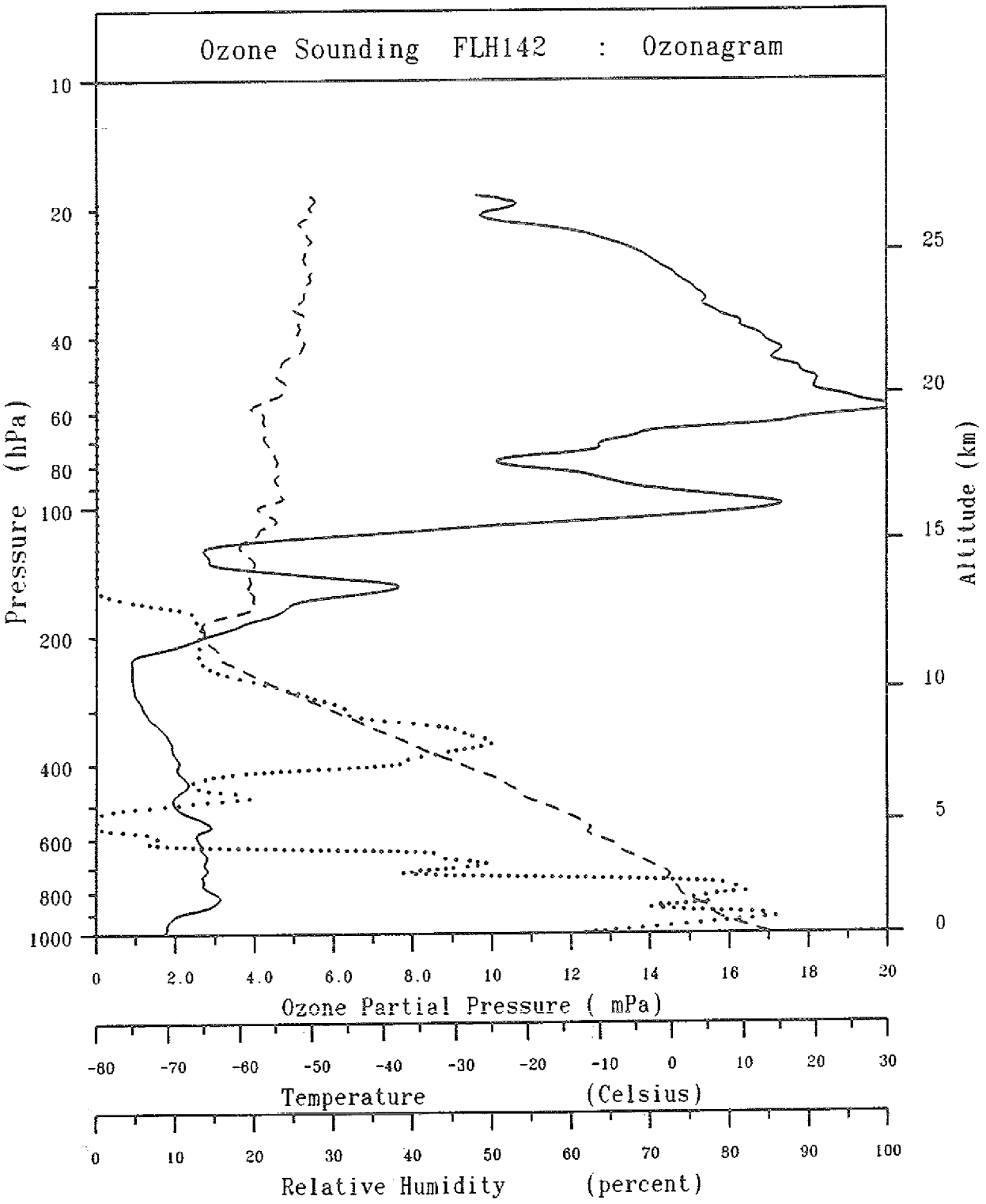

Ozone Sounding FLH138 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 08-02-1990
Time at launch 12:10 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH140 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 13-02-1990
Time at launch 11:55 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

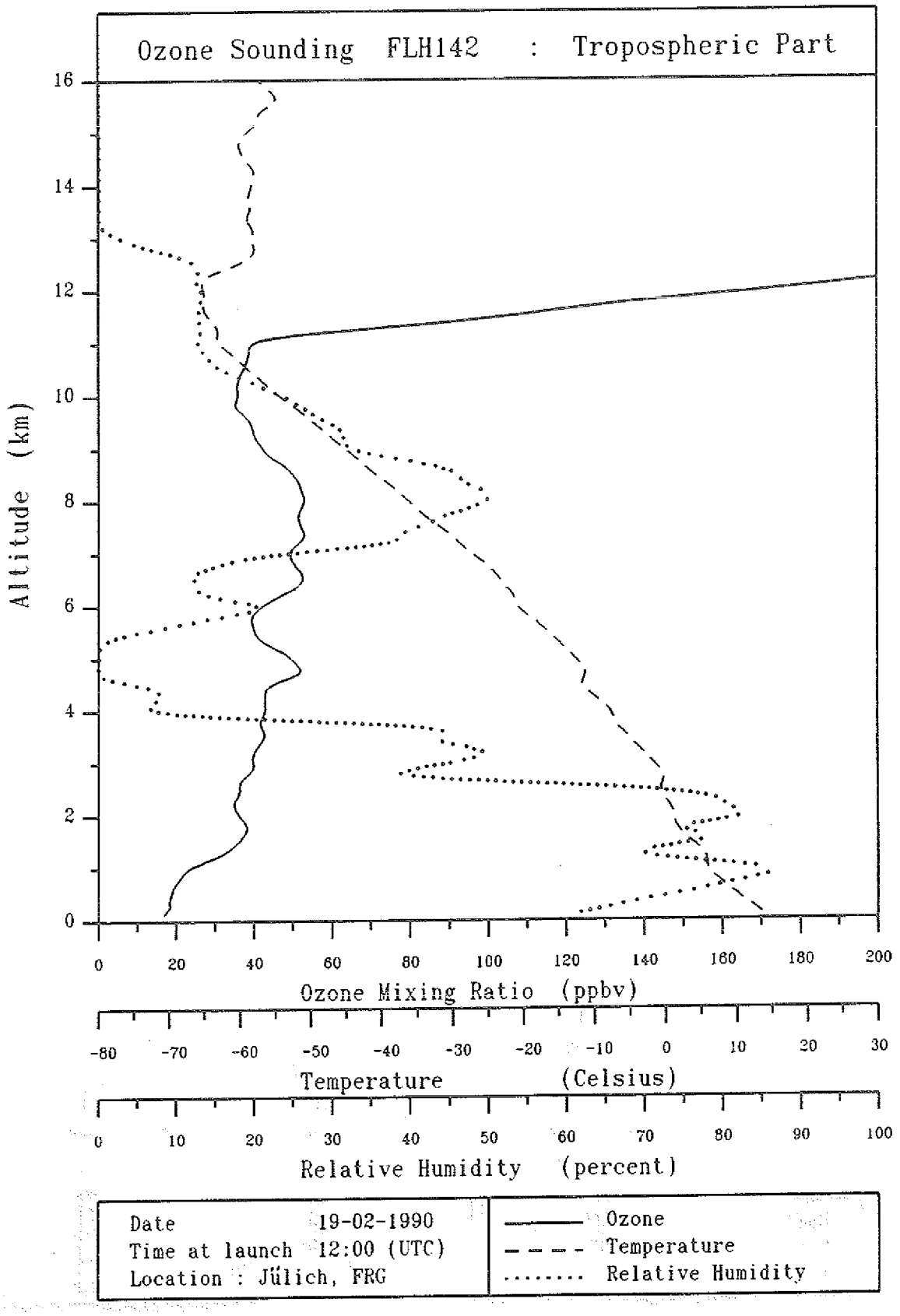

Ozone Sounding FLH140 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 13-02-1990
Time at launch 11:55 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

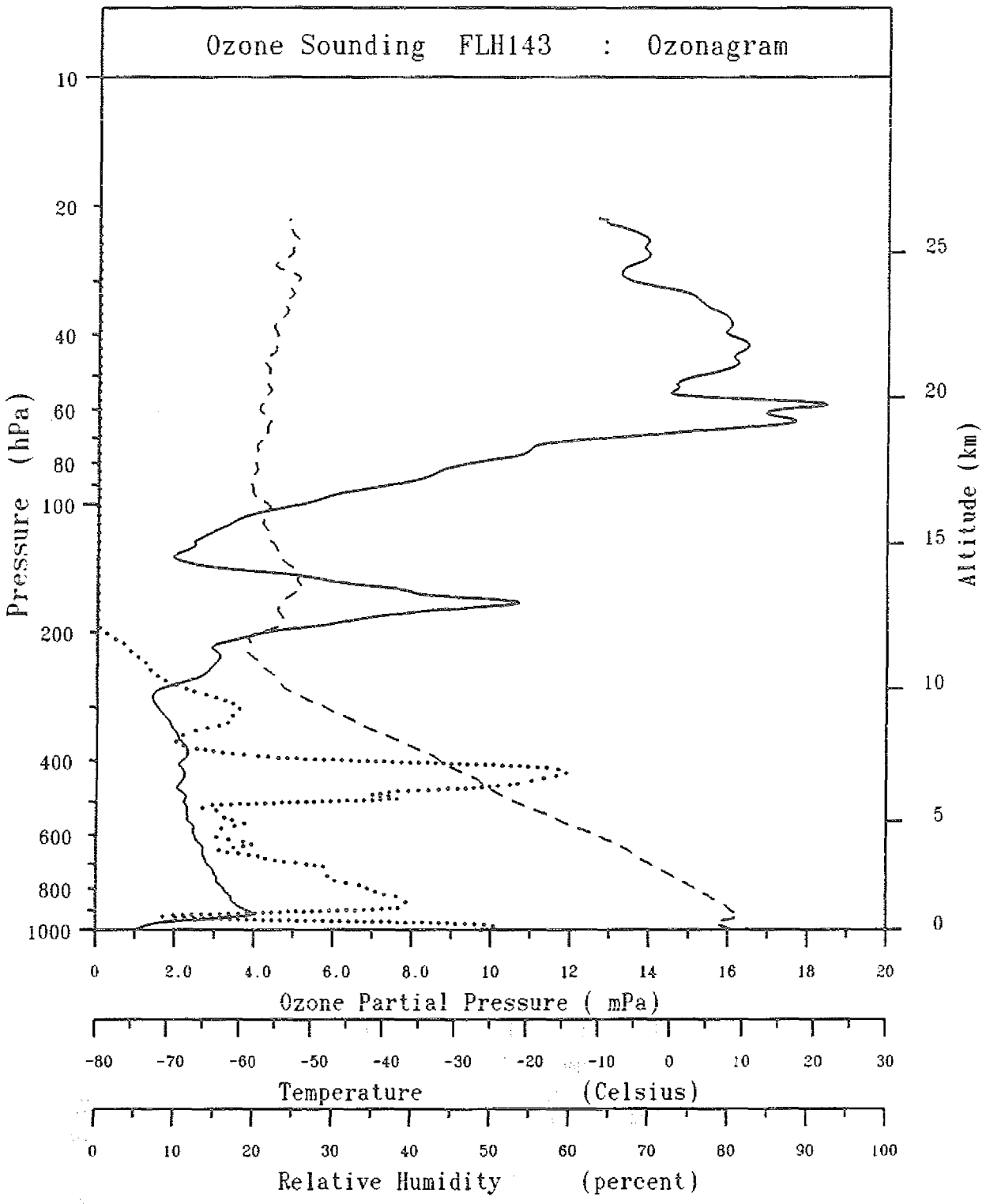

Ozone Sounding FLH141 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 15-02-1990
Time at launch 12:50 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH141 : Tropospheric Part
Altitude (km)
16
14
12
10
8
6
4
2
0
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 15-02-1990
Time at launch 12:50 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

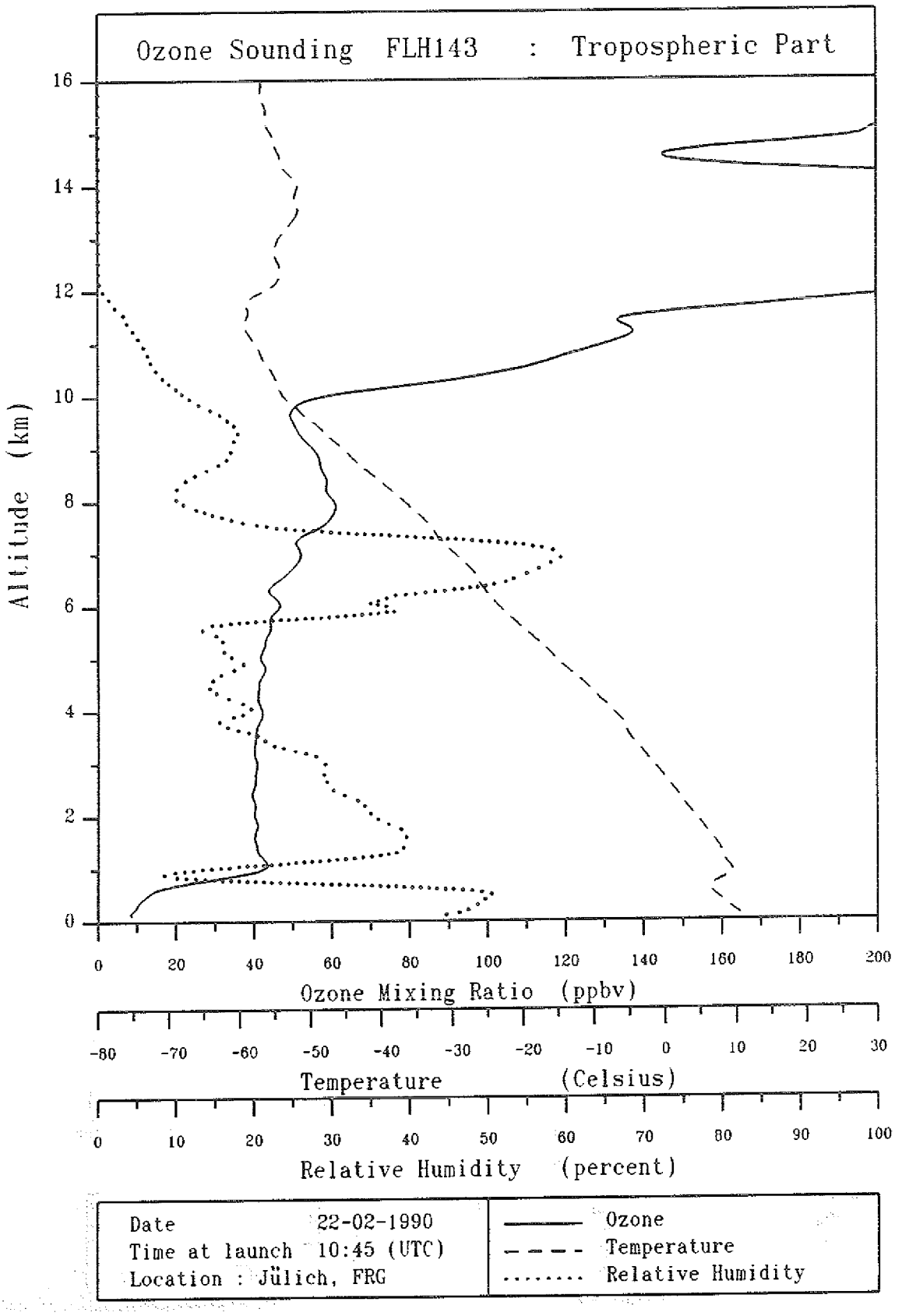


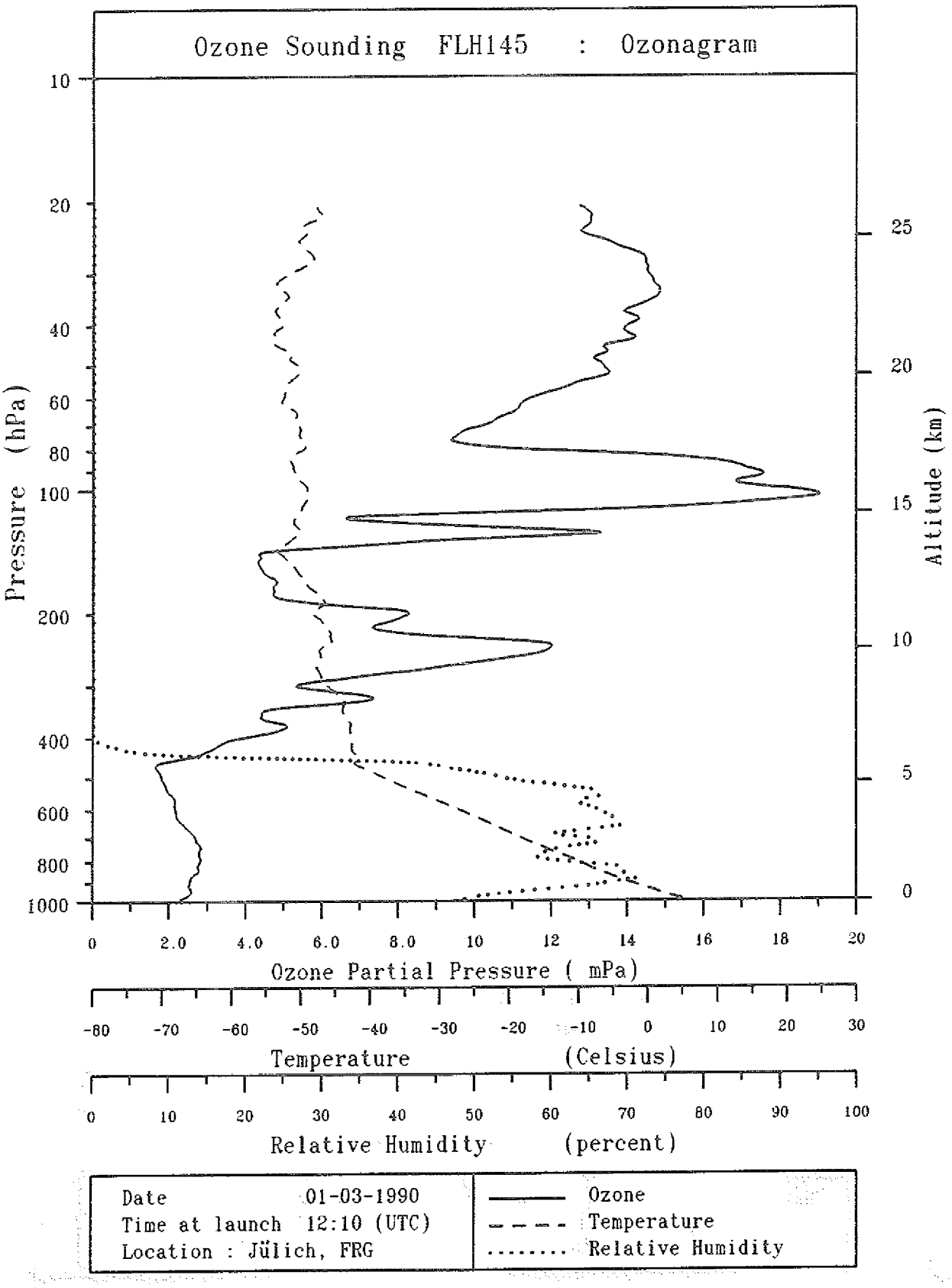
Date 19-02-1990	——— Ozone
Time at launch 12:00 (UTC)	– – – – Temperature
Location : Jülich, FRG	..... Relative Humidity

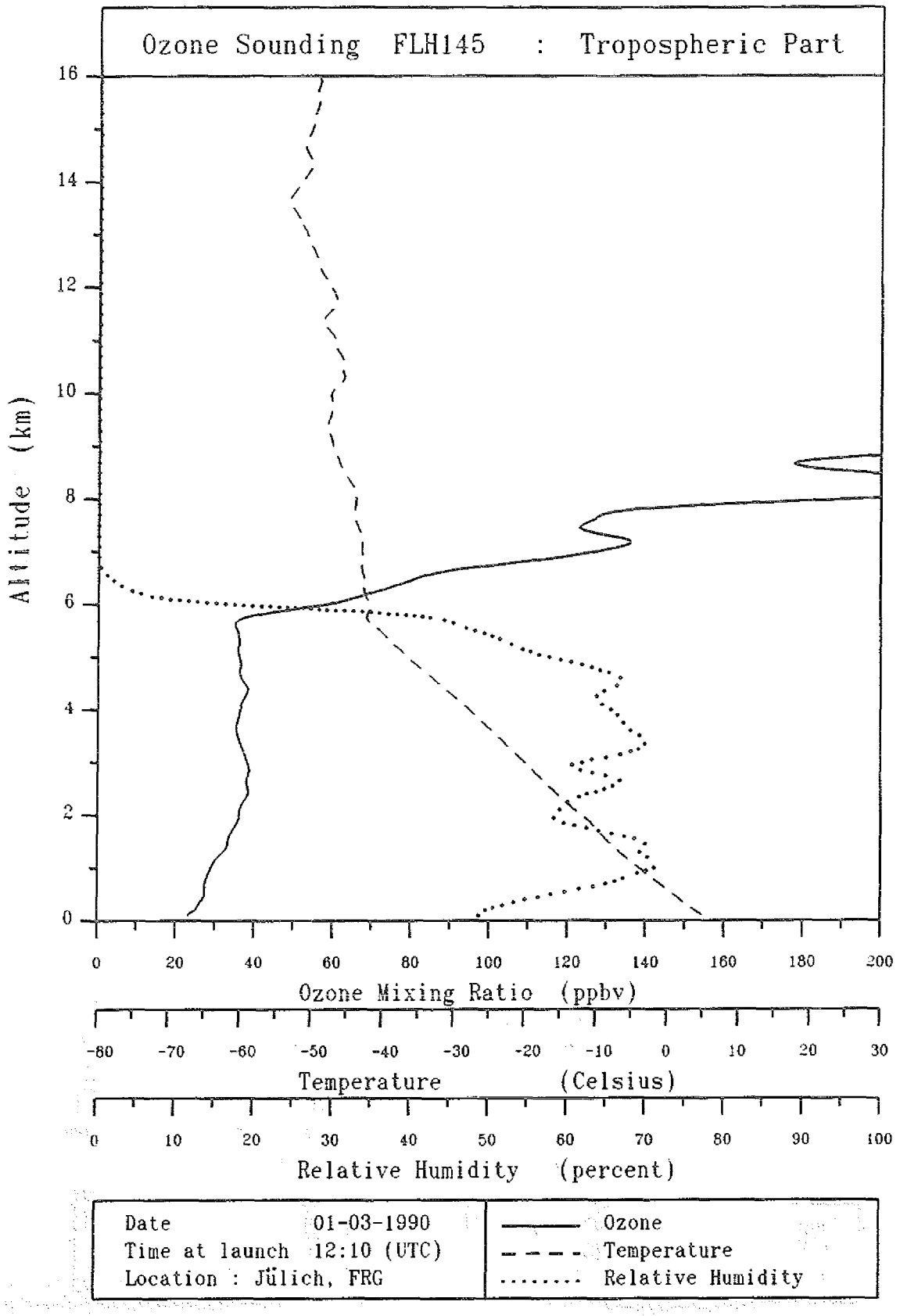

Ozone Sounding FLH142 : Tropospheric Part
Altitude (km)
16
14
12
10
8
6
4
2
0
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 19-02-1990
Time at launch 12:00 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

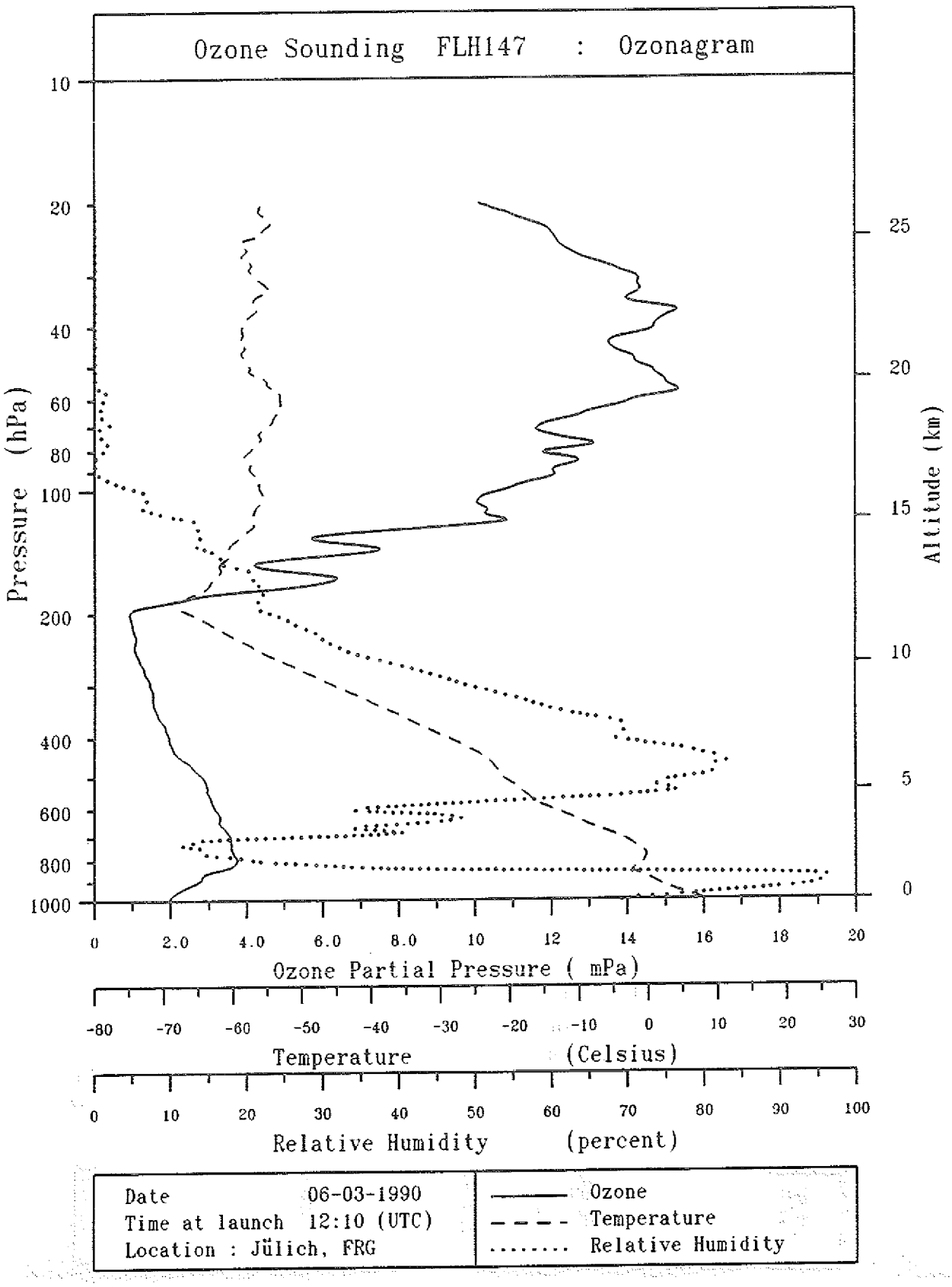


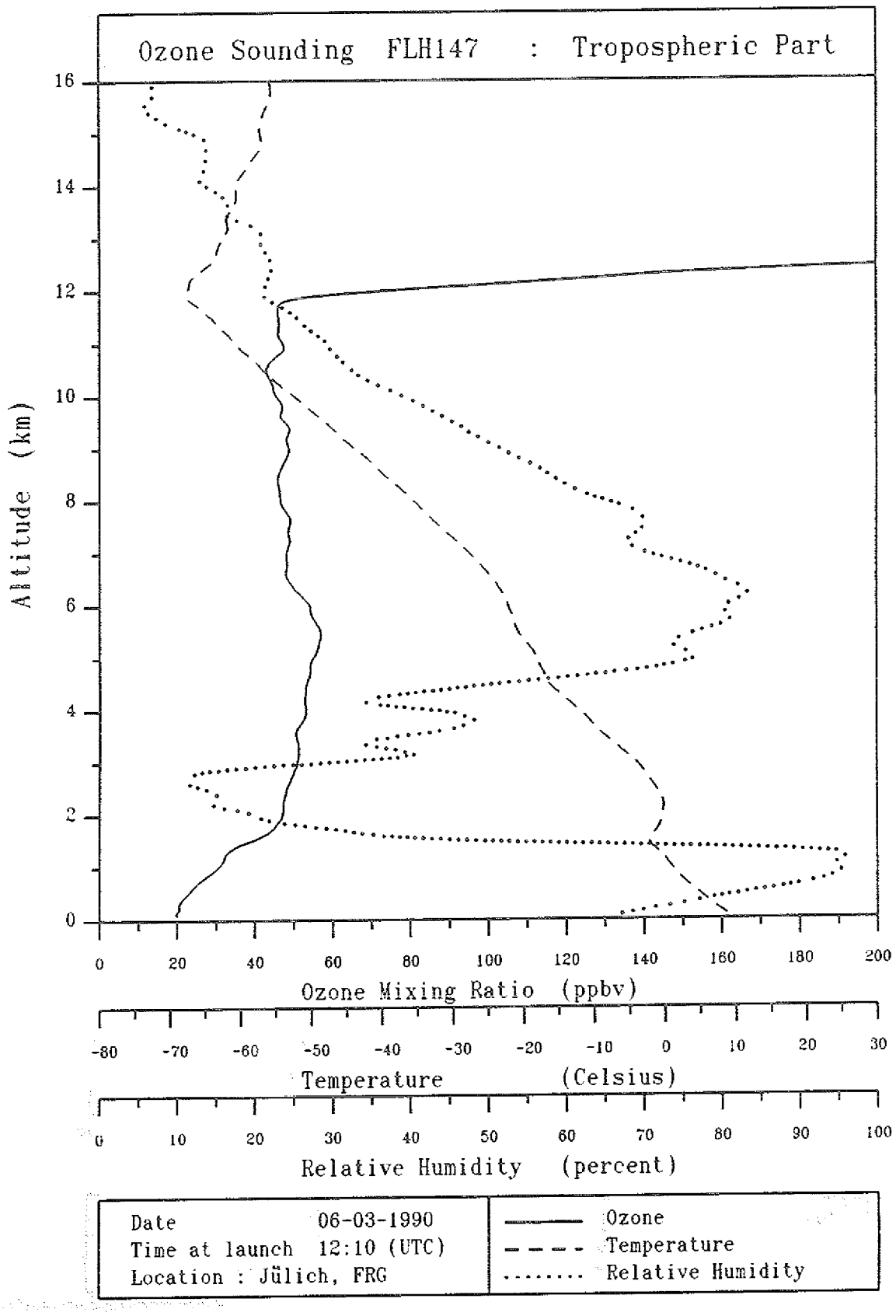
Date 22-02-1990	——— Ozone
Time at launch 10:45 (UTC)	- - - - Temperature
Location : Jülich, FRG	..... Relative Humidity

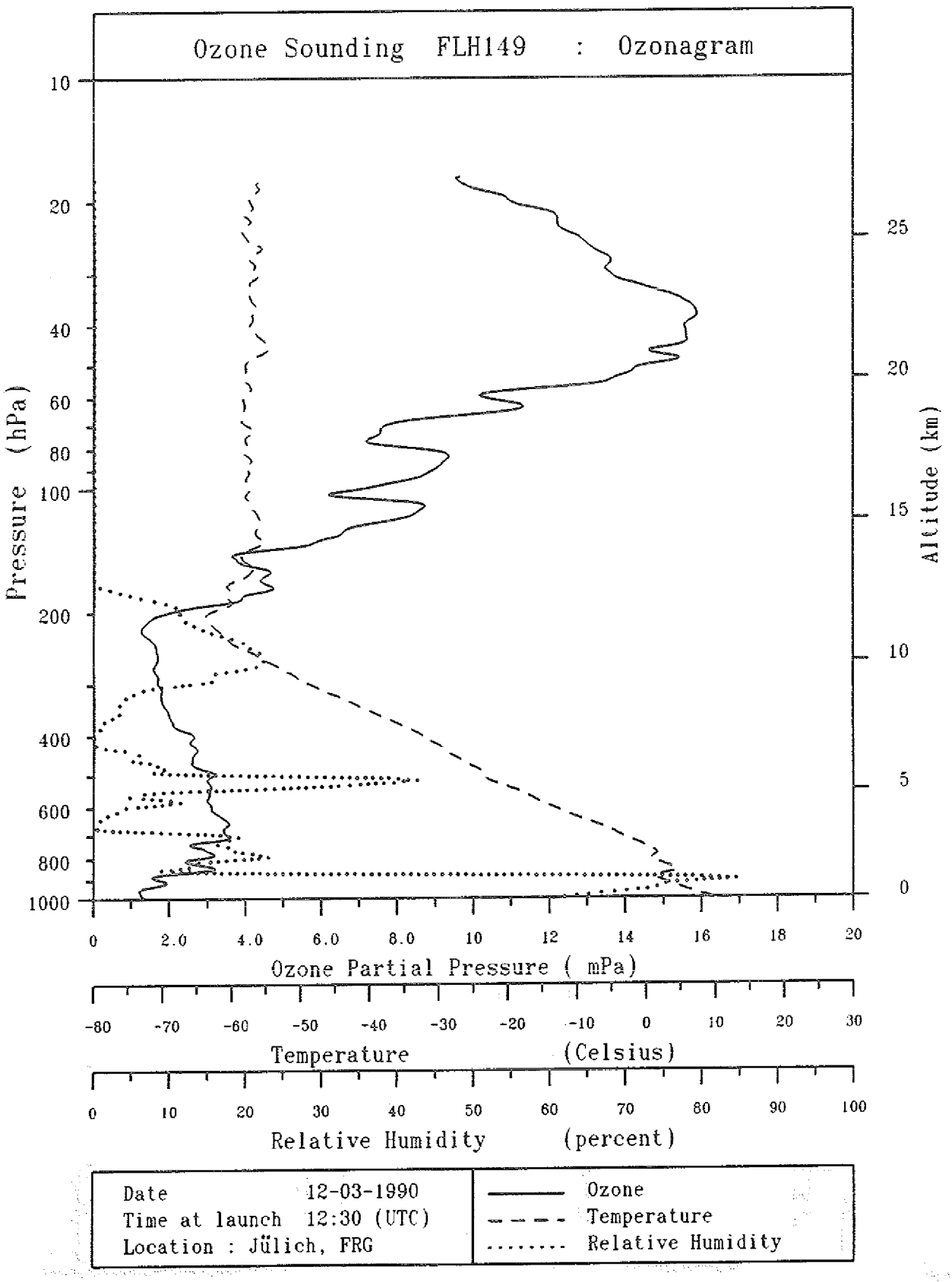

Ozone Sounding FLH143 : Tropospheric Part
Altitude (km)
16
14
12
10
8
6
4
2
0
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 22-02-1990
Time at launch 10:45 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH145 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 01-03-1990
Time at launch 12:10 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

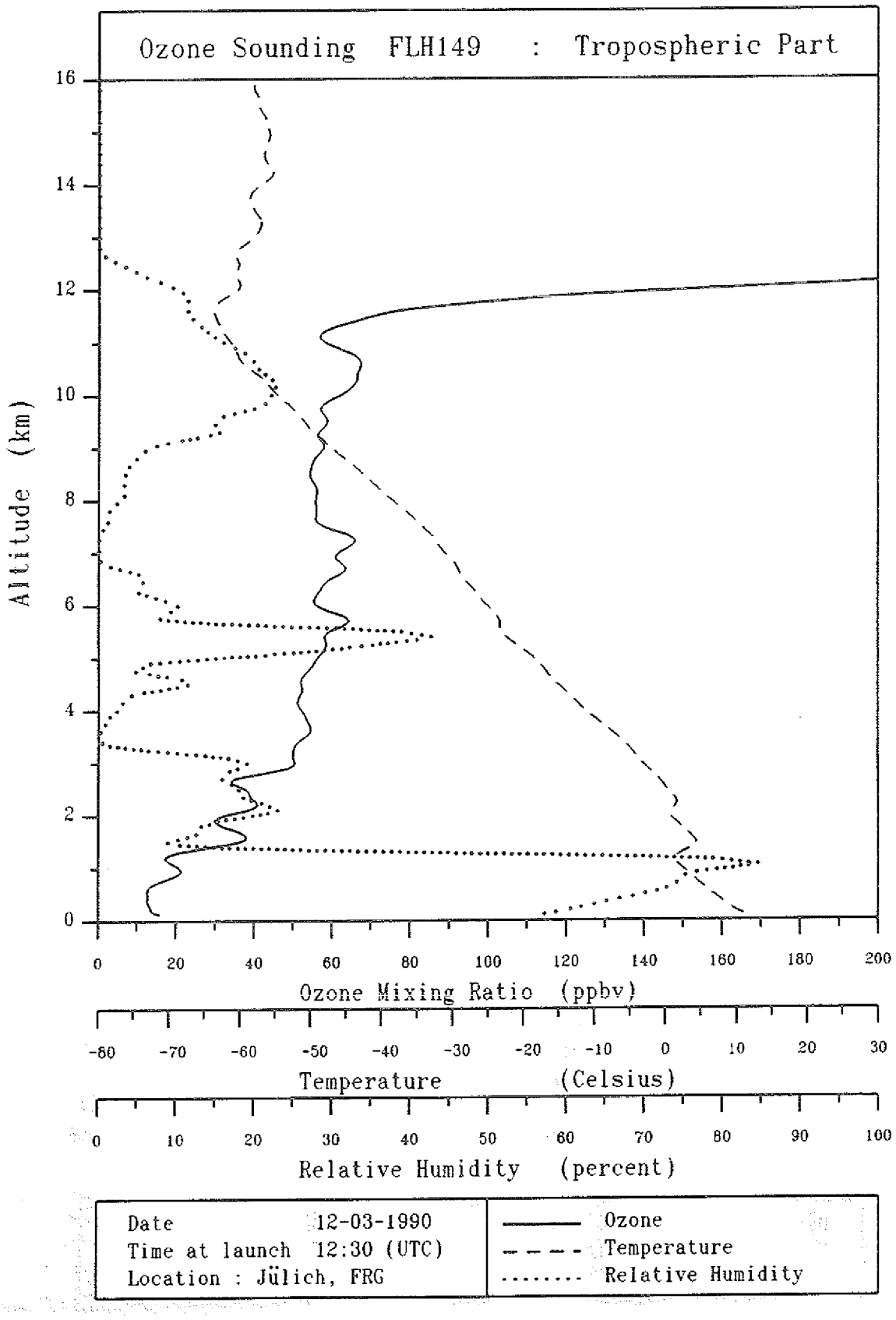

Ozone Sounding FLH145 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 01-03-1990
Time at launch 12:10 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

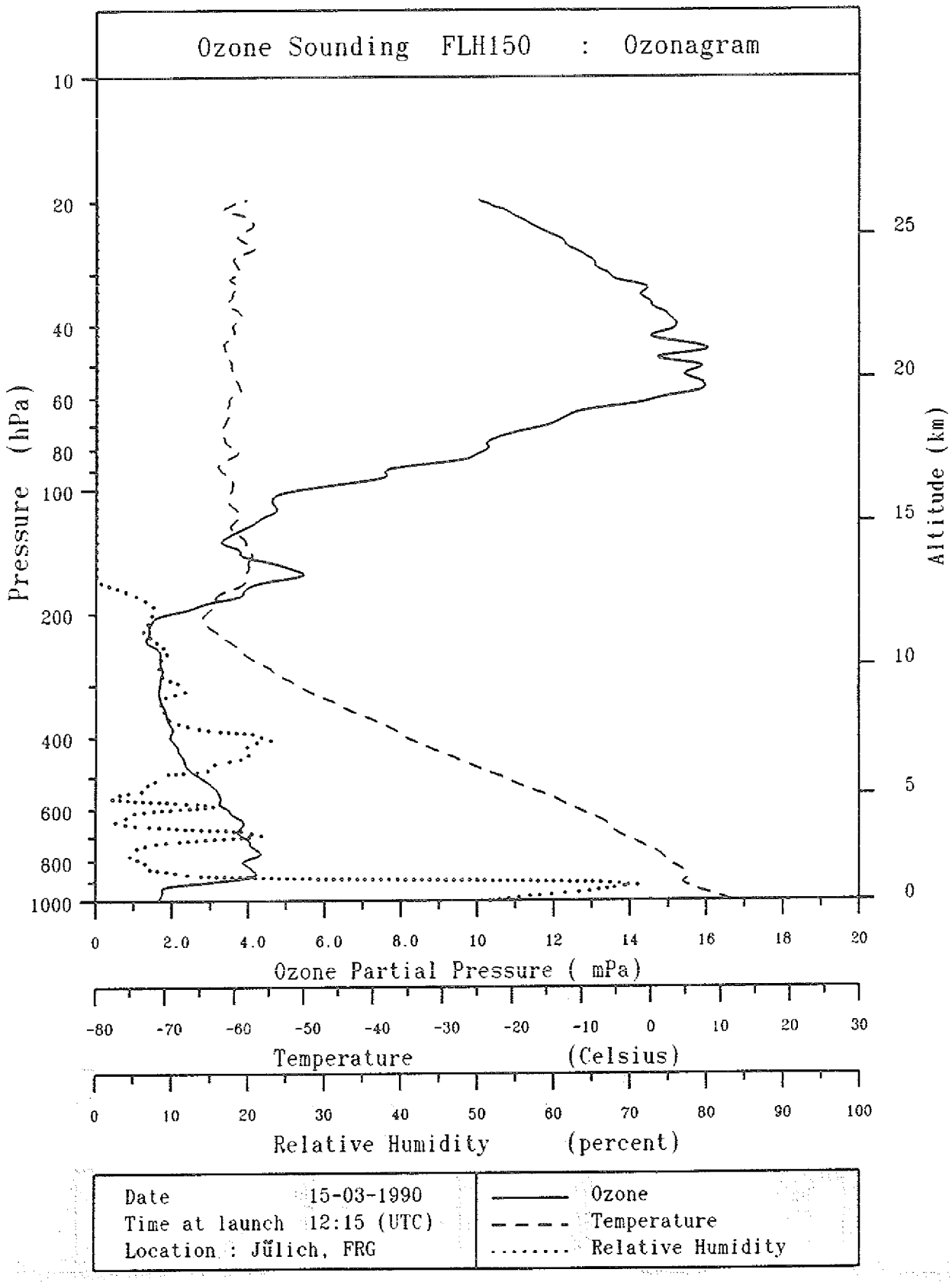

Ozone Sounding FLH147 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 06-03-1990
Time at launch 12:10 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

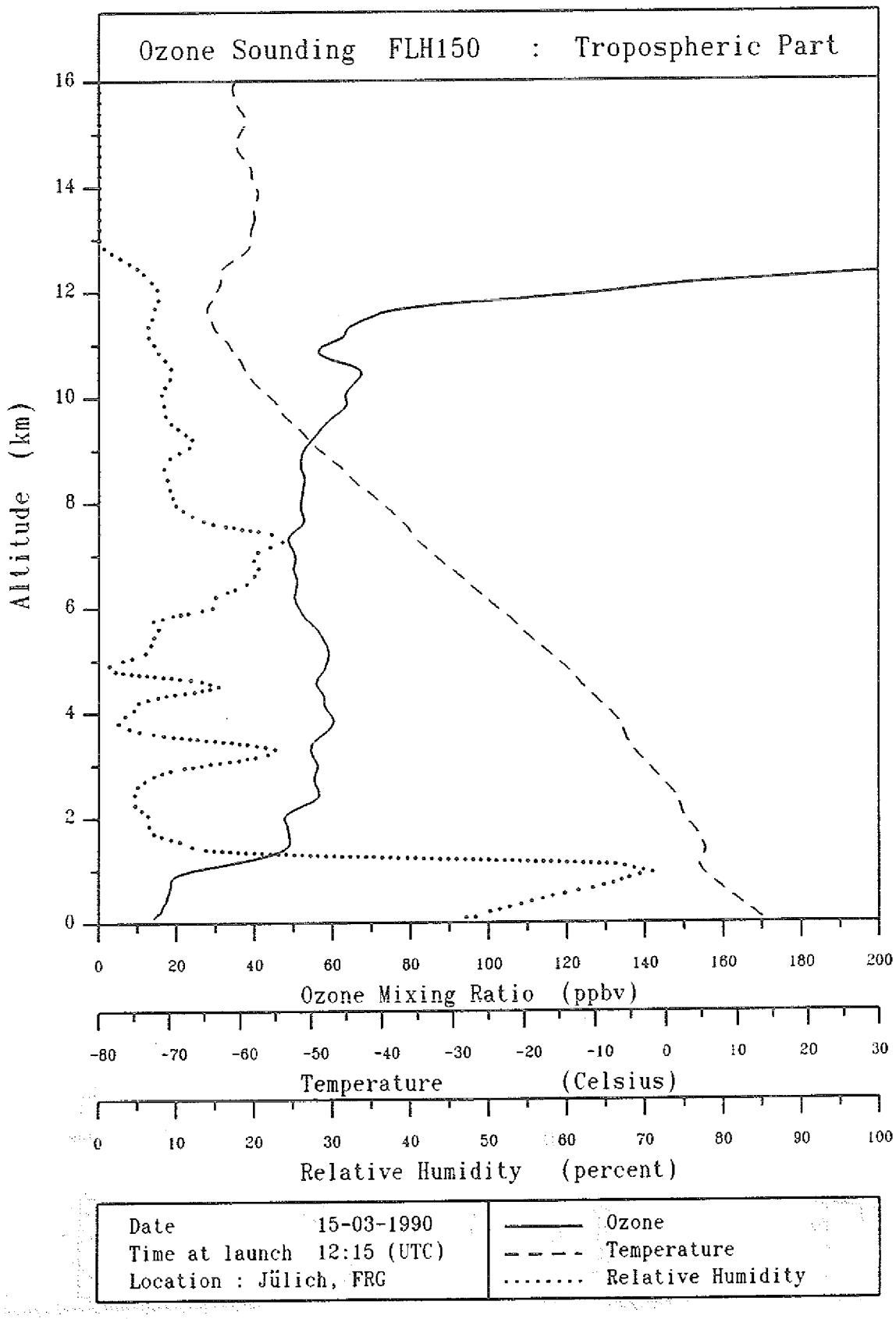

Ozone Sounding FLH147 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 06-03-1990
Time at launch 12:10 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

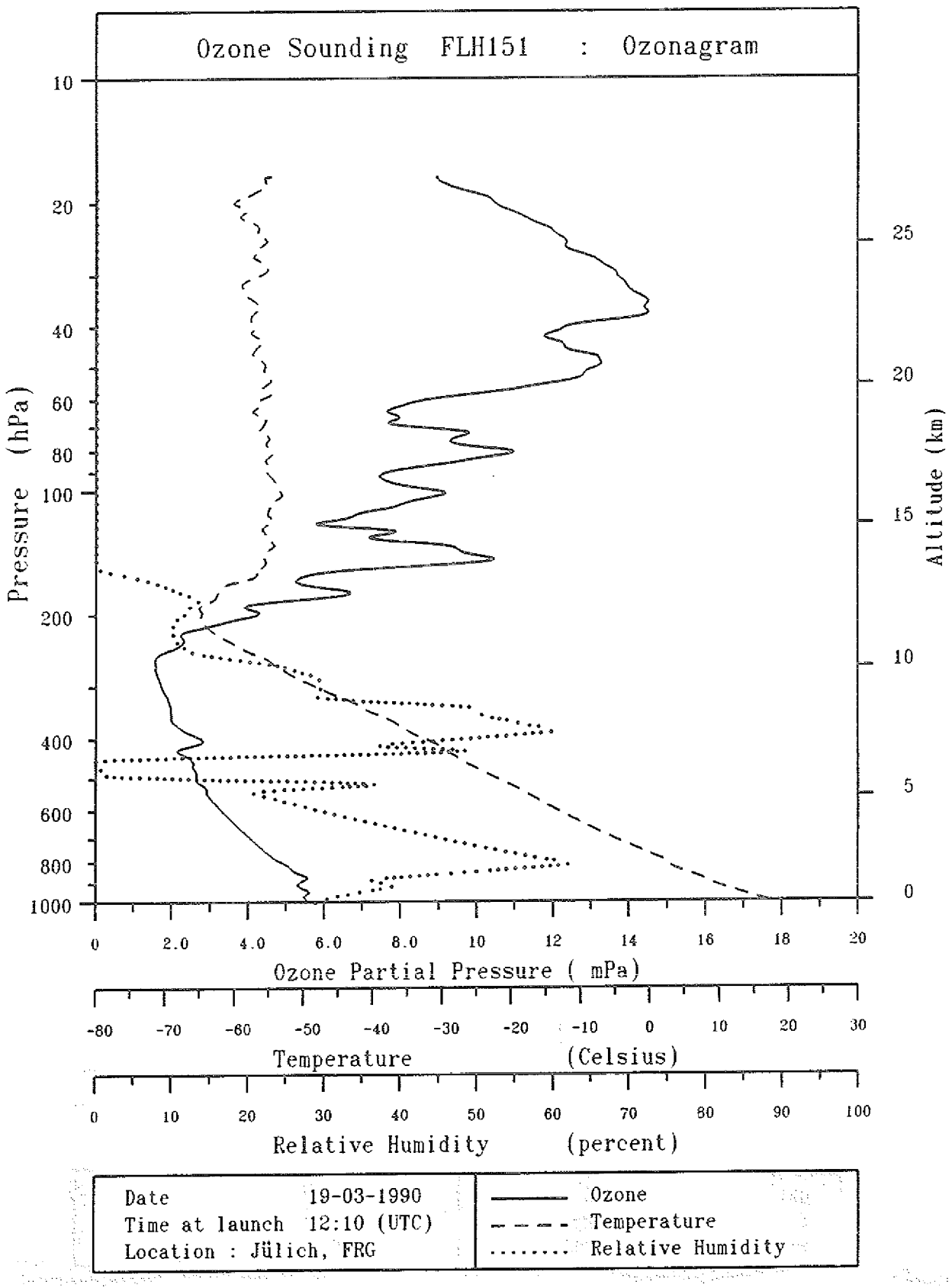


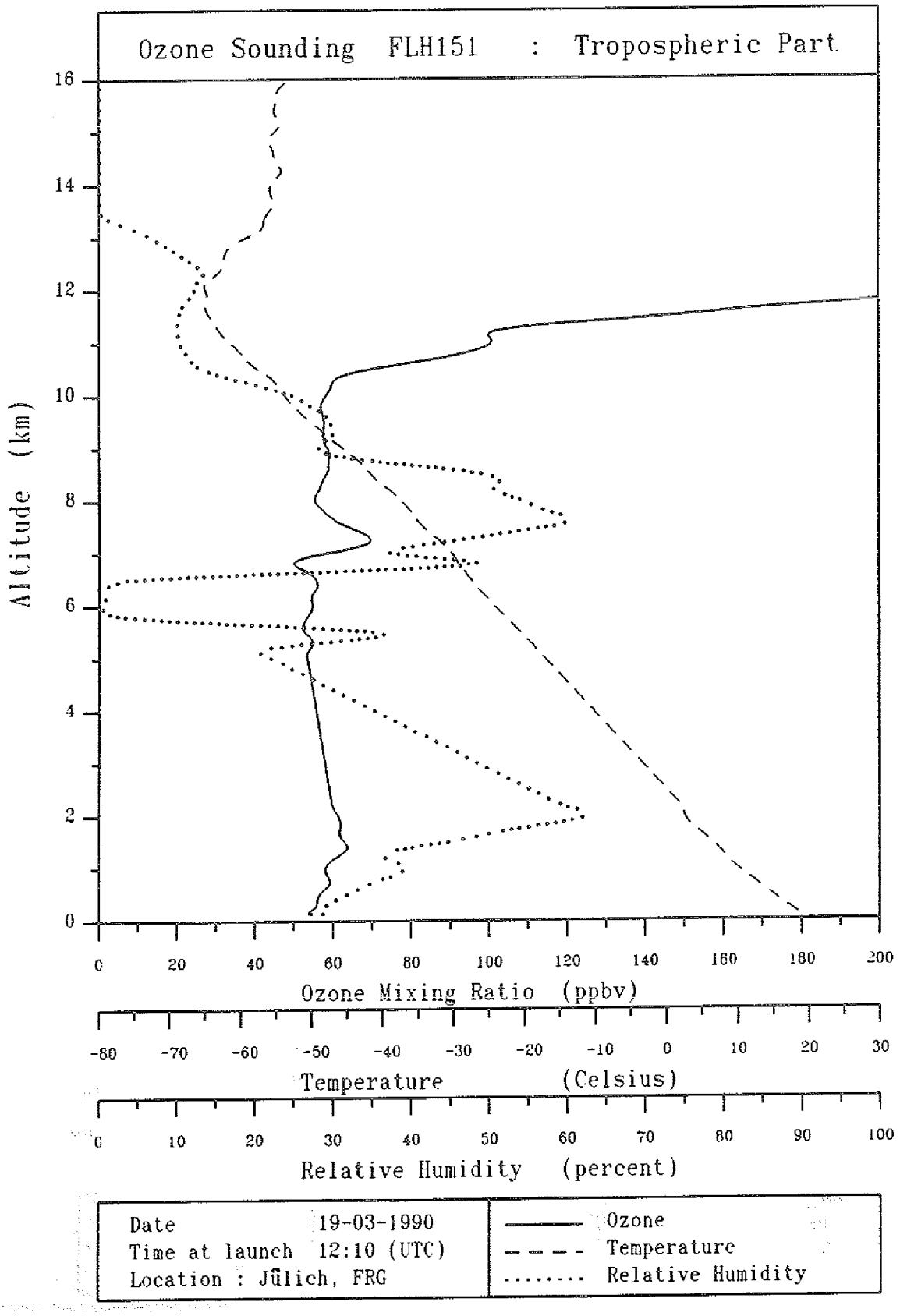
Date 12-03-1990	——— Ozone
Time at launch 12:30 (UTC)	- - - - Temperature
Location : Jülich, FRG	..... Relative Humidity

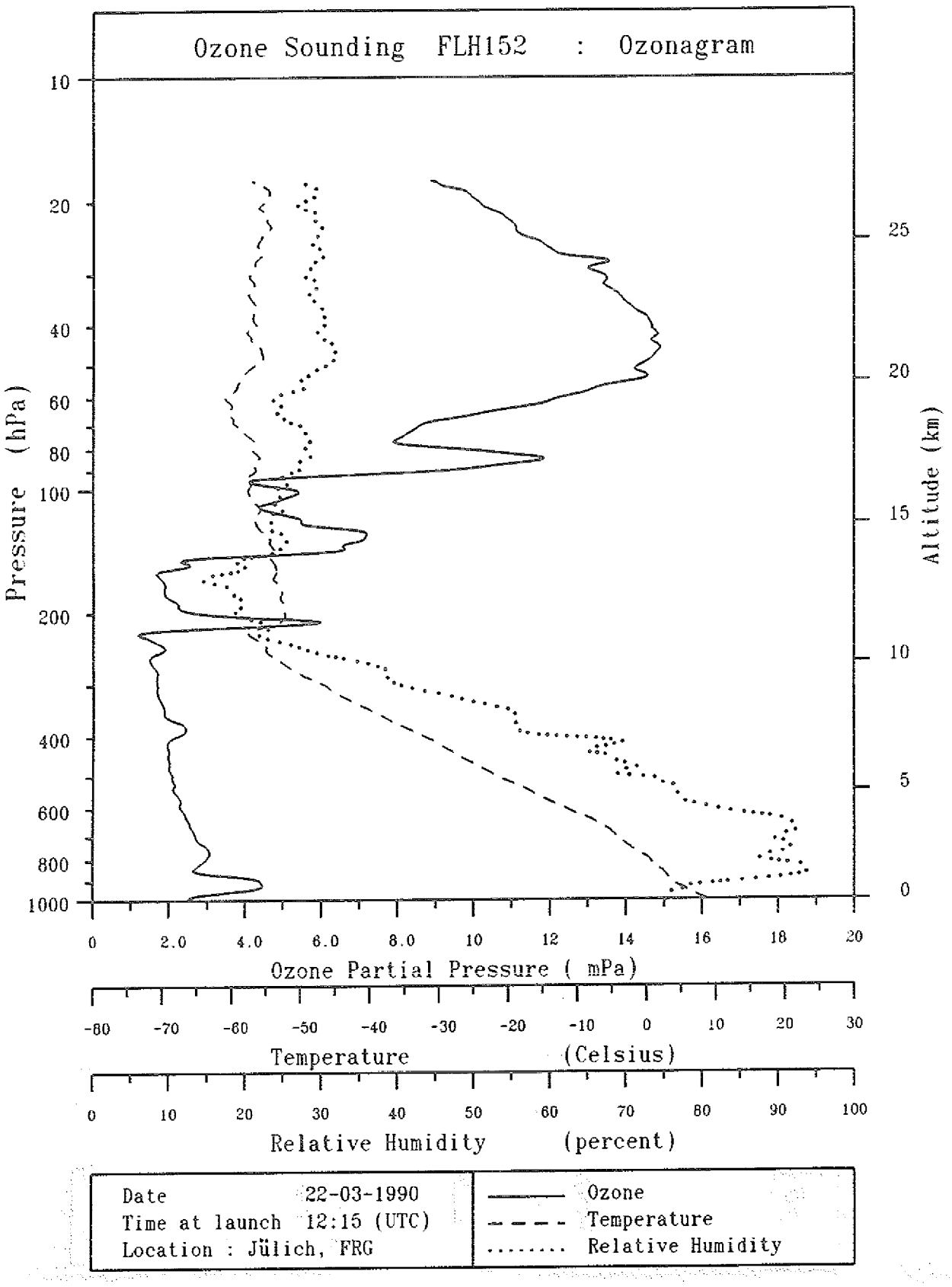

Ozone Sounding FLH149 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 12-03-1990
Time at launch 12:30 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

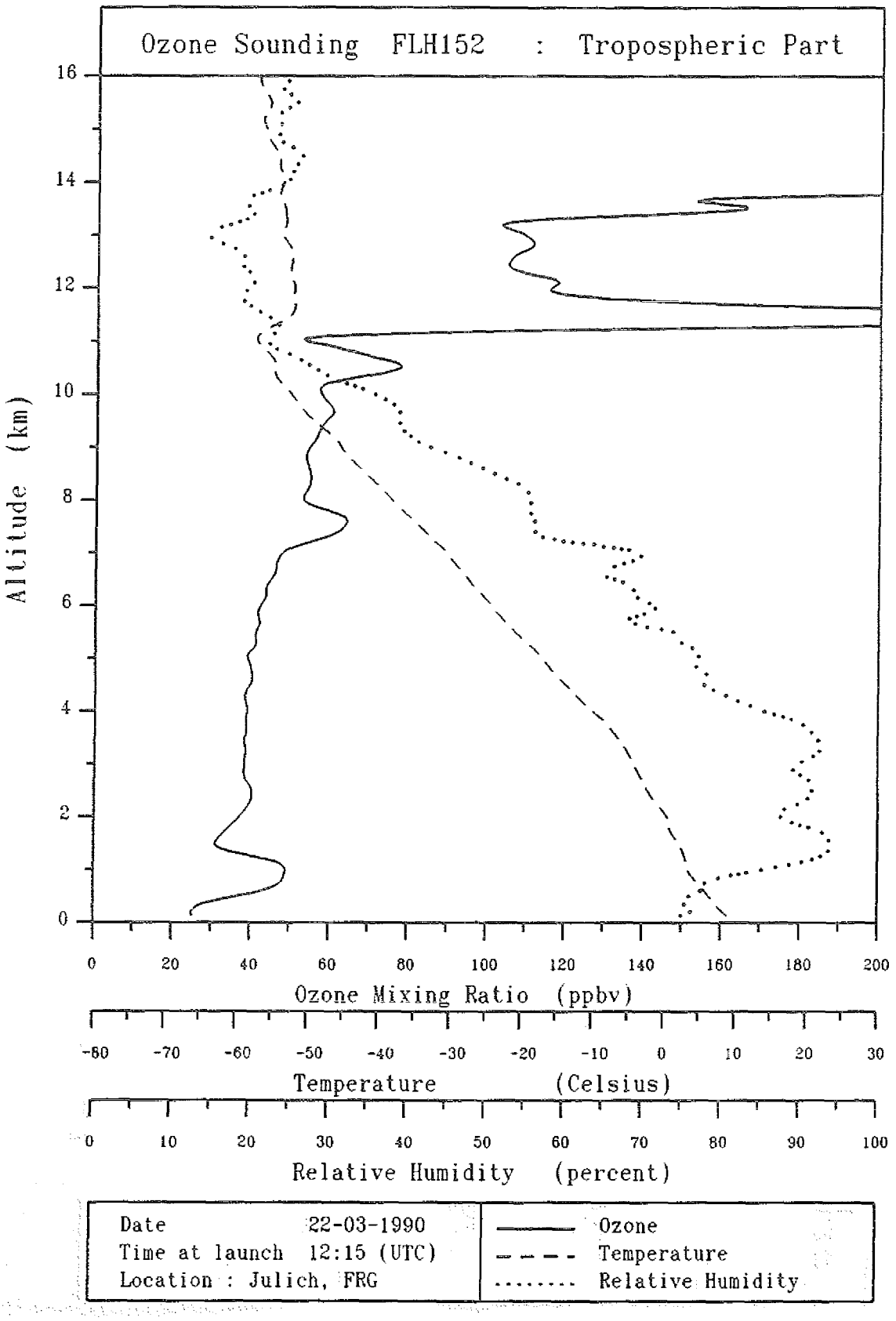

Ozone Sounding FLH150 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 15-03-1990
Time at launch 12:15 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

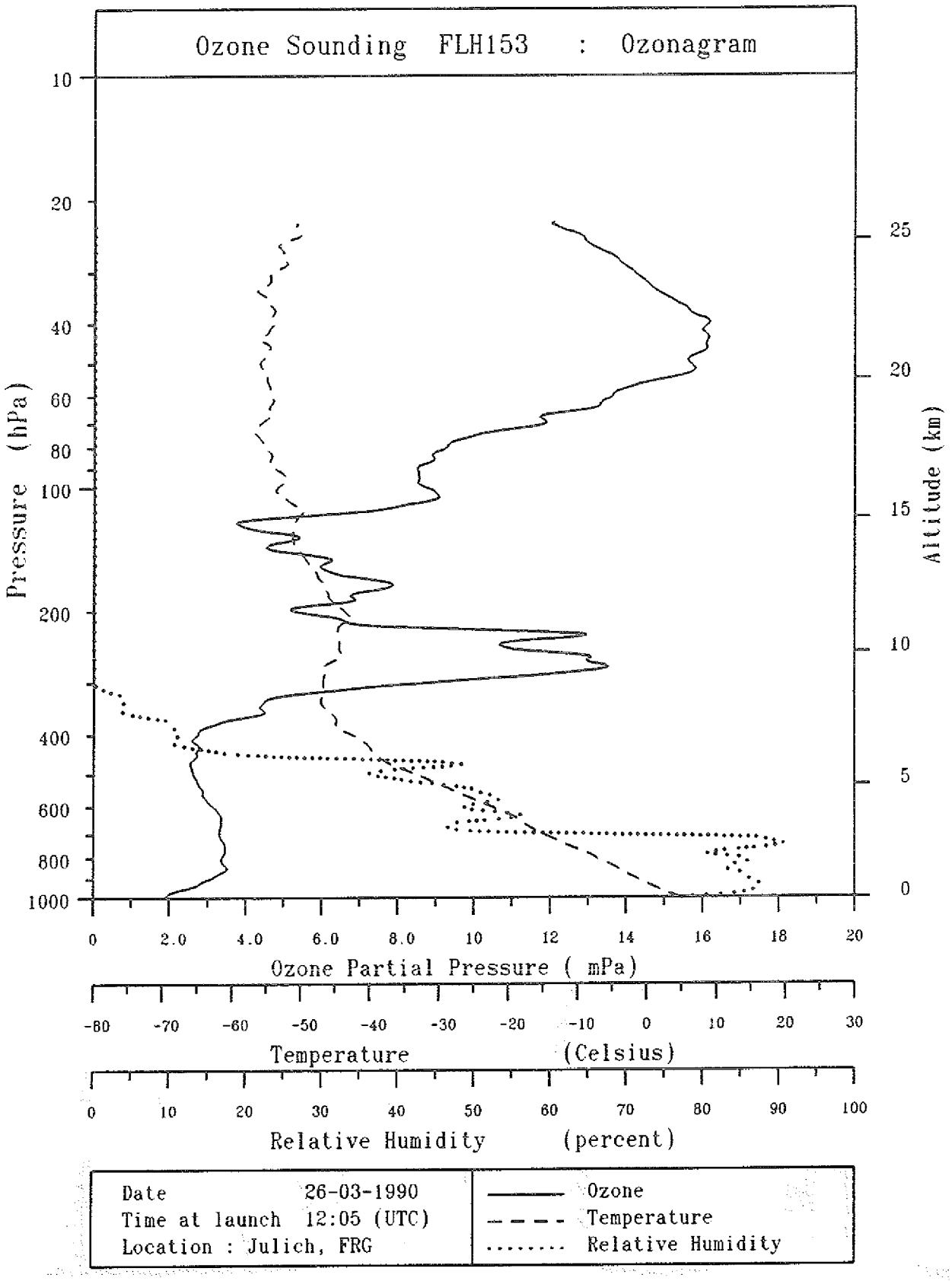

Ozone Sounding FLH150 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 15-03-1990
Time at launch 12:15 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

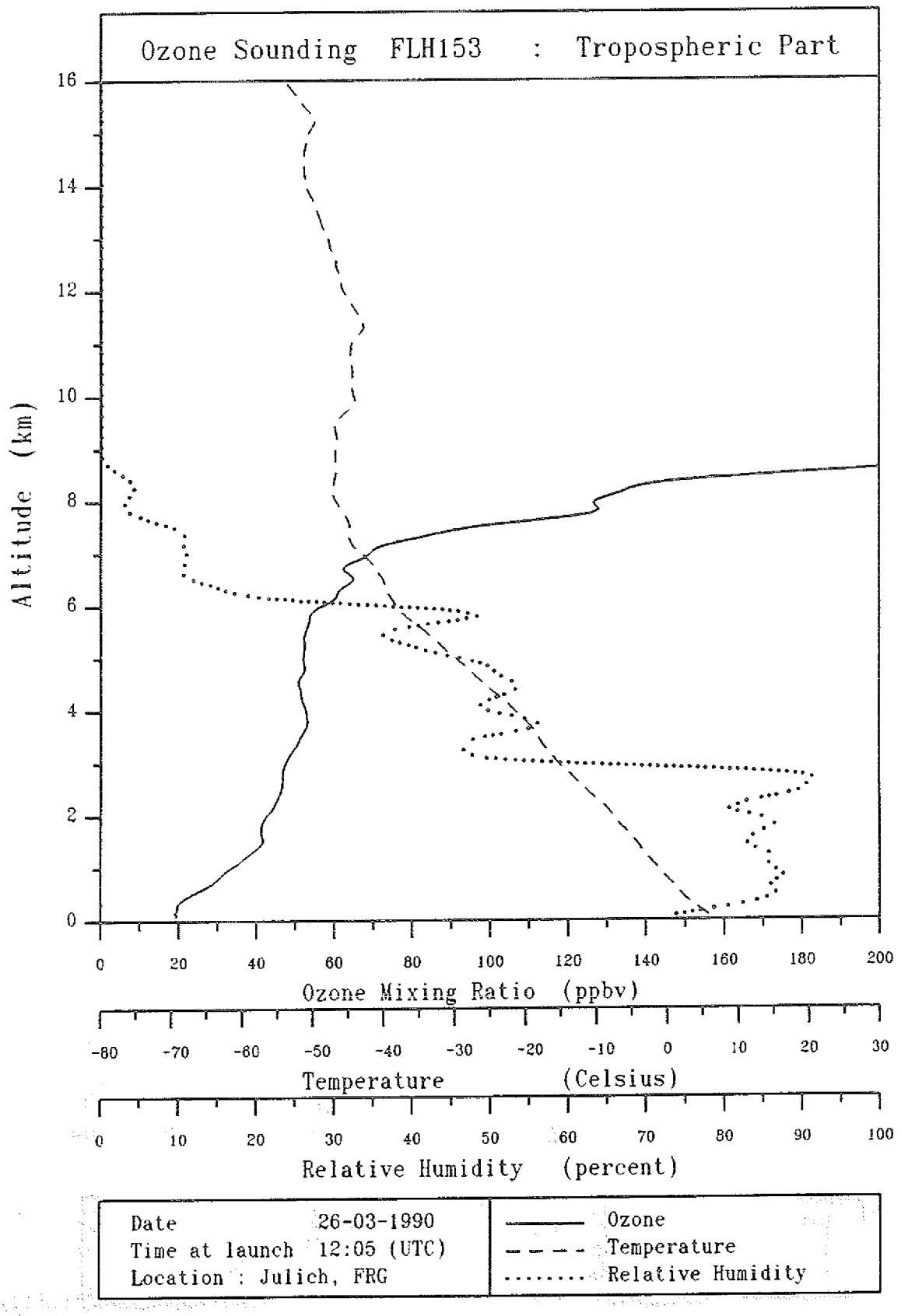

Ozone Sounding FLH151 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 19-03-1990
Time at launch 12:10 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

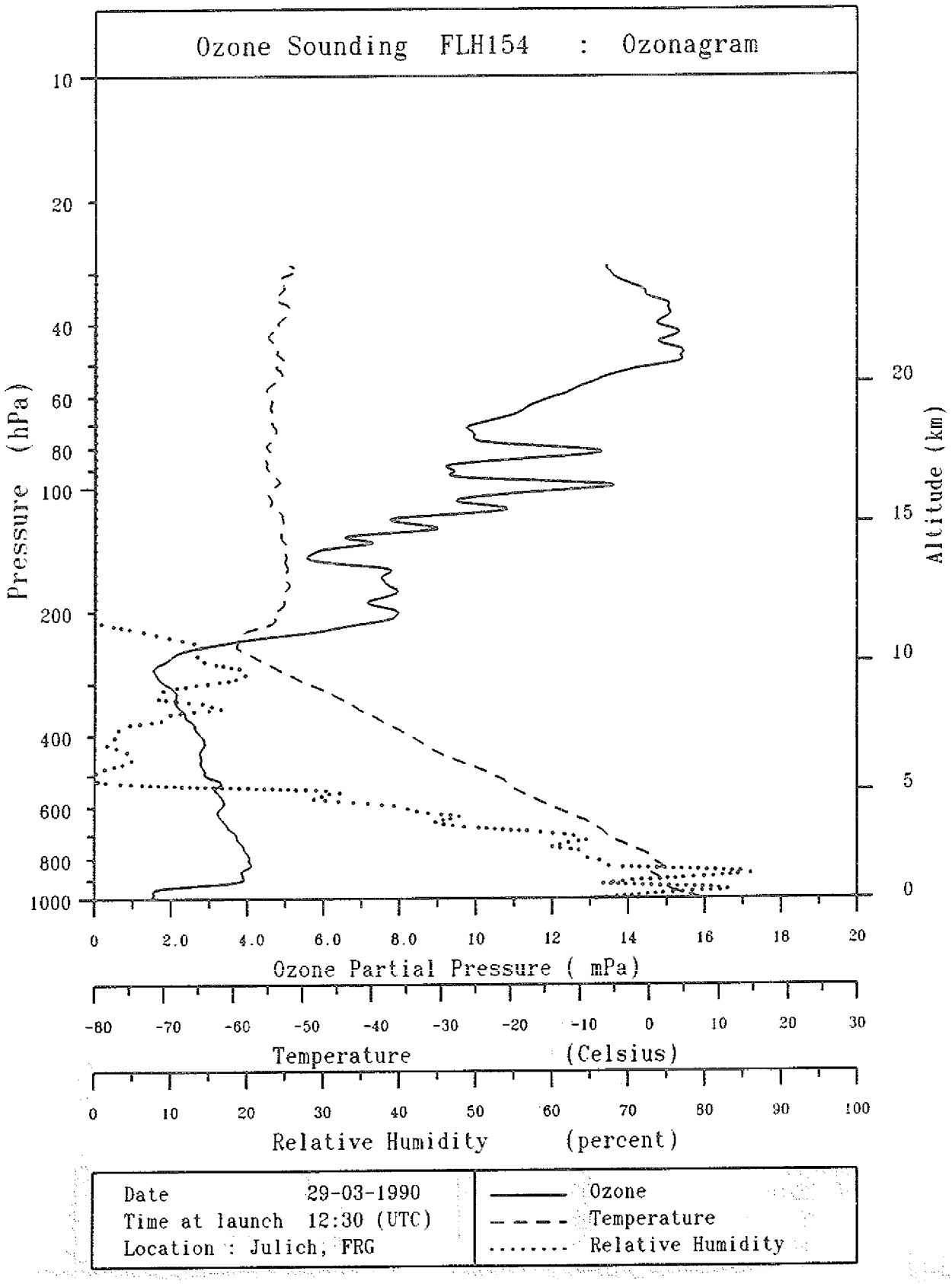

Ozone Sounding FLH151 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 19-03-1990
Time at launch 12:10 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

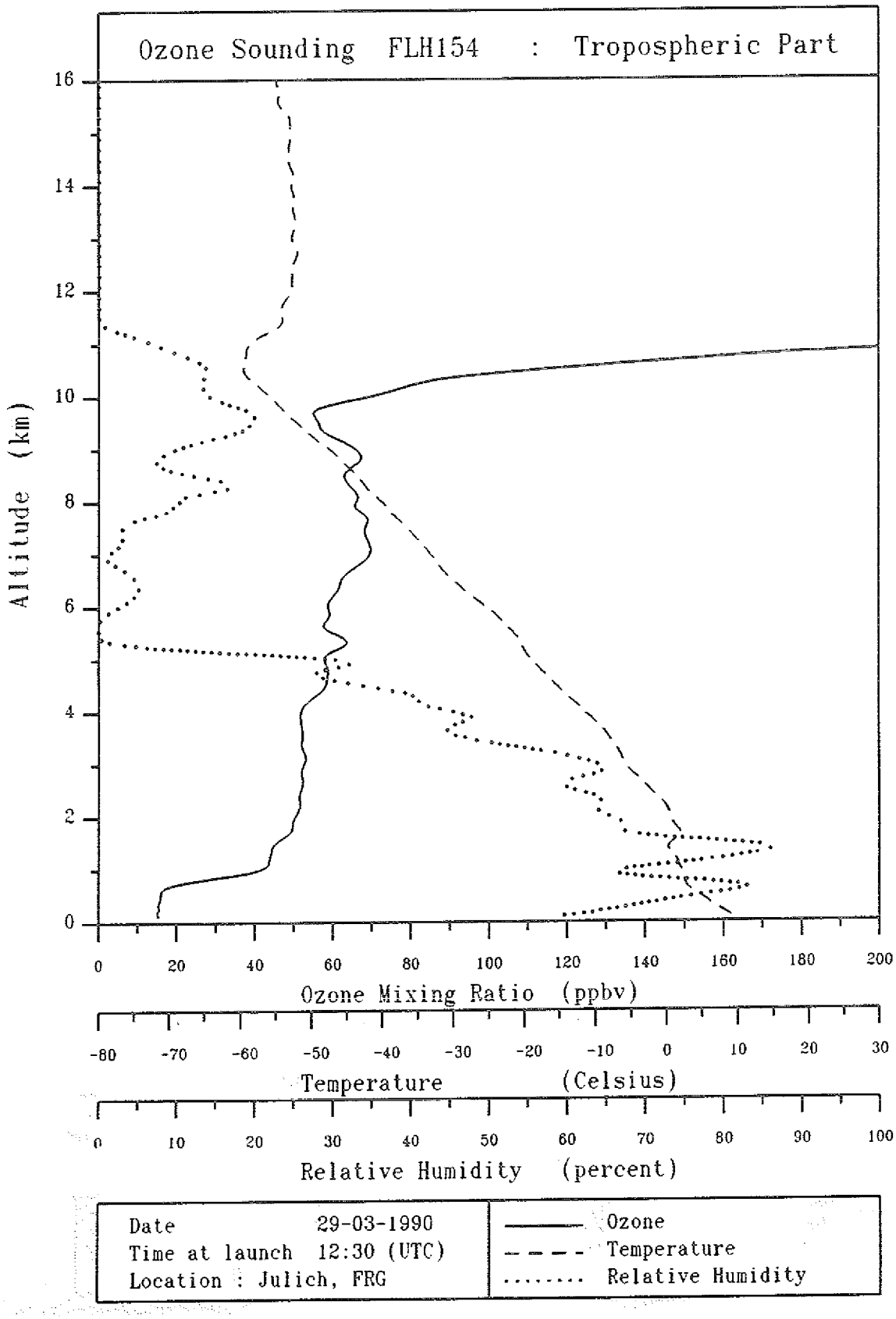

Ozone Sounding FLH152 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 22-03-1990
Time at launch 12:15 (UTC)
Location : Jülich, FRG
Ozone
Temperature
Relative Humidity

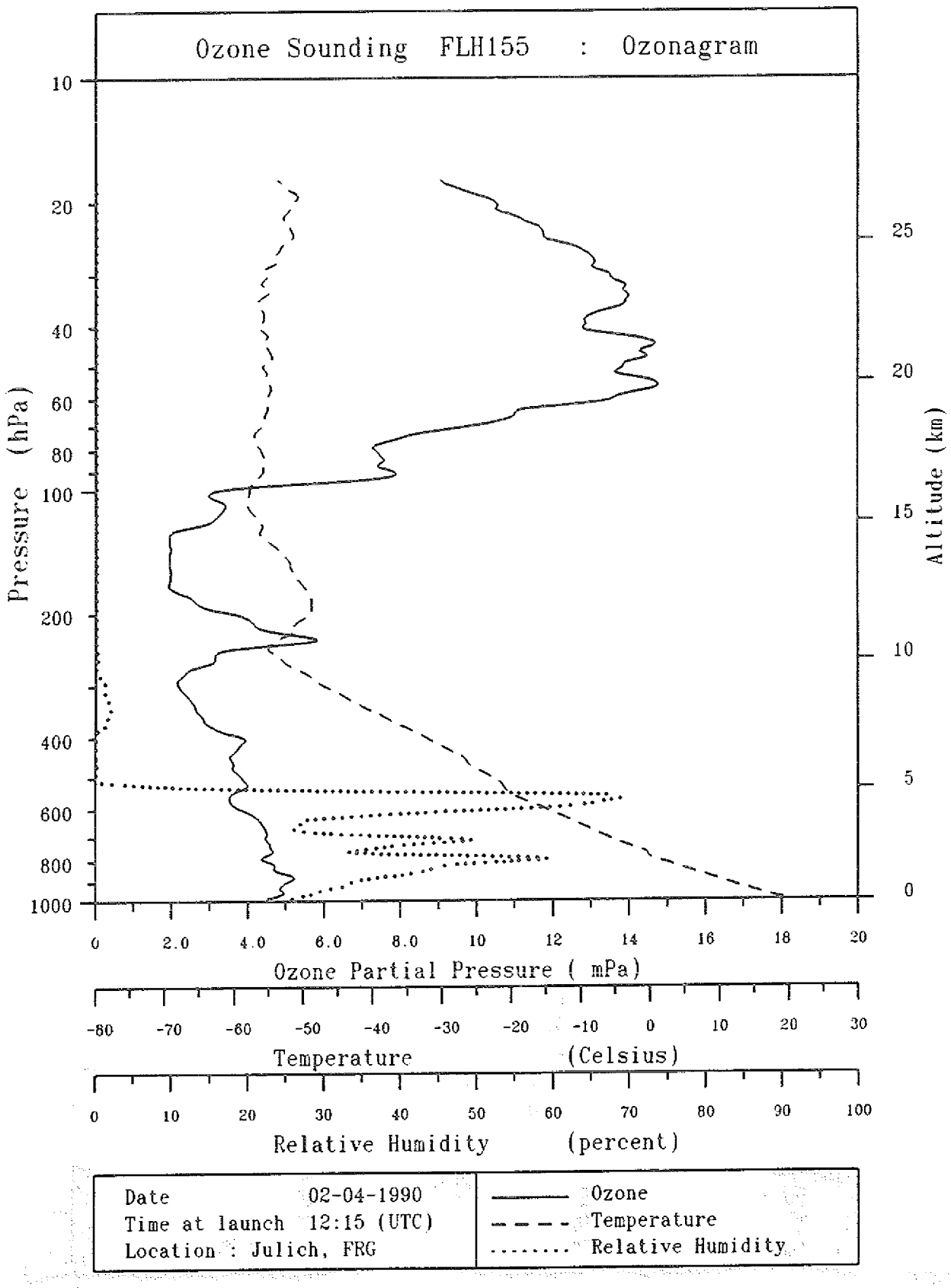

Ozone Sounding FLH152 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 22-03-1990
Time at launch 12:15 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH153 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 26-03-1990
Time at launch 12:05 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

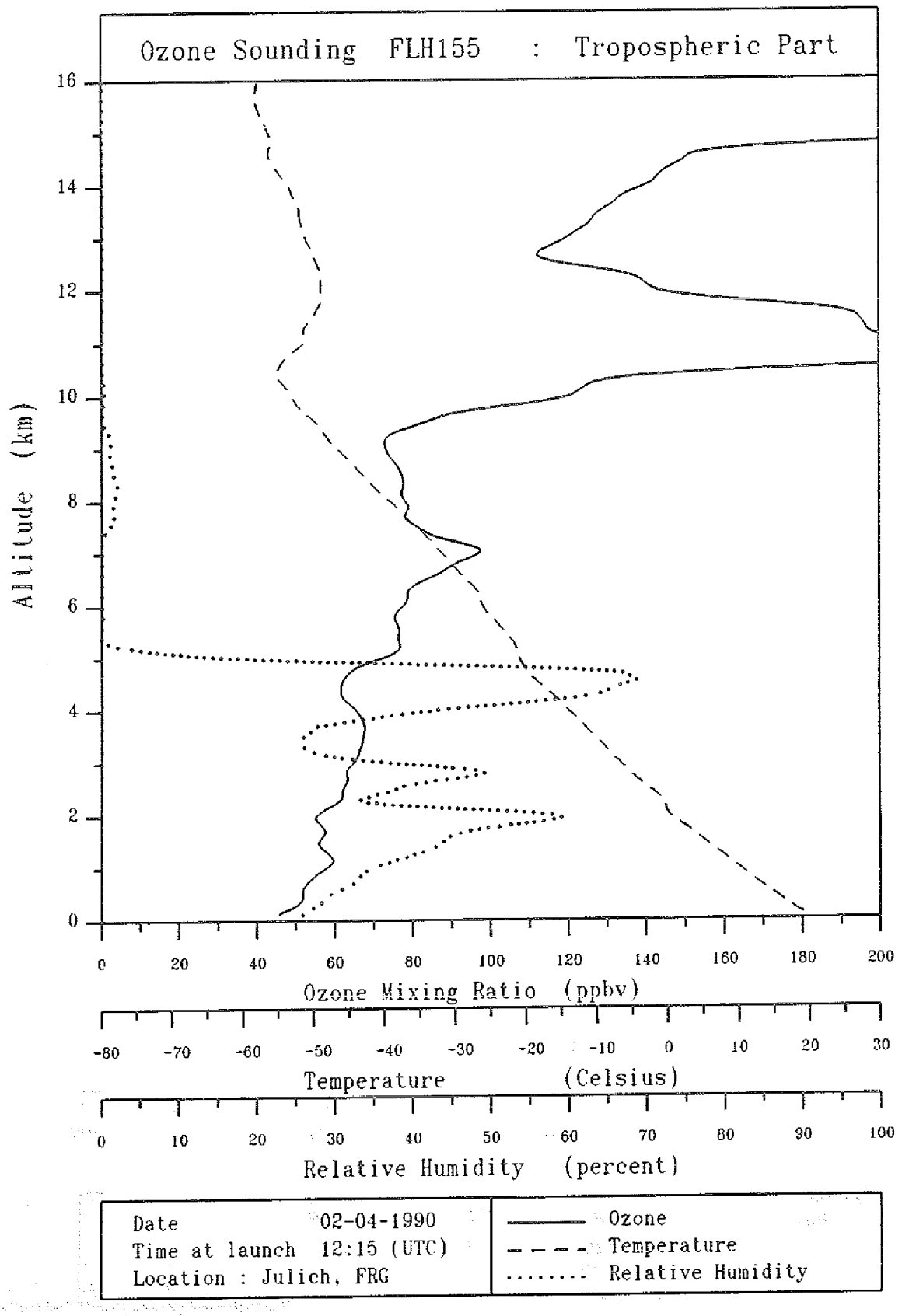

Ozone Sounding FLH153 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 26-03-1990
Time at launch 12:05 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

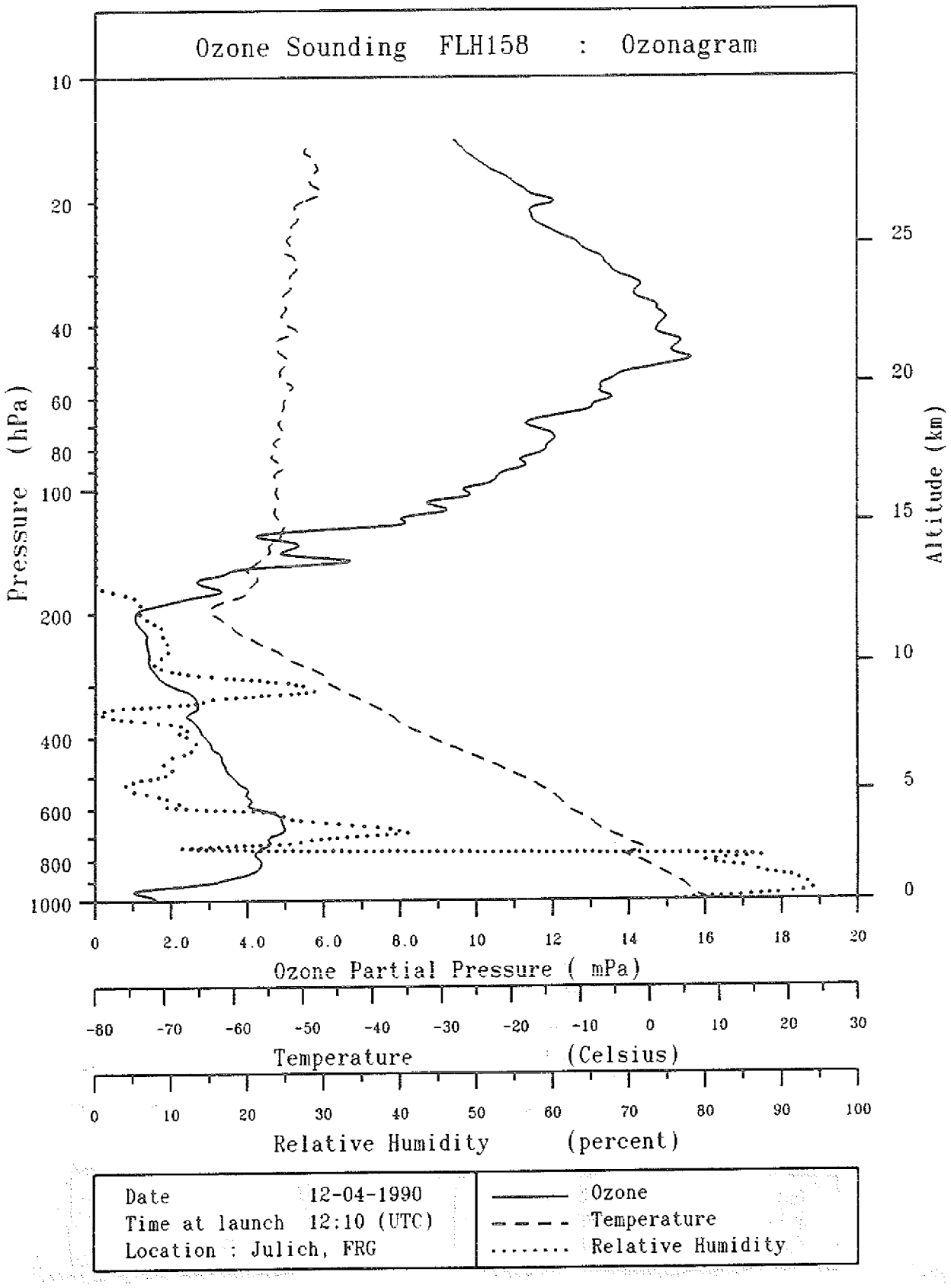

Ozone Sounding FLH154 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 29-03-1990
Time at launch 12:30 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH154 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 29-03-1990
Time at launch 12:30 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

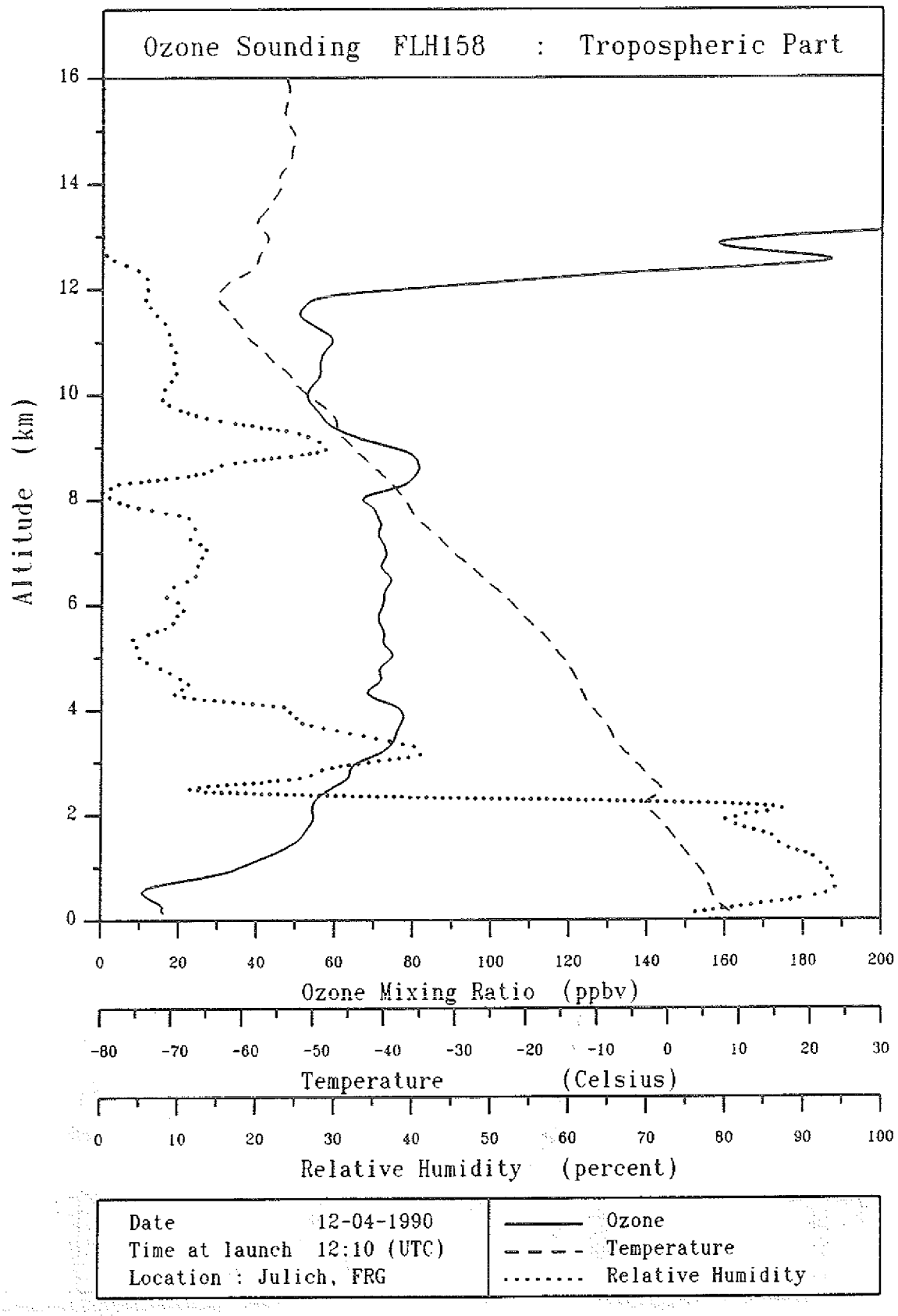


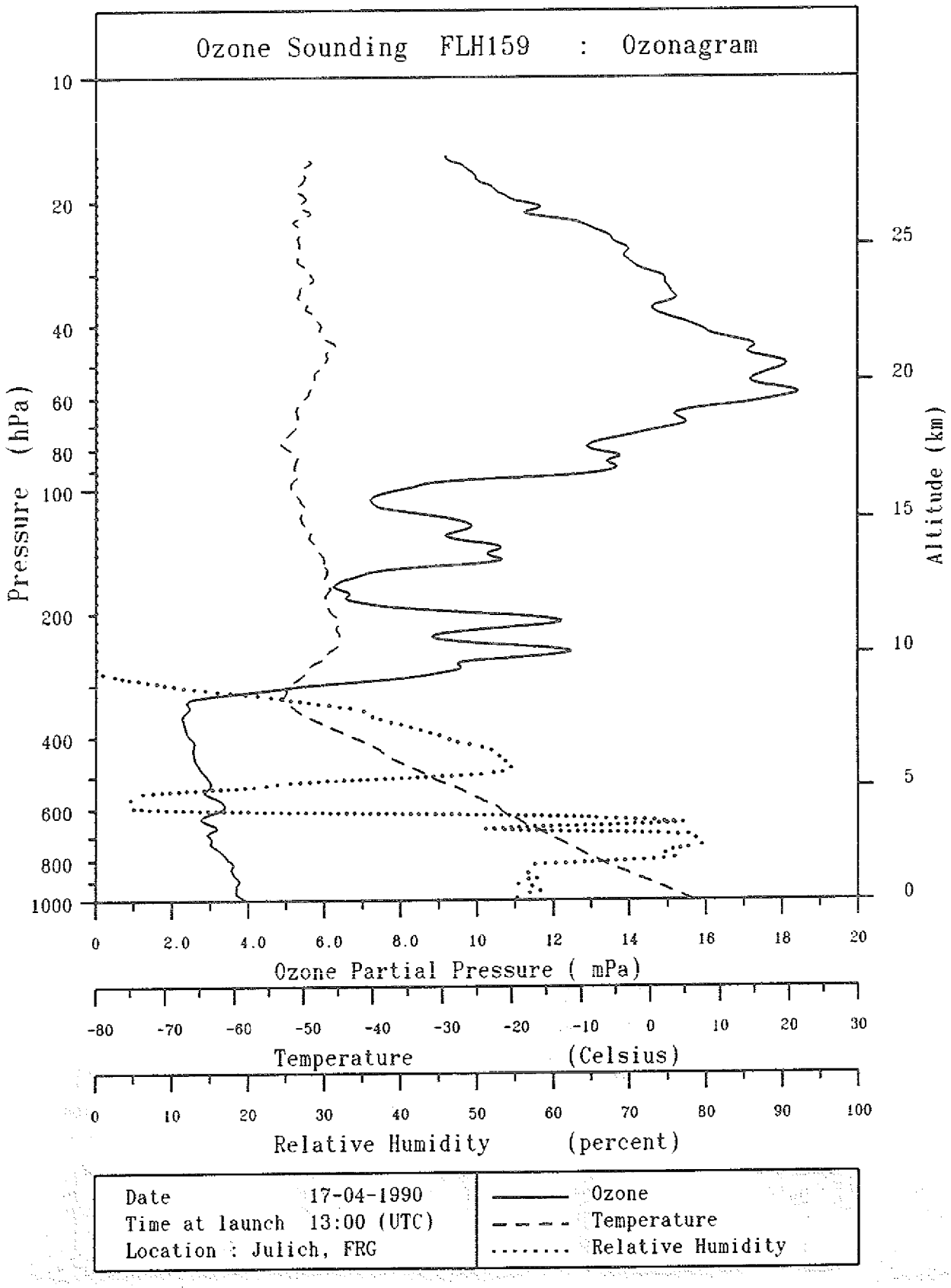
Date 02-04-1990	——— Ozone
Time at launch 12:15 (UTC)	- - - - Temperature
Location : Julich, FRG	..... Relative Humidity

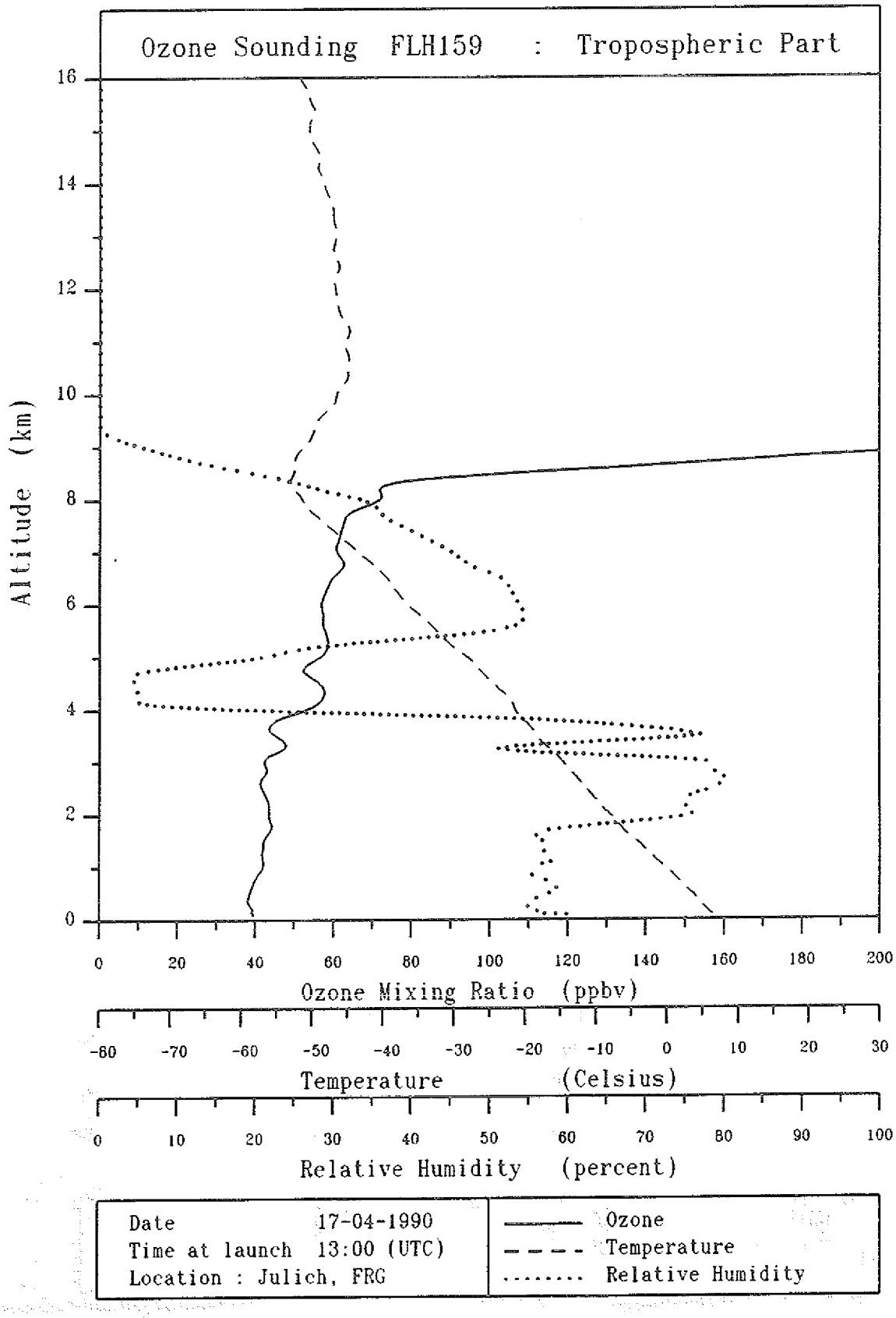

Ozone Sounding FLH155 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 02-04-1990
Time at launch 12:15 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

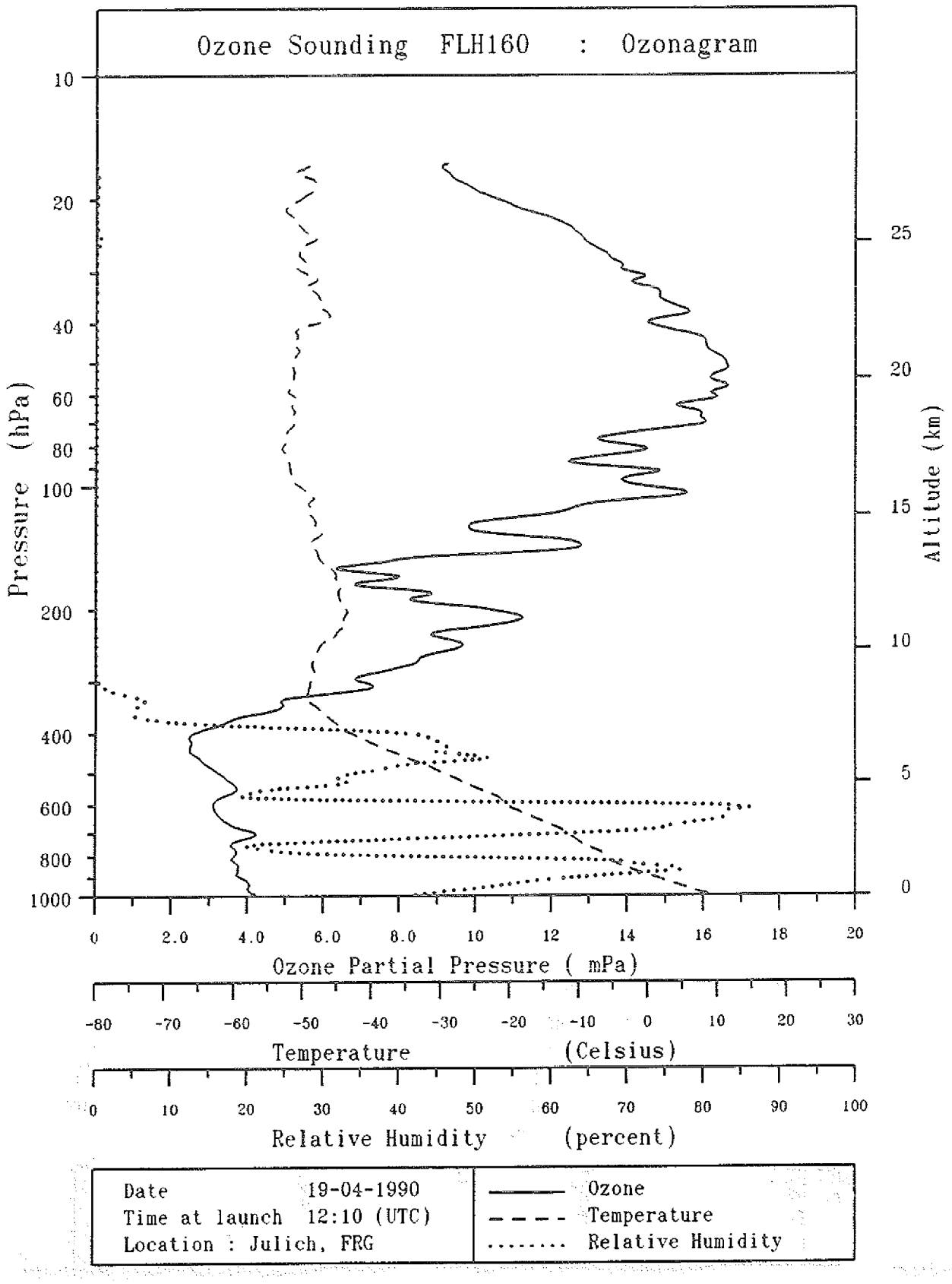


Date 12-04-1990	——— Ozone
Time at launch 12:10 (UTC)	- - - - Temperature
Location : Julich, FRG	..... Relative Humidity

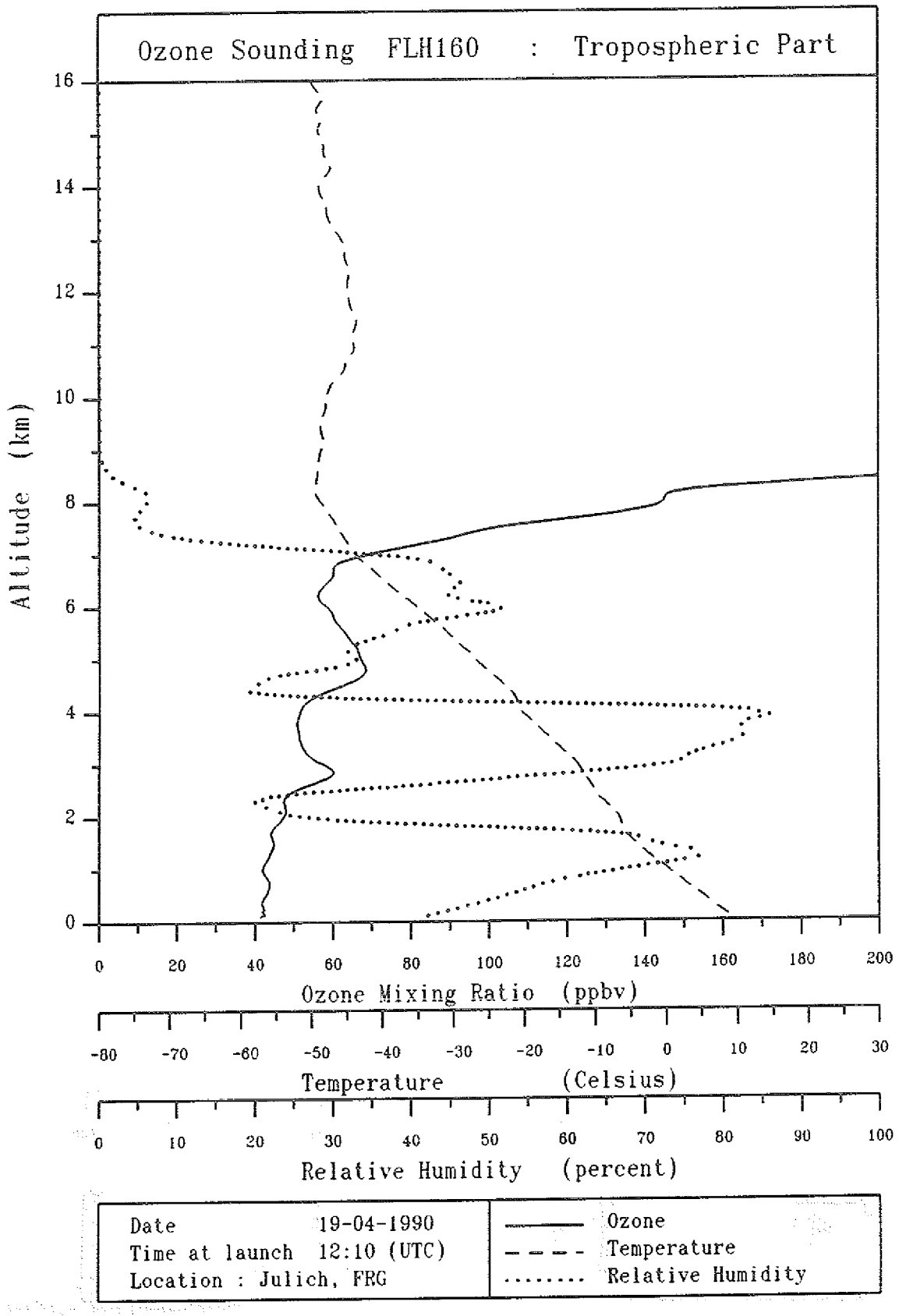

Ozone Sounding FLH158 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 12-04-1990
Time at launch 12:10 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

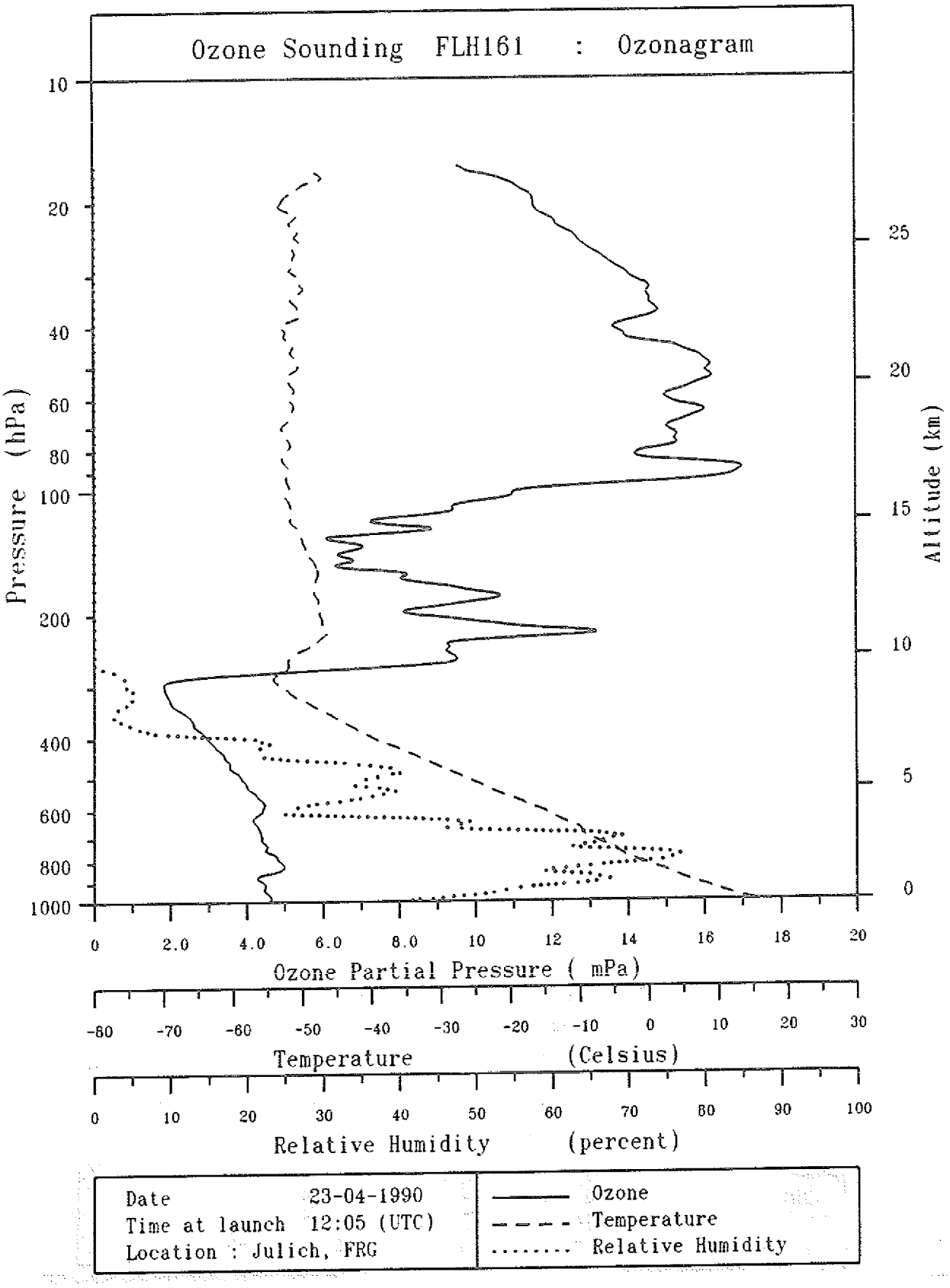

Ozone Sounding FLH159 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 17-04-1990
Time at launch 13:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

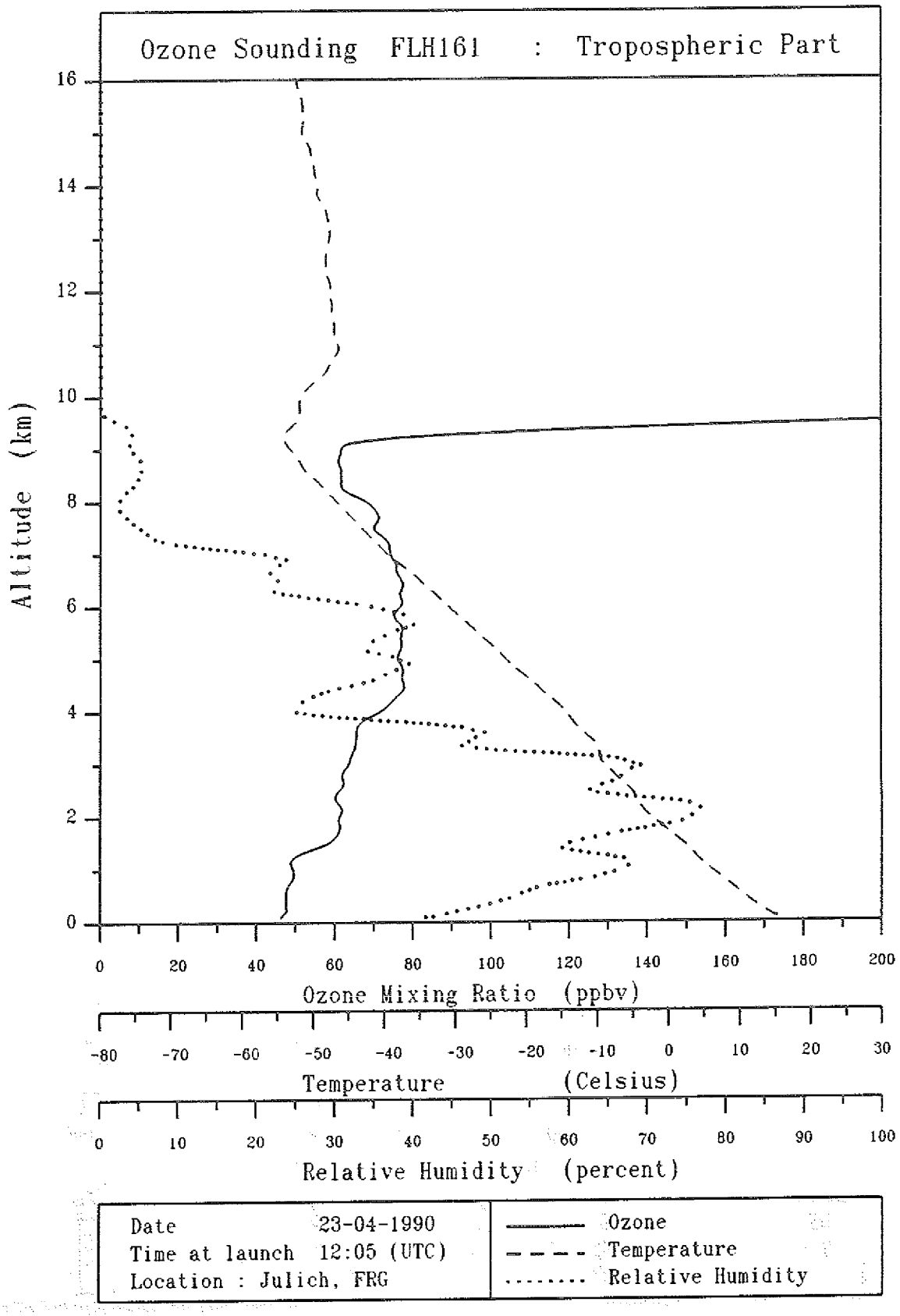

Ozone Sounding FLH159 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 17-04-1990
Time at launch 13:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

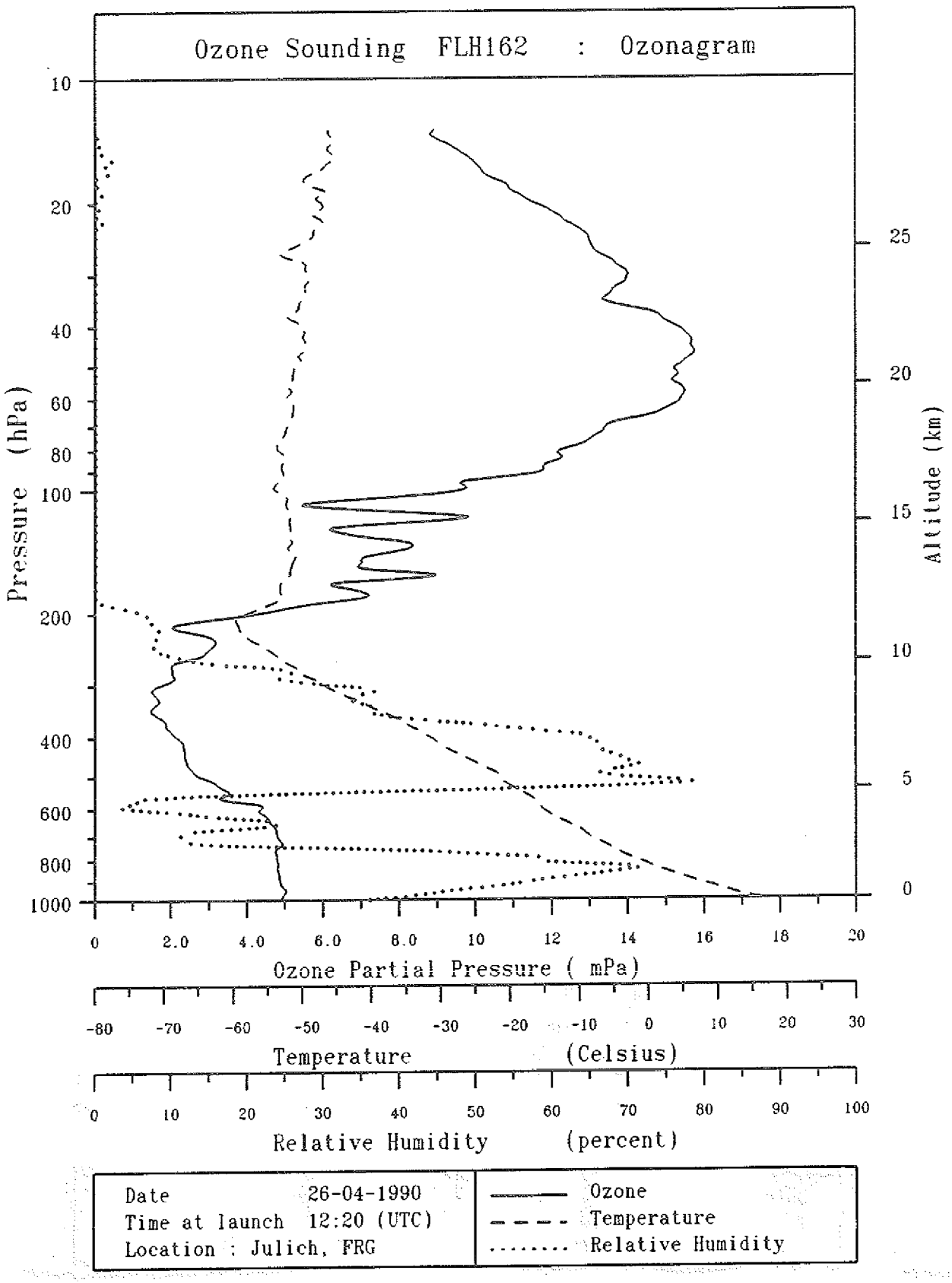


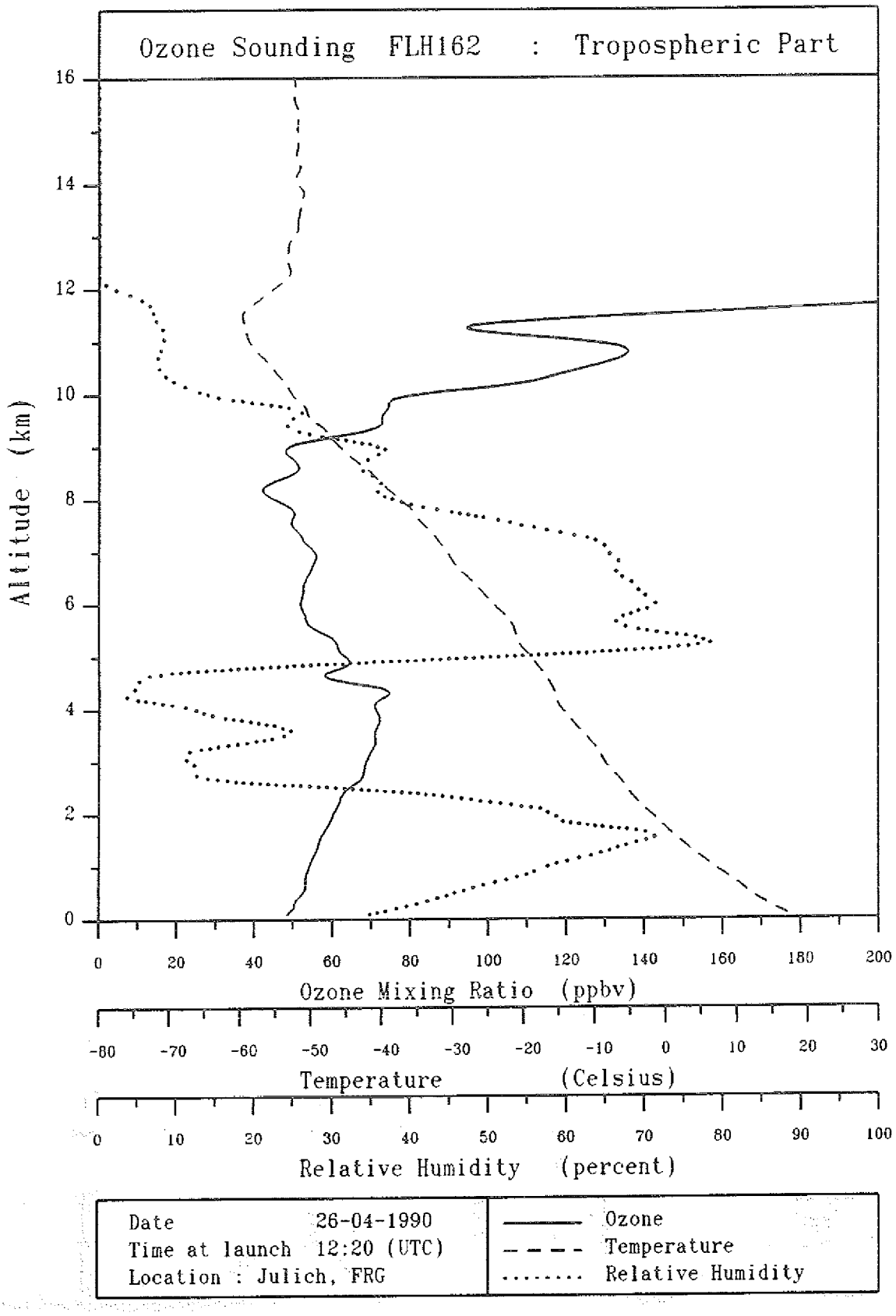
Date 19-04-1990	——— Ozone
Time at launch 12:10 (UTC)	- - - - Temperature
Location : Julich, FRG	..... Relative Humidity

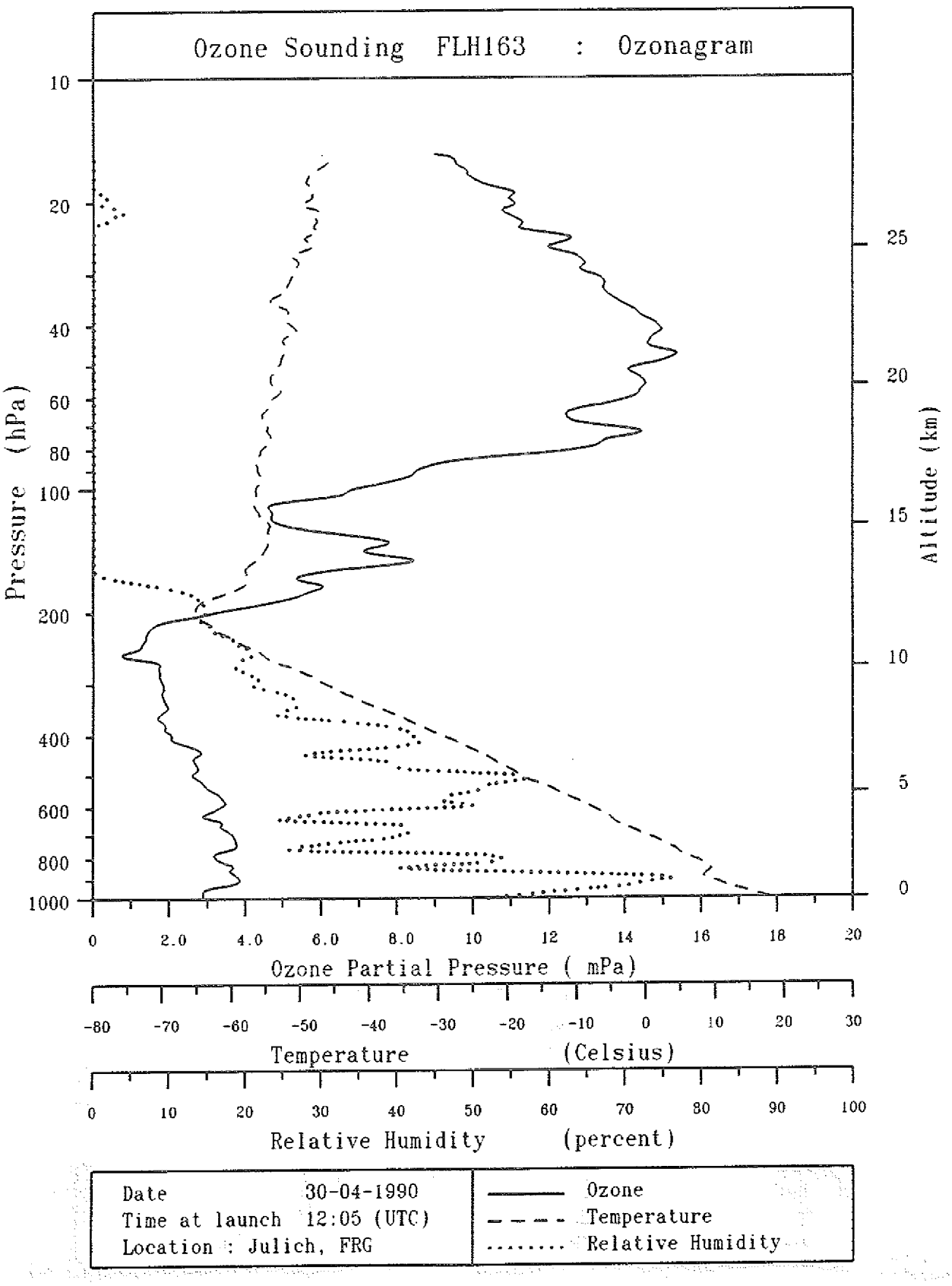

Ozone Sounding FLH160 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 19-04-1990
Time at launch 12:10 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH161 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 23-04-1990
Time at launch 12:05 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

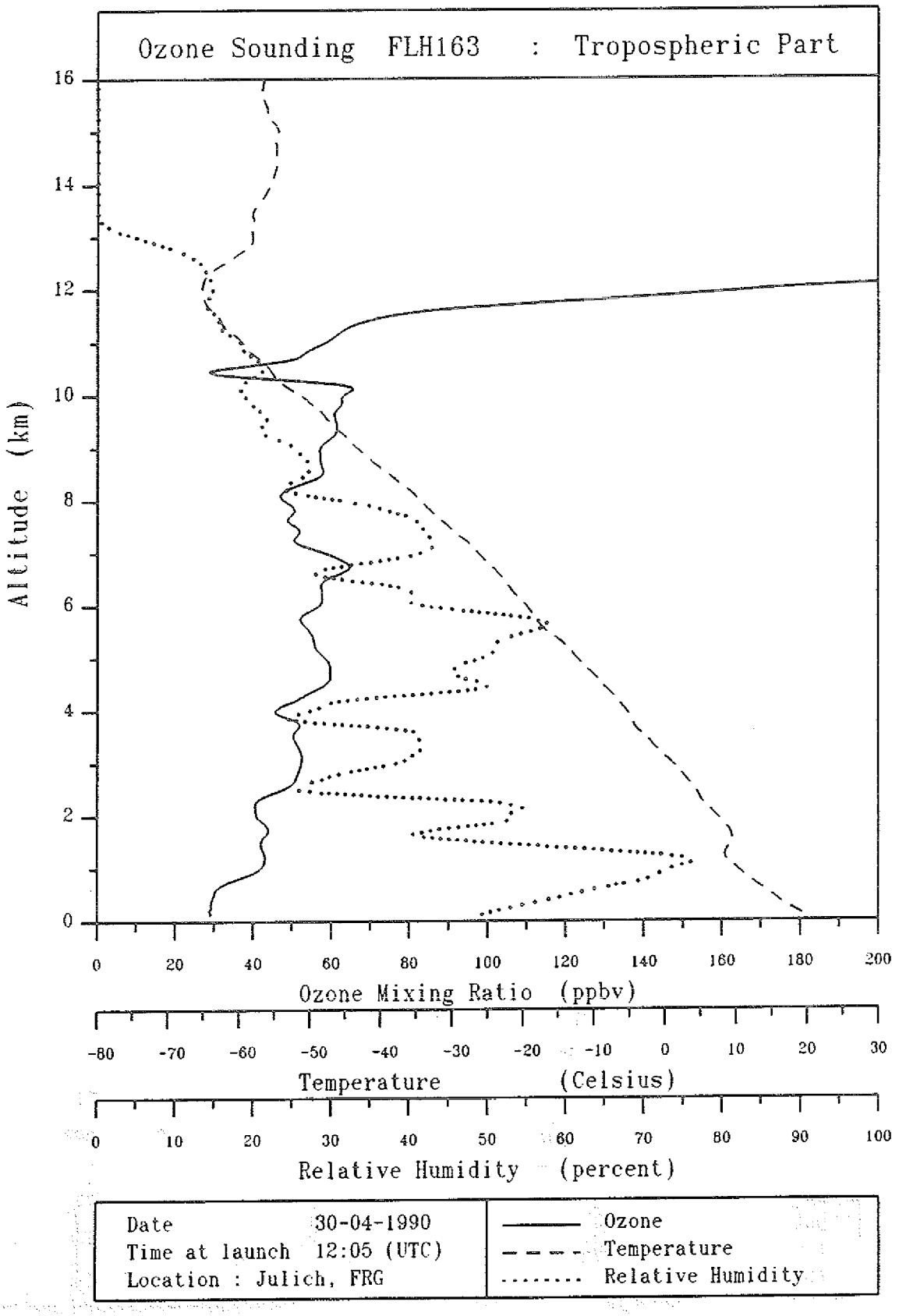

Ozone Sounding FLH161 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 23-04-1990
Time at launch 12:05 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

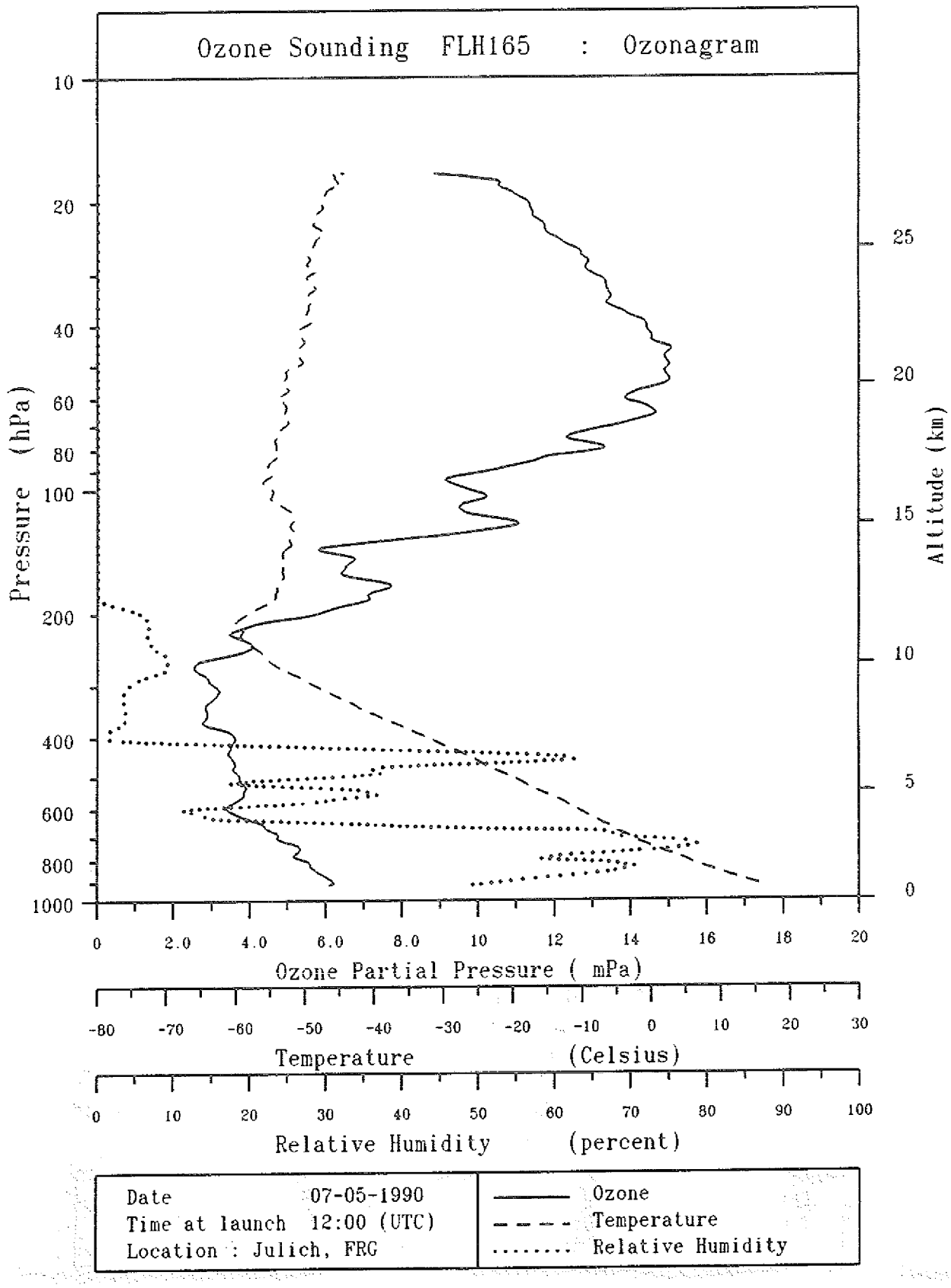

Ozone Sounding FLH162 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 26-04-1990
Time at launch 12:20 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

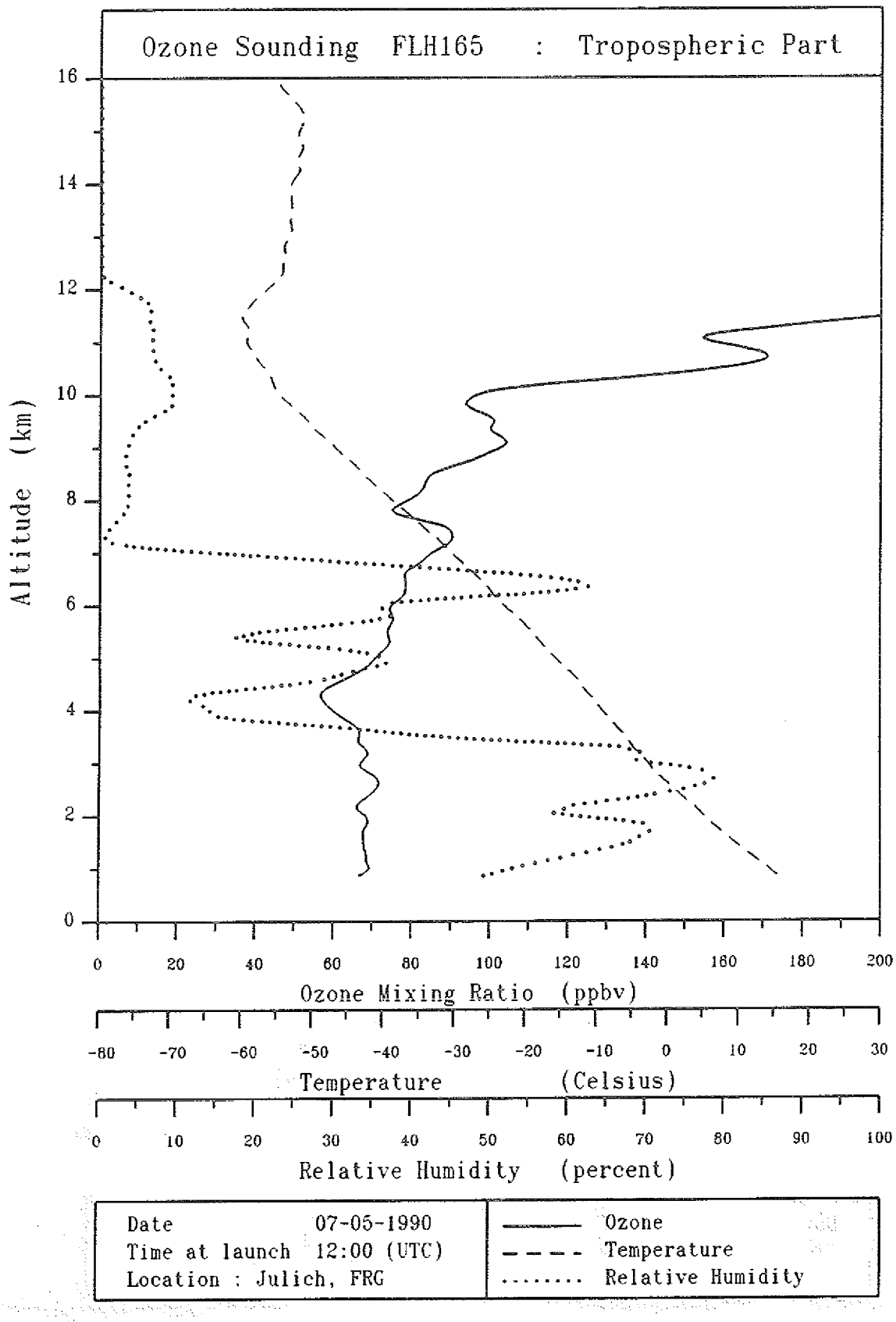

Ozone Sounding FLH162 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 26-04-1990
Time at launch 12:20 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

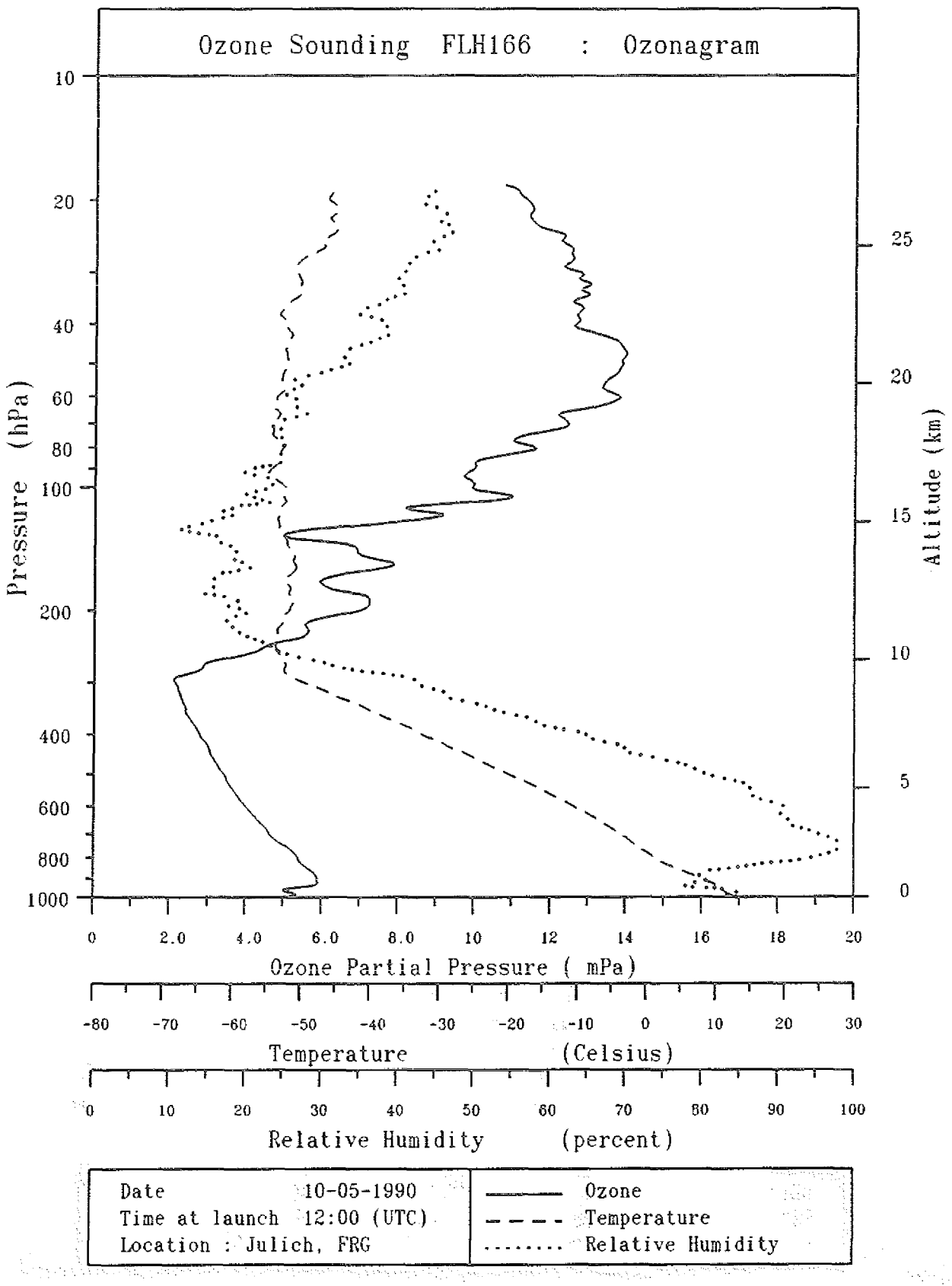


Date 30-04-1990	——— Ozone
Time at launch 12:05 (UTC)	– – – – Temperature
Location : Julich, FRG	..... Relative Humidity

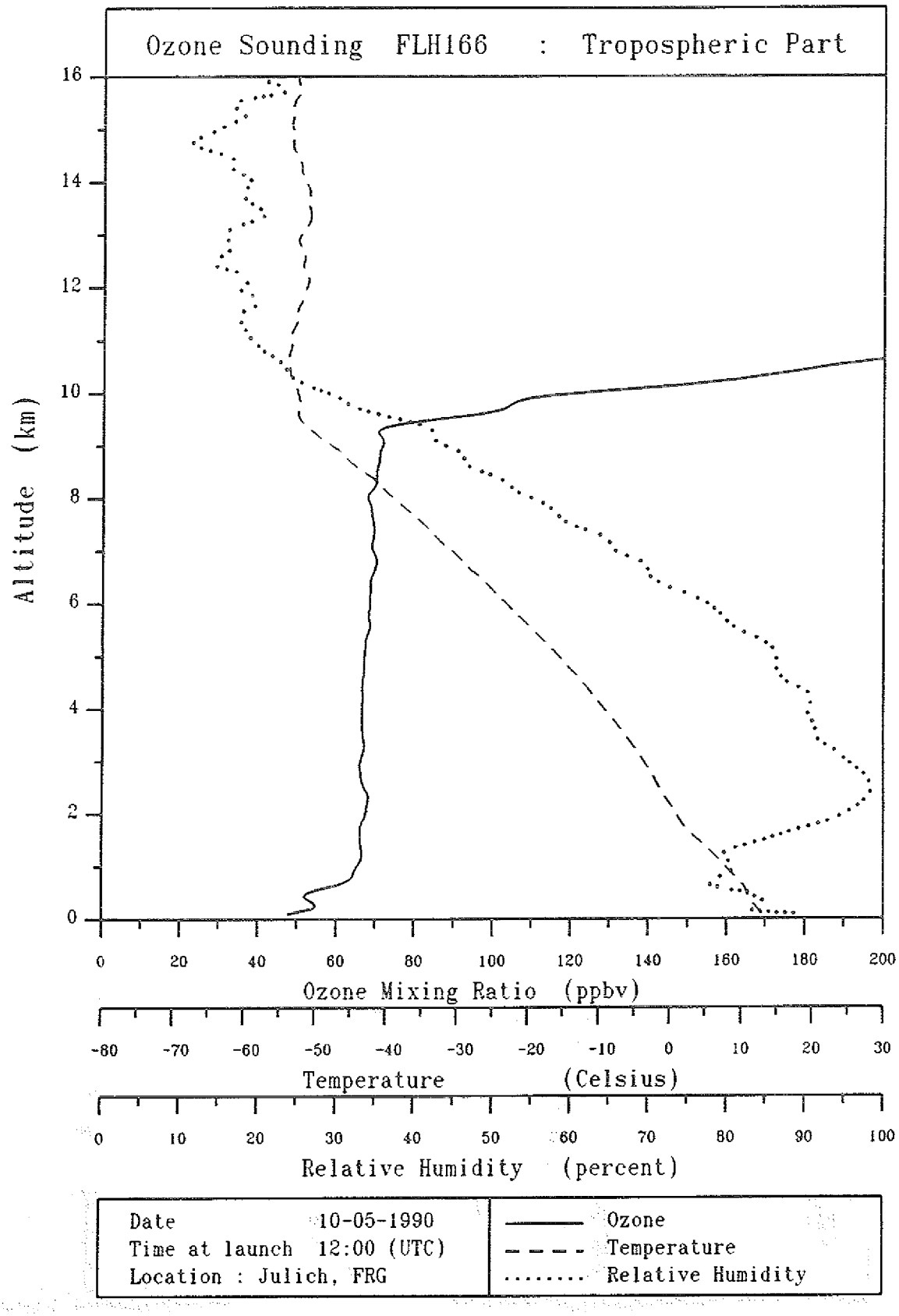

Ozone Sounding FLH163 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 30-04-1990
Time at launch 12:05 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

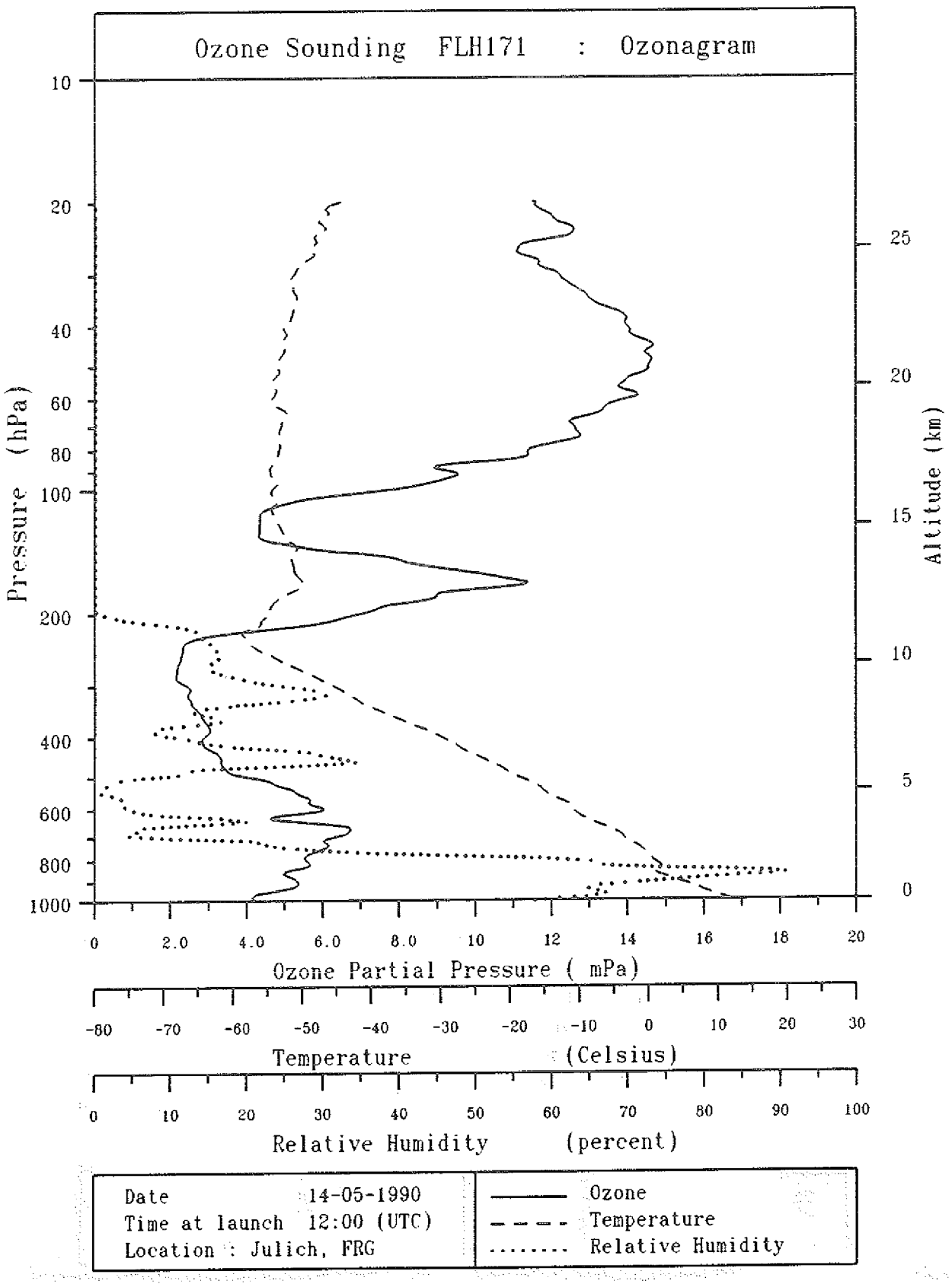

Ozone Sounding FLH165 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 07-05-1990
Time at launch 12:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

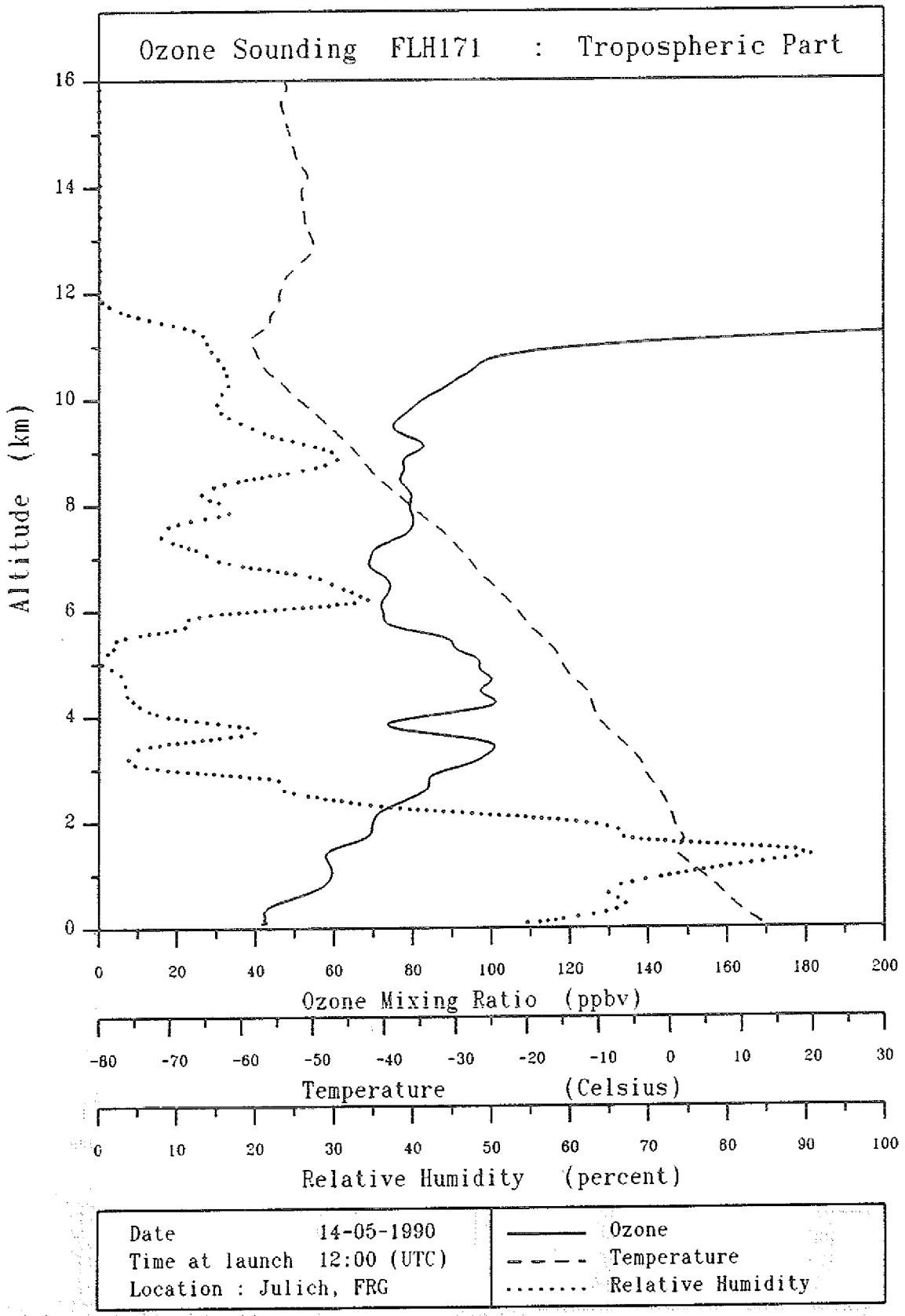

Ozone Sounding FLH165 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 07-05-1990
Time at launch 12:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

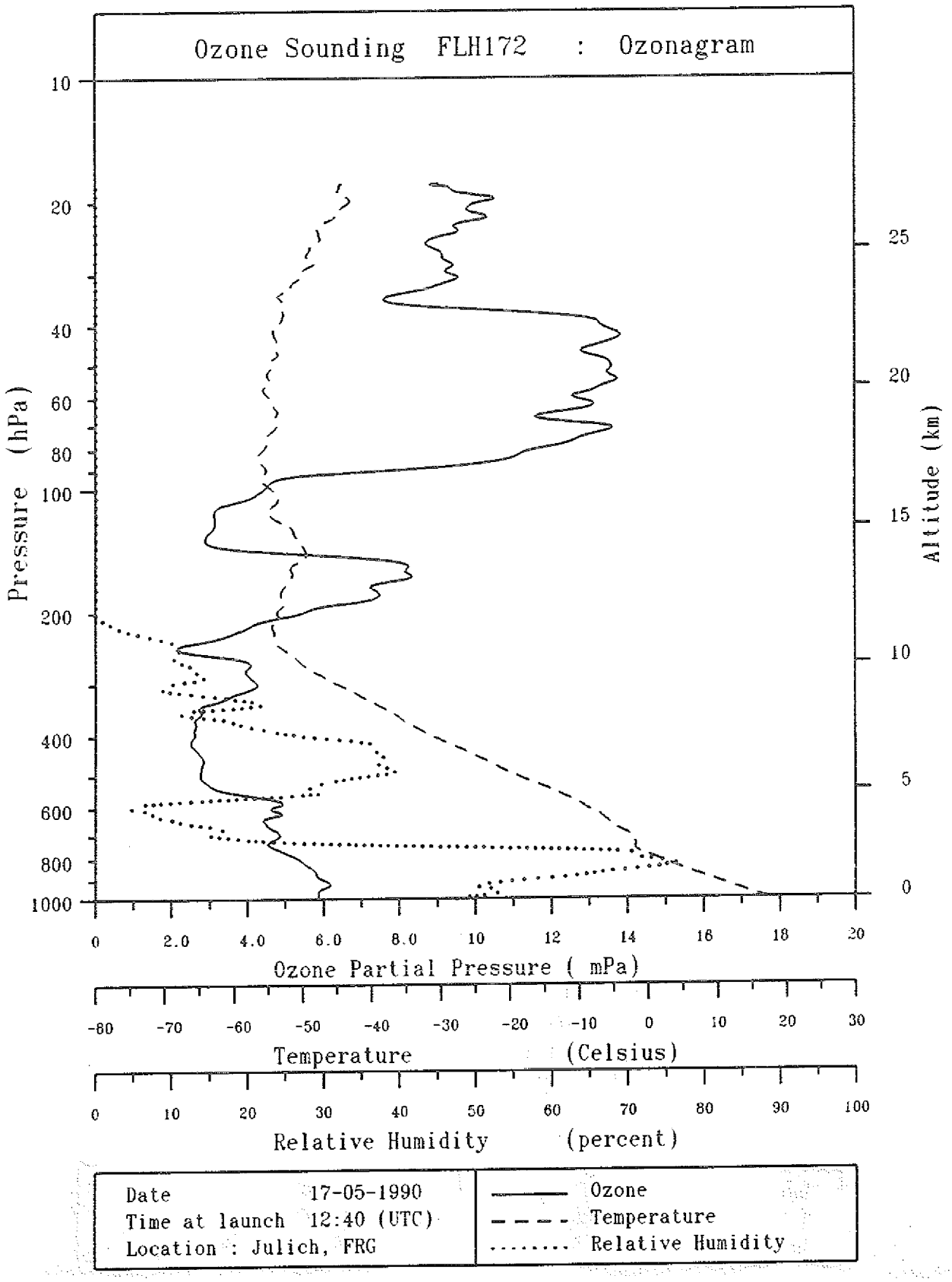


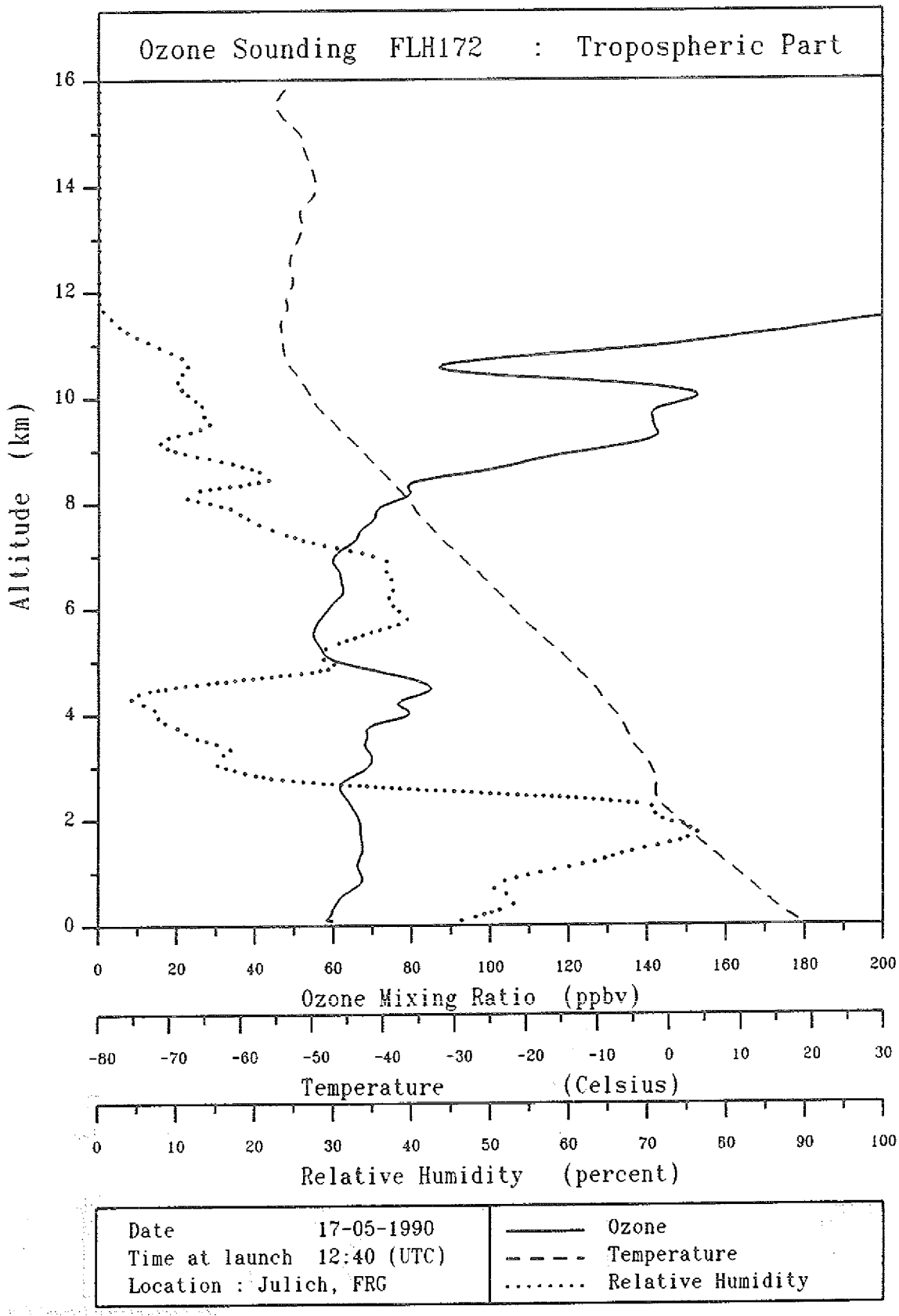
Date 10-05-1990	——— Ozone
Time at launch 12:00 (UTC)	- - - - Temperature
Location : Julich, FRG	..... Relative Humidity

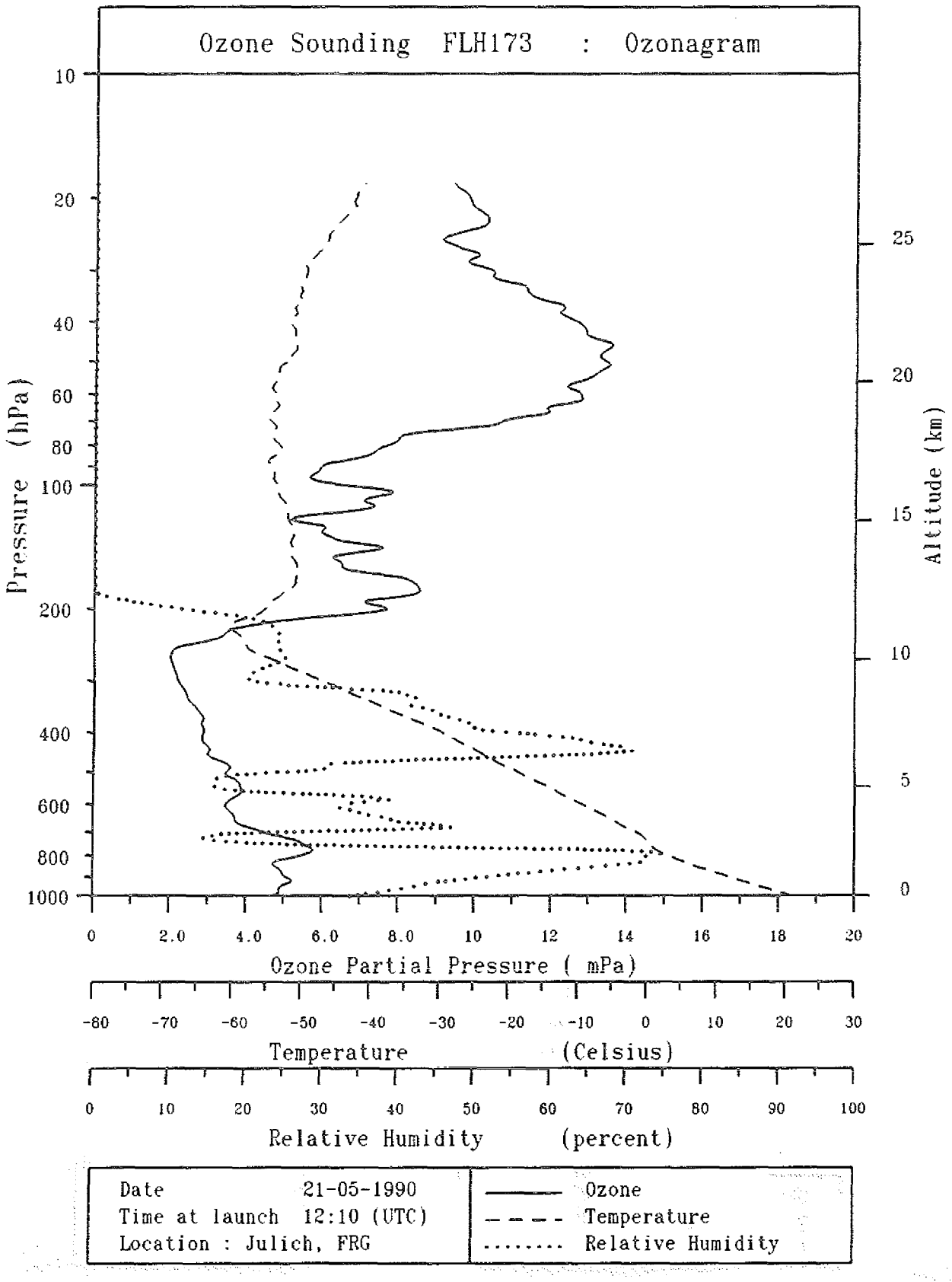

Ozone Sounding FLH166 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 10-05-1990
Time at launch 12:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

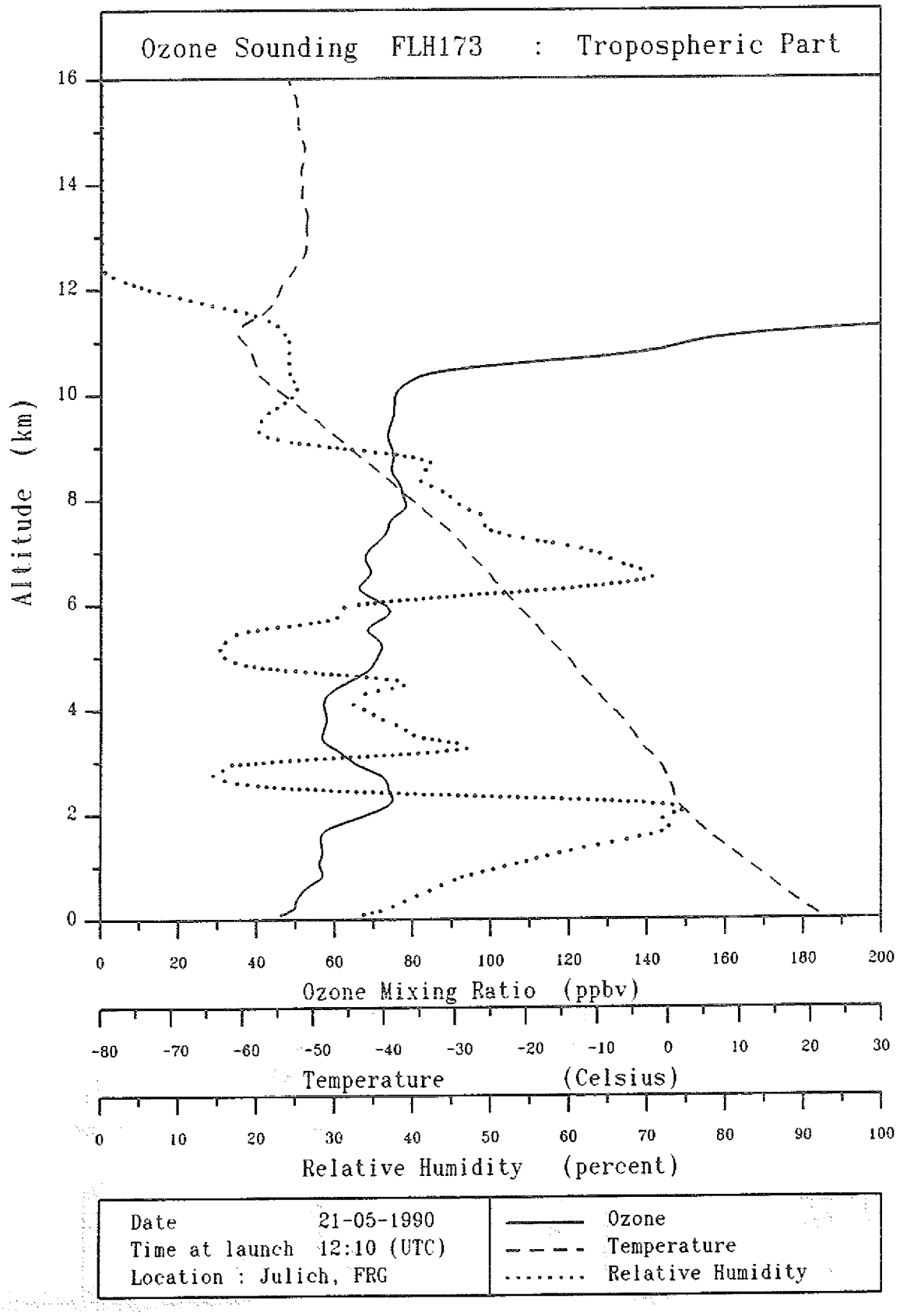

Ozone Sounding FLH171 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 14-05-1990
Time at launch 12:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

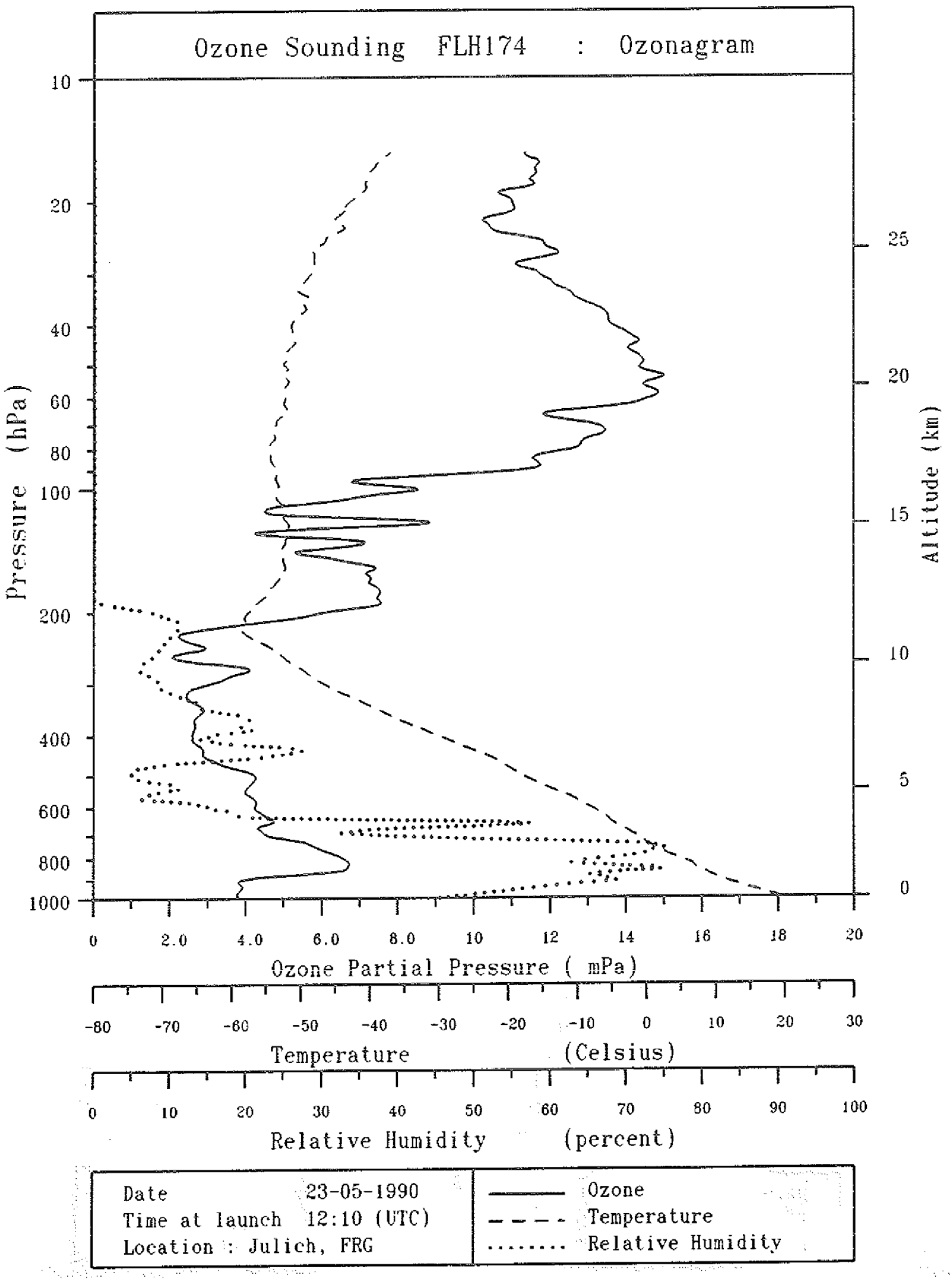

Ozone Sounding FLH171 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 14-05-1990
Time at launch 12:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

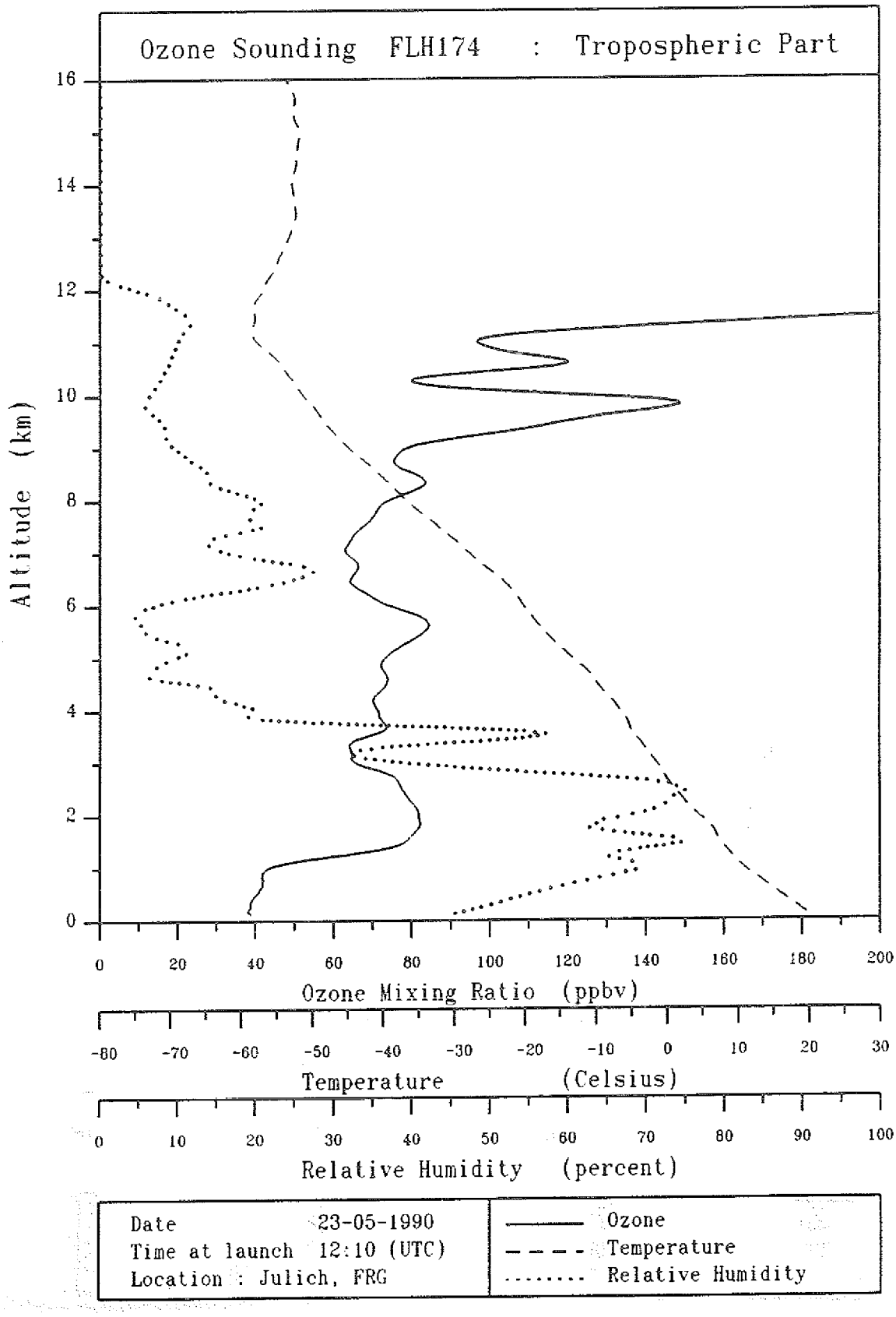

Ozone Sounding FLH172 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 17-05-1990
Time at launch 12:40 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

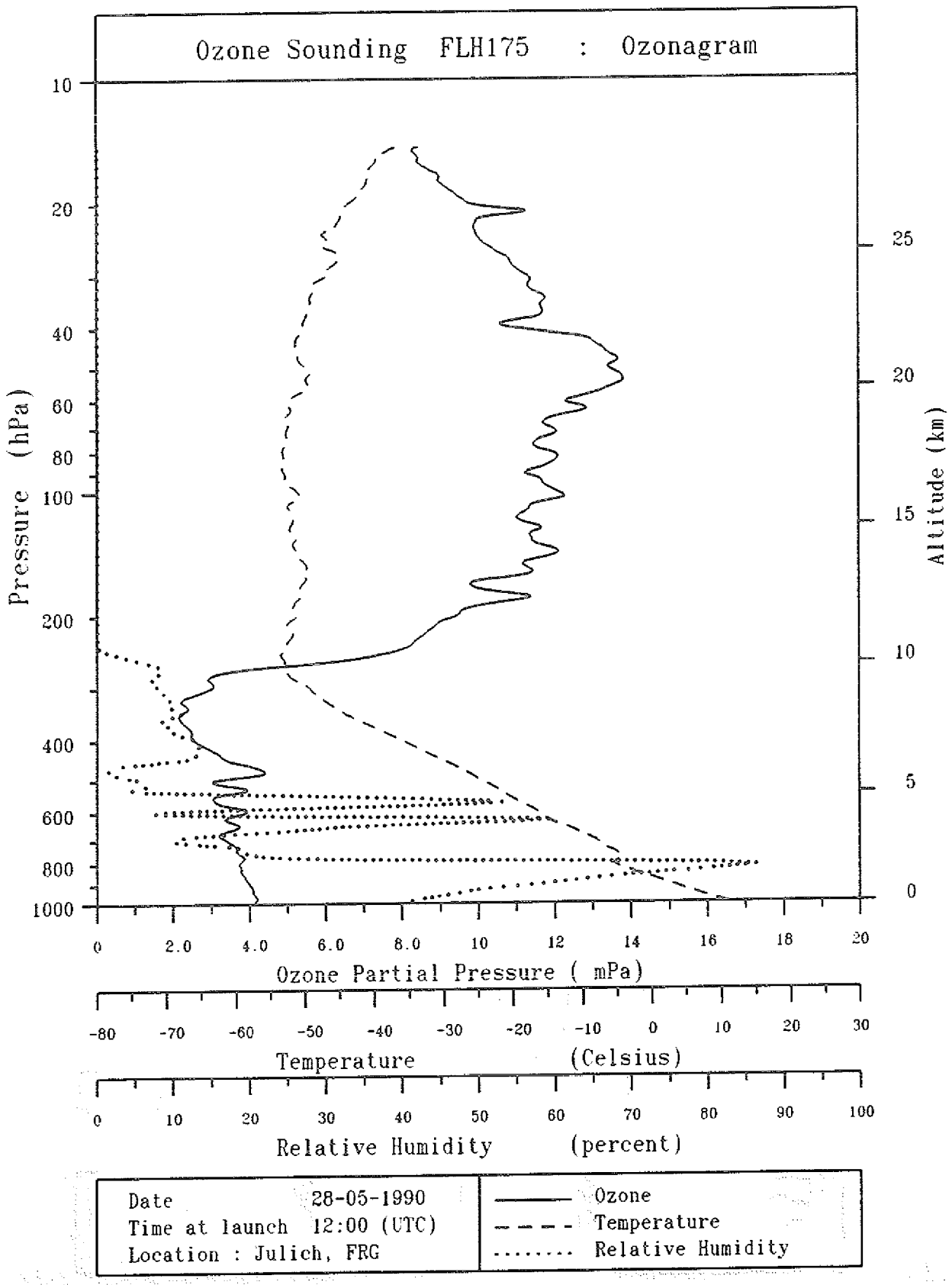

Ozone Sounding FLH172 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 17-05-1990
Time at launch 12:40 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

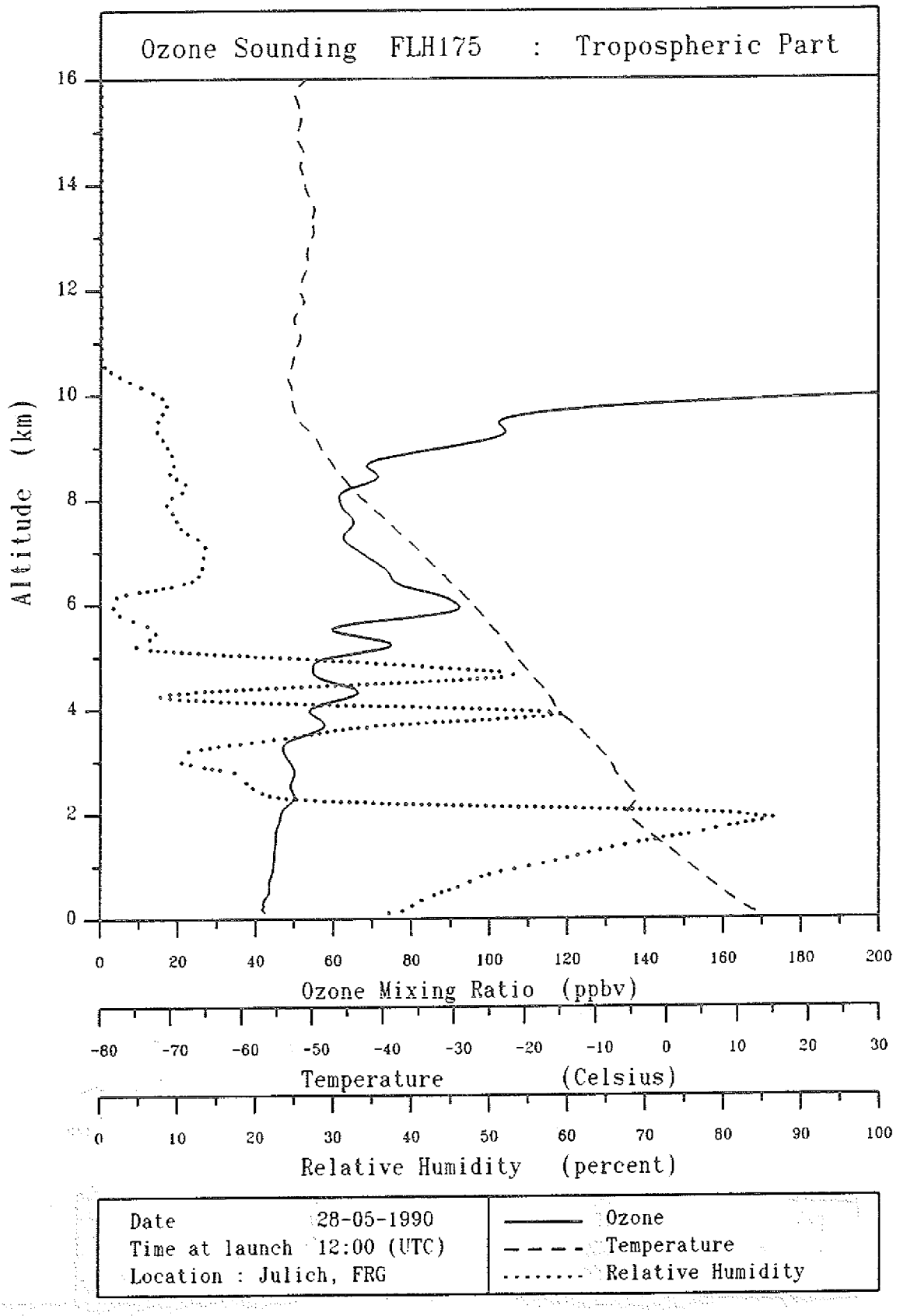

Ozone Sounding FLH173 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 21-05-1990
Time at launch 12:10 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

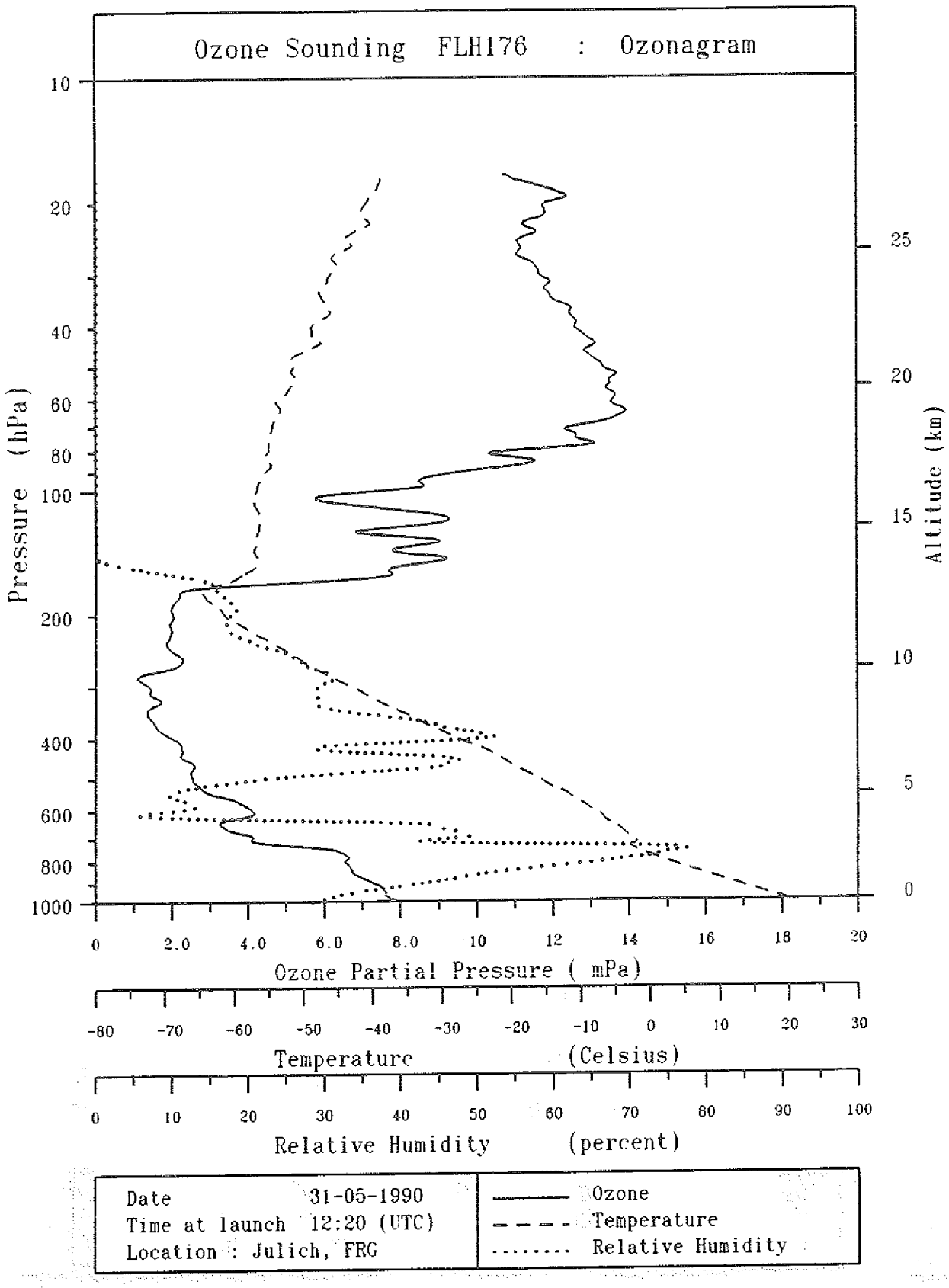

Ozone Sounding FLH173 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 21-05-1990
Time at launch 12:10 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH174 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 23-05-1990
Time at launch 12:10 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

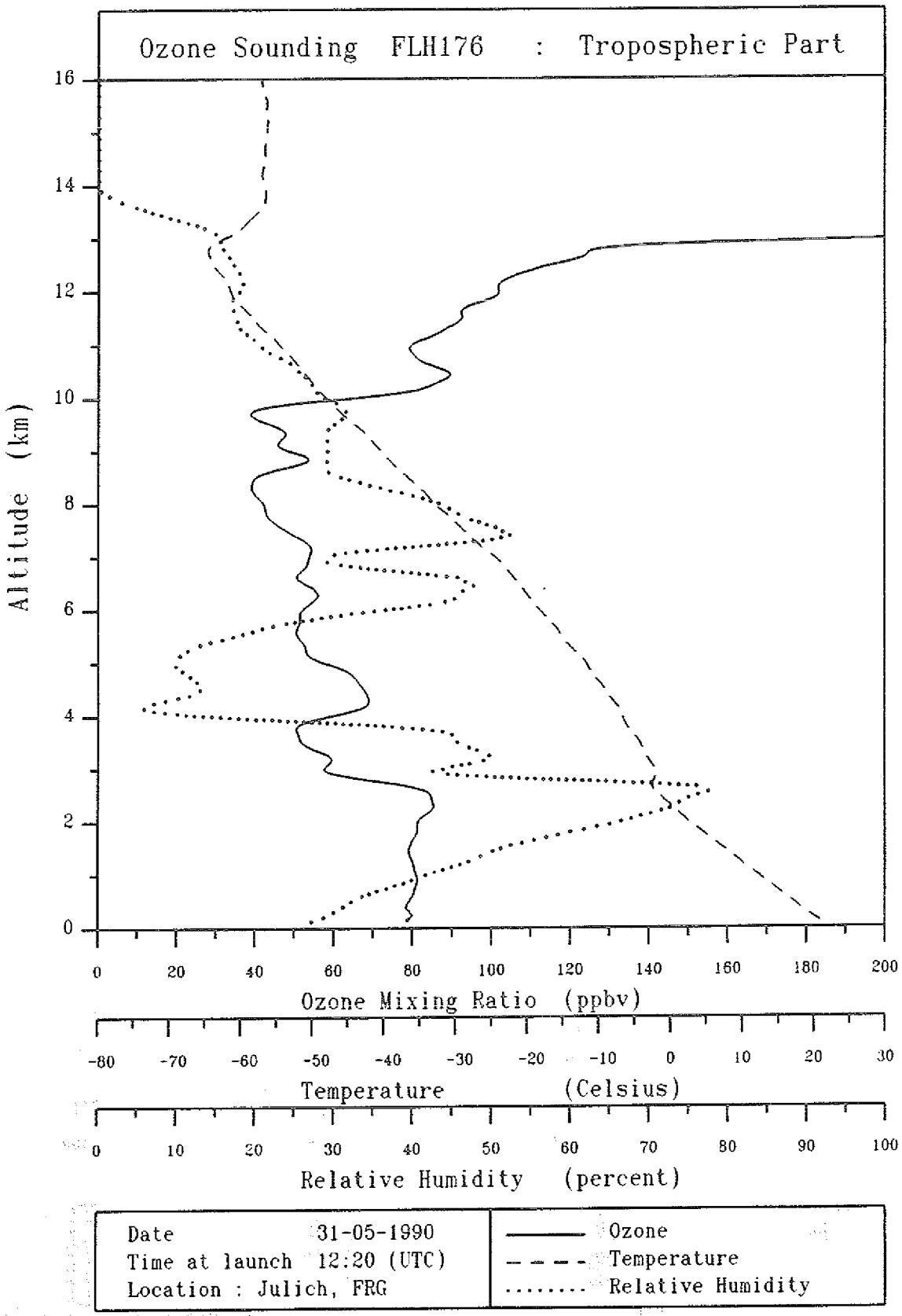

Ozone Sounding FLH174 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 23-05-1990
Time at launch 12:10 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

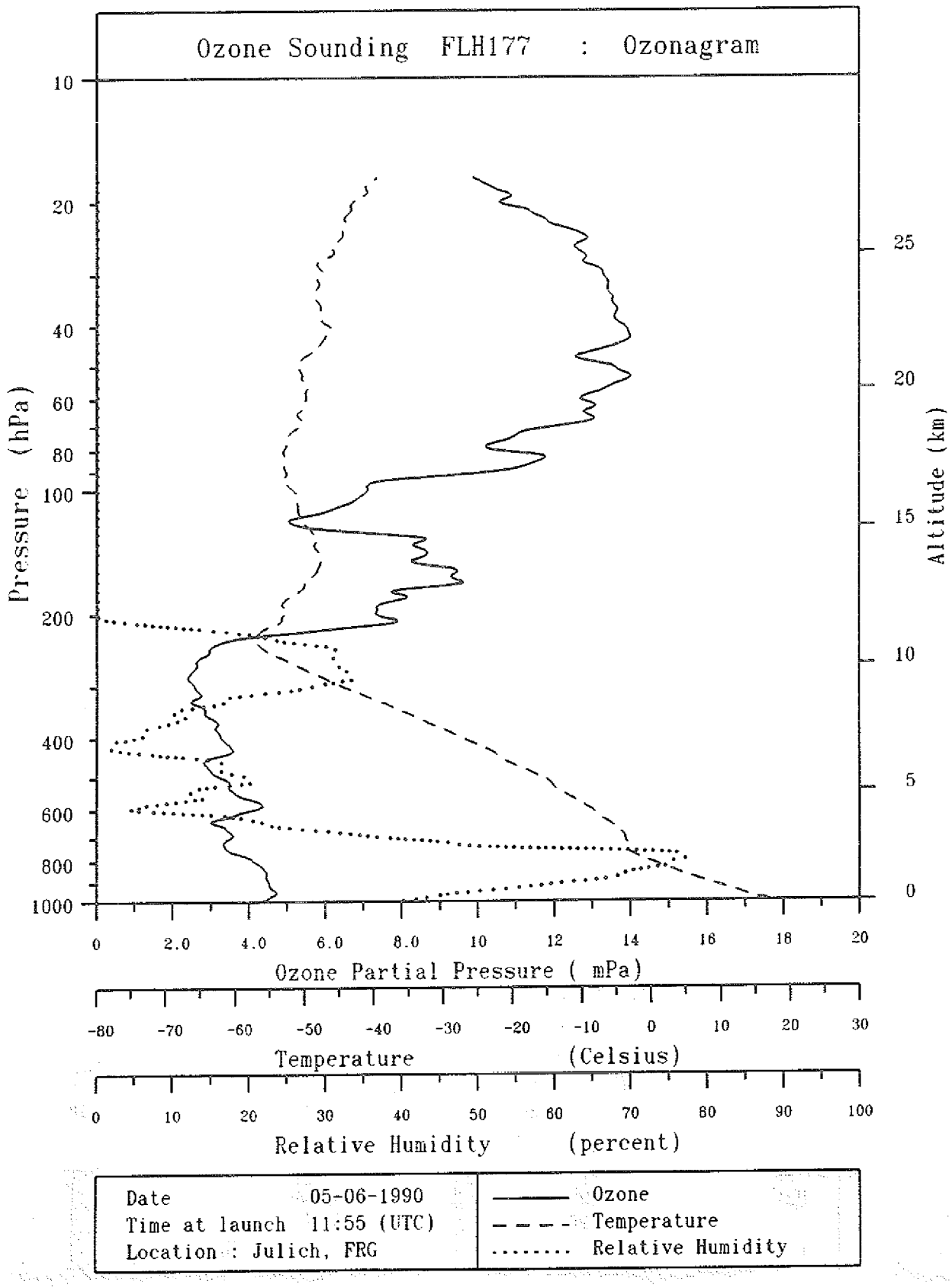

Ozone Sounding FLH175 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 28-05-1990
Time at launch 12:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH175 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 28-05-1990
Time at launch 12:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

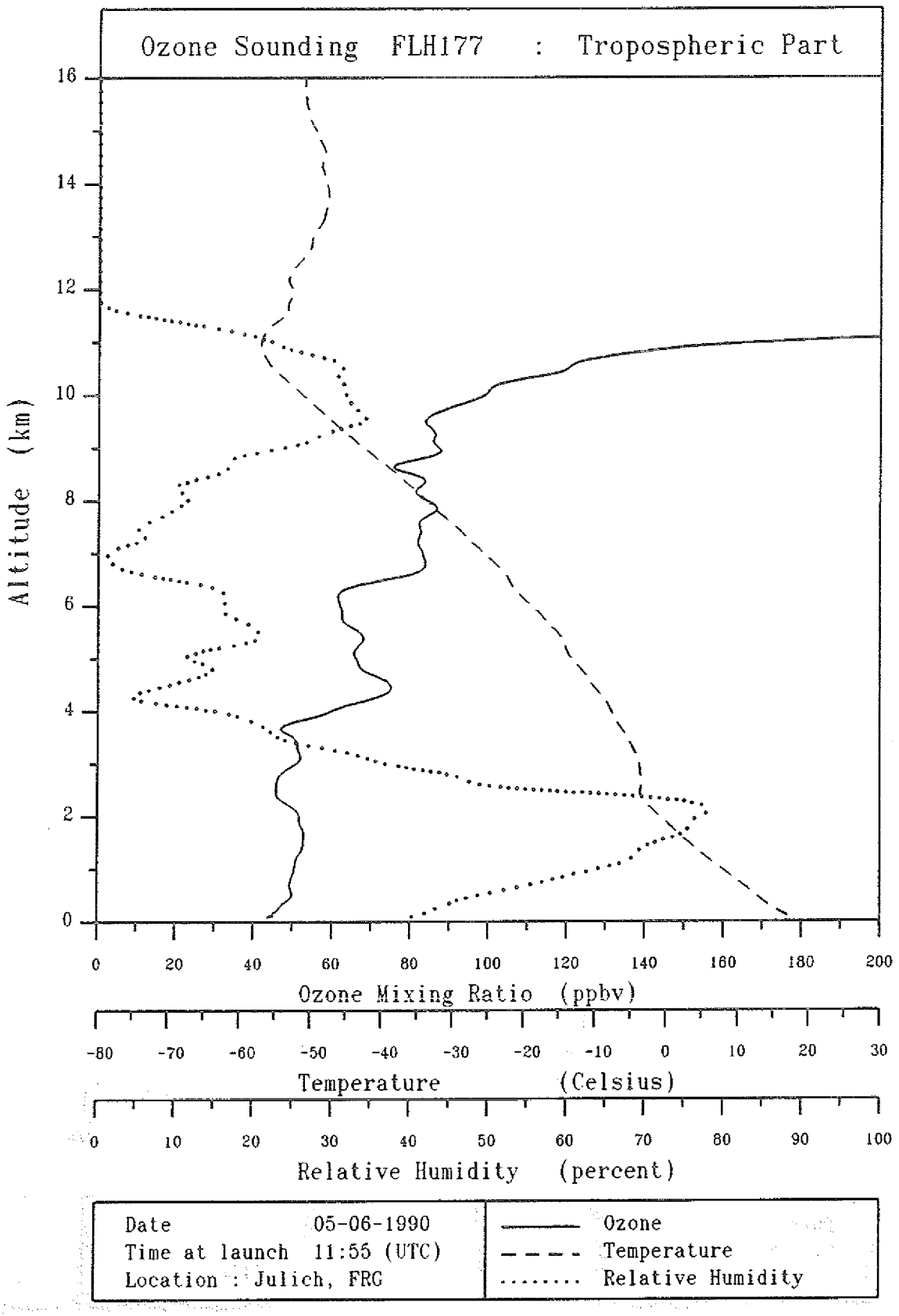


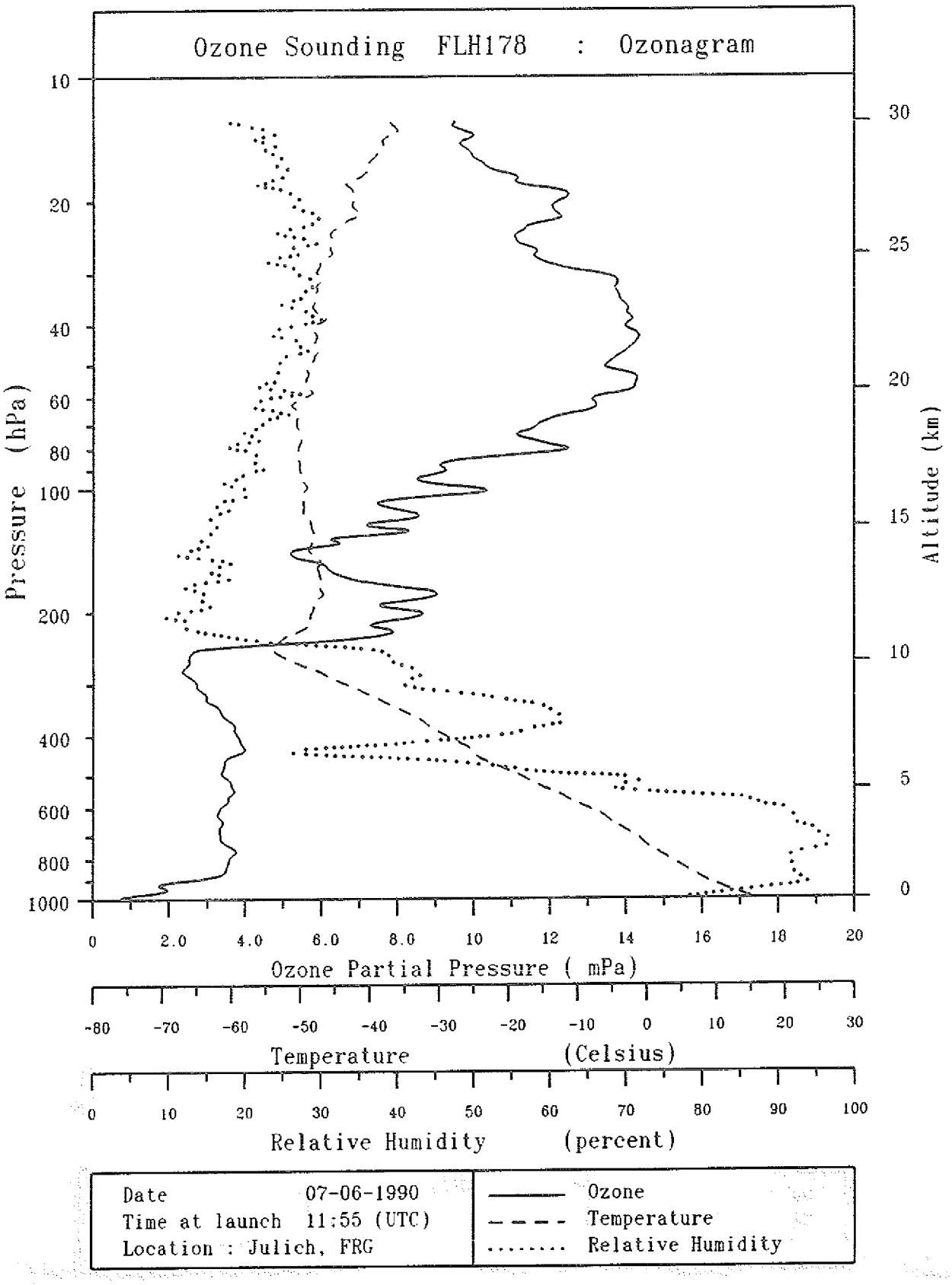
Date 31-05-1990	——— Ozone
Time at launch 12:20 (UTC)	- - - - Temperature
Location : Julich, FRG	..... Relative Humidity

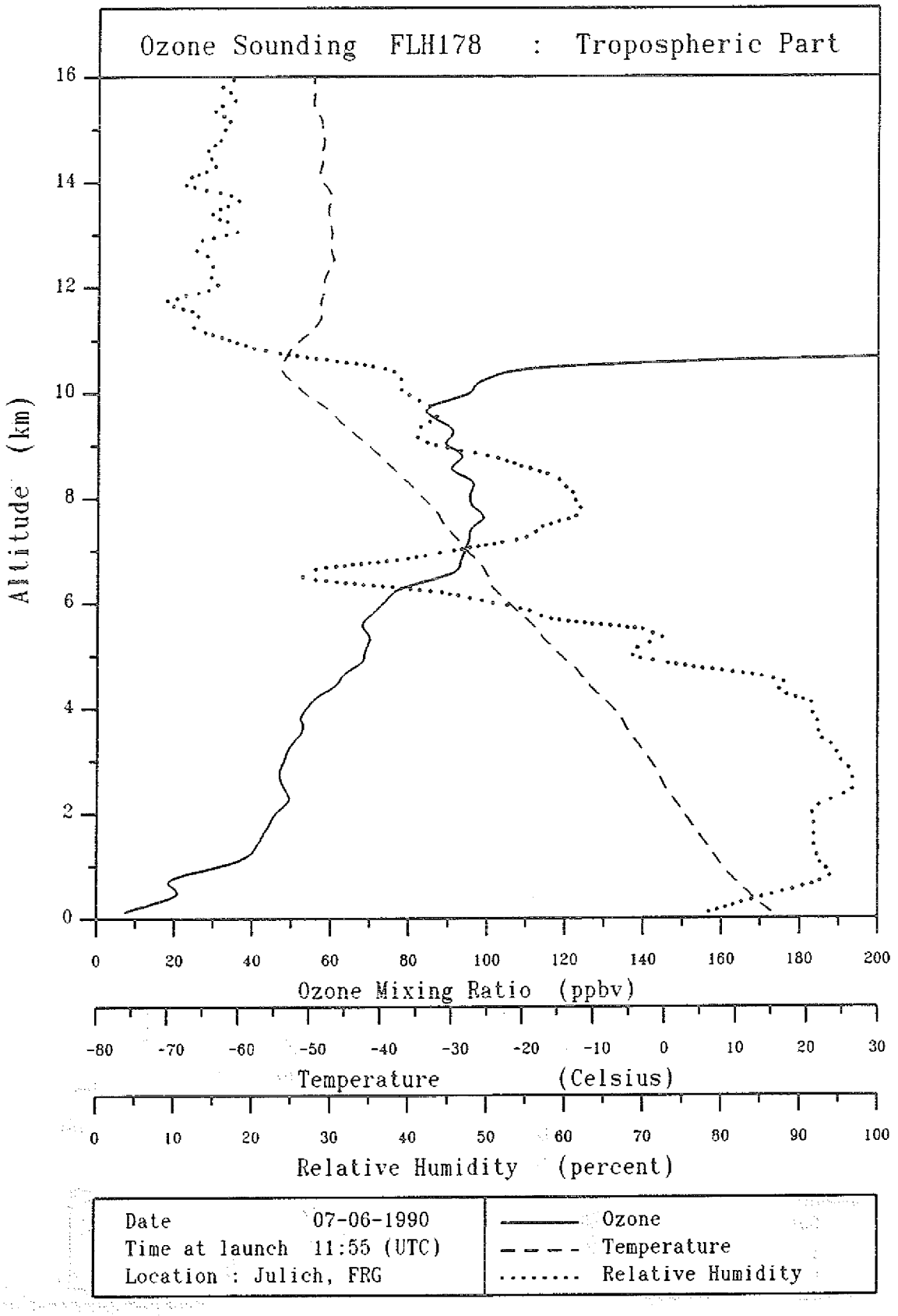

Ozone Sounding FLH176 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 31-05-1990
Time at launch 12:20 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

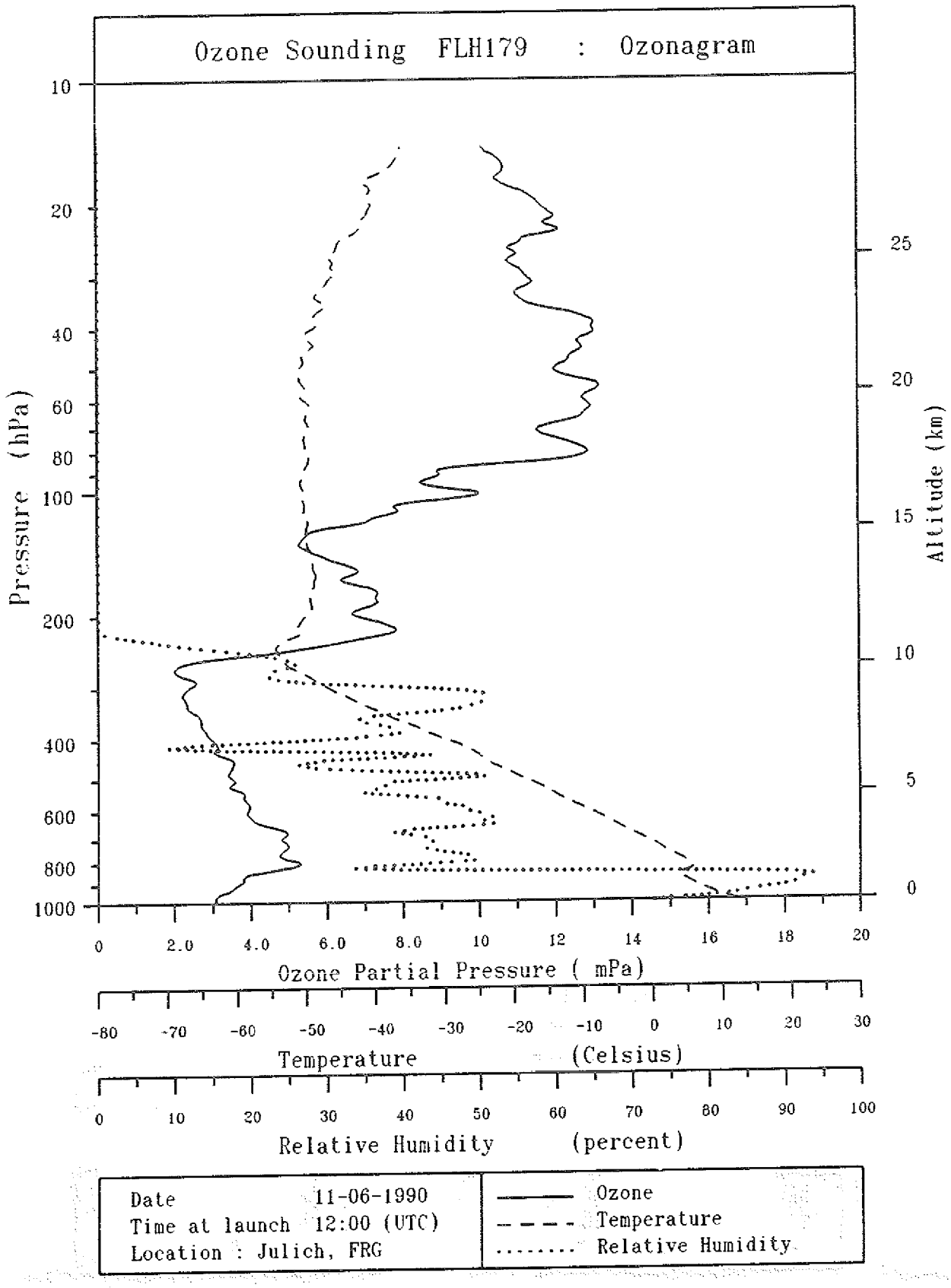


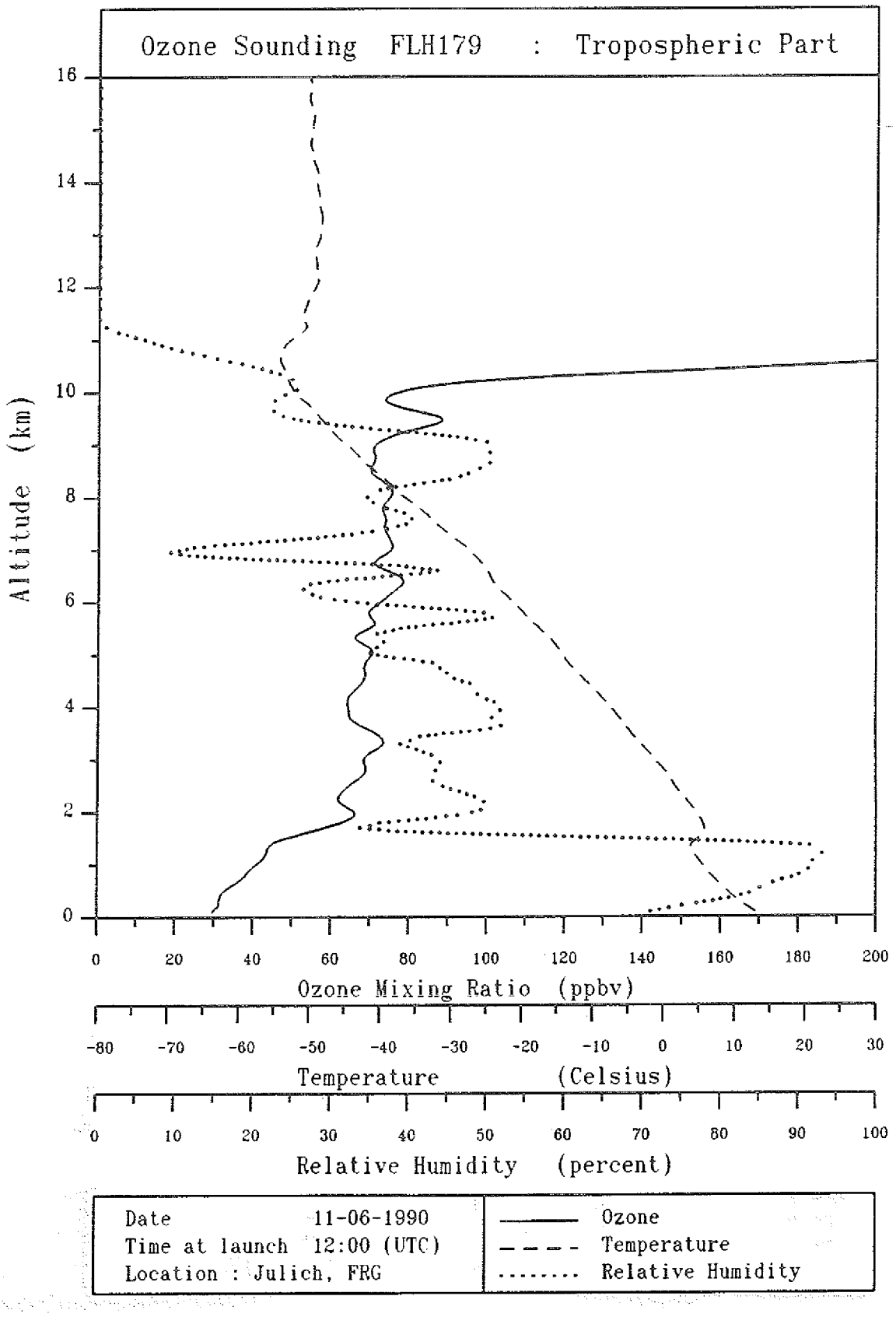
Date 05-06-1990	——— Ozone
Time at launch 11:55 (UTC)	– – – – Temperature
Location : Julich, FRG	..... Relative Humidity

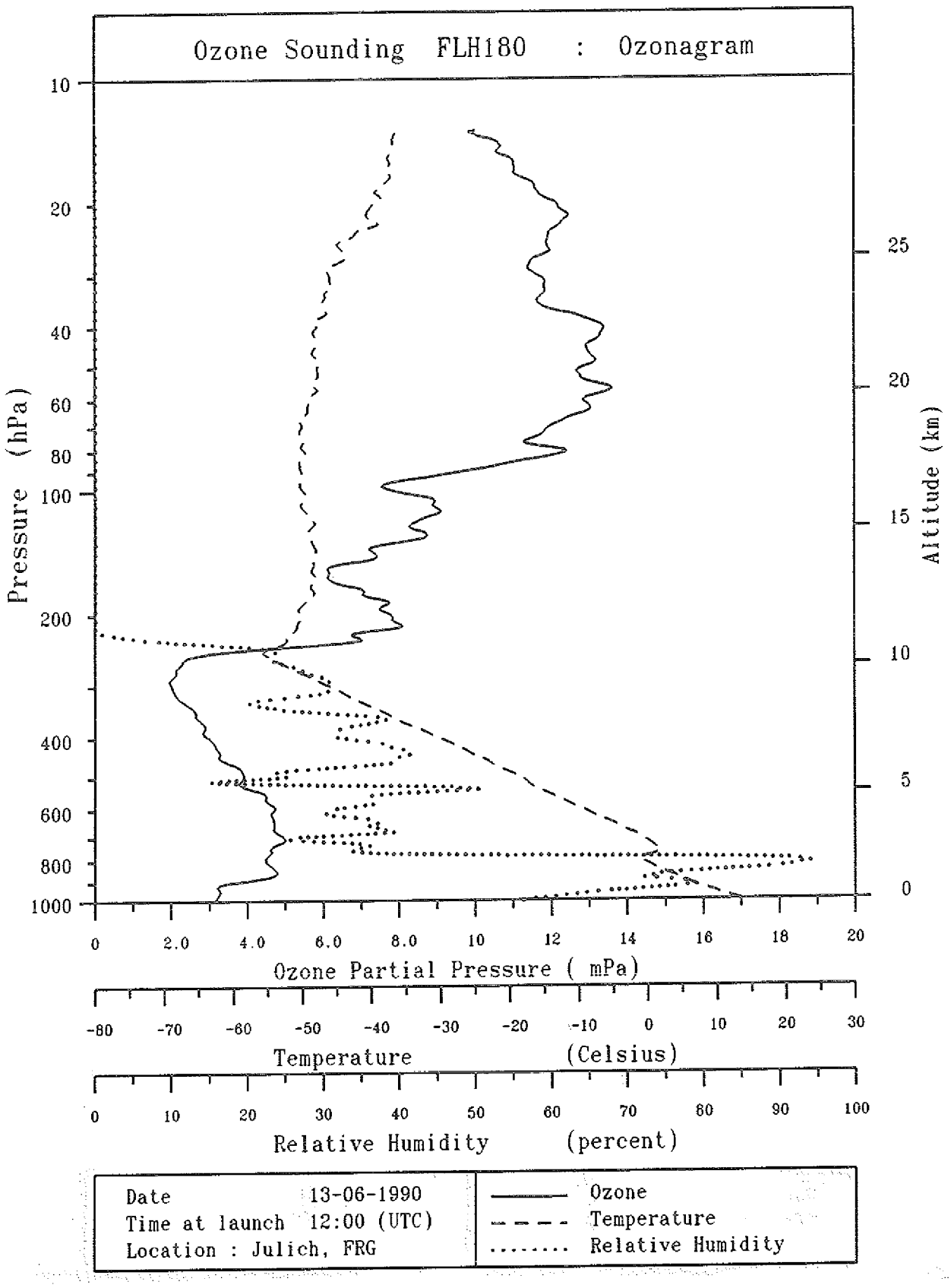

Ozone Sounding FLH177 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 05-06-1990
Time at launch 11:55 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH178 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
30
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 07-06-1990
Time at launch 11:55 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

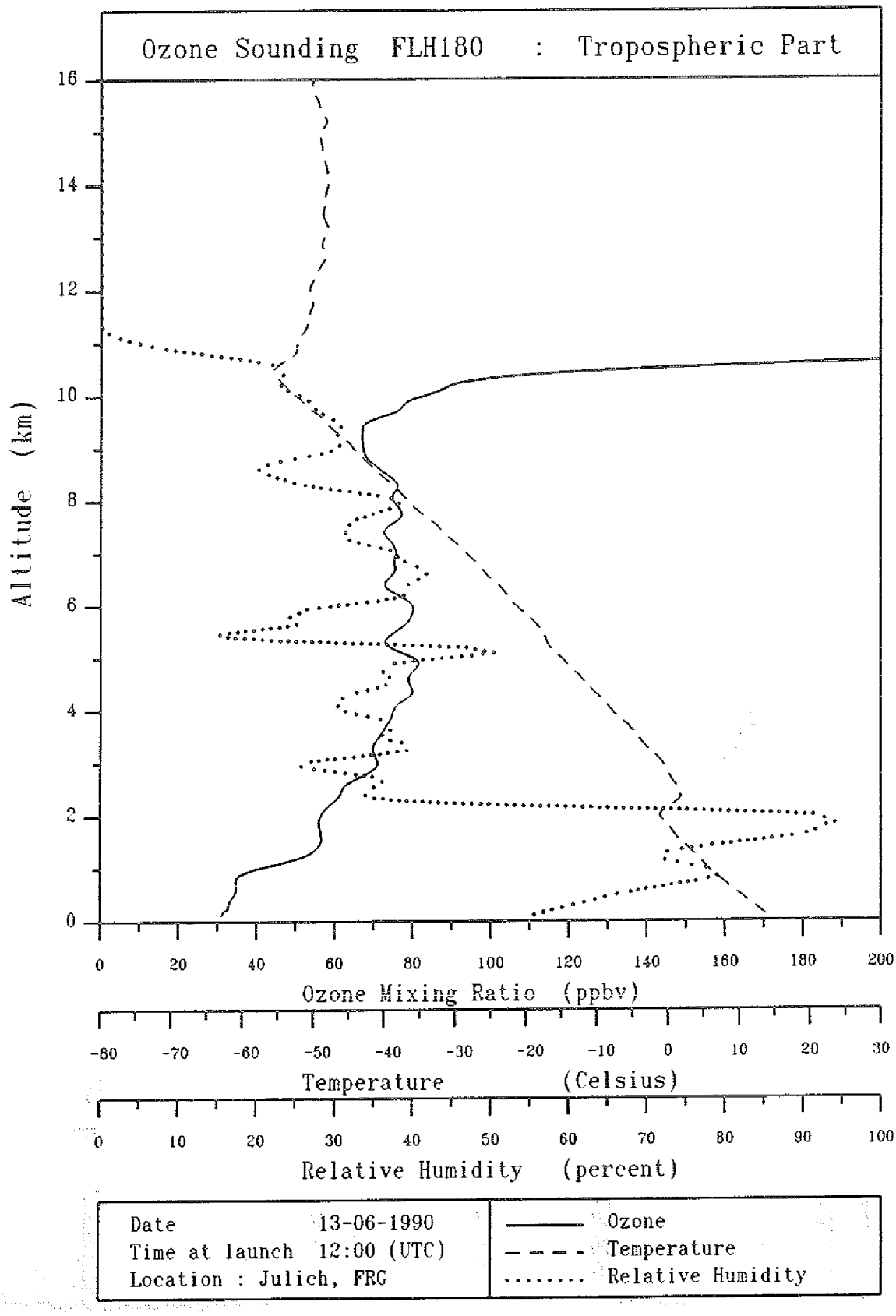

Ozone Sounding FLH178 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 07-06-1990
Time at launch 11:55 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

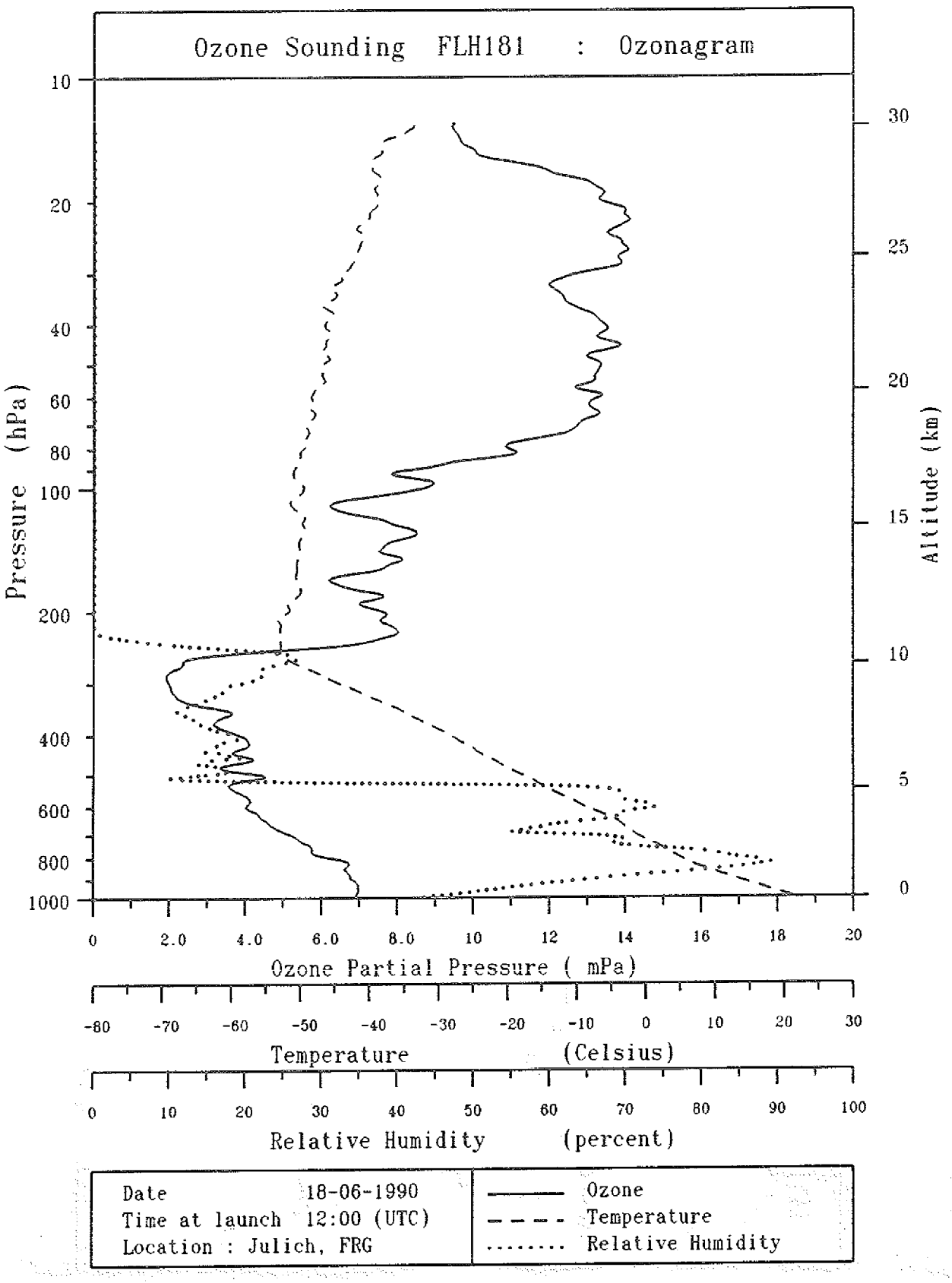

Ozone Sounding FLH179 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 11-06-1990
Time at launch 12:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

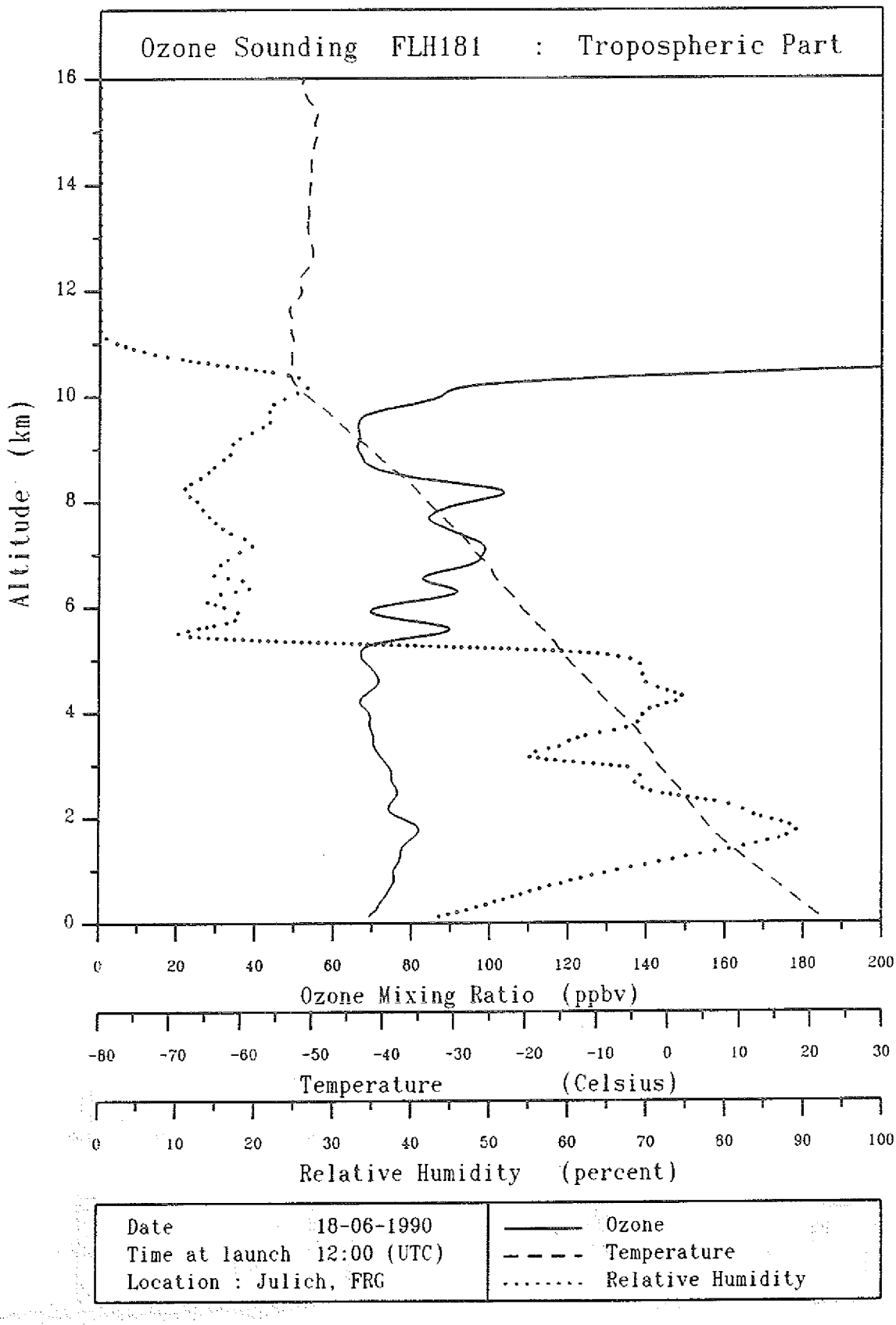

Ozone Sounding FLH179 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 11-06-1990
Time at launch 12:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

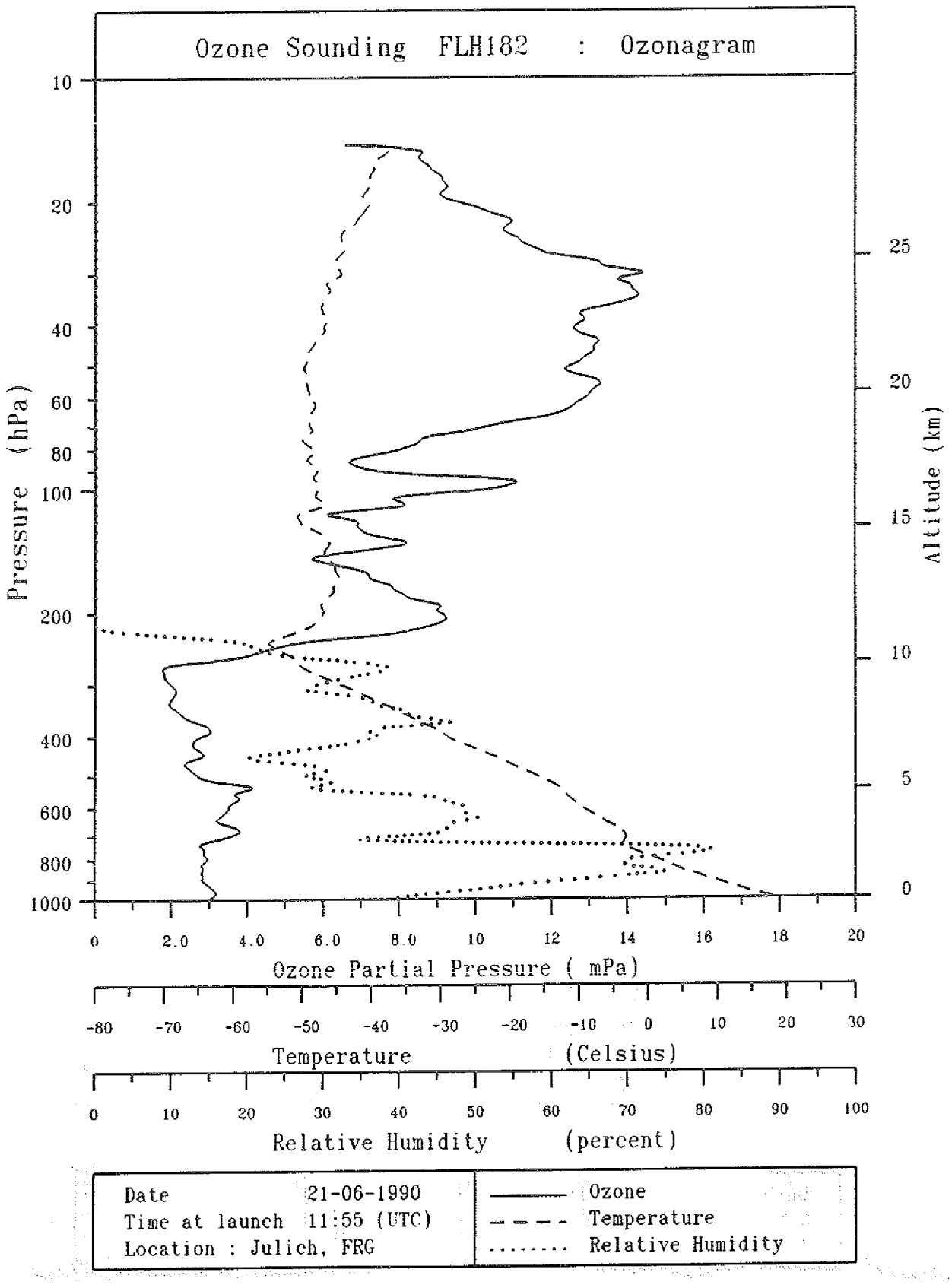


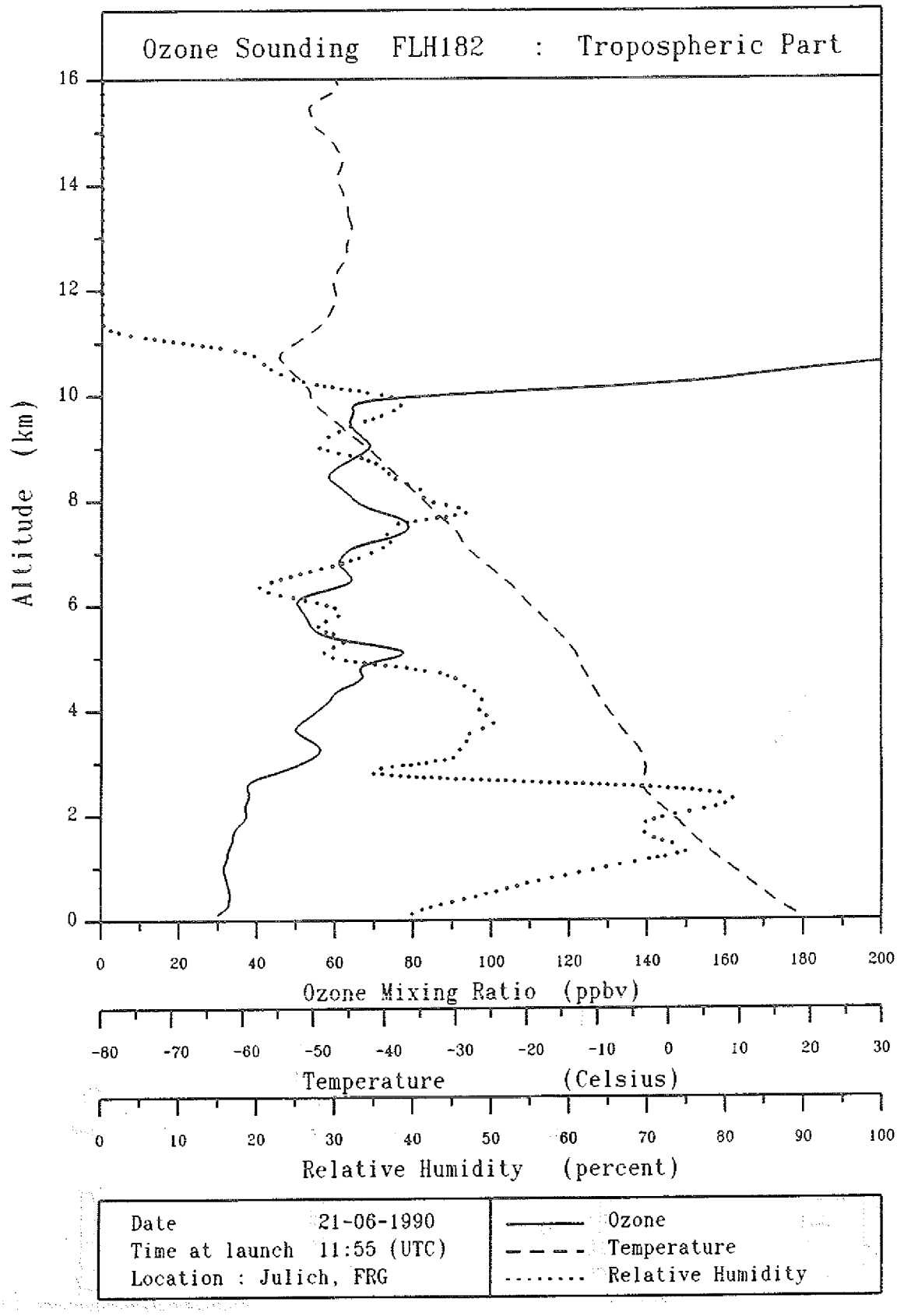
Date 13-06-1990	——— Ozone
Time at launch 12:00 (UTC)	- - - - Temperature
Location : Julich, FRG	..... Relative Humidity

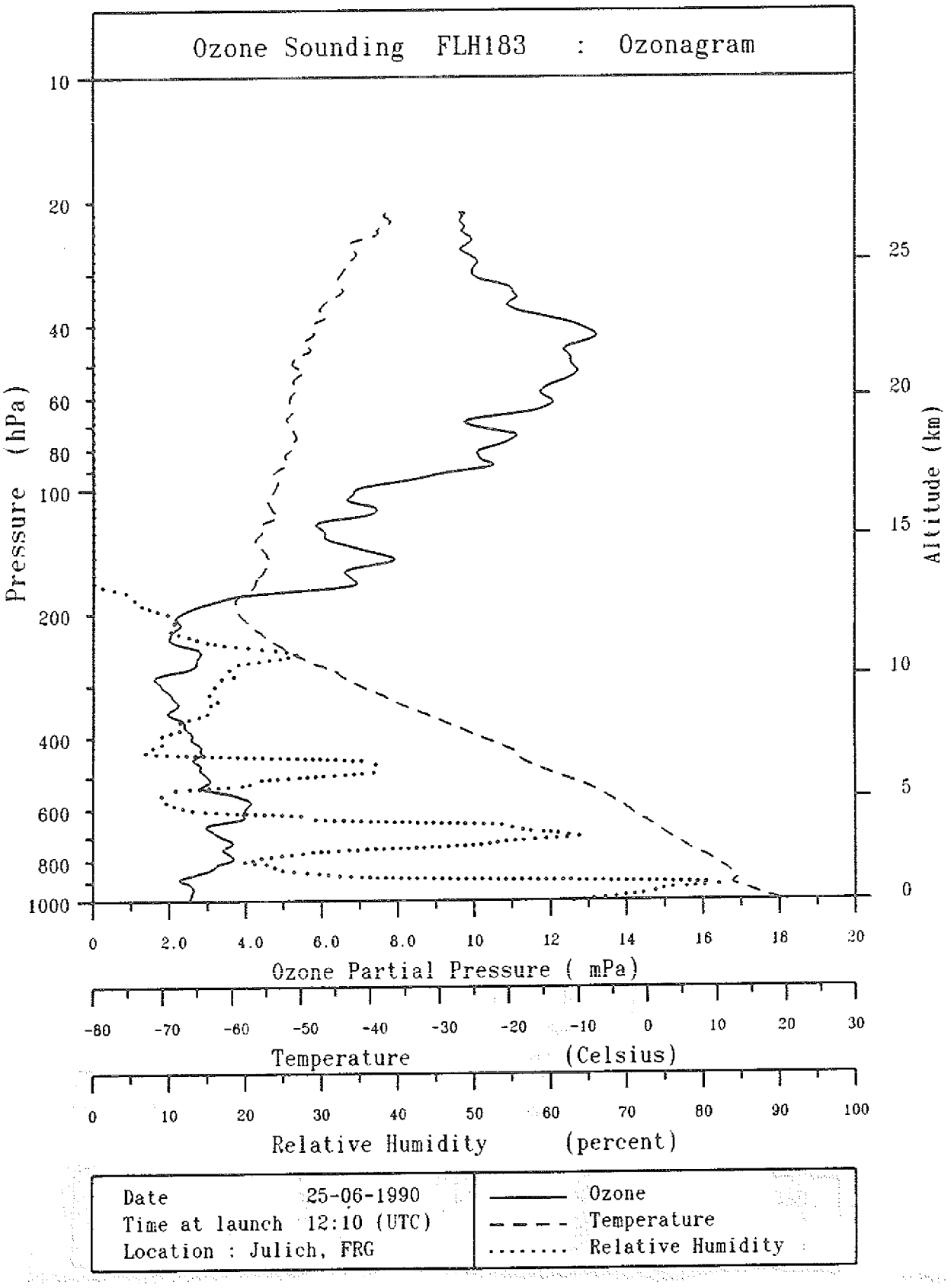

Ozone Sounding FLH180 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 13-06-1990
Time at launch 12:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

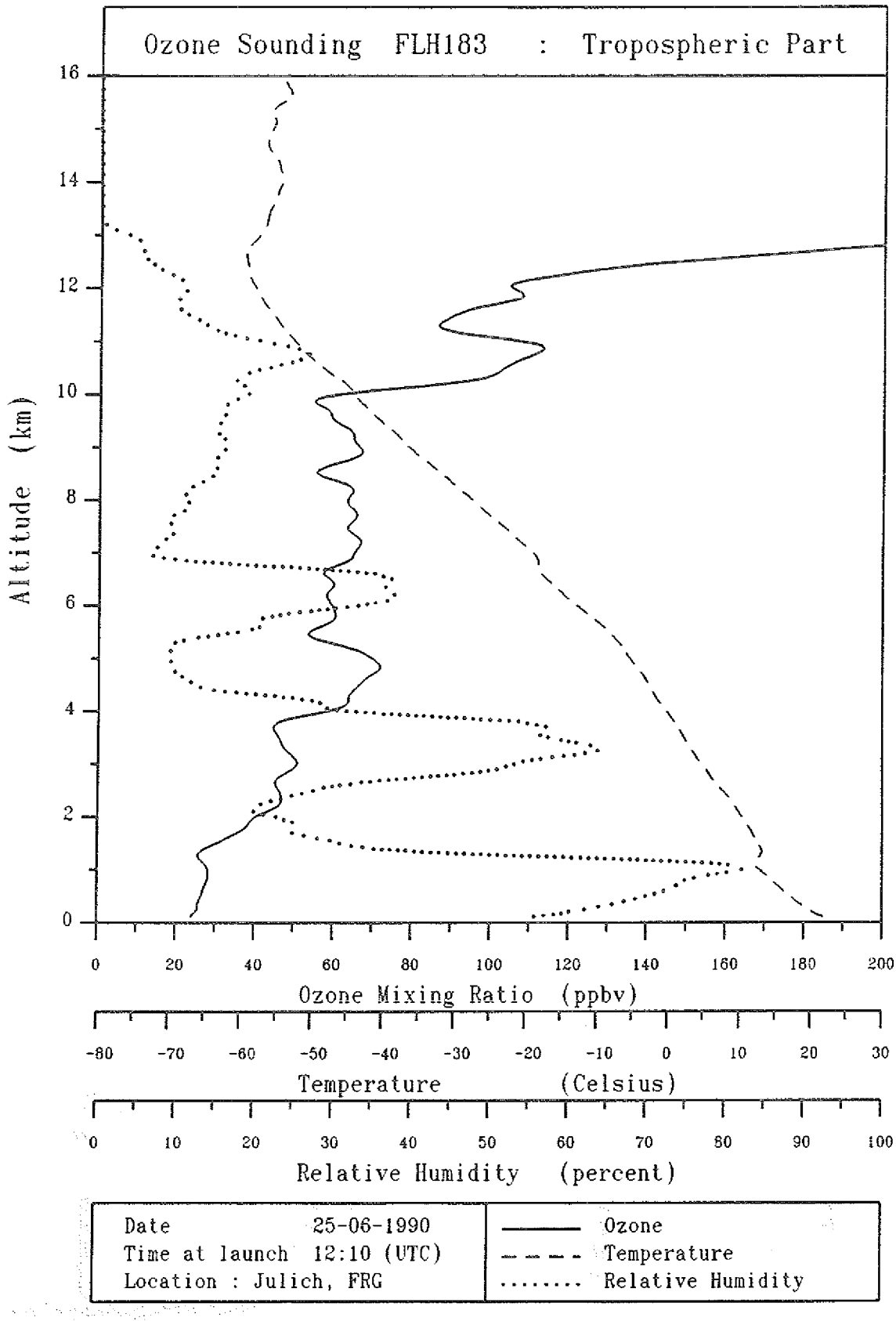

Ozone Sounding FLH181 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
30
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 18-06-1990
Time at launch 12:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

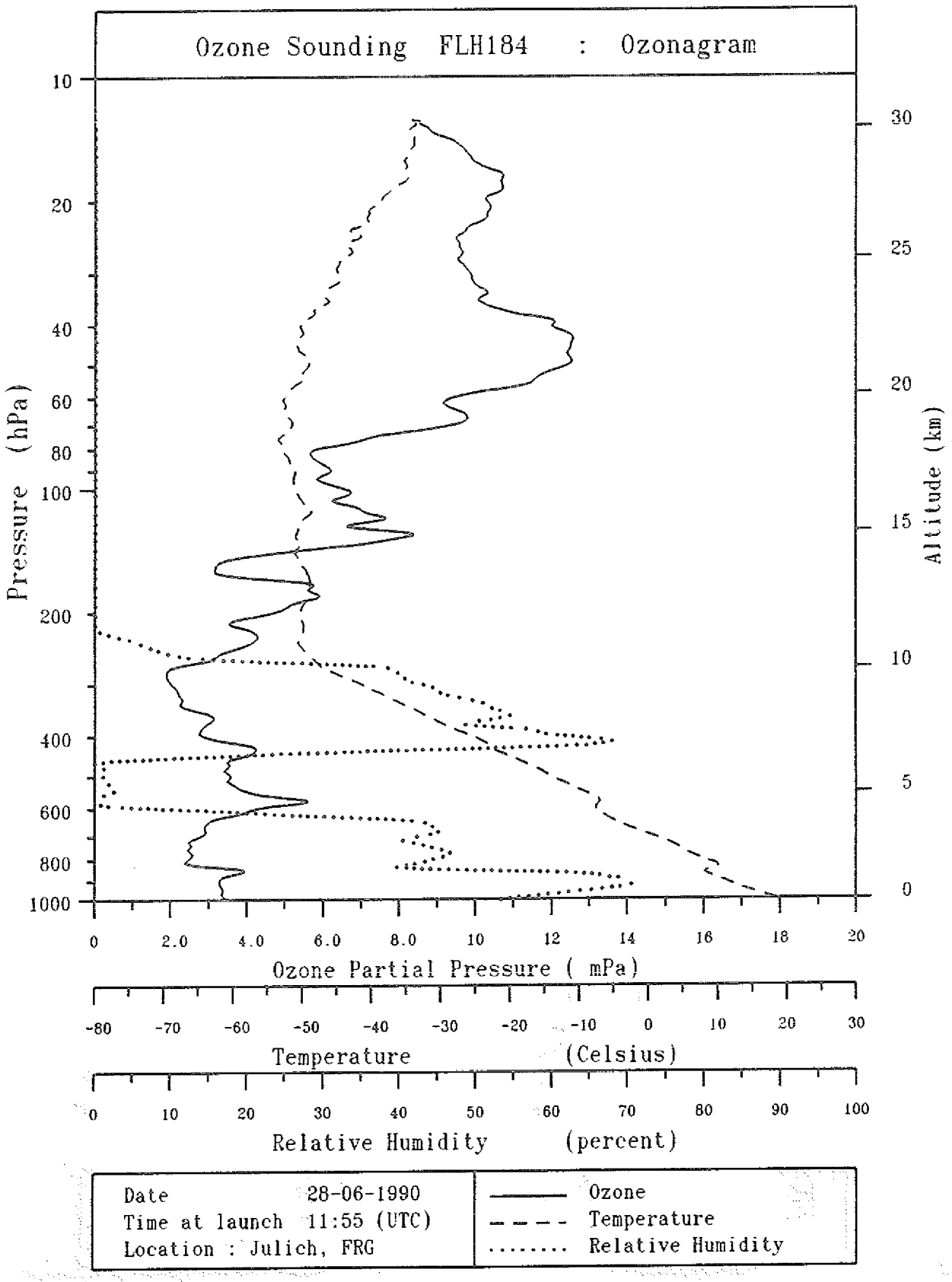

Ozone Sounding FLH181 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 18-06-1990
Time at launch 12:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

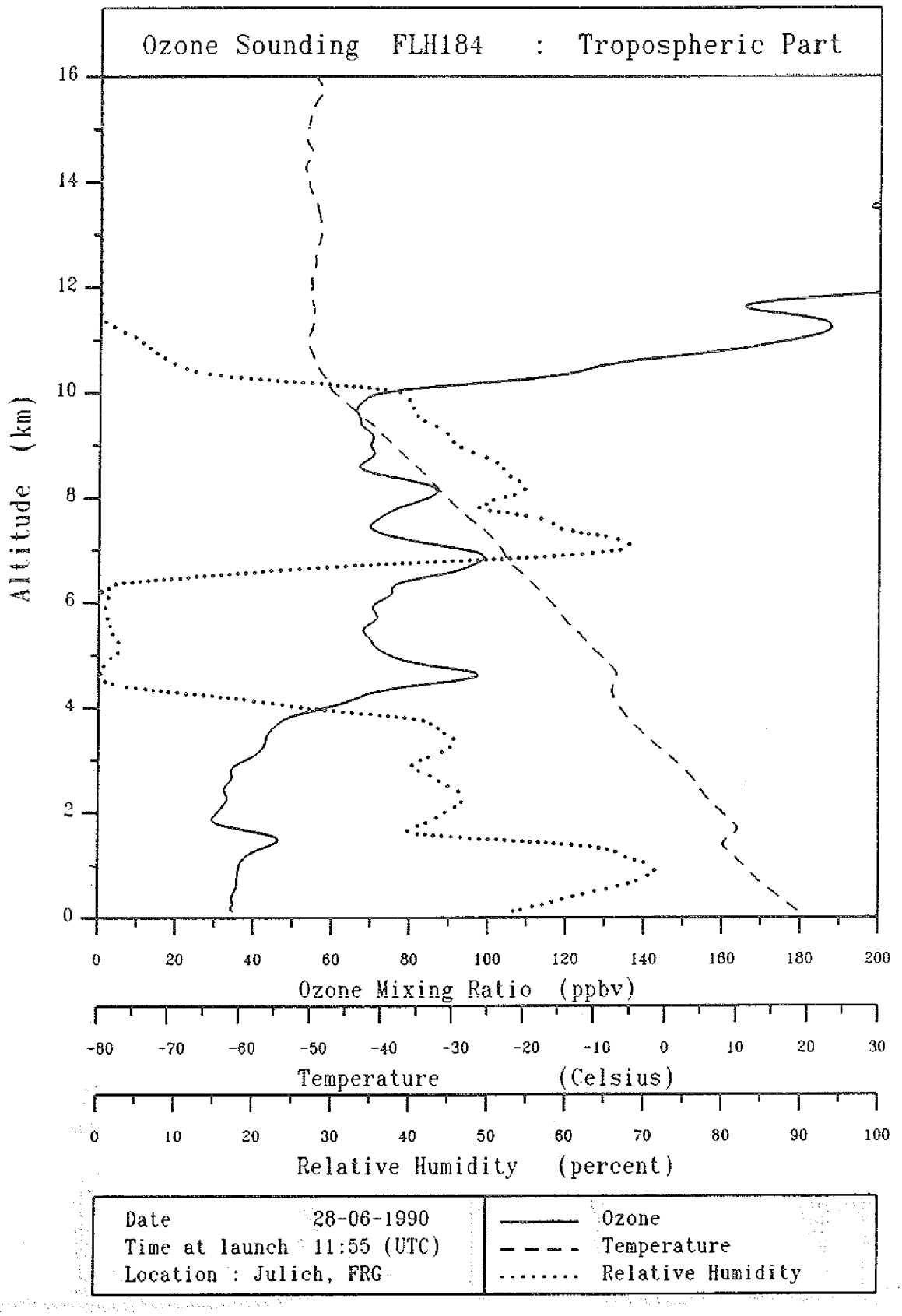

Ozone Sounding FLH182 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 21-06-1990
Time at launch 11:55 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH182 : Tropospheric Part
Altitude (km)
16
14
12
10
8
6
4
2
0
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 21-06-1990
Time at launch 11:55 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

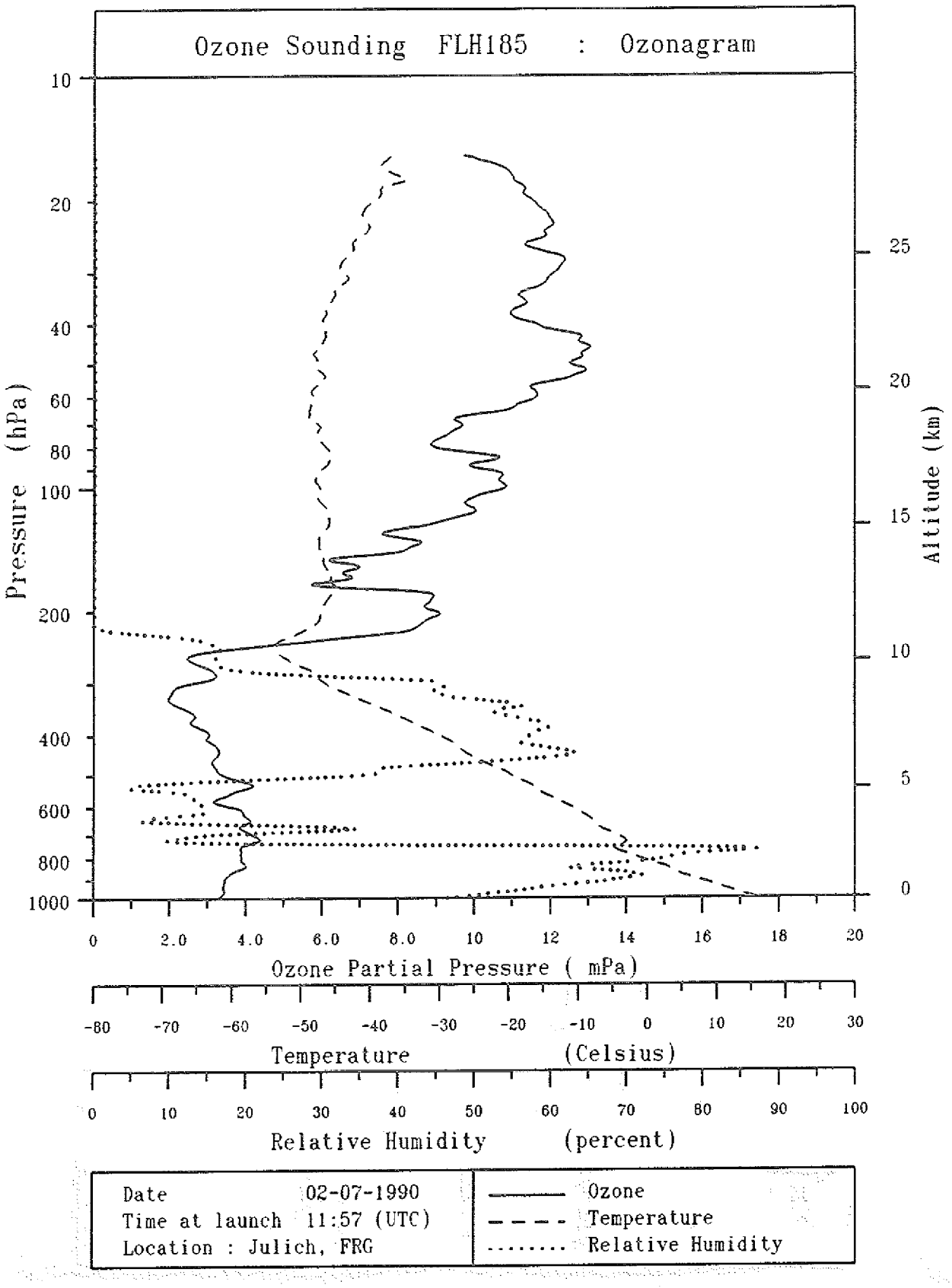

Ozone Sounding FLH183 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 25-06-1990
Time at launch 12:10 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH183 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 25-06-1990
Time at launch 12:10 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

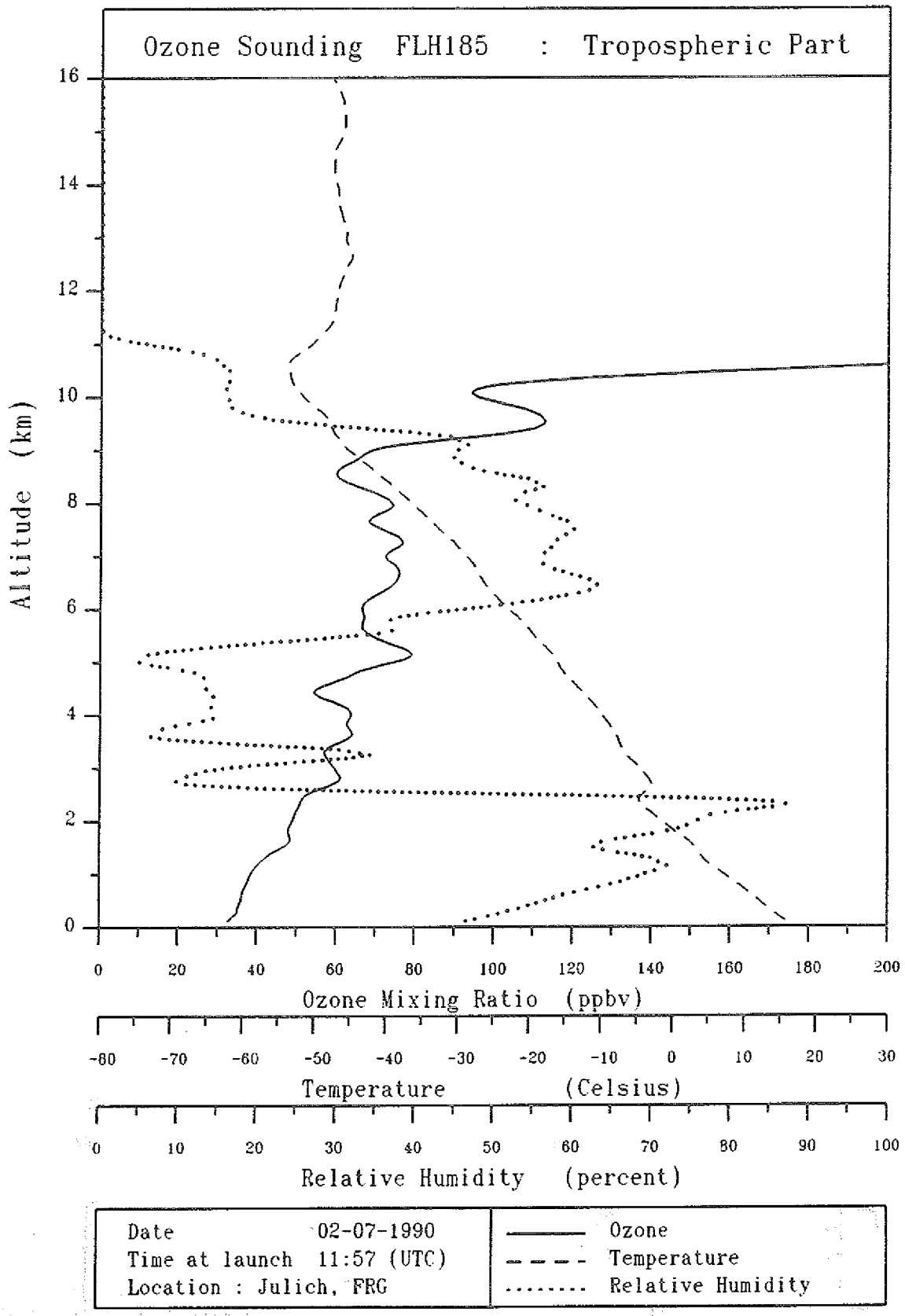

Ozone Sounding FLH184 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
30
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 28-06-1990
Time at launch 11:55 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

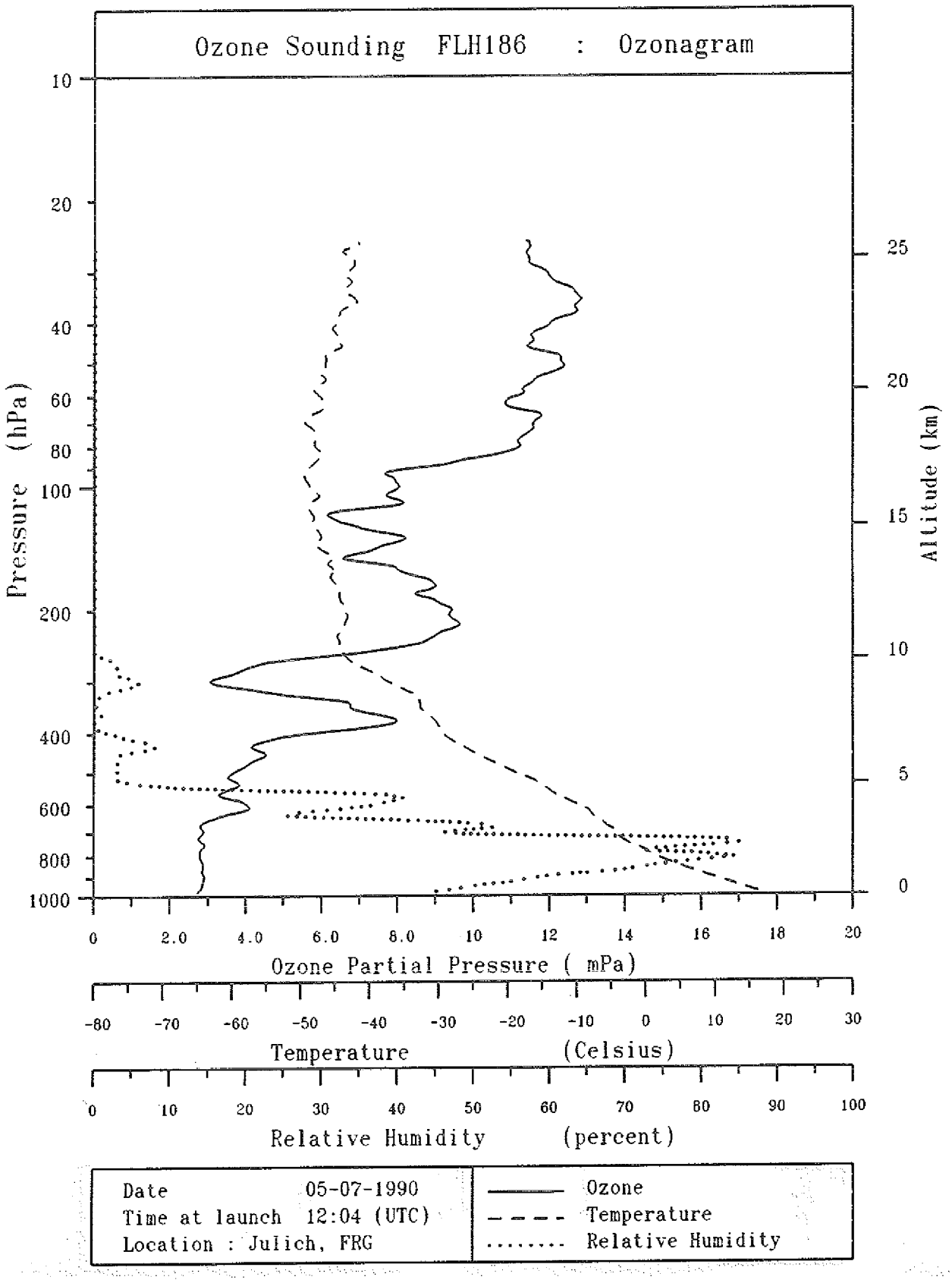


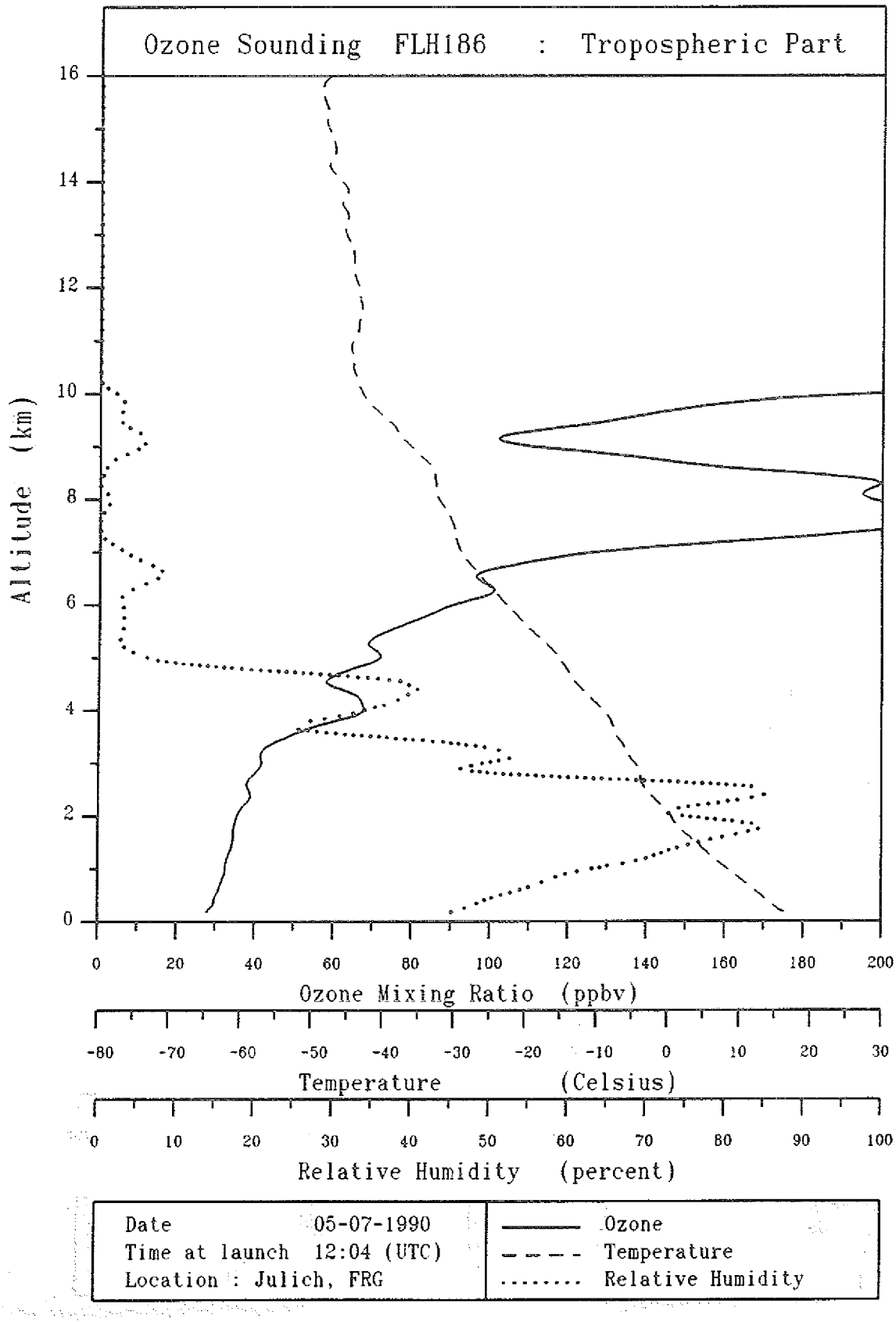
Date 28-06-1990	——— Ozone
Time at launch 11:55 (UTC)	– – – – Temperature
Location : Julich, FRG	..... Relative Humidity

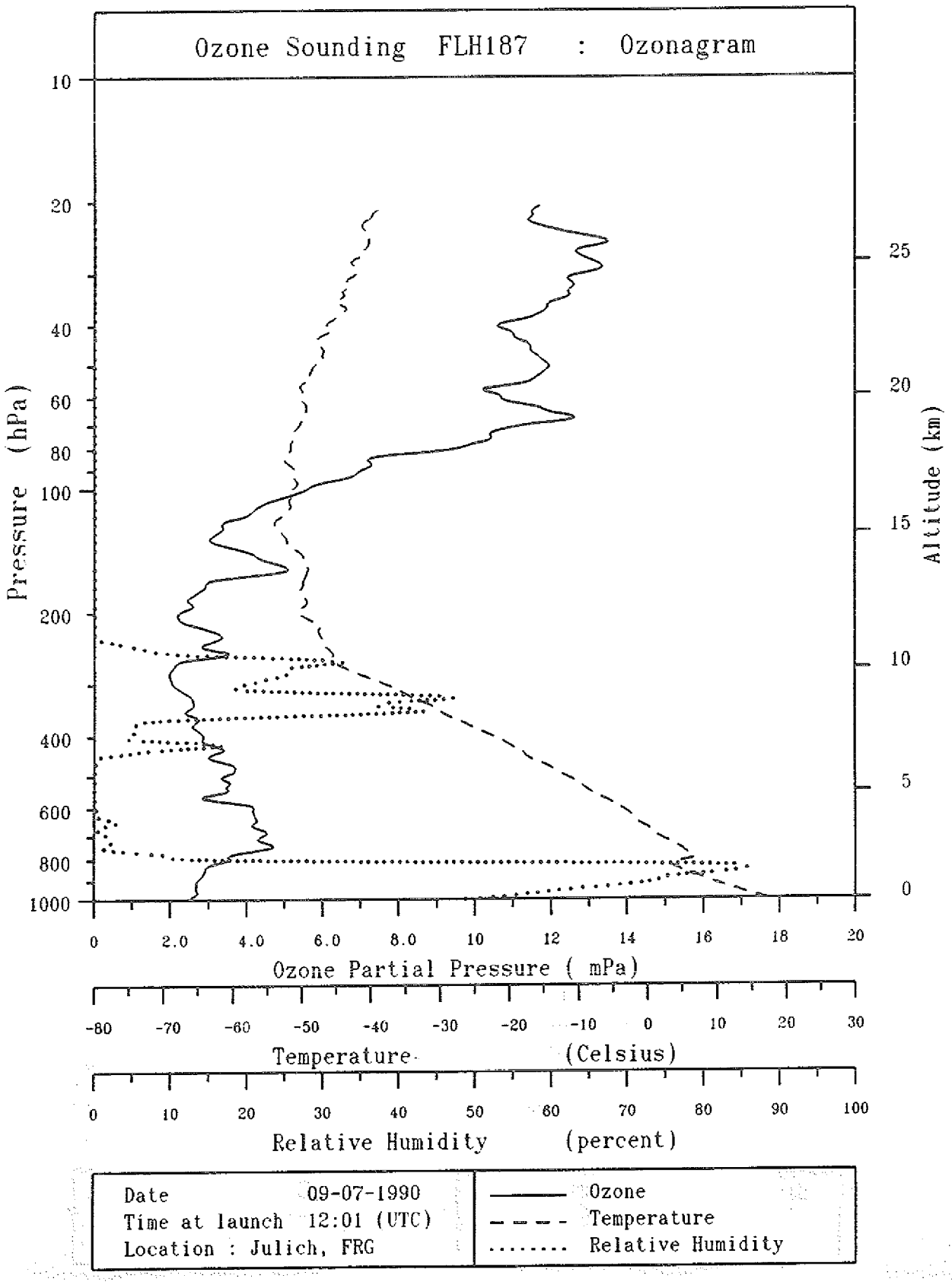


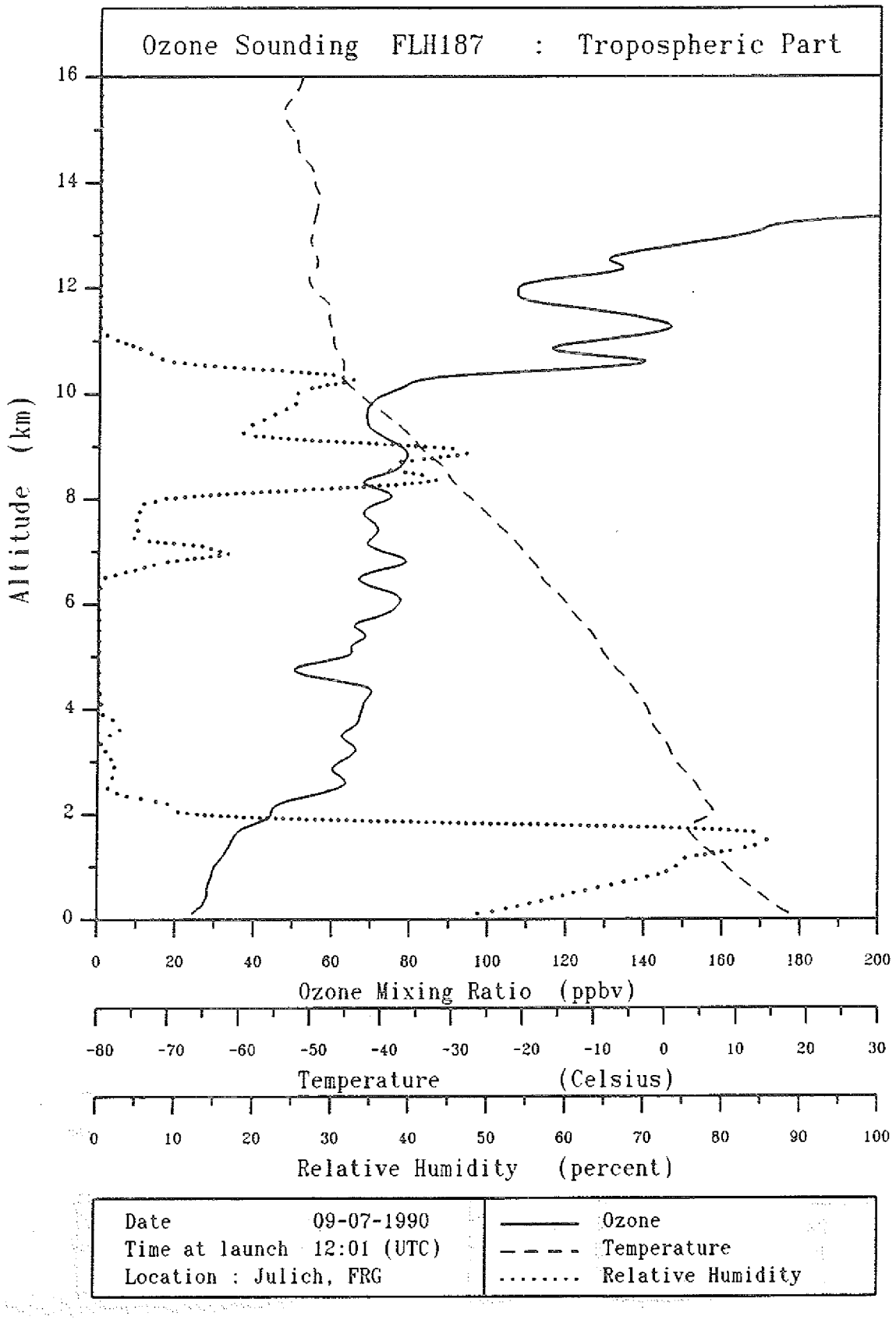
Date 02-07-1990	——— Ozone
Time at launch 11:57 (UTC)	- - - - Temperature
Location : Julich, FRG	..... Relative Humidity

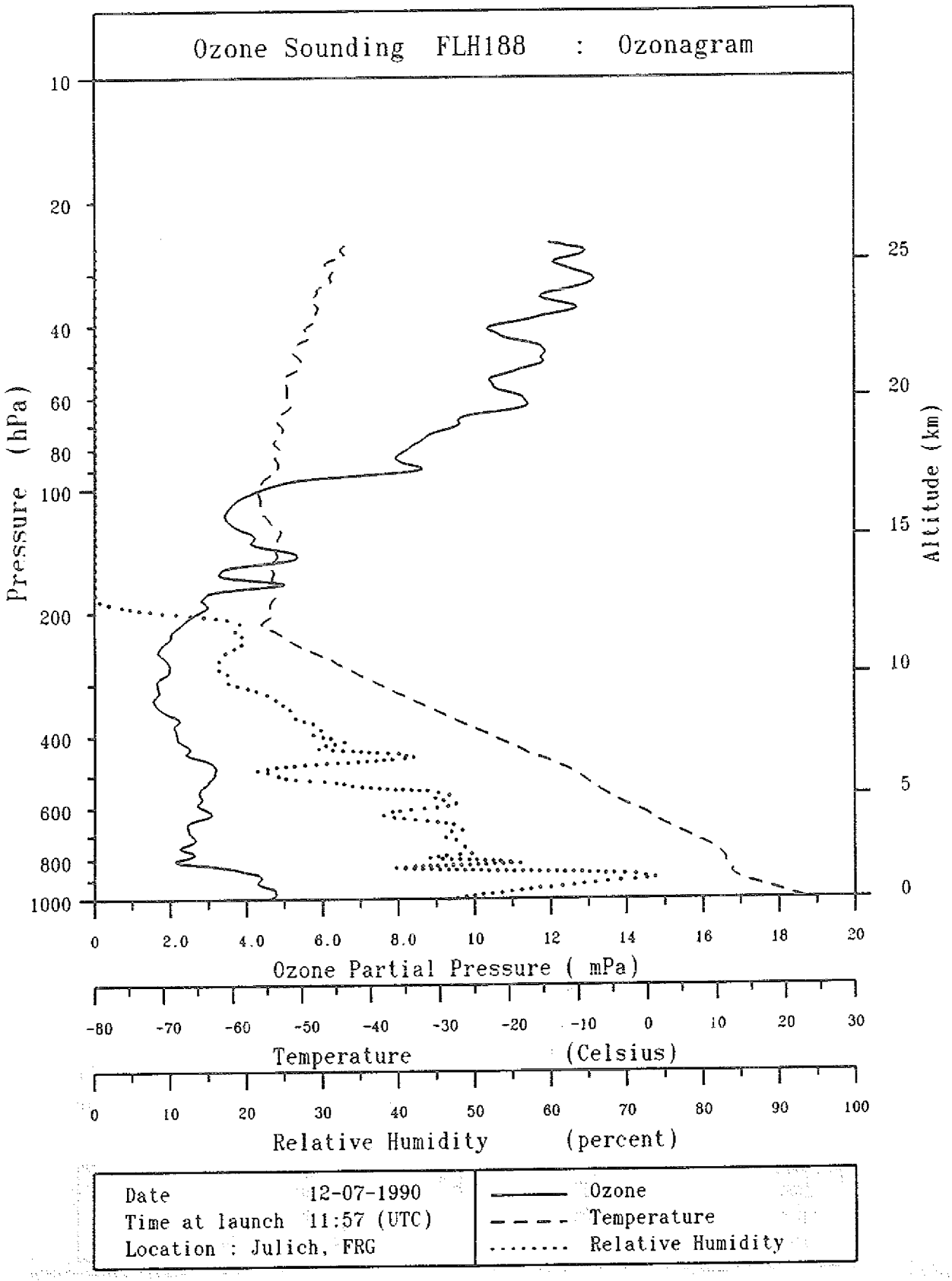

Ozone Sounding FLH185 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 02-07-1990
Time at launch 11:57 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

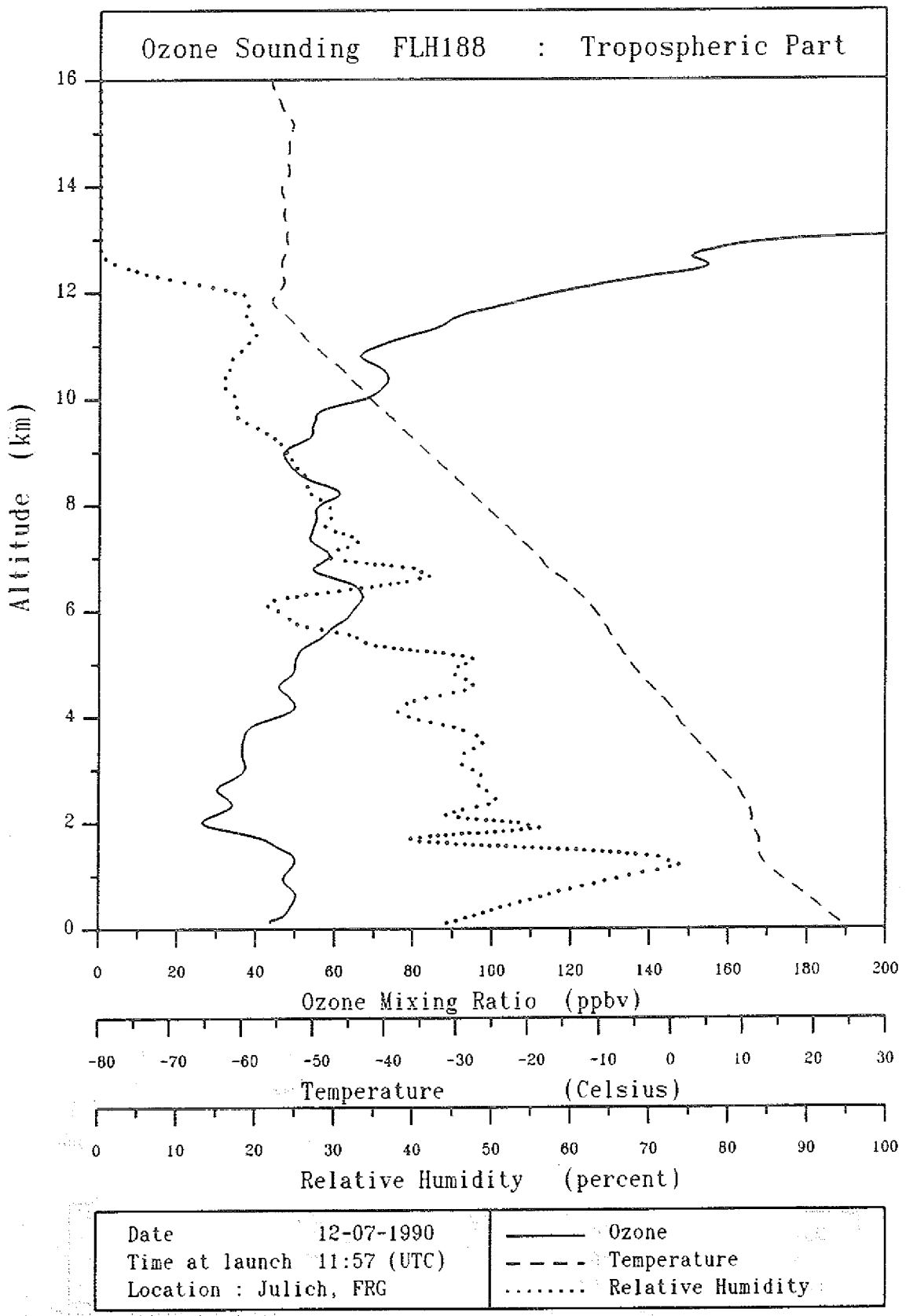

Ozone Sounding FLH186 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 05-07-1990
Time at launch 12:04 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

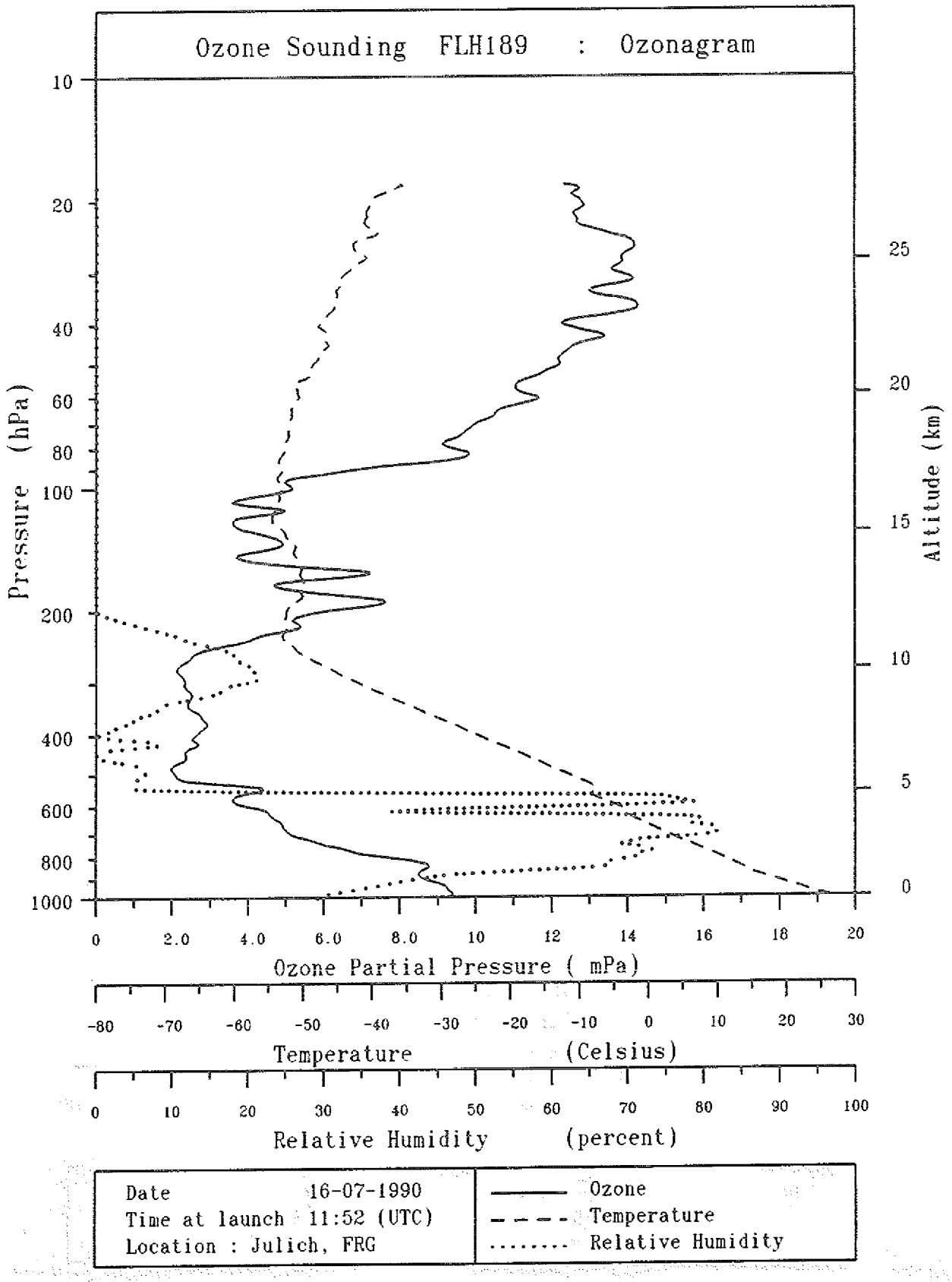

Ozone Sounding FLH186 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 05-07-1990
Time at launch 12:04 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

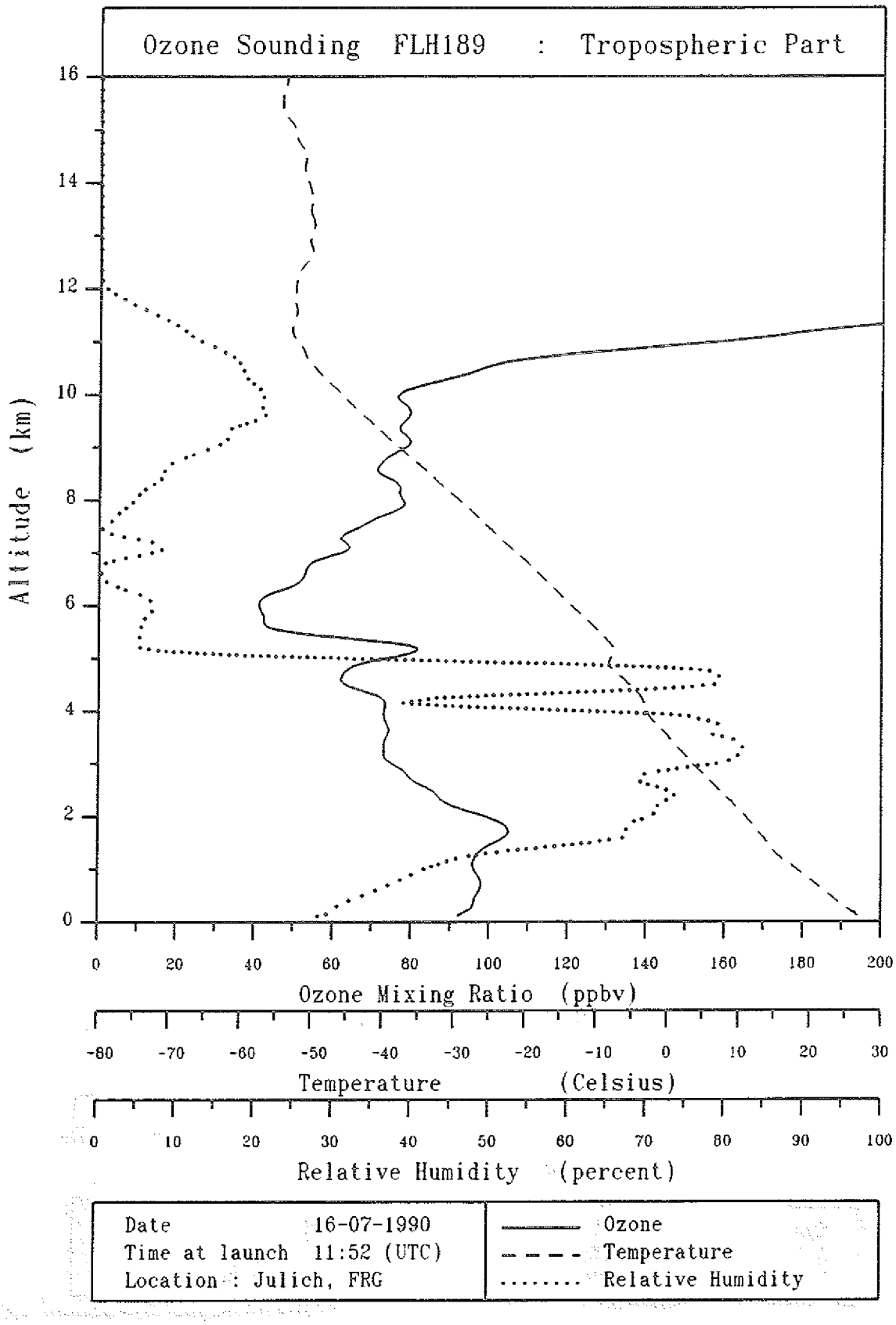

Ozone Sounding FLH187 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 09-07-1990
Time at launch 12:01 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

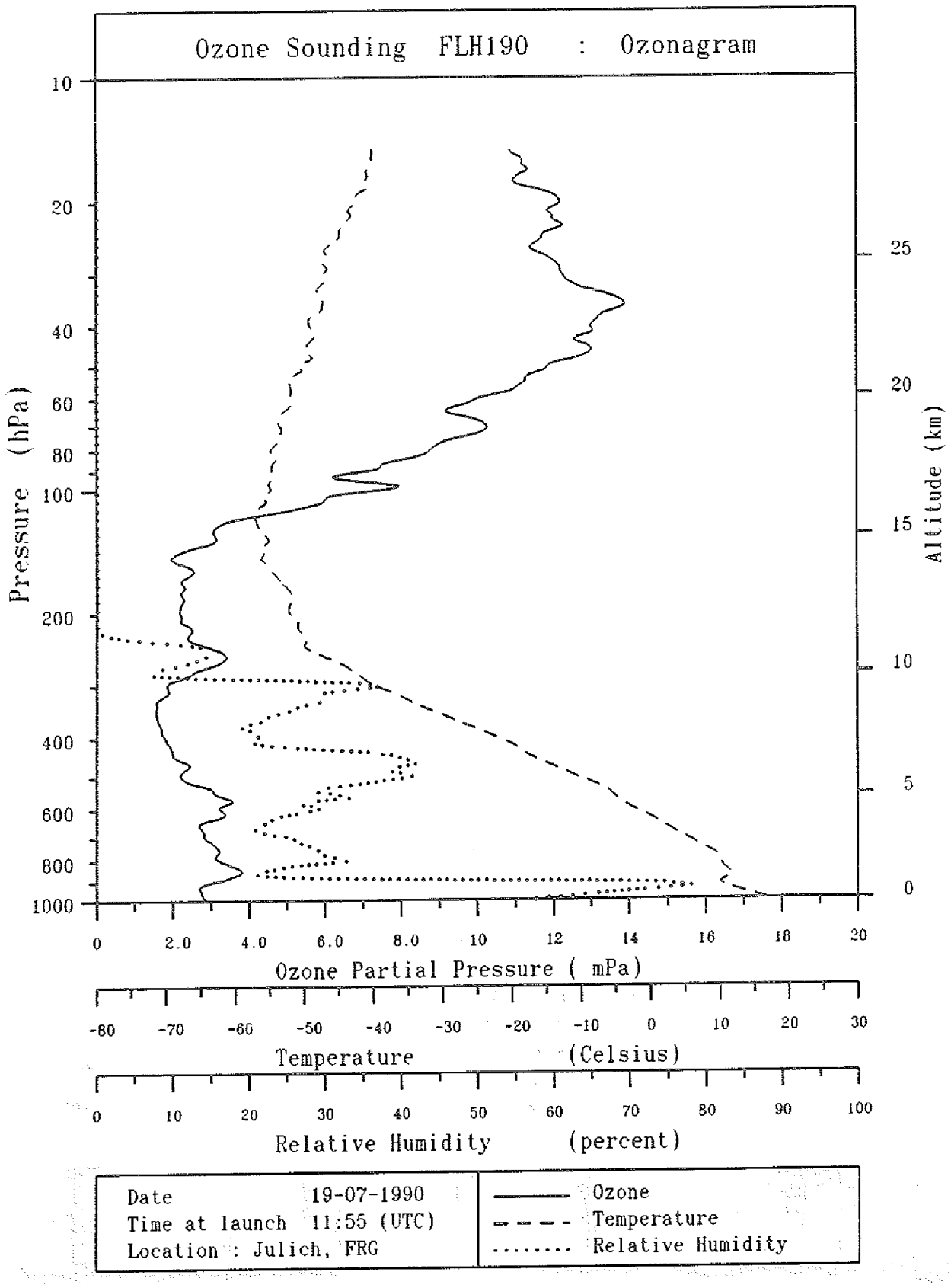

Ozone Sounding FLH187 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 09-07-1990
Time at launch 12:01 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

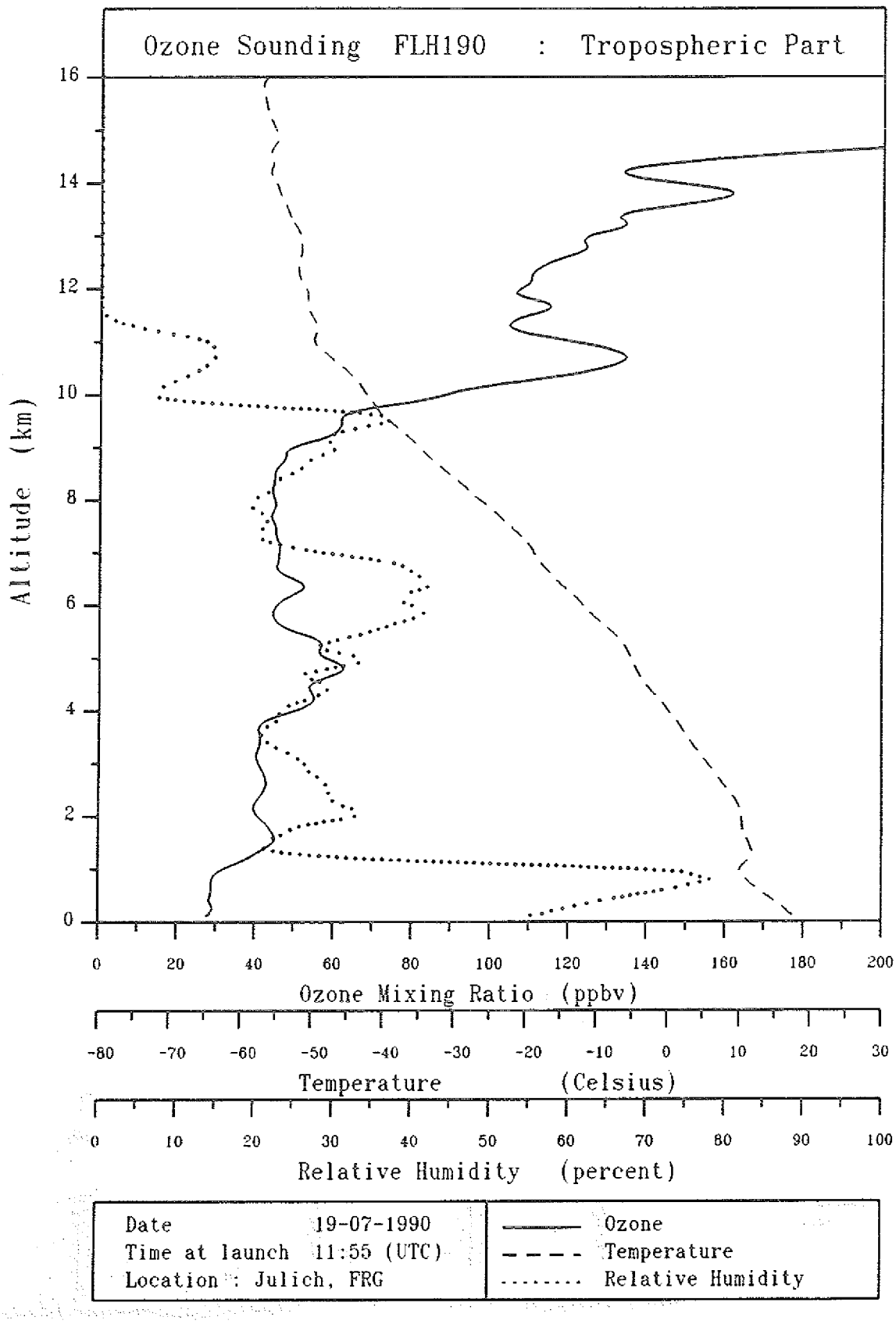

Ozone Sounding FLH188 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 12-07-1990
Time at launch 11:57 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

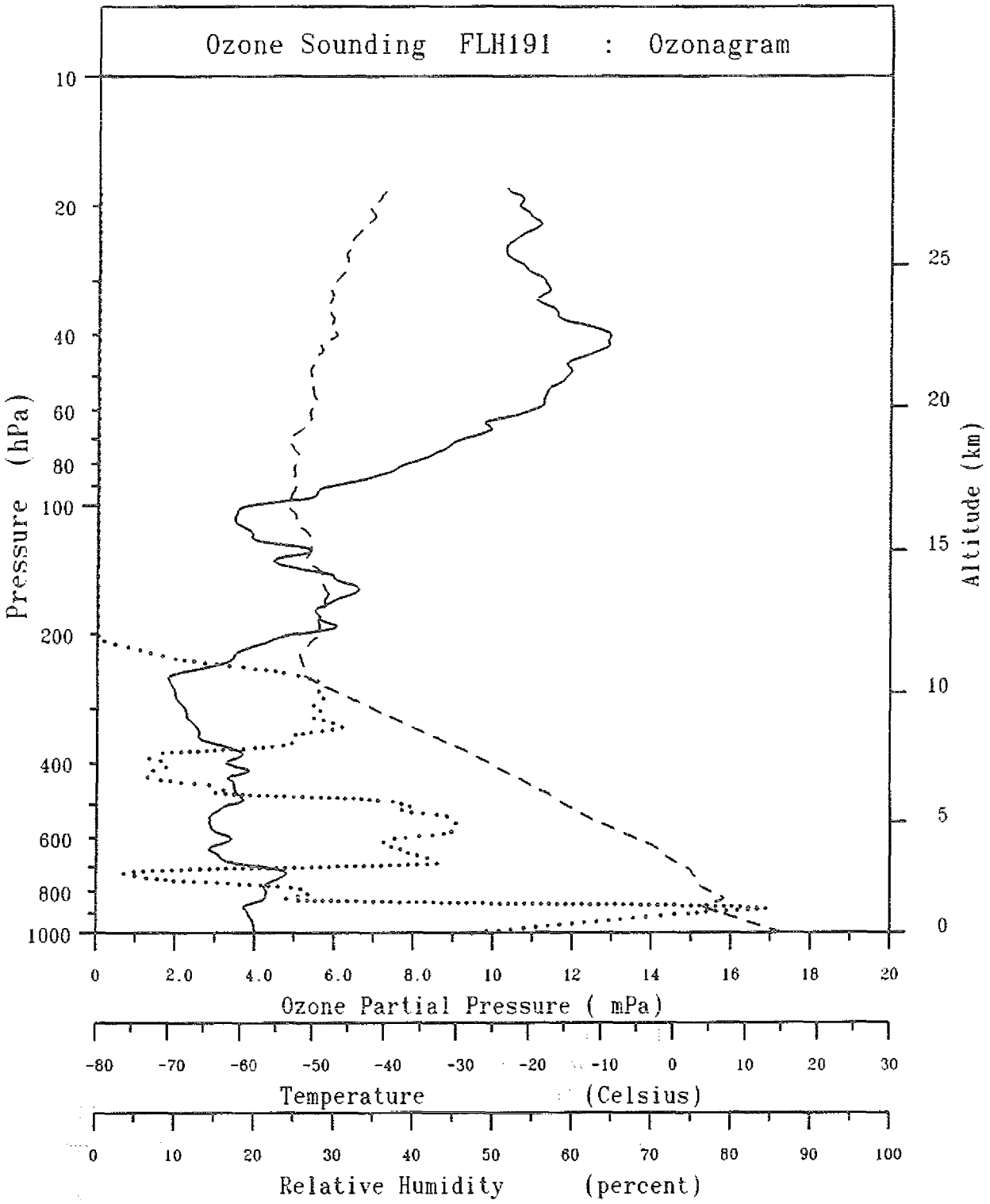

Ozone Sounding FLH188 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 12-07-1990
Time at launch 11:57 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH189 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 16-07-1990
Time at launch 11:52 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

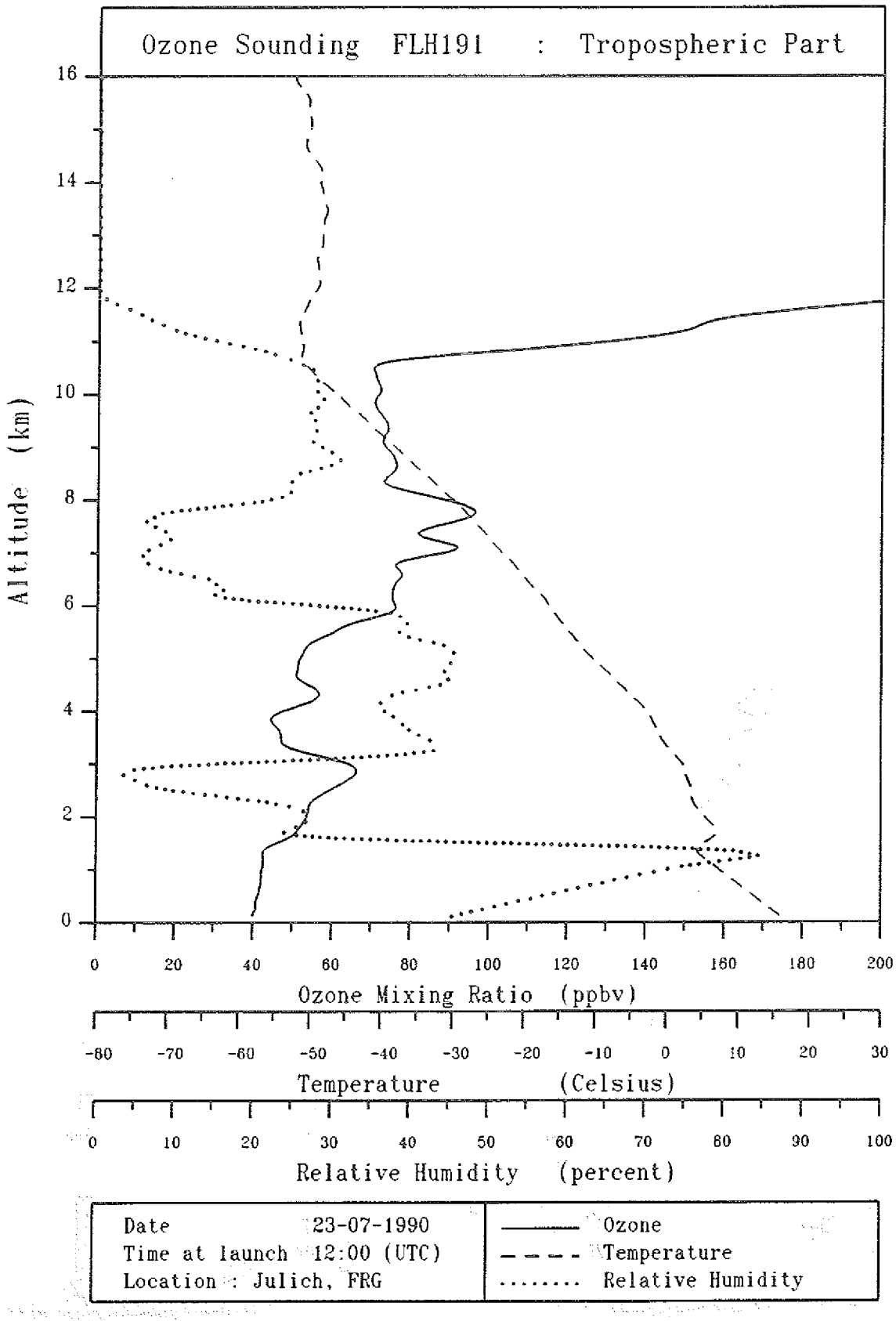

Ozone Sounding FLH189 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 16-07-1990
Time at launch 11:52 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

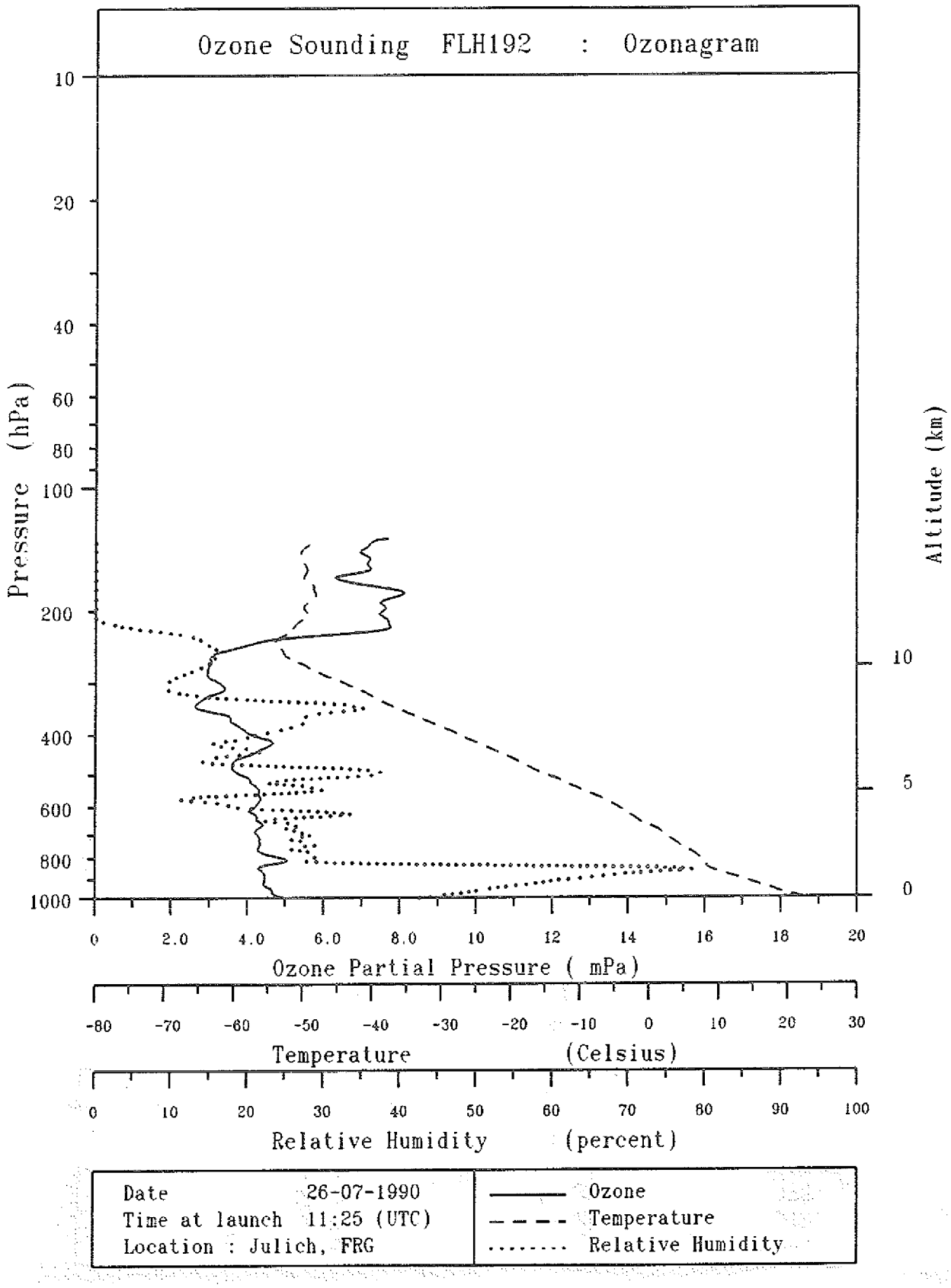

Ozone Sounding FLH190 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 19-07-1990
Time at launch 11:55 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH190 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 19-07-1990
Time at launch 11:55 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

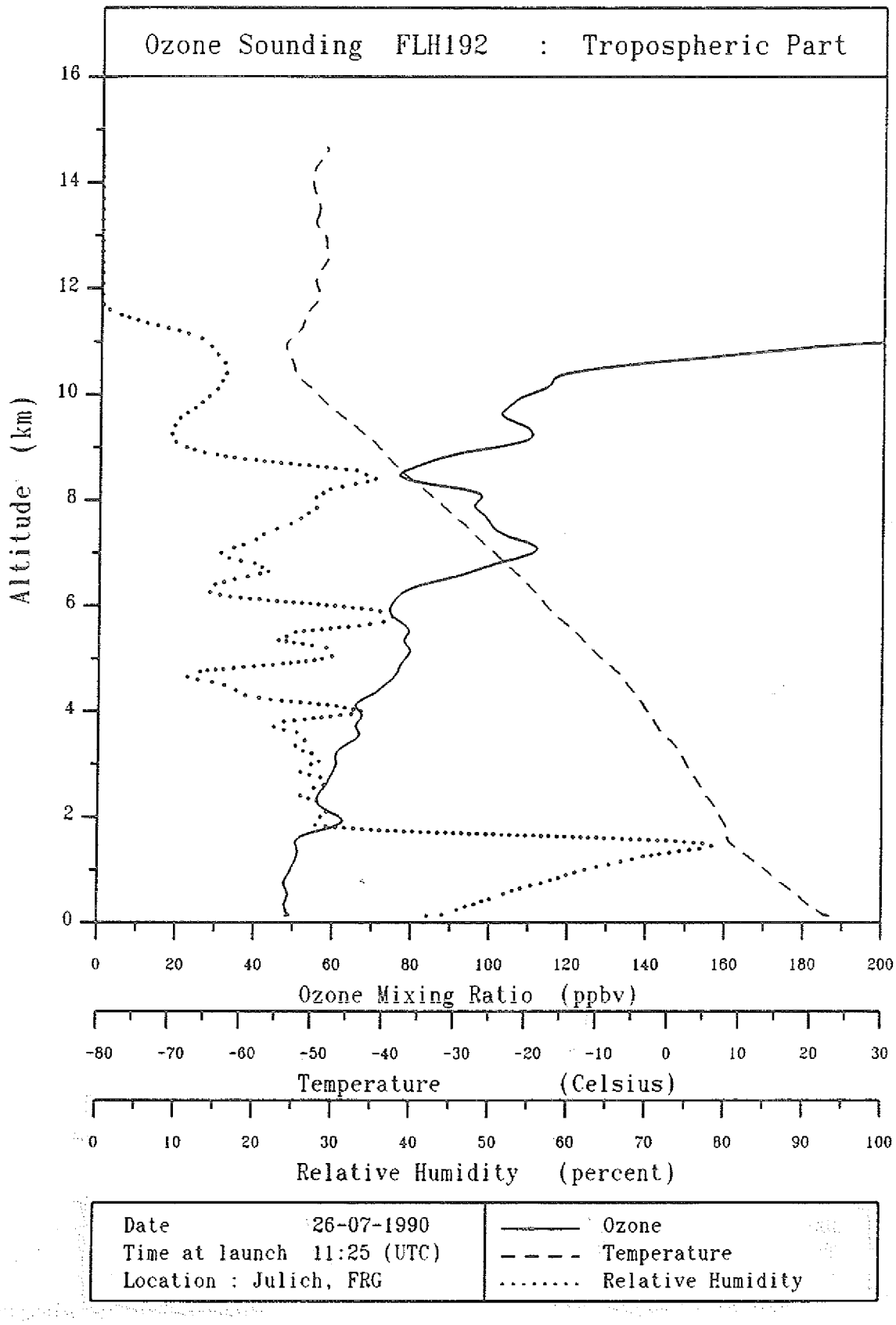


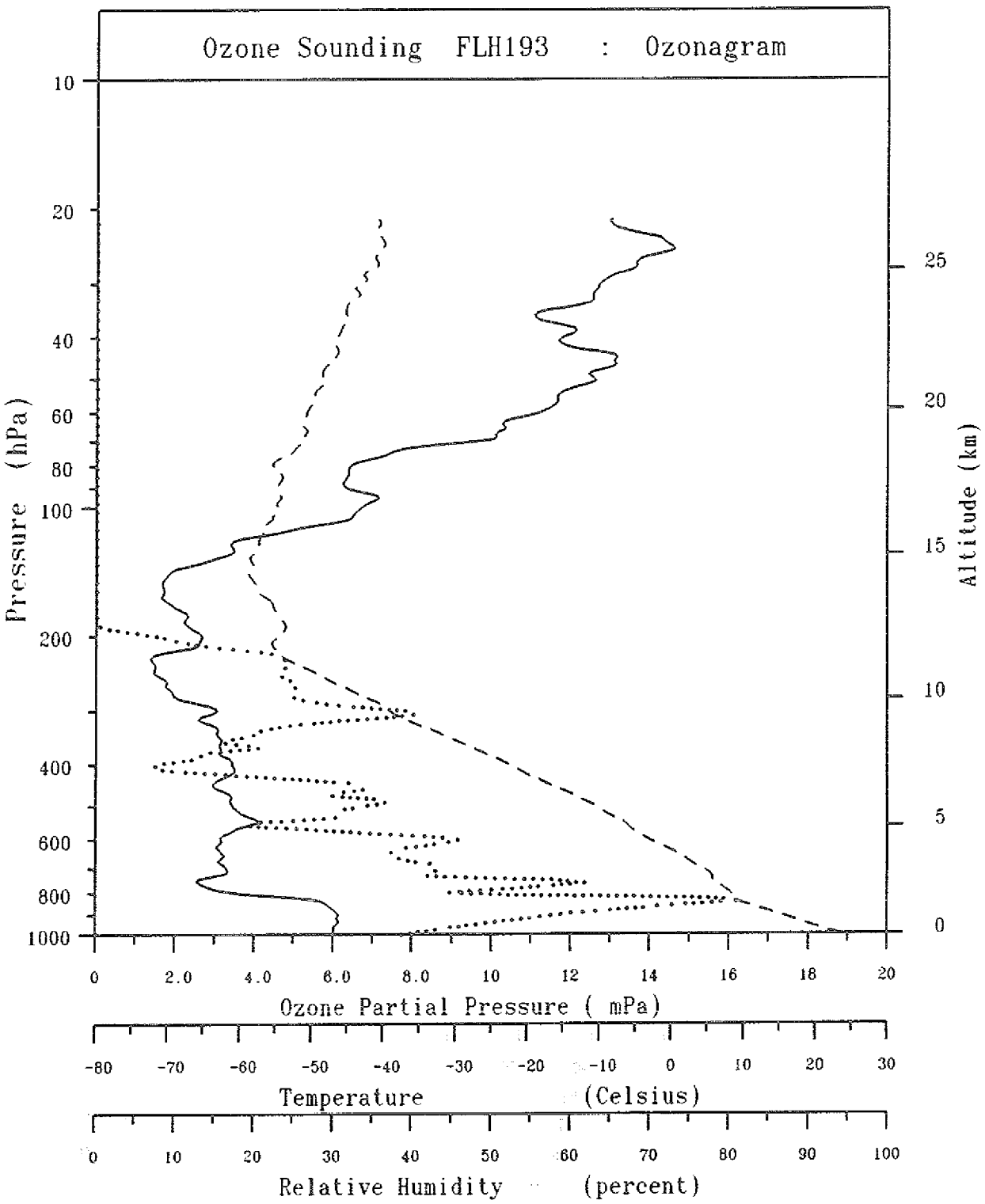
Date 23-07-1990	——— Ozone
Time at launch 12:00 (UTC)	- - - - Temperature
Location : Julich, FRG	..... Relative Humidity


Ozone Sounding FLH191 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 23-07-1990
Time at launch 12:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

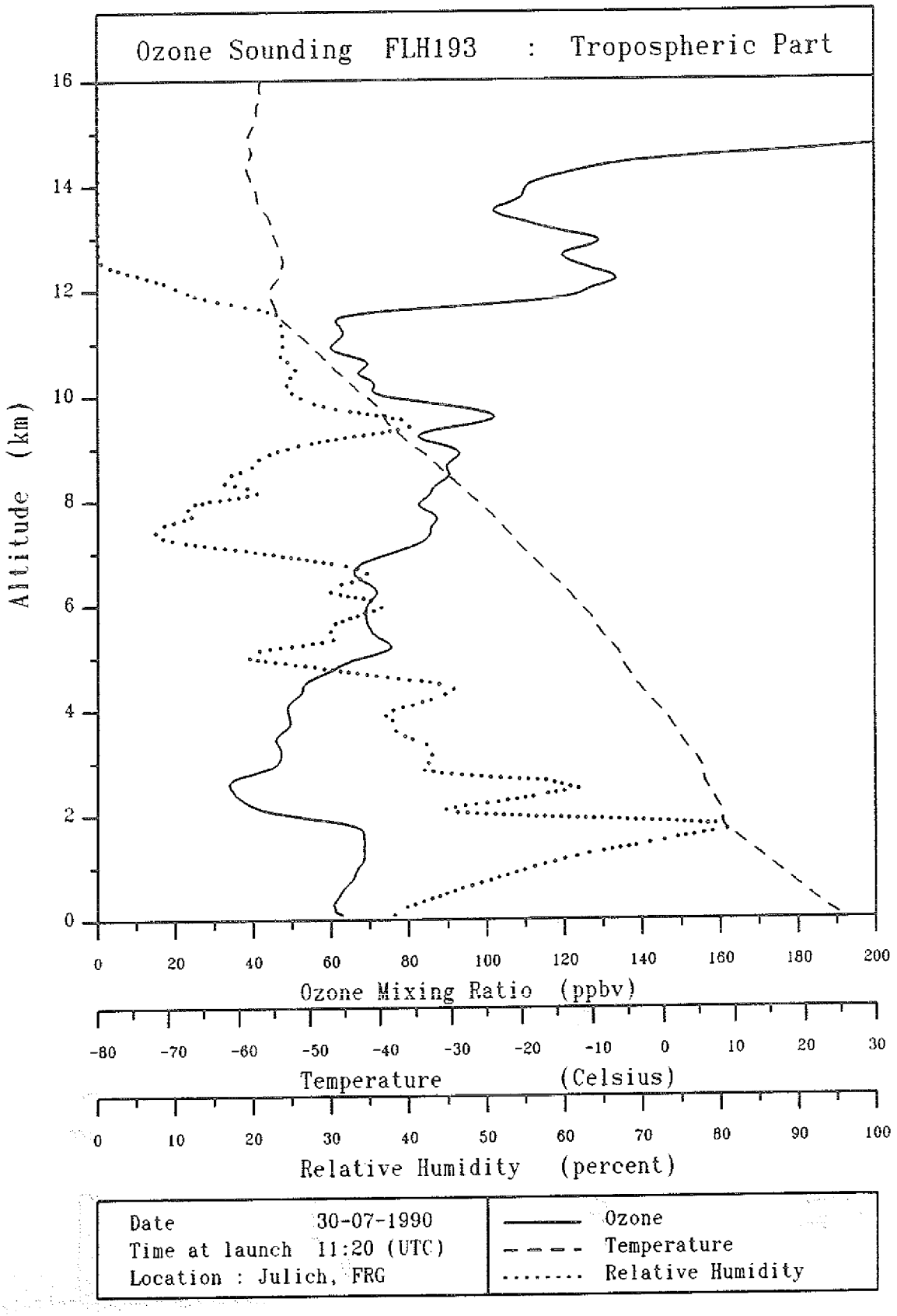


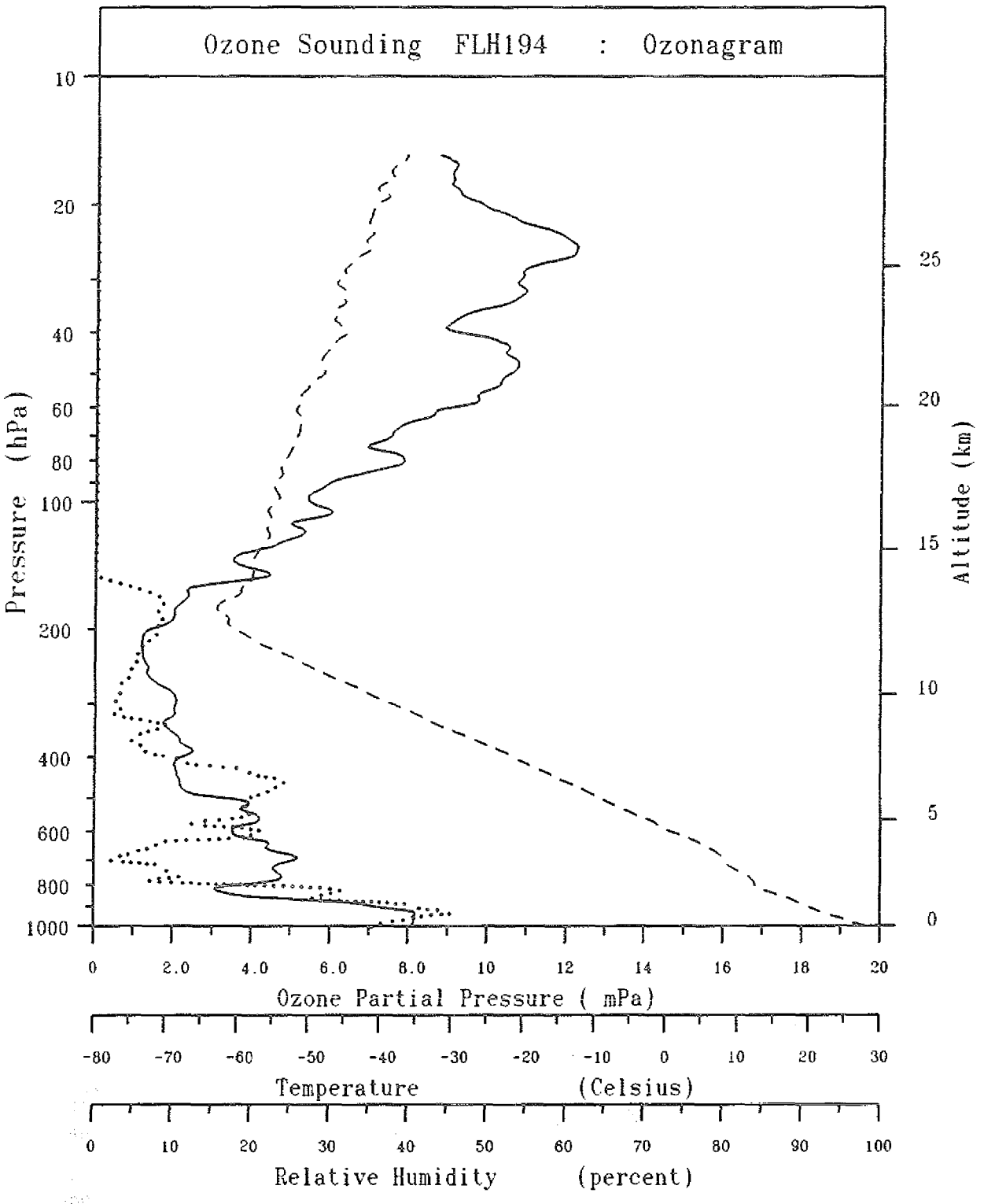
Date 26-07-1990	——— Ozone
Time at launch 11:25 (UTC)	– – – – Temperature
Location : Julich, FRG	..... Relative Humidity

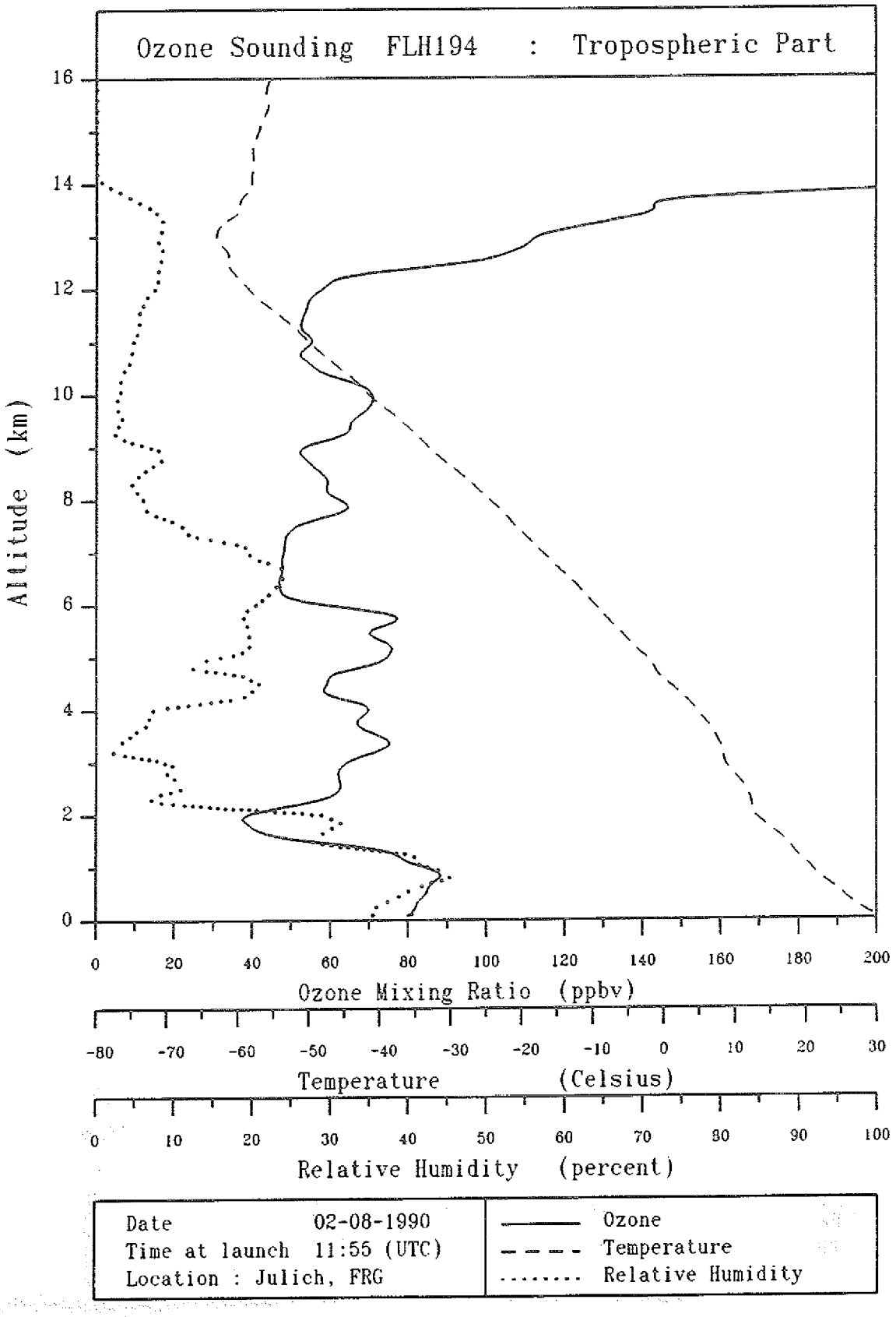

Ozone Sounding FLH192 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 26-07-1990
Time at launch 11:25 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

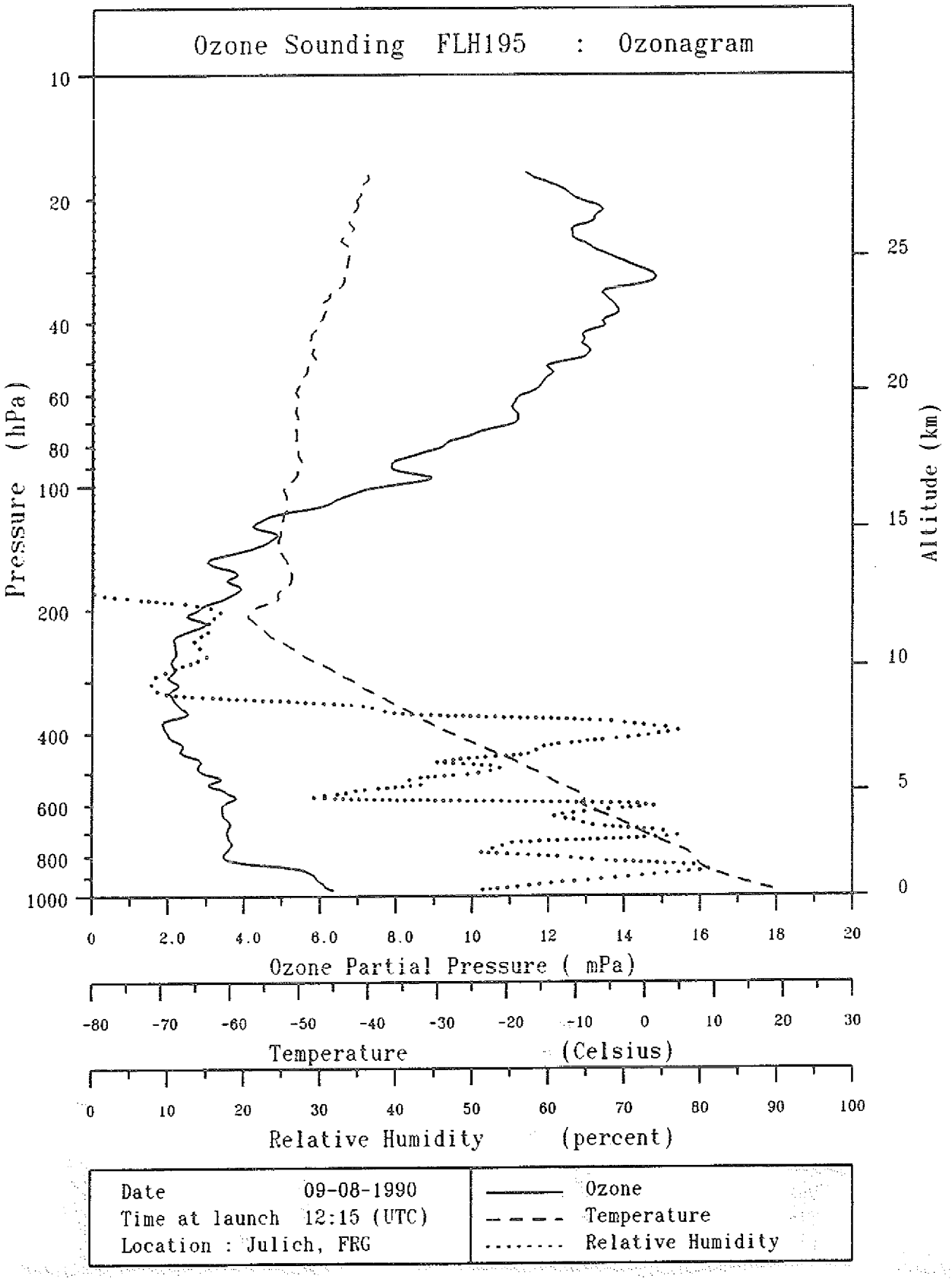


Date 30-07-1990	——— Ozone
Time at launch 11:20 (UTC)	- - - - Temperature
Location : Julich, FRG	..... Relative Humidity

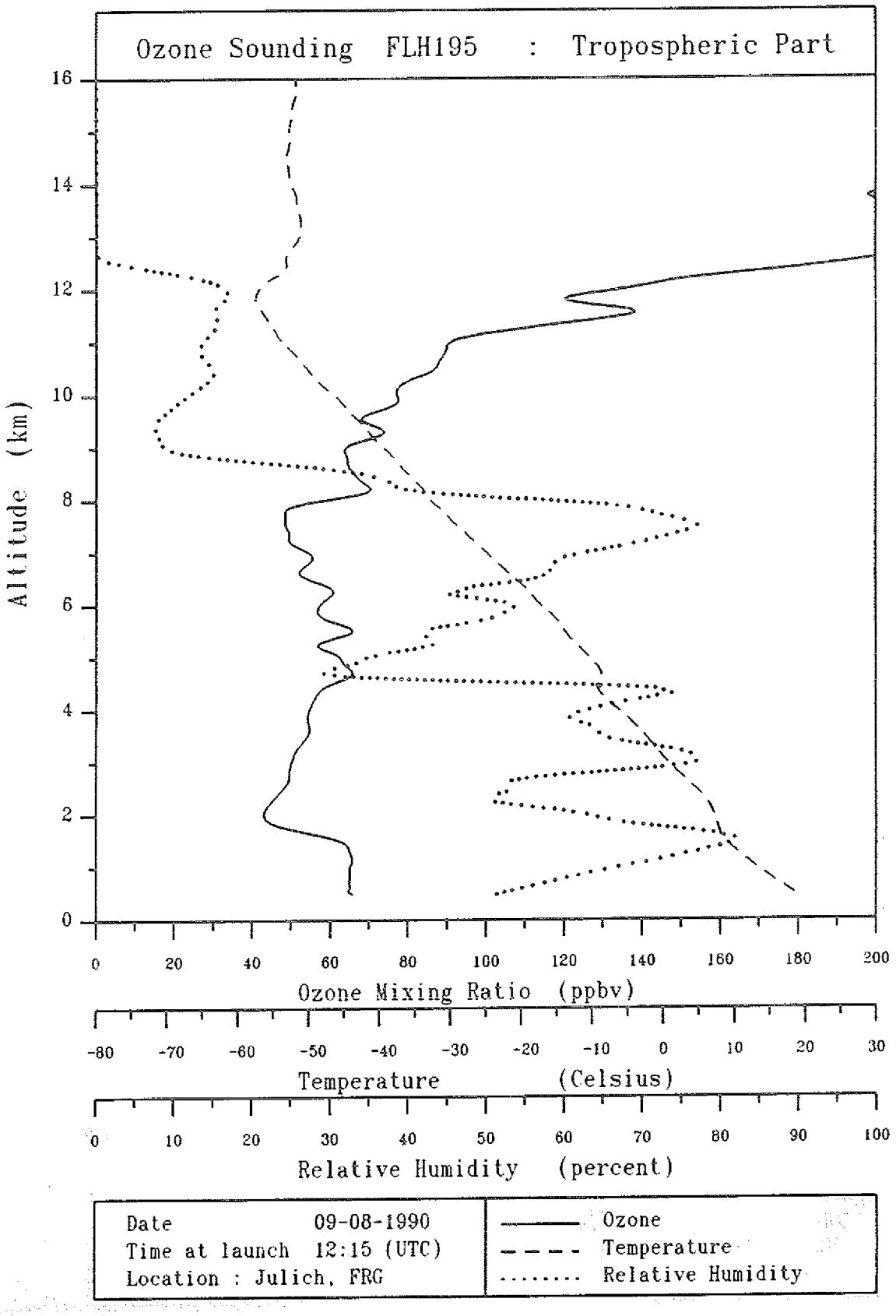

Ozone Sounding FLH193 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 30-07-1990
Time at launch 11:20 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

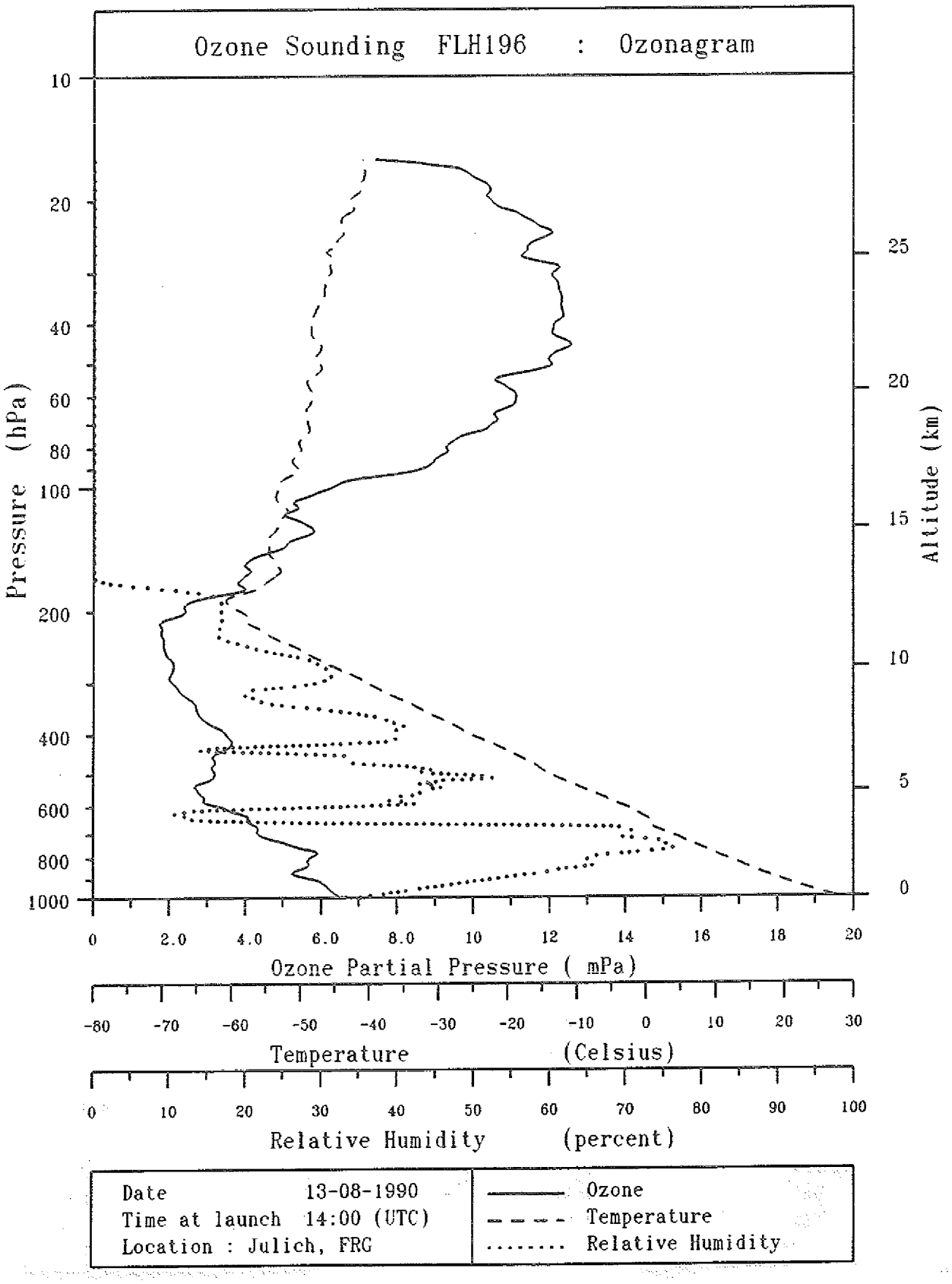

Ozone Sounding FLH194 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 02-08-1990
Time at launch 11:55 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

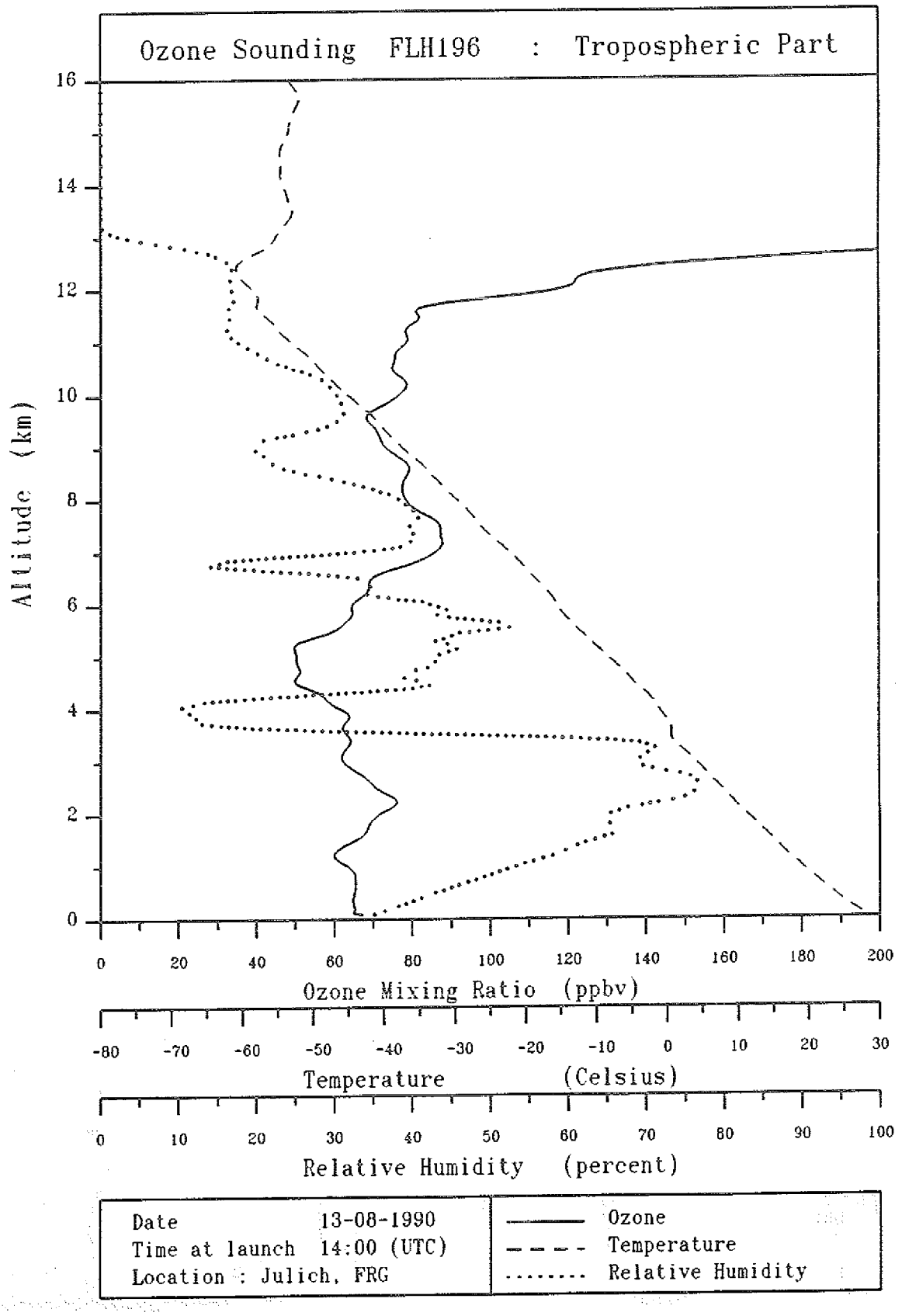

Ozone Sounding FLH194 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 02-08-1990
Time at launch 11:55 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

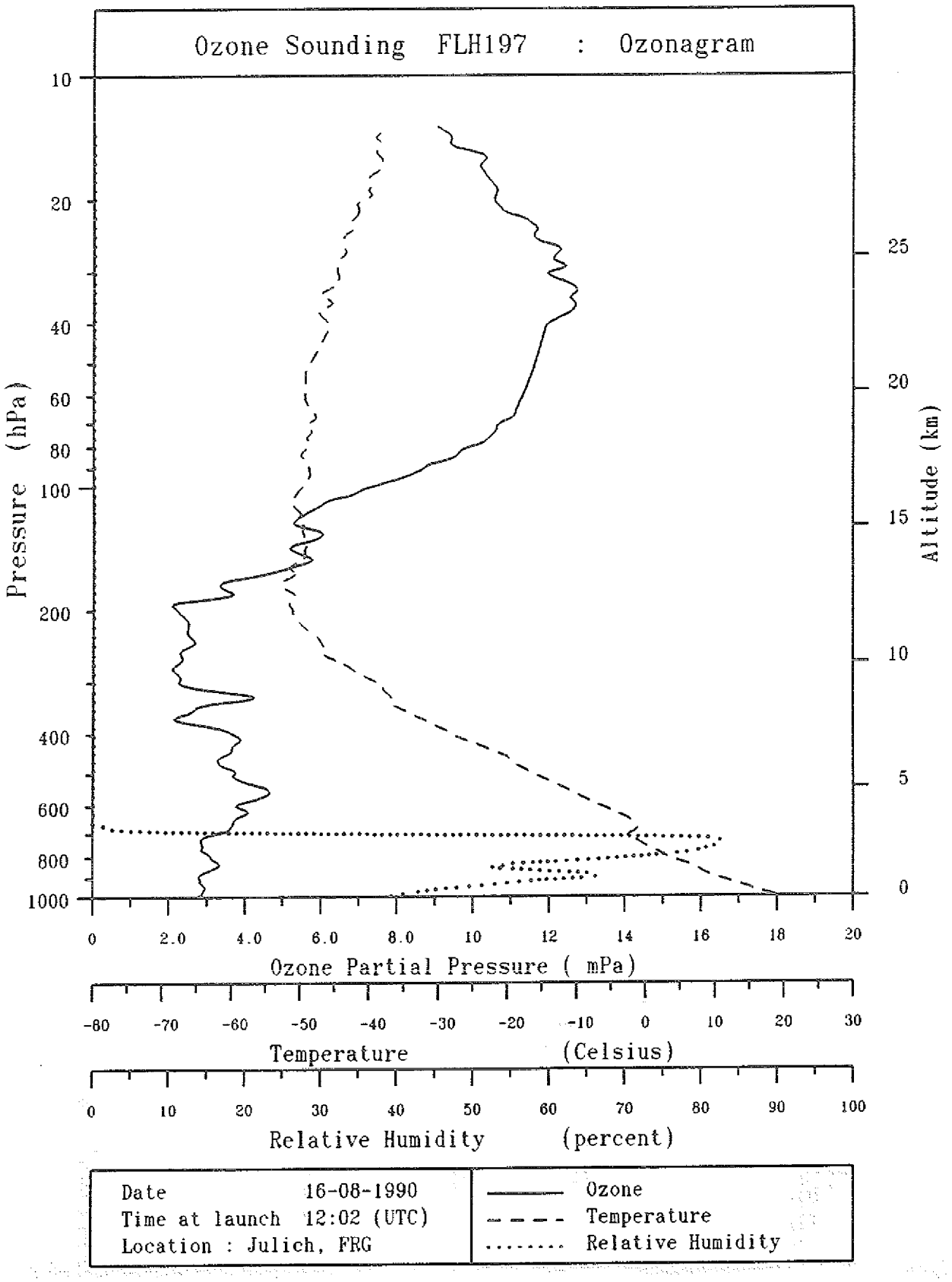


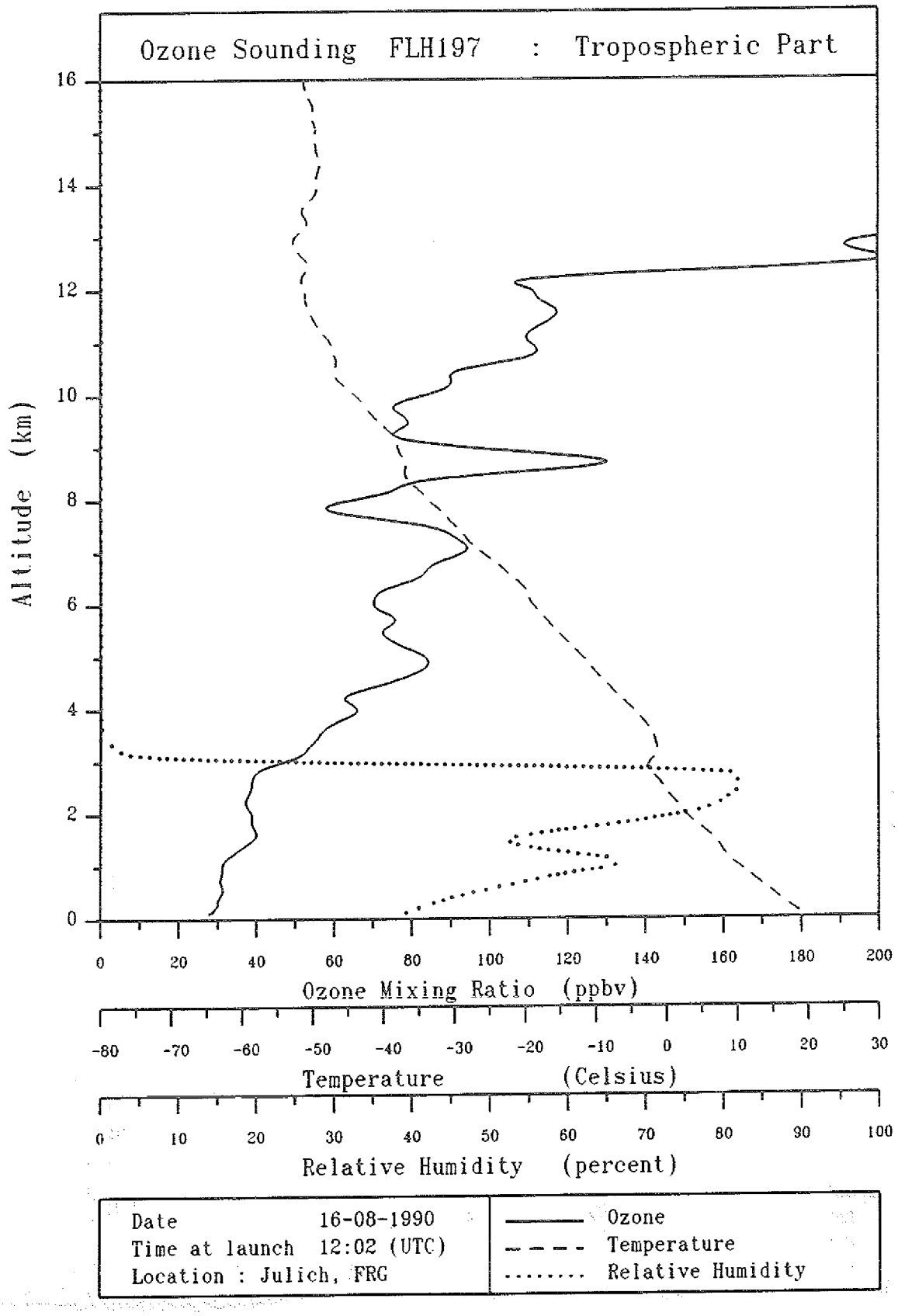
Date 09-08-1990	——— Ozone
Time at launch 12:15 (UTC)	– – – – Temperature
Location : Julich, FRG	..... Relative Humidity

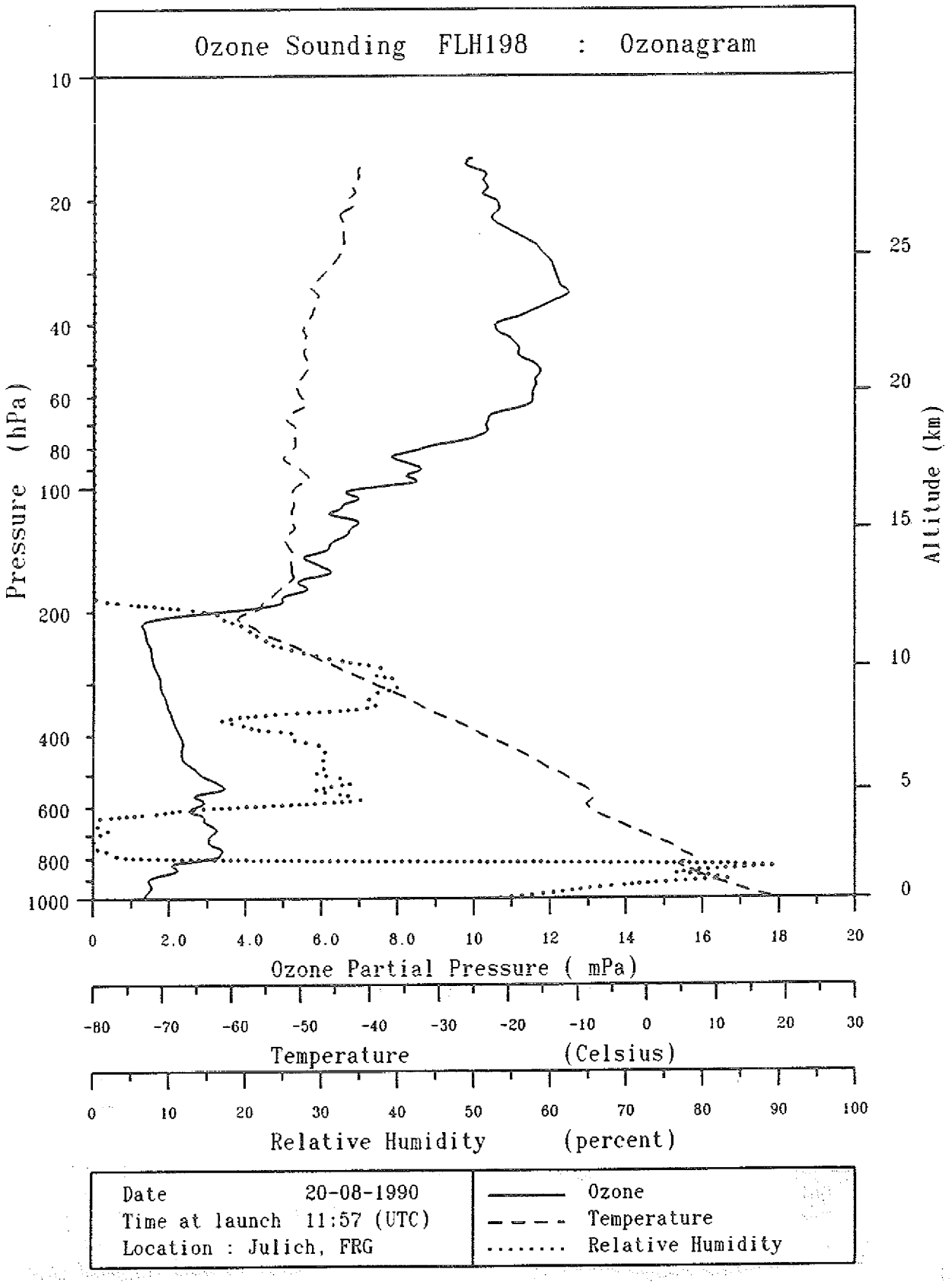

Ozone Sounding FLH195 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 09-08-1990
Time at launch 12:15 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

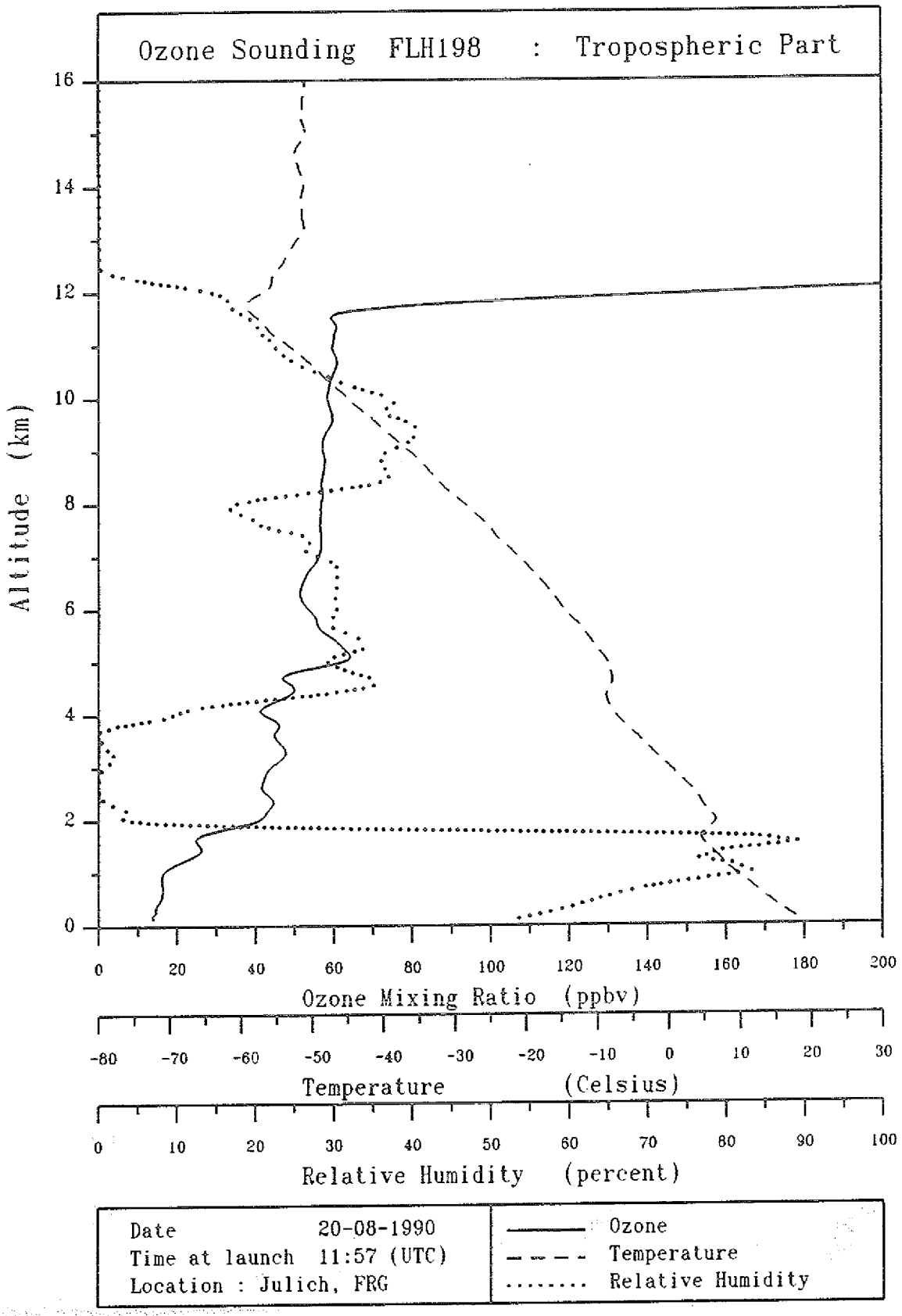

Ozone Sounding FLH196 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 13-08-1990
Time at launch 14:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

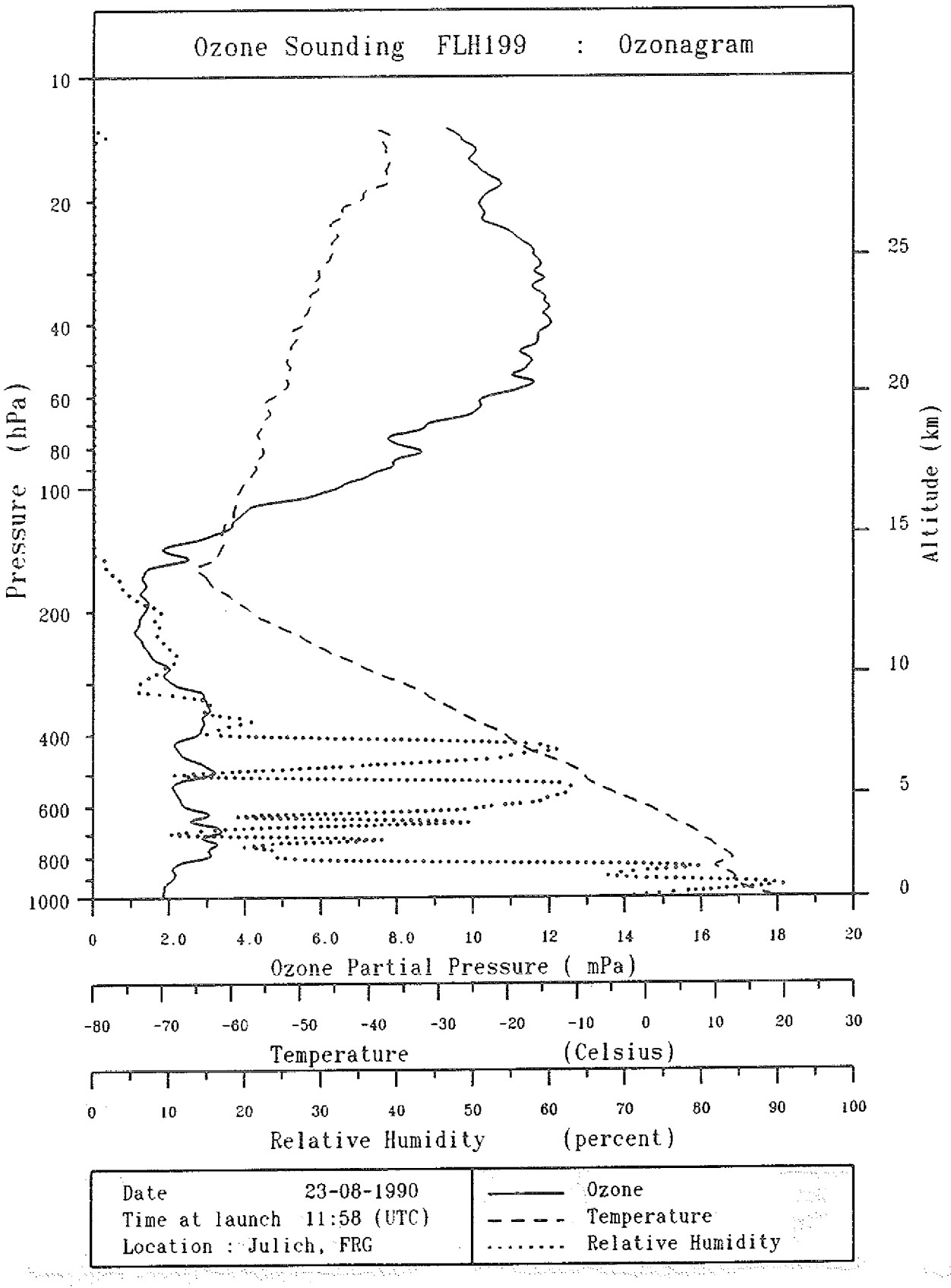

Ozone Sounding FLH196 : Tropospheric Part
Altitude (km)
16
14
12
10
8
6
4
2
0
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 13-08-1990
Time at launch 14:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

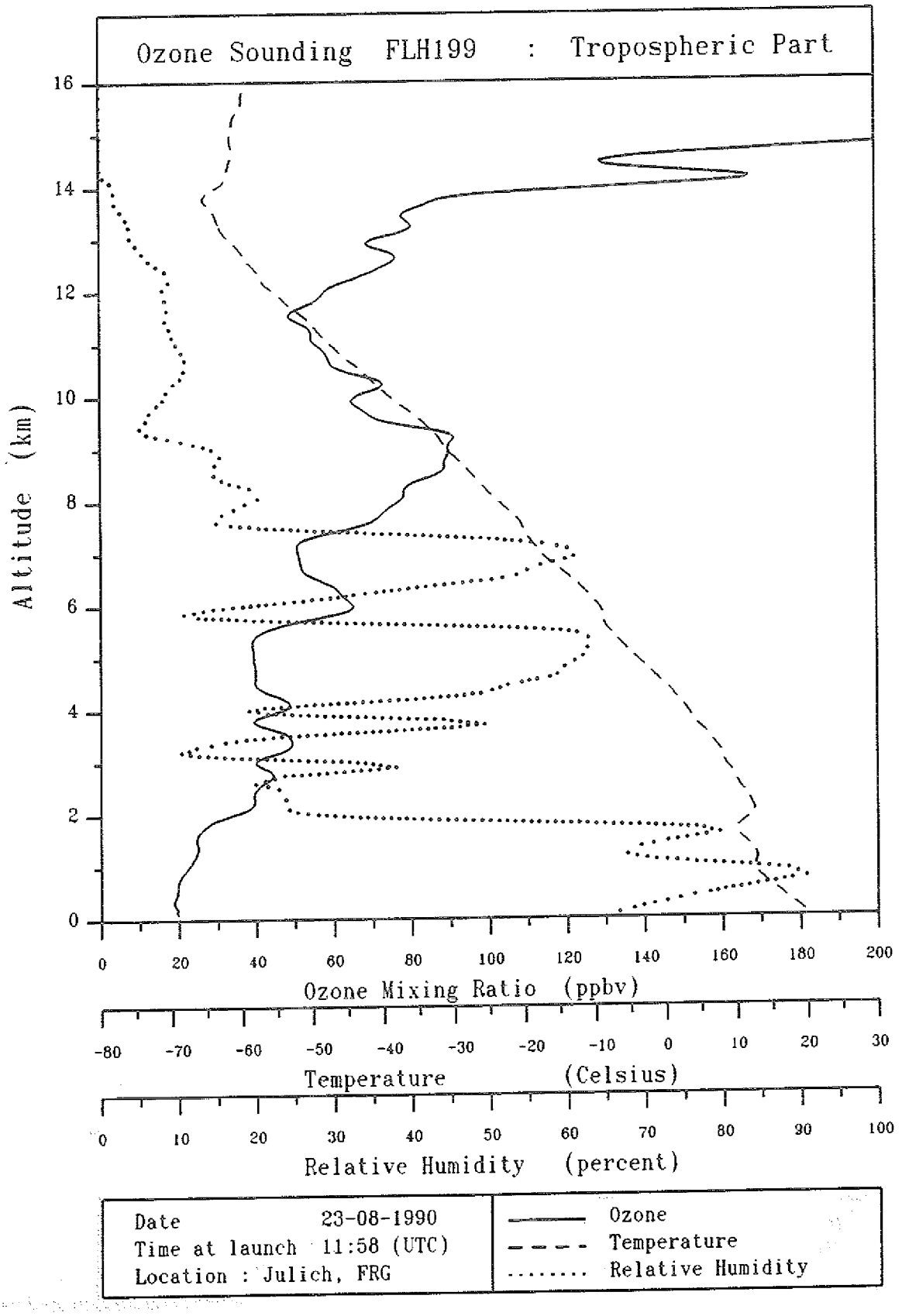

Ozone Sounding FLH197 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 16-08-1990
Time at launch 12:02 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

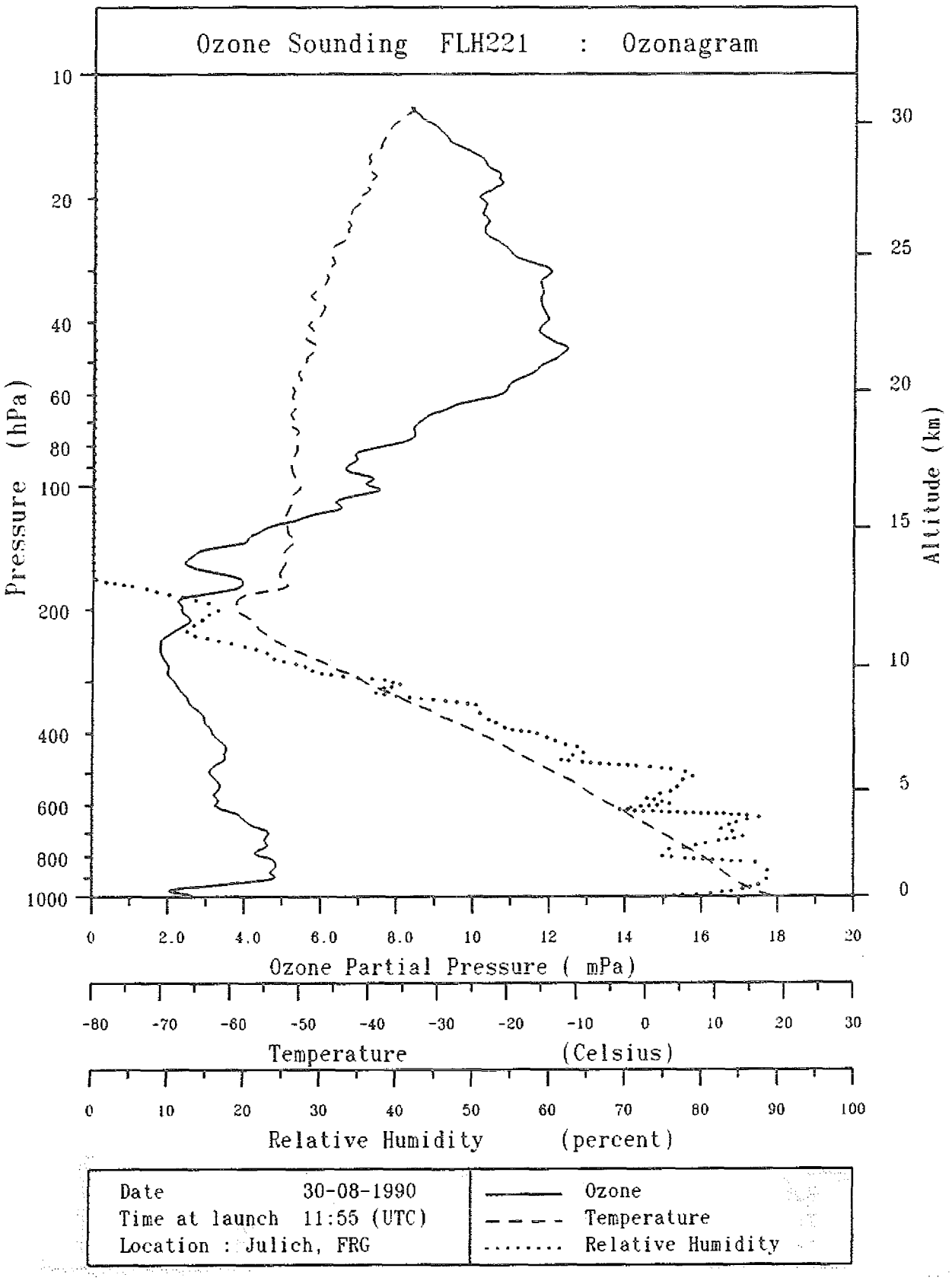

Ozone Sounding FLH197 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 16-08-1990
Time at launch 12:02 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

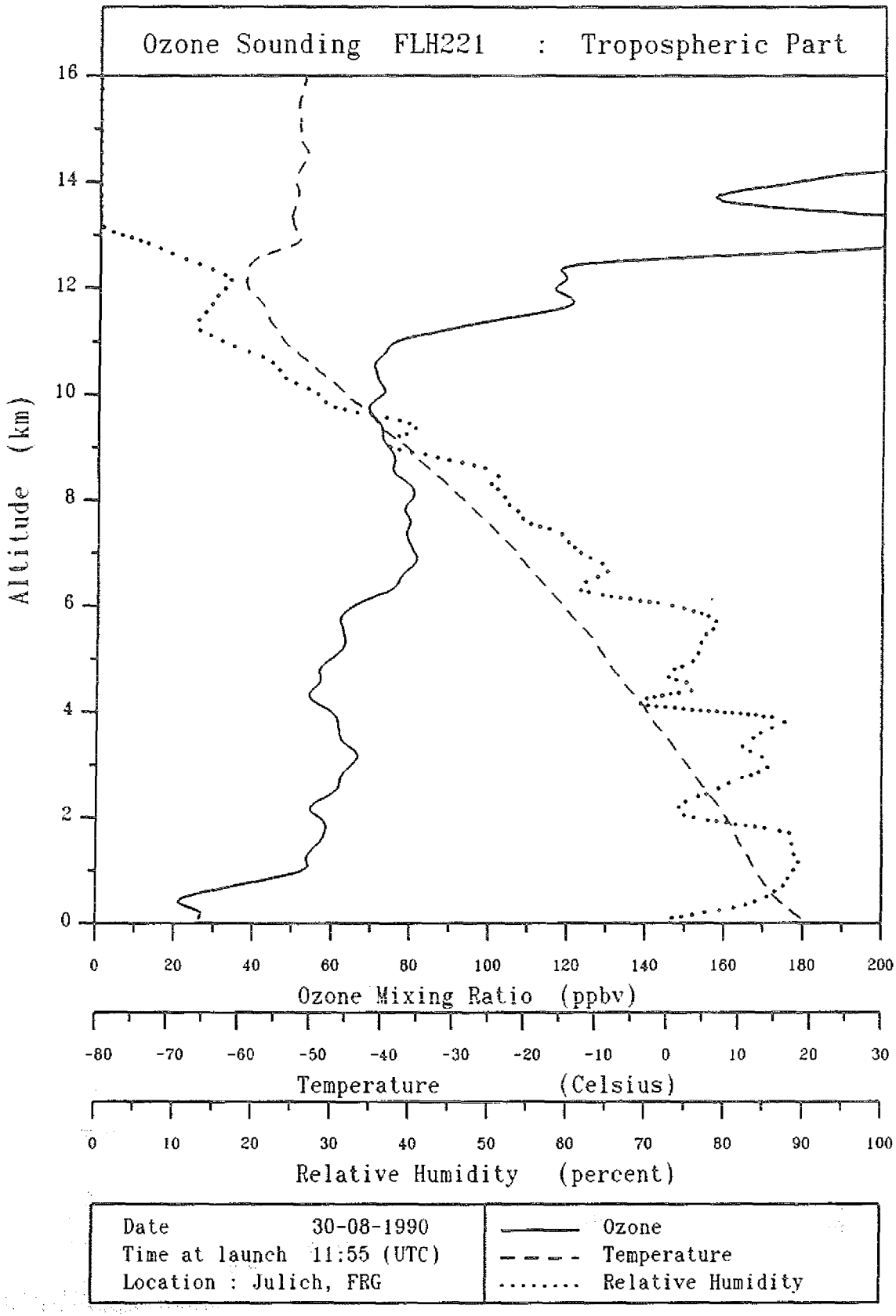

Ozone Sounding FLH198 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 20-08-1990
Time at launch 11:57 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

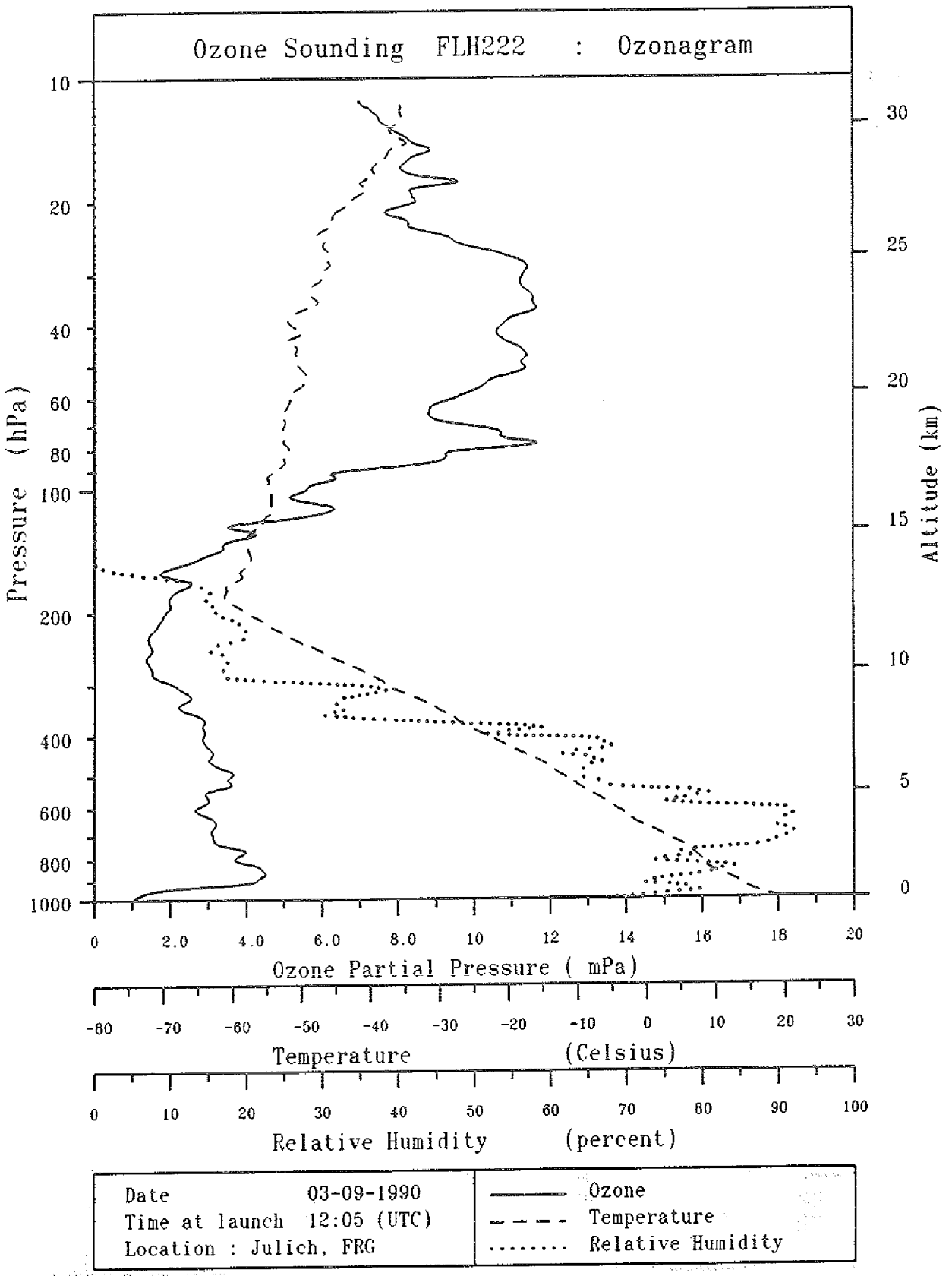

Ozone Sounding FLH198 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 20-08-1990
Time at launch 11:57 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

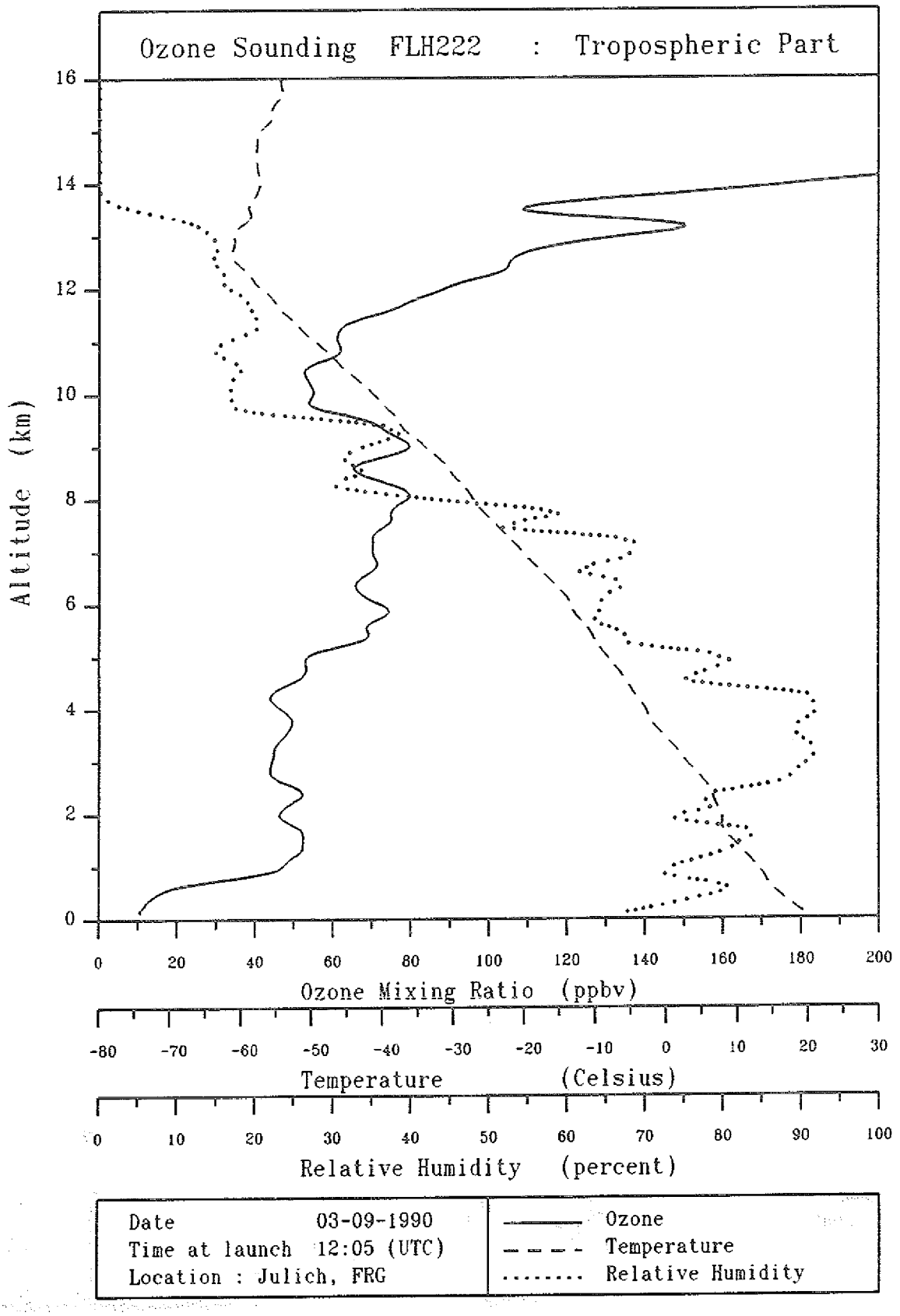

Ozone Sounding FLH199 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 23-08-1990
Time at launch 11:58 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

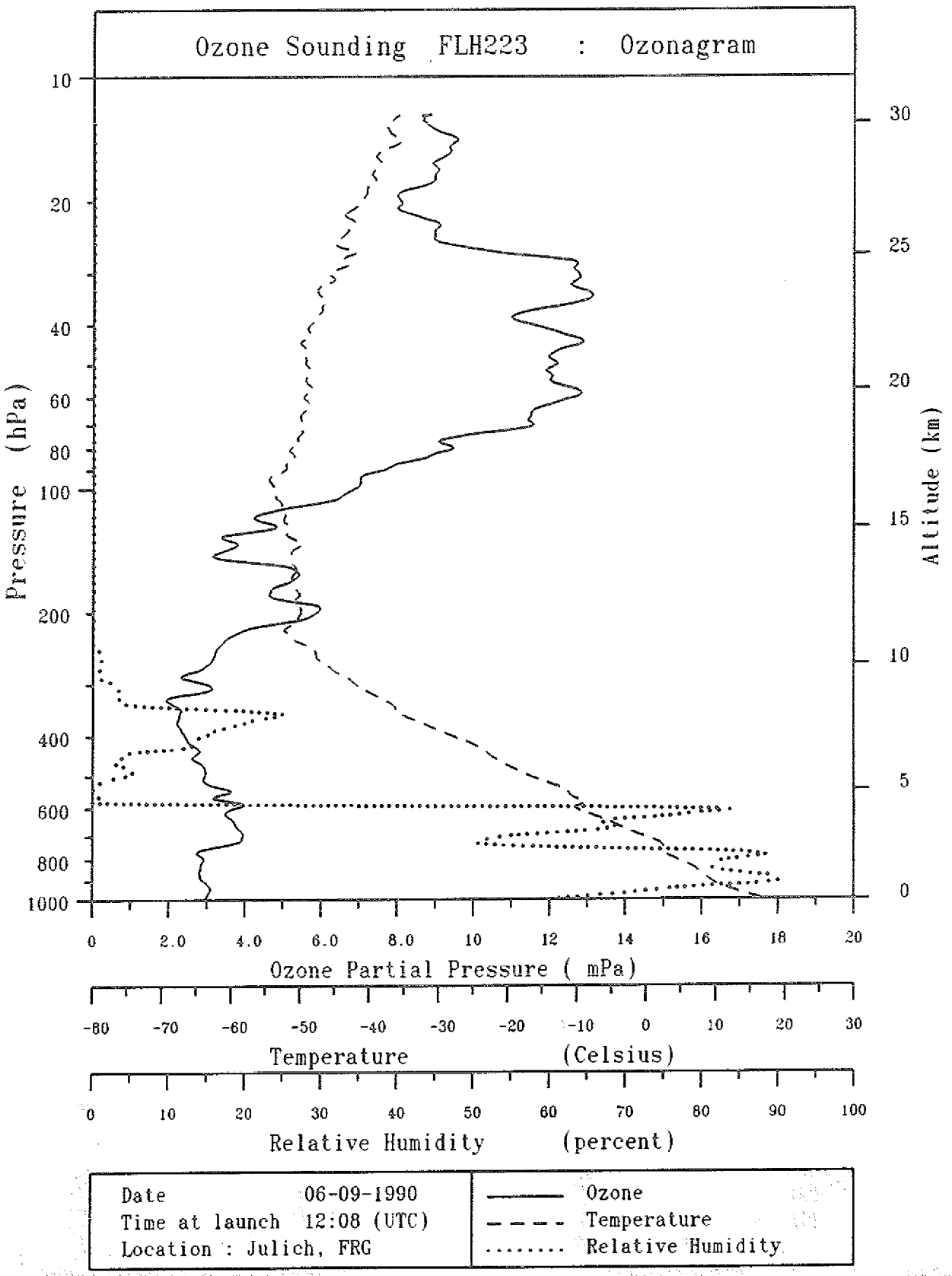

Ozone Sounding FLH199 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 23-08-1990
Time at launch 11:58 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

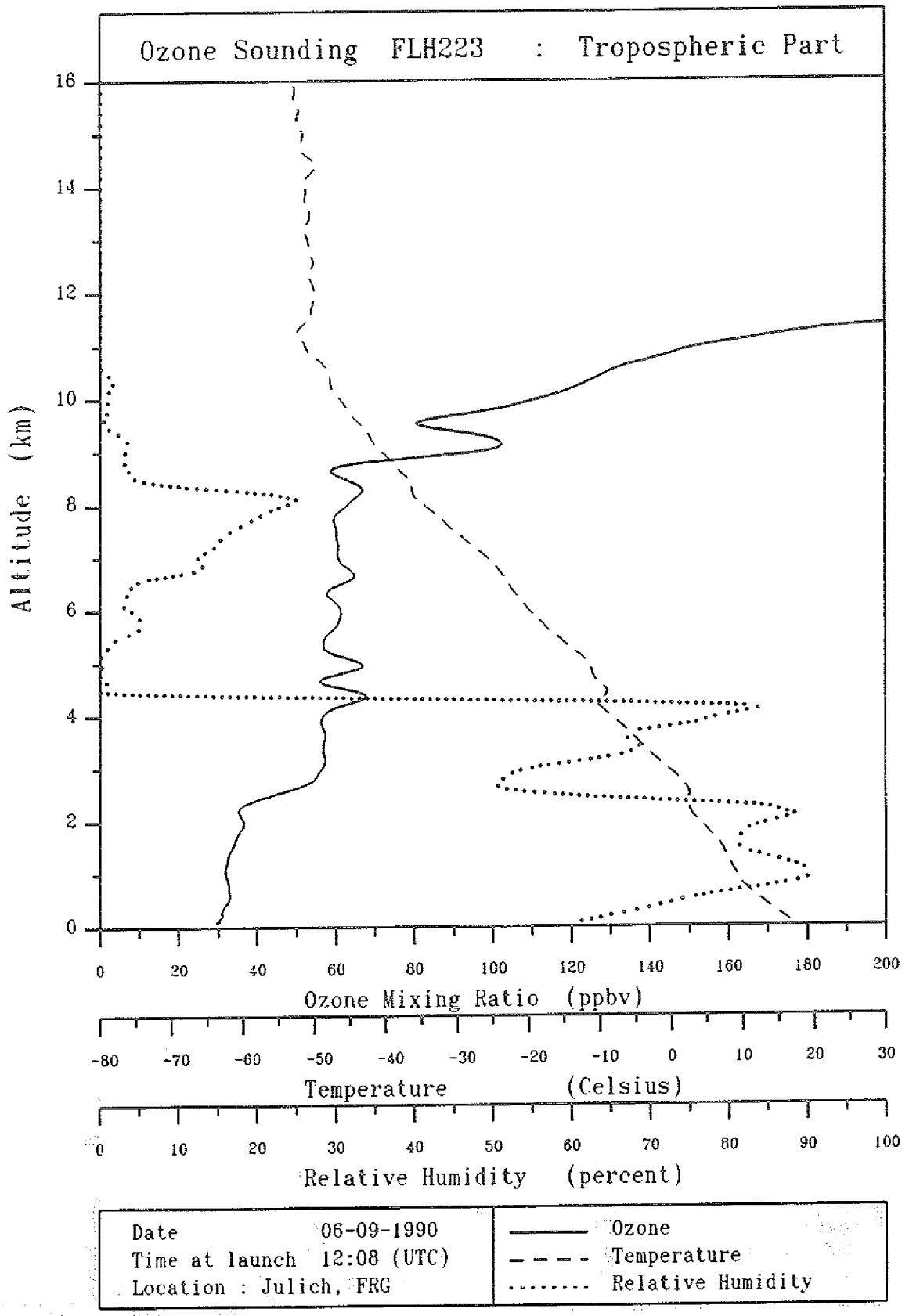

Ozone Sounding FLH221 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
30
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 30-08-1990
Time at launch 11:55 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

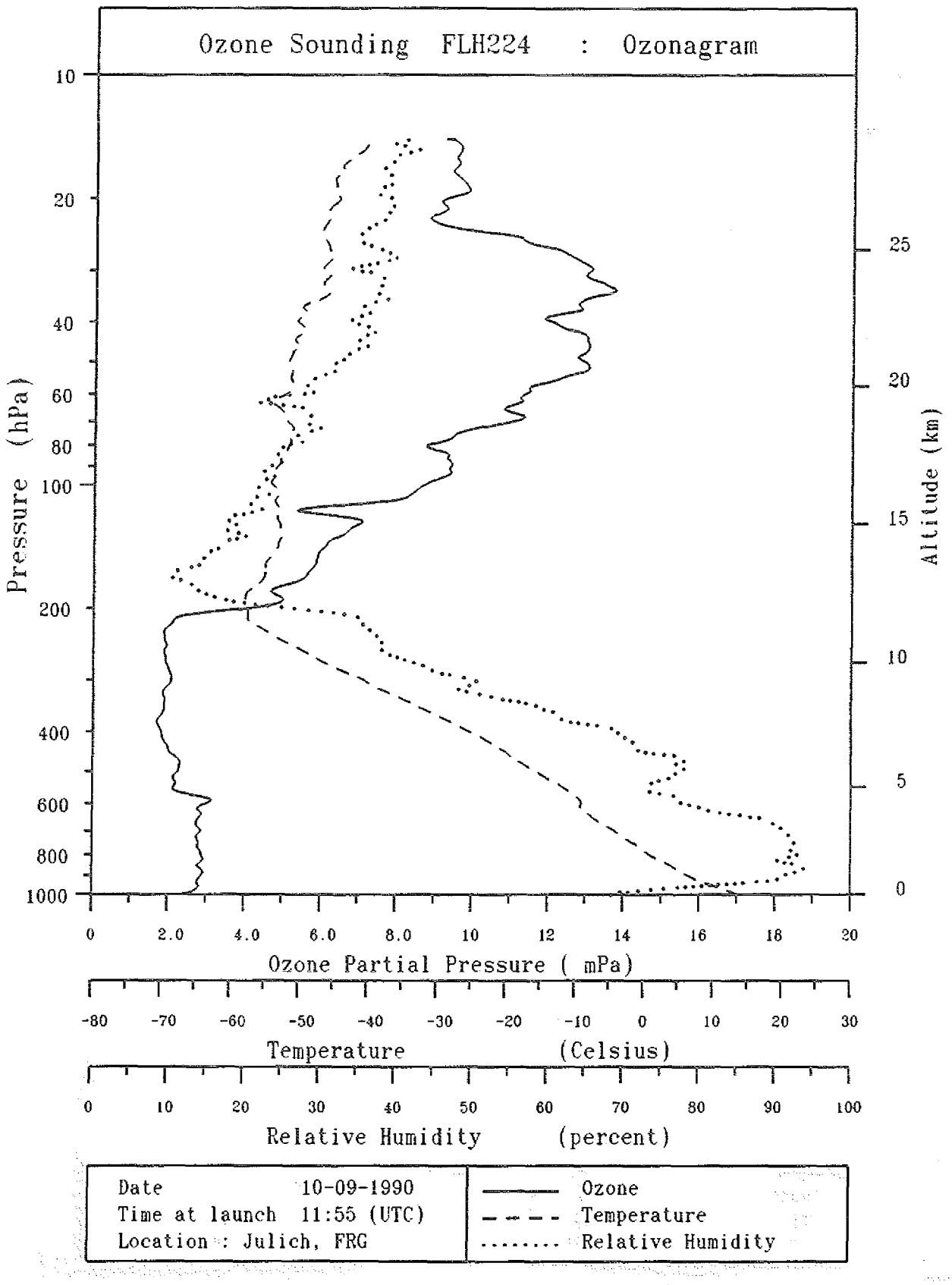

Ozone Sounding FLH221 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 30-08-1990
Time at launch 11:55 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

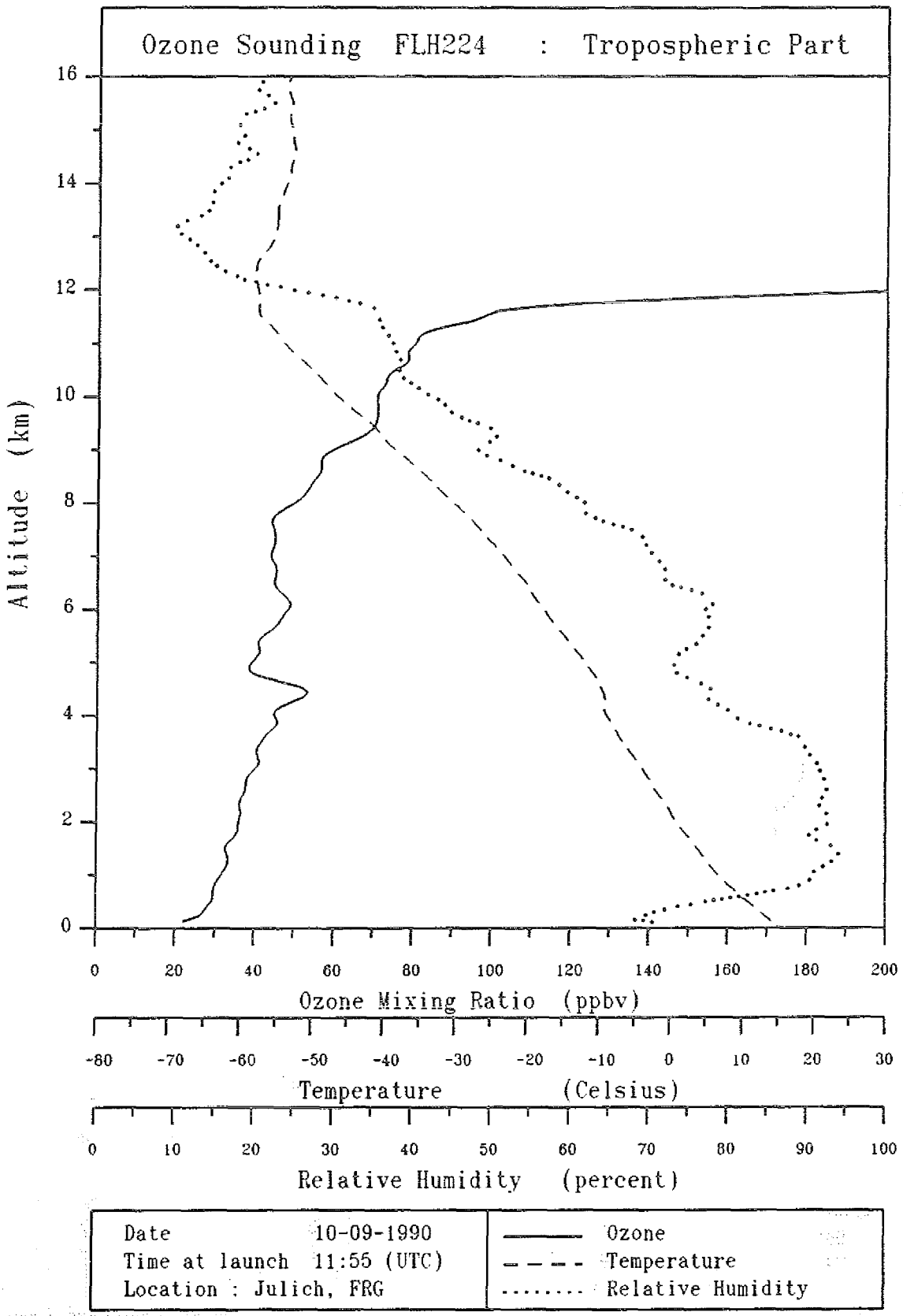

Ozone Sounding FLH222 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
30
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 03-09-1990
Time at launch 12:05 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

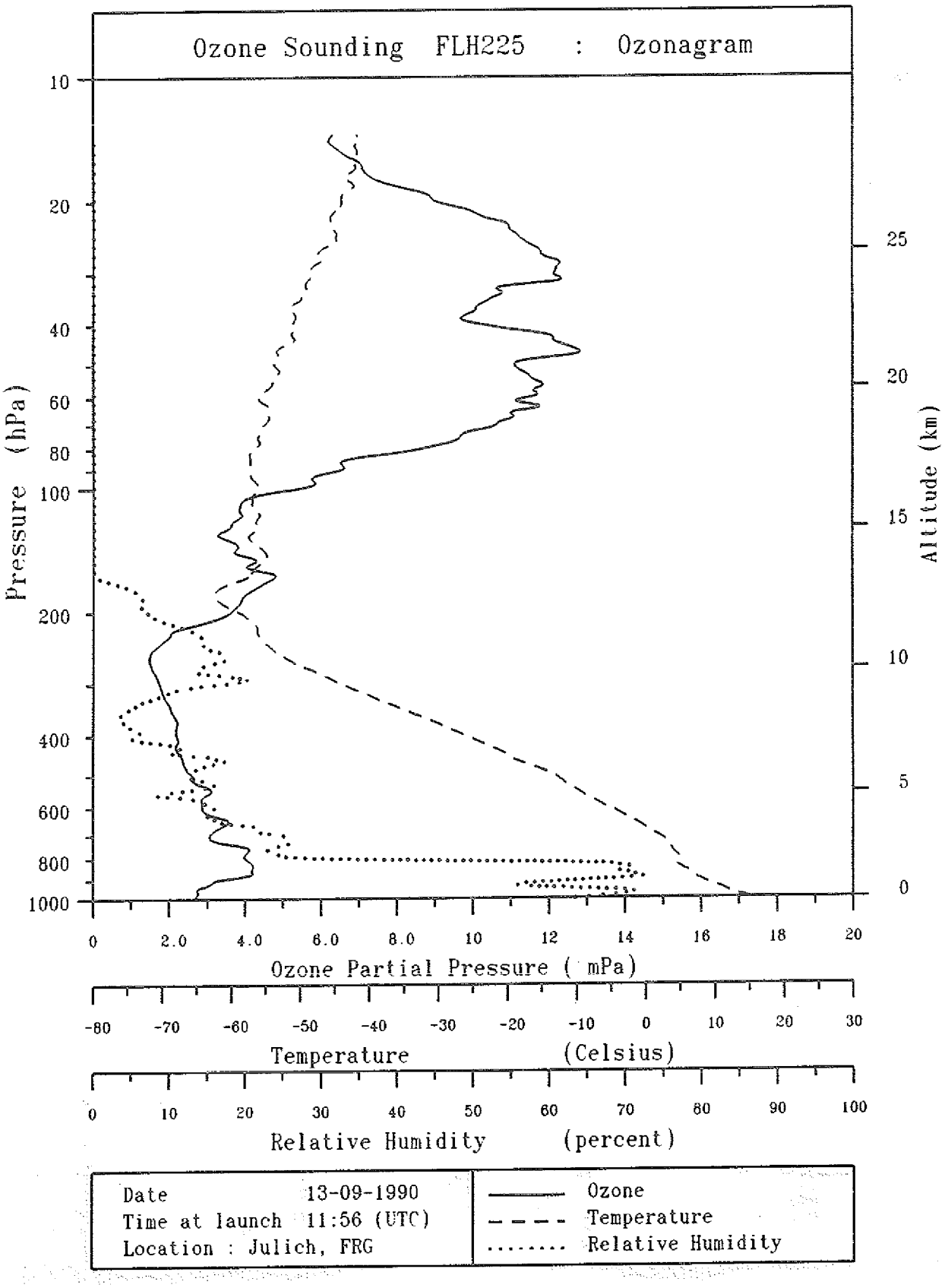

Ozone Sounding FLH222 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 03-09-1990
Time at launch 12:05 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

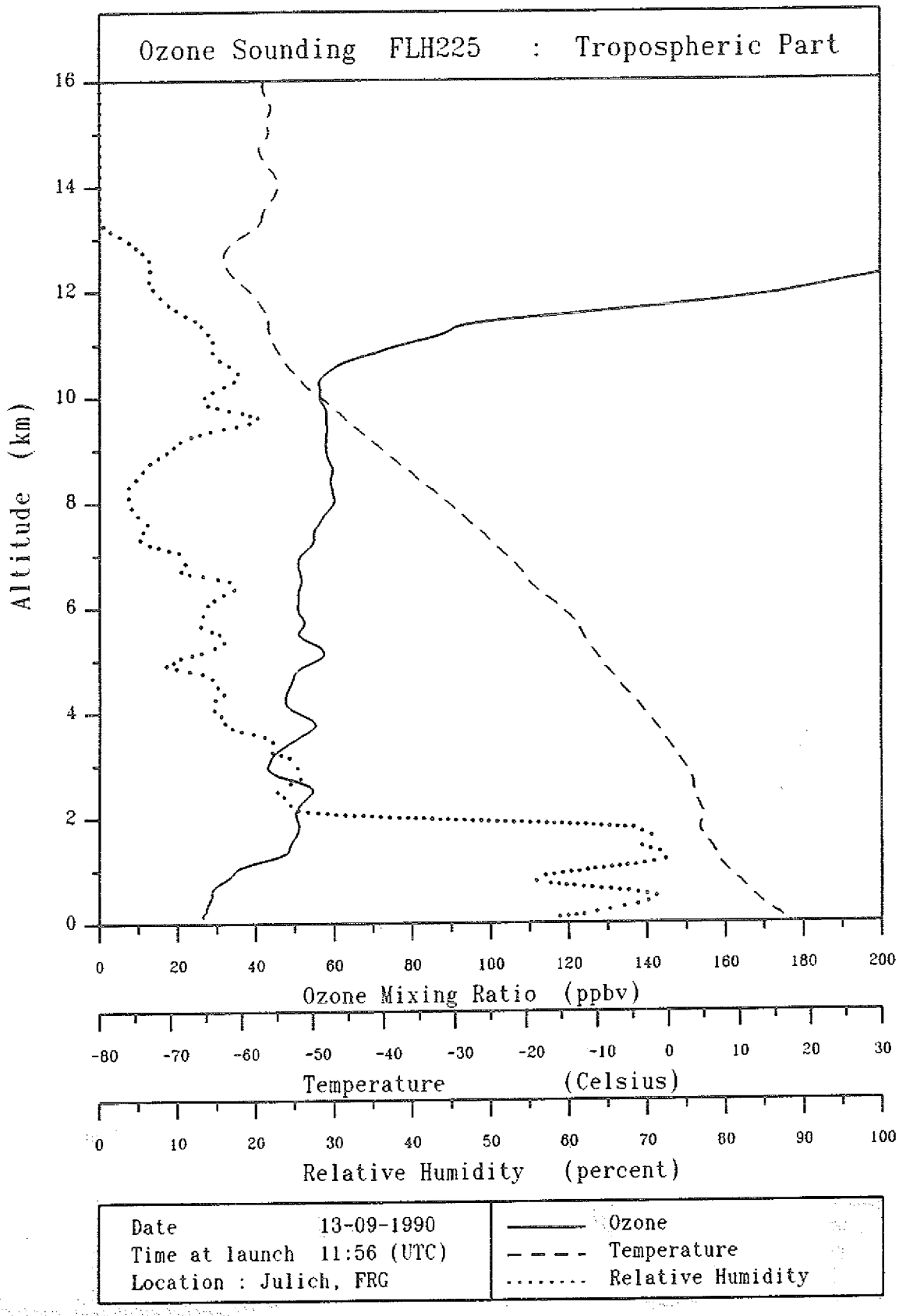

Ozone Sounding FLH223 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
30
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 06-09-1990
Time at launch 12:08 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

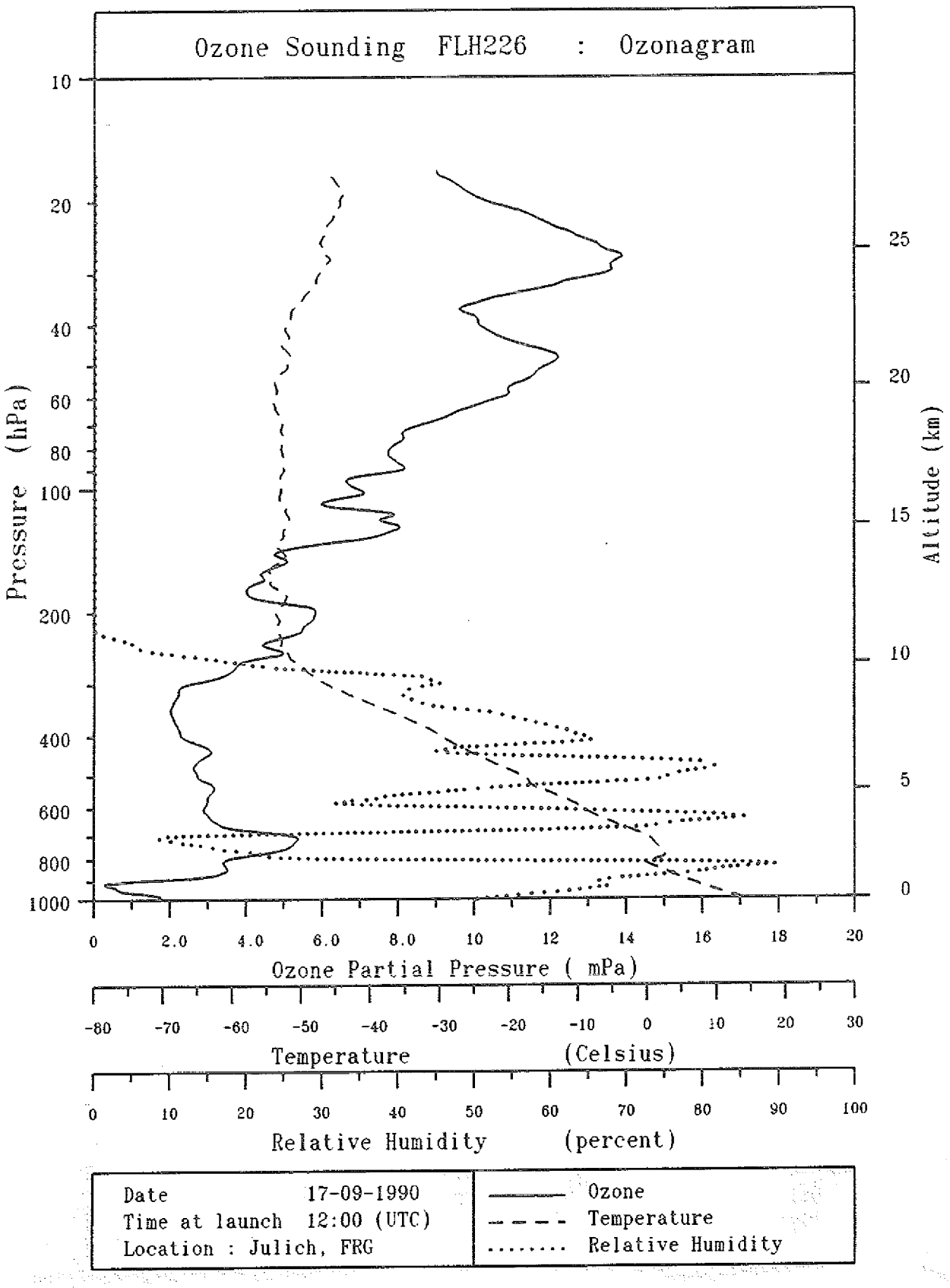

Ozone Sounding FLH223 : Tropospheric Part
Altitude (km)
16
14
12
10
8
6
4
2
0
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 06-09-1990
Time at launch 12:08 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

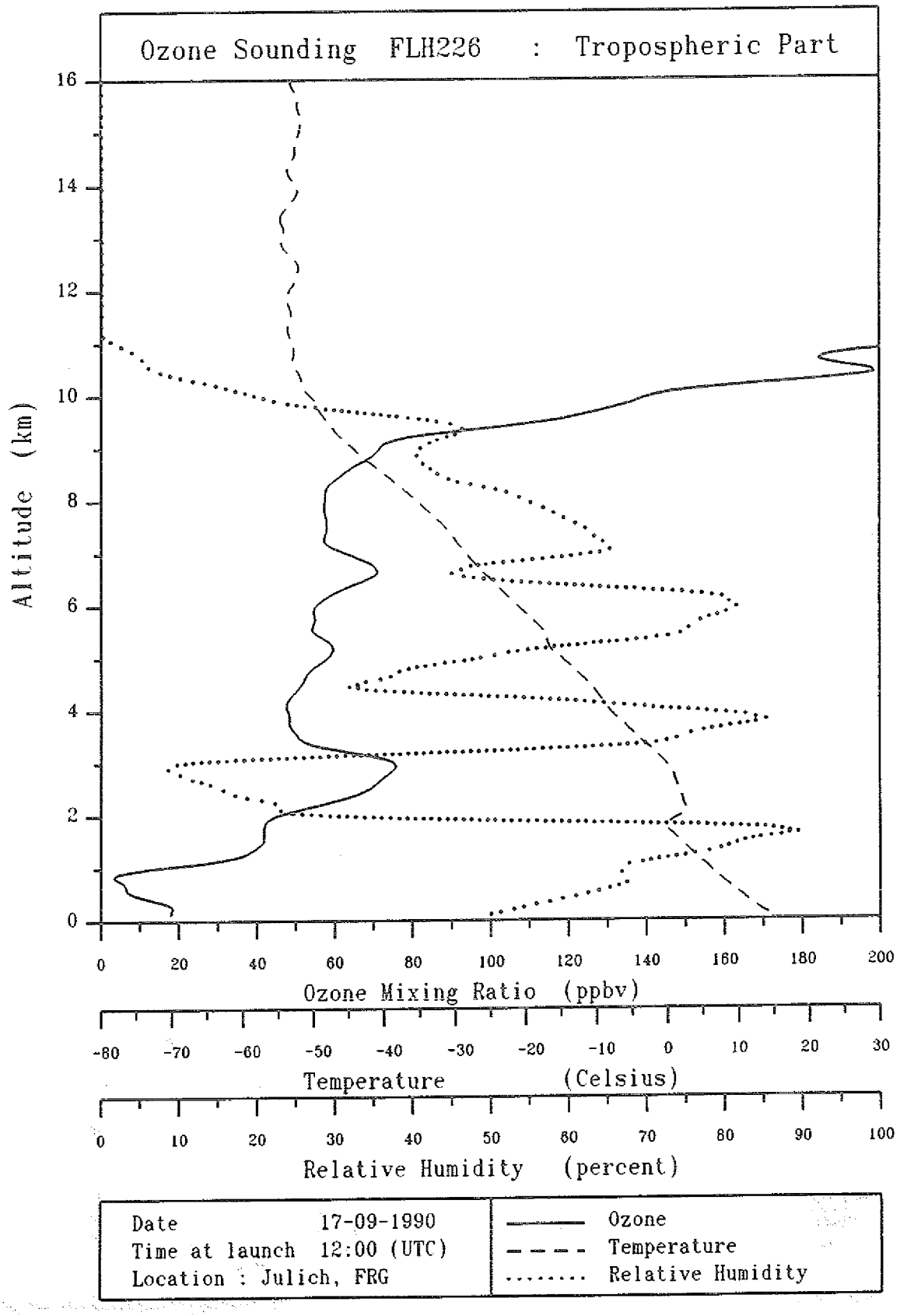

Ozone Sounding FLH224 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 10-09-1990
Time at launch 11:55 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

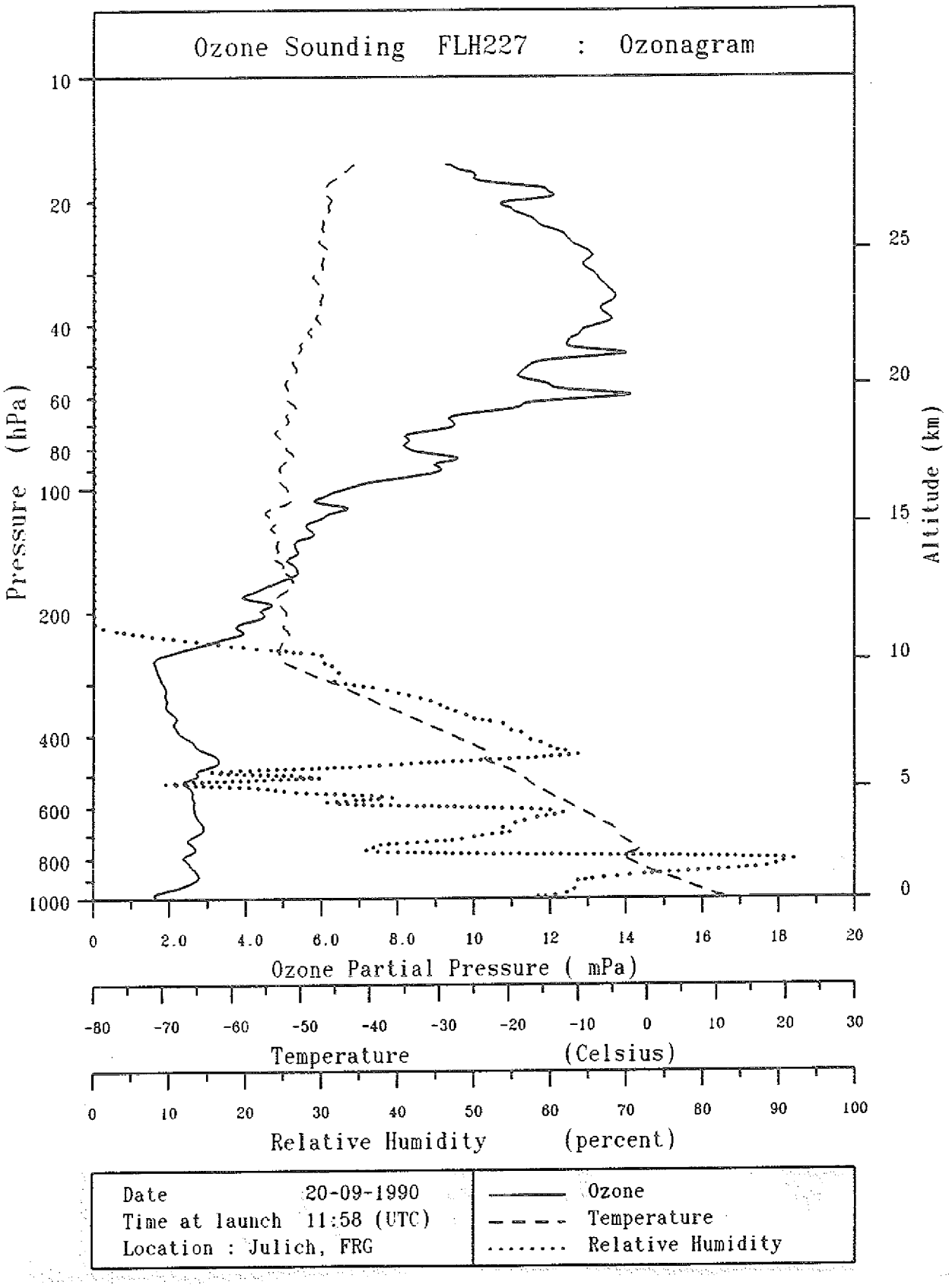

Ozone Sounding FLH224 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 10-09-1990
Time at launch 11:55 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

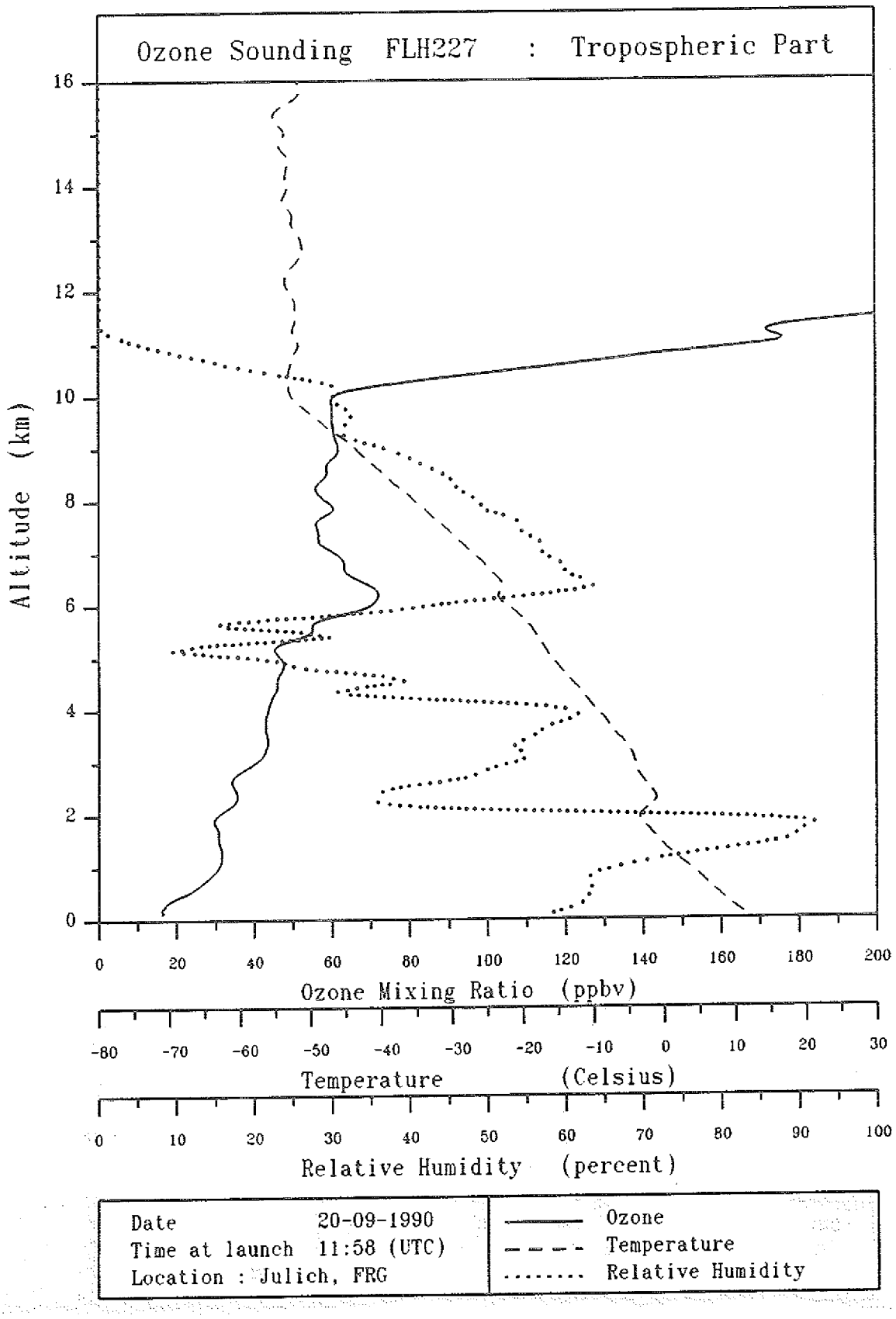

Ozone Sounding FLH225 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 13-09-1990
Time at launch 11:56 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

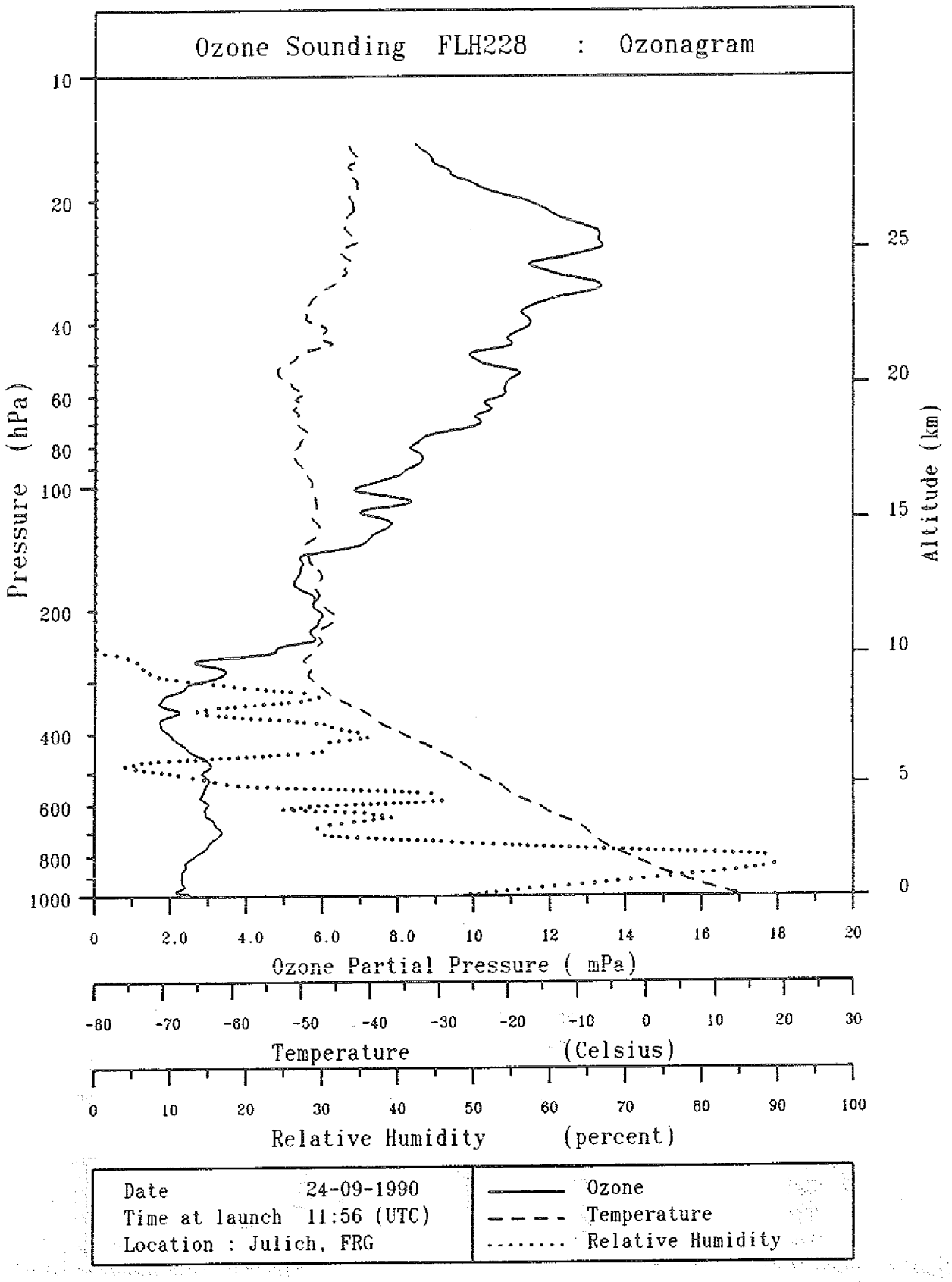

Ozone Sounding FLH225 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 13-09-1990
Time at launch 11:56 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

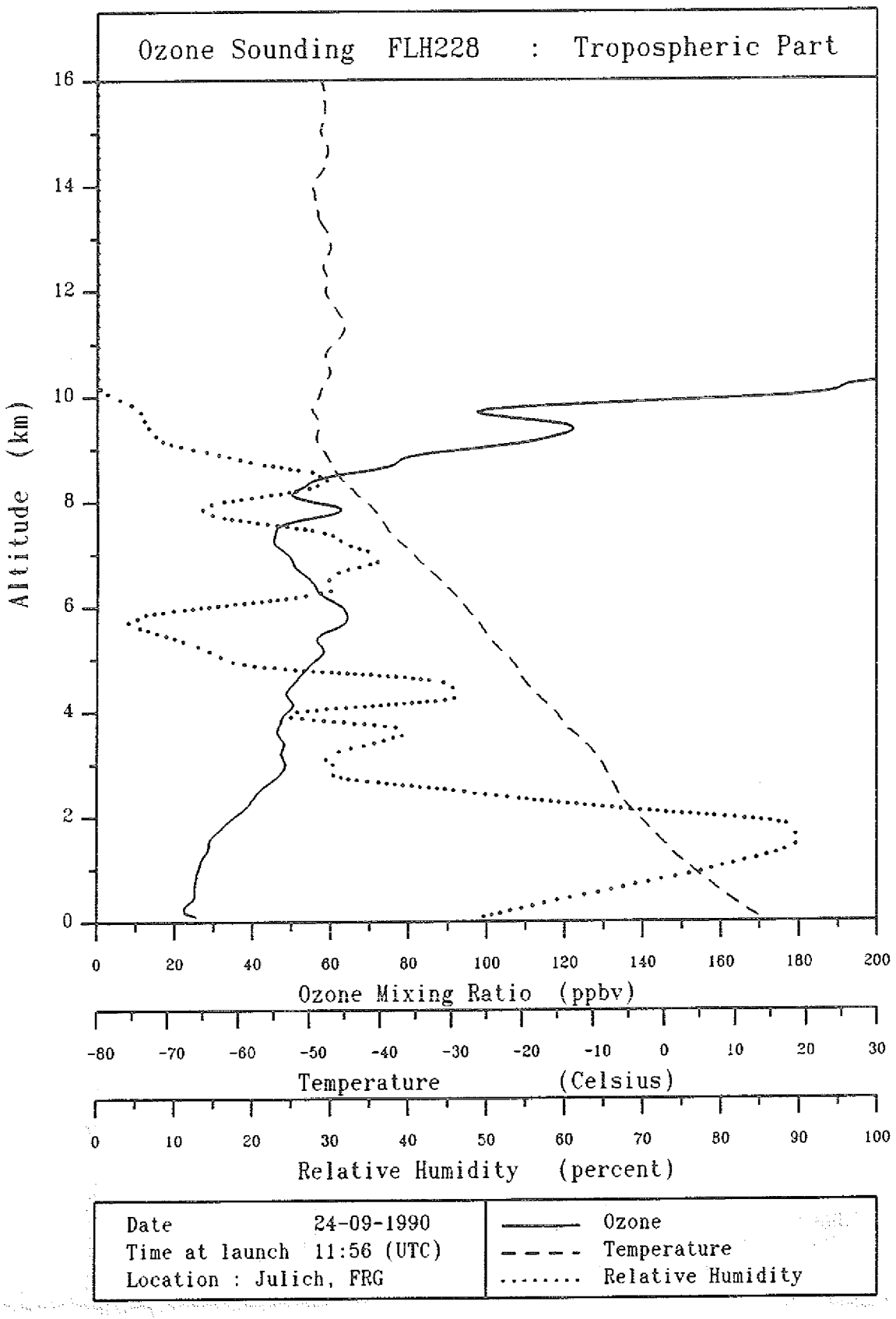

Ozone Sounding FLH226 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 17-09-1990
Time at launch 12:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

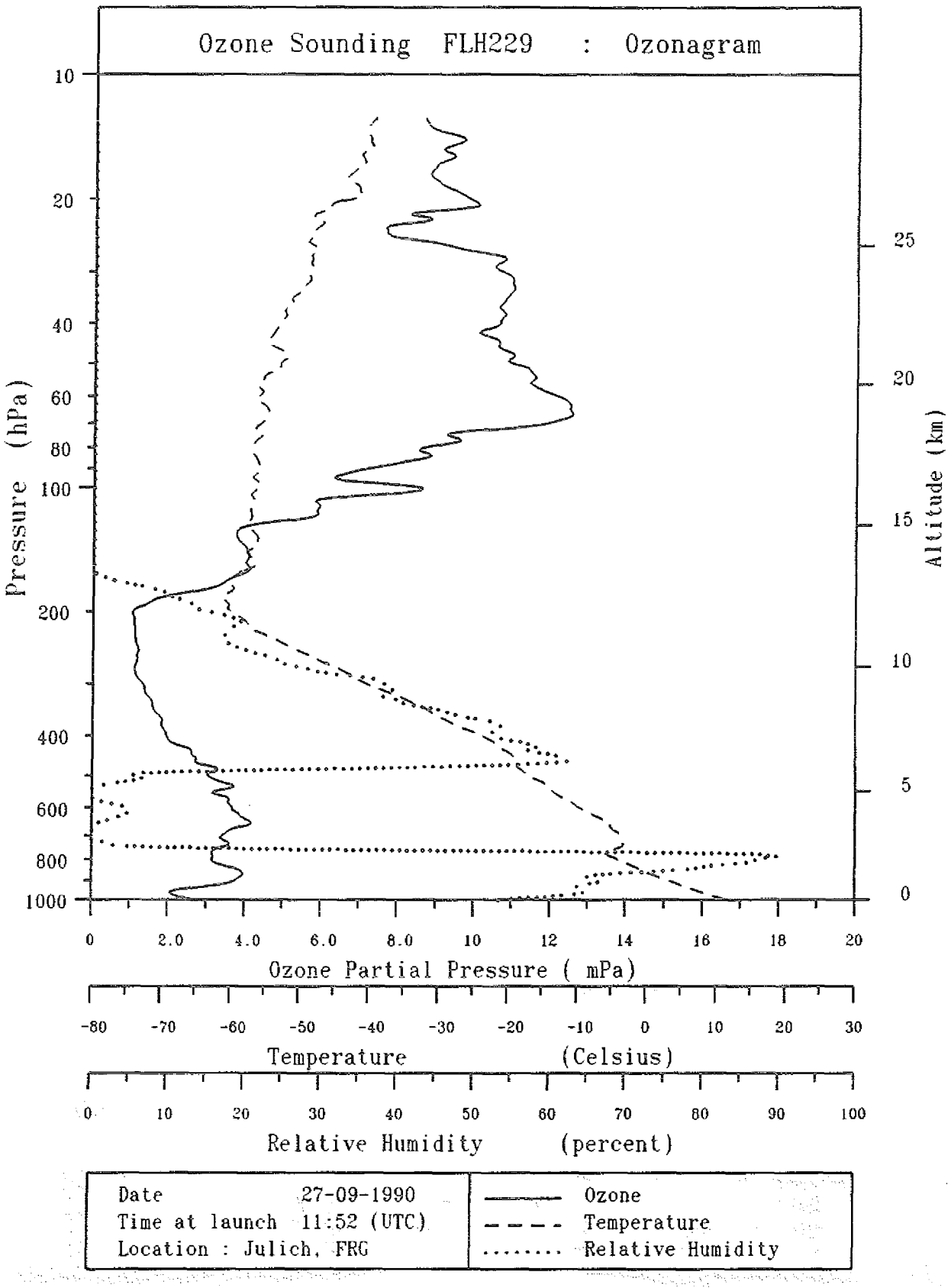

Ozone Sounding FLH226 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 17-09-1990
Time at launch 12:00 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

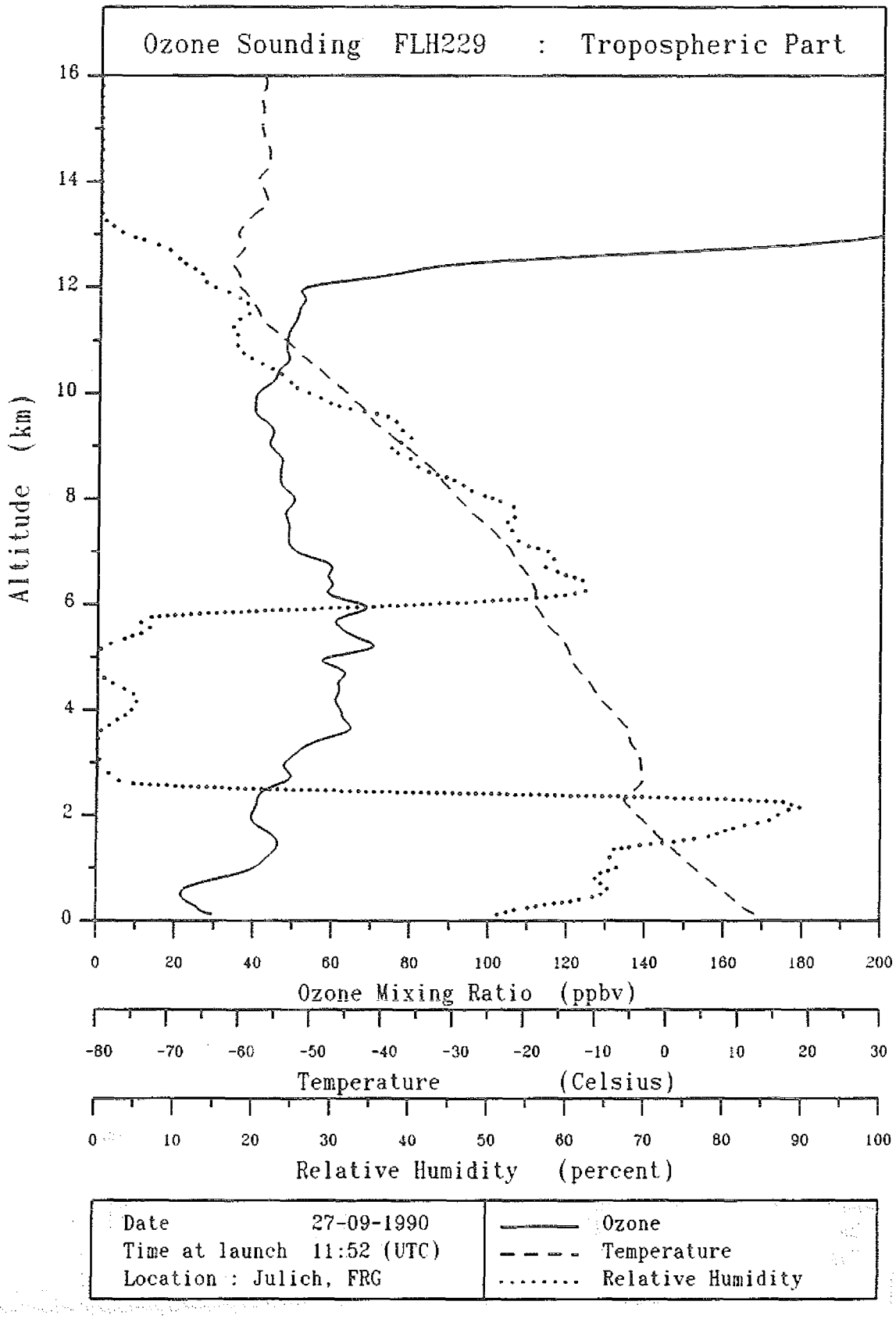

Ozone Sounding FLH227 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 20-09-1990
Time at launch 11:58 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

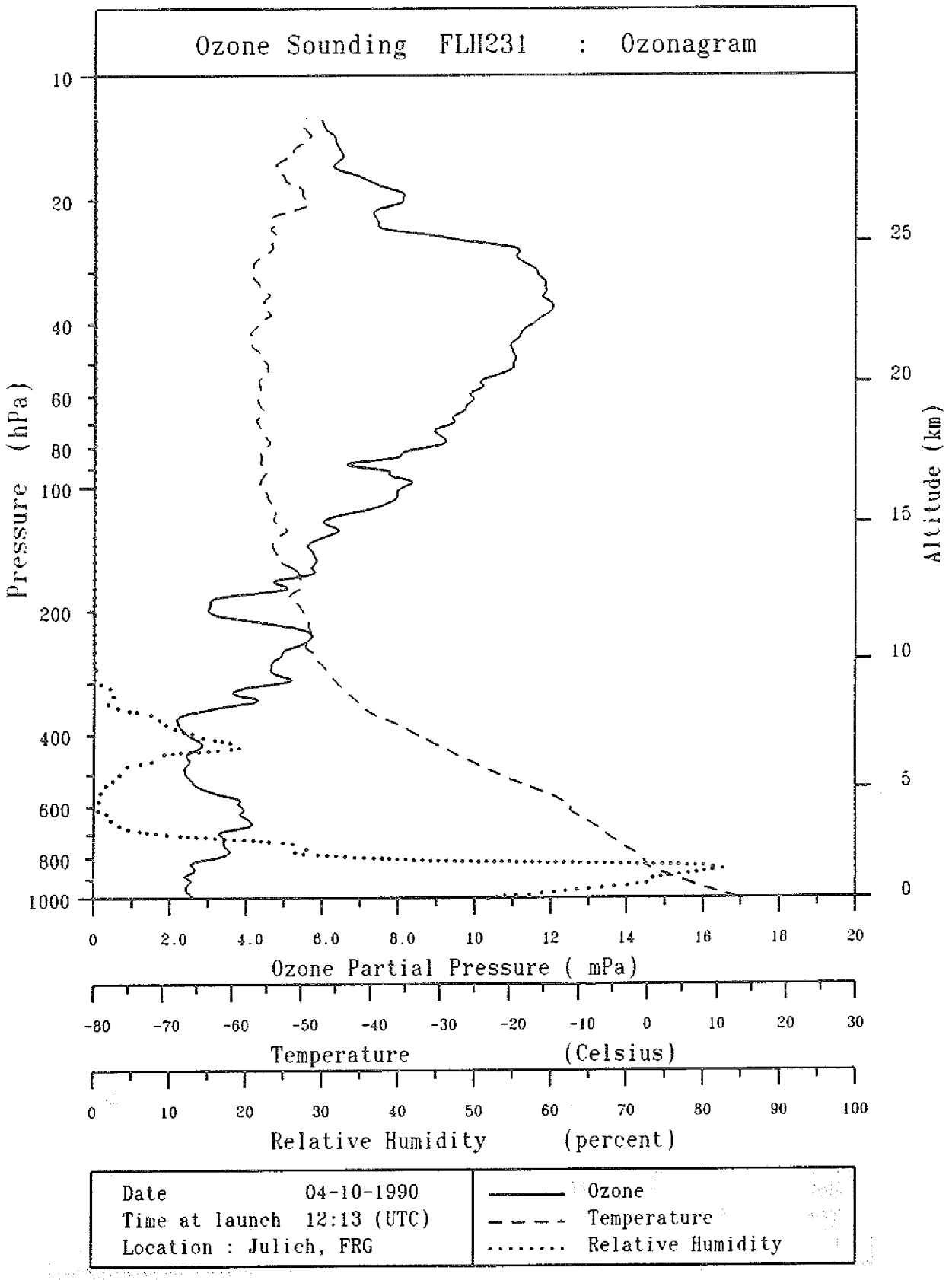

Ozone Sounding FLH227 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 20-09-1990
Time at launch 11:58 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

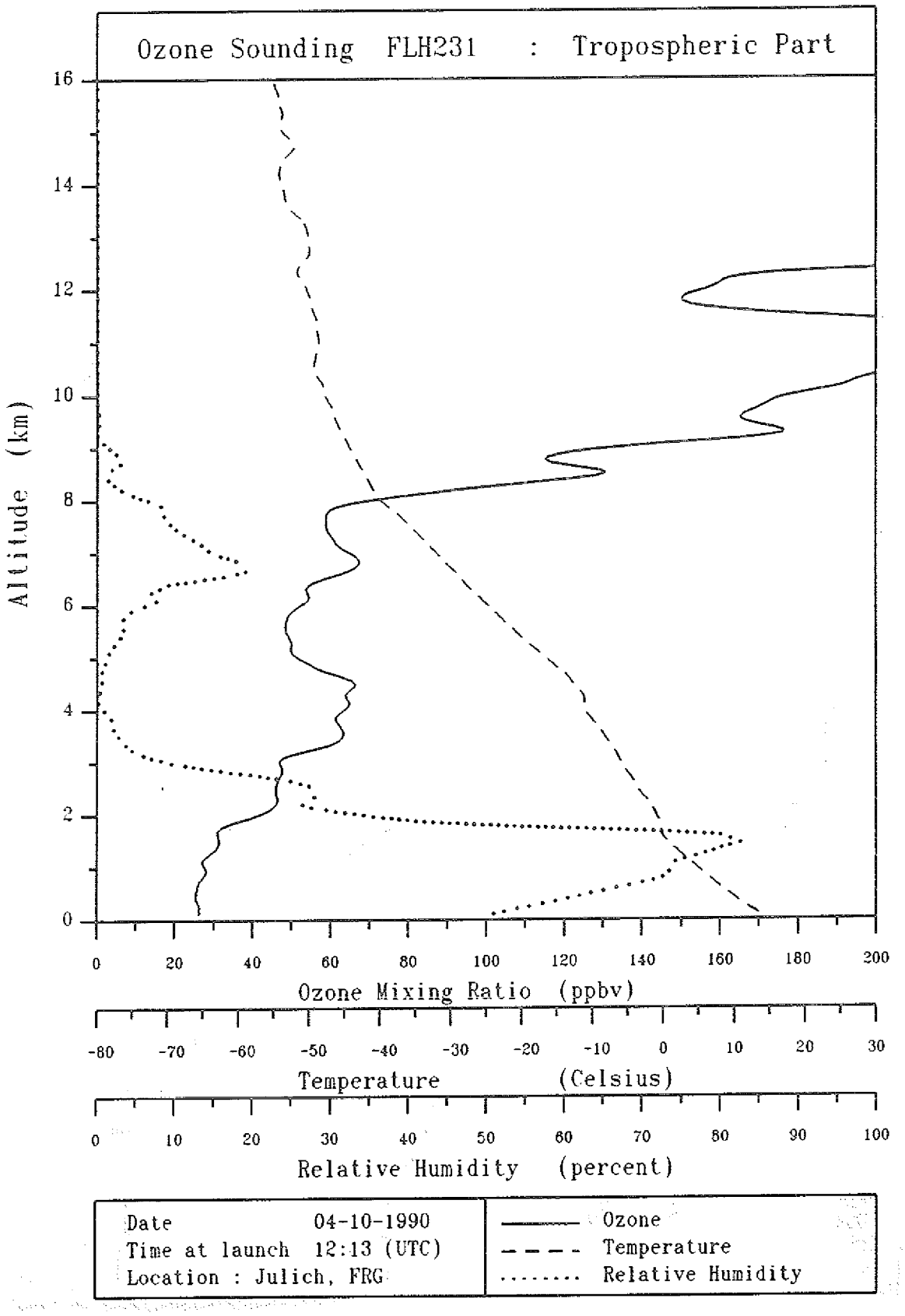

Ozone Sounding FLH228 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 24-09-1990
Time at launch 11:56 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

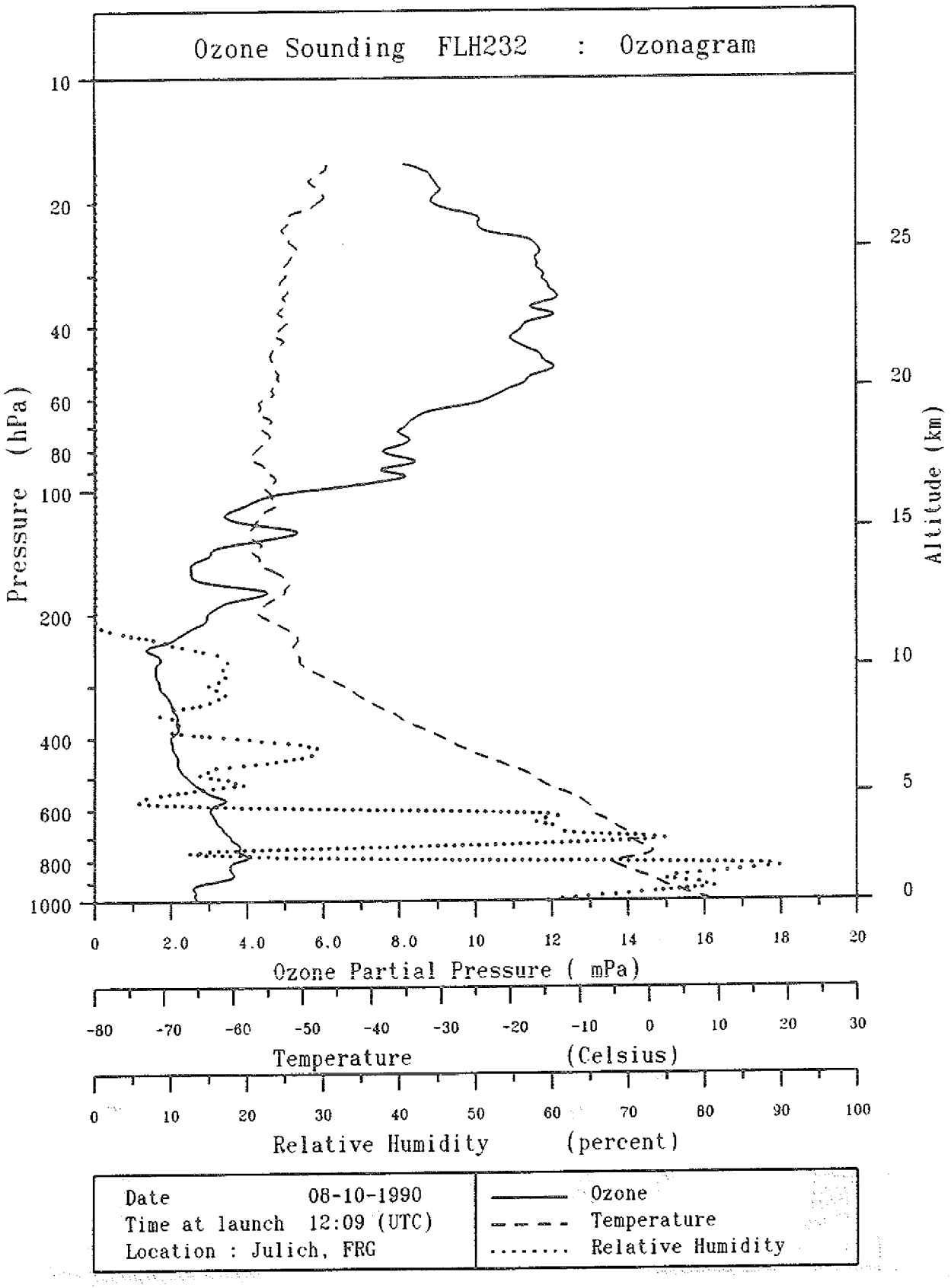

Ozone Sounding FLH228 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 24-09-1990
Time at launch 11:56 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

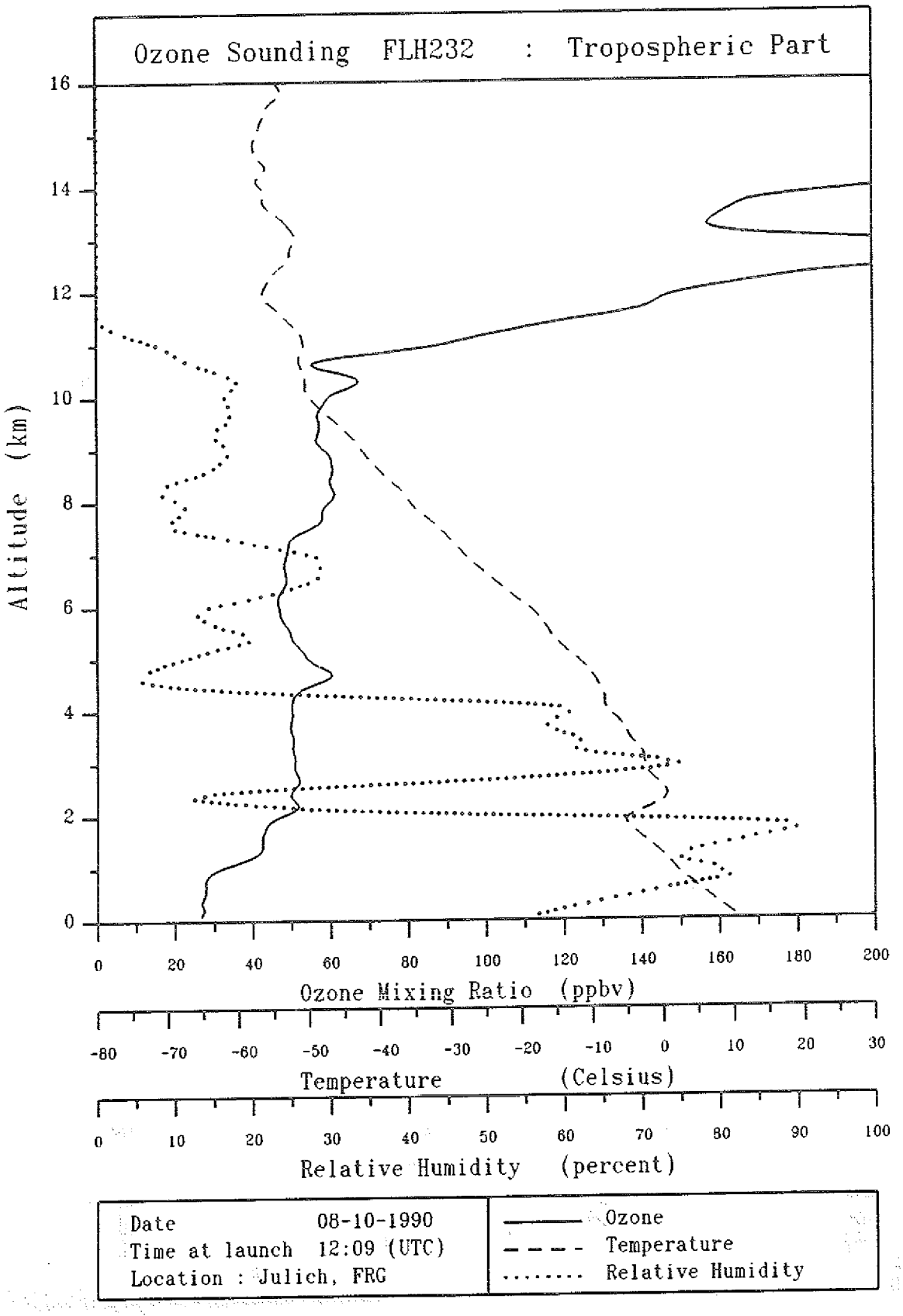

Ozone Sounding FLH229 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 27-09-1990
Time at launch 11:52 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

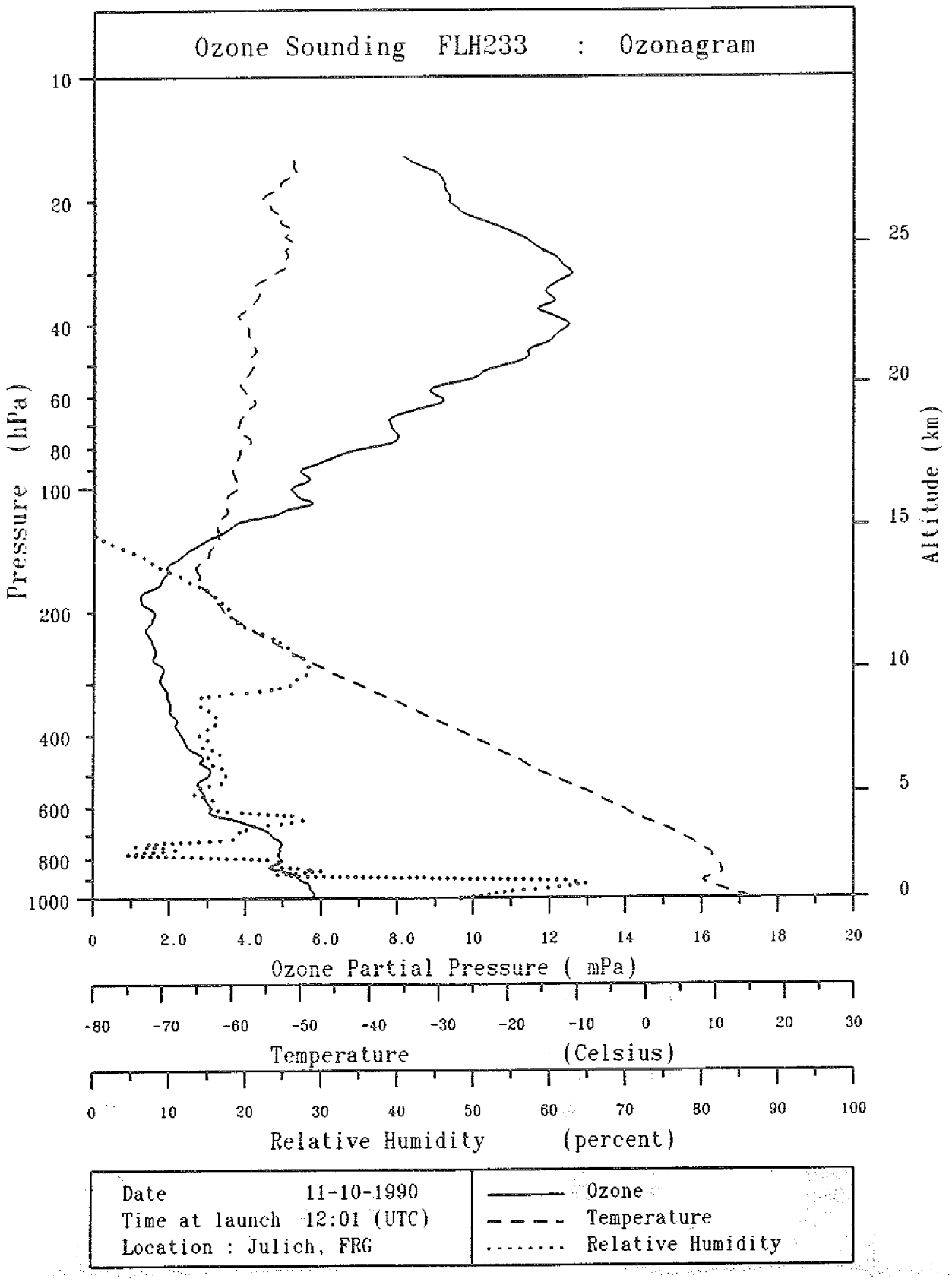

Ozone Sounding FLH229 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 27-09-1990
Time at launch 11:52 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

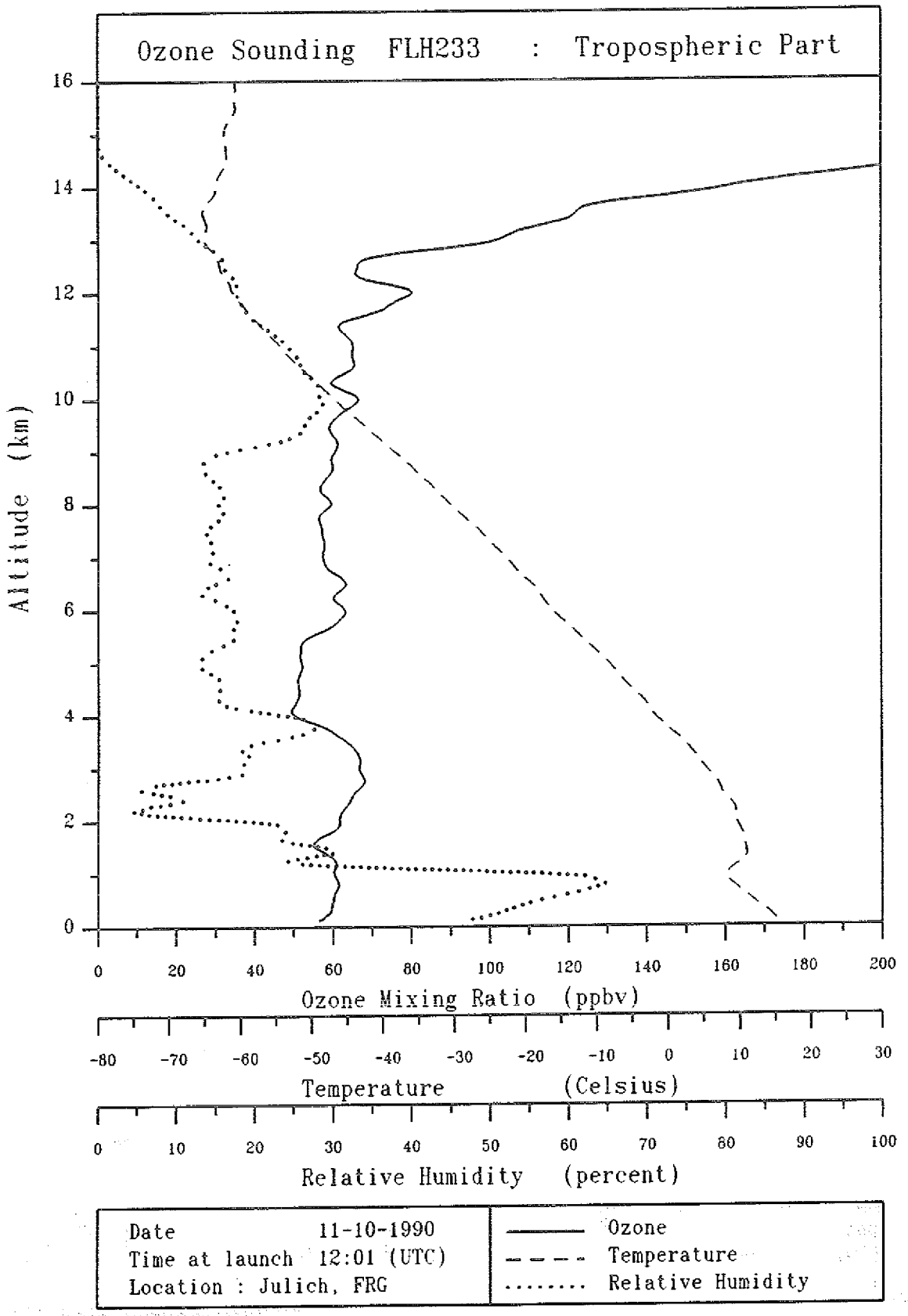

Ozone Sounding FLH231 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 04-10-1990
Time at launch 12:13 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

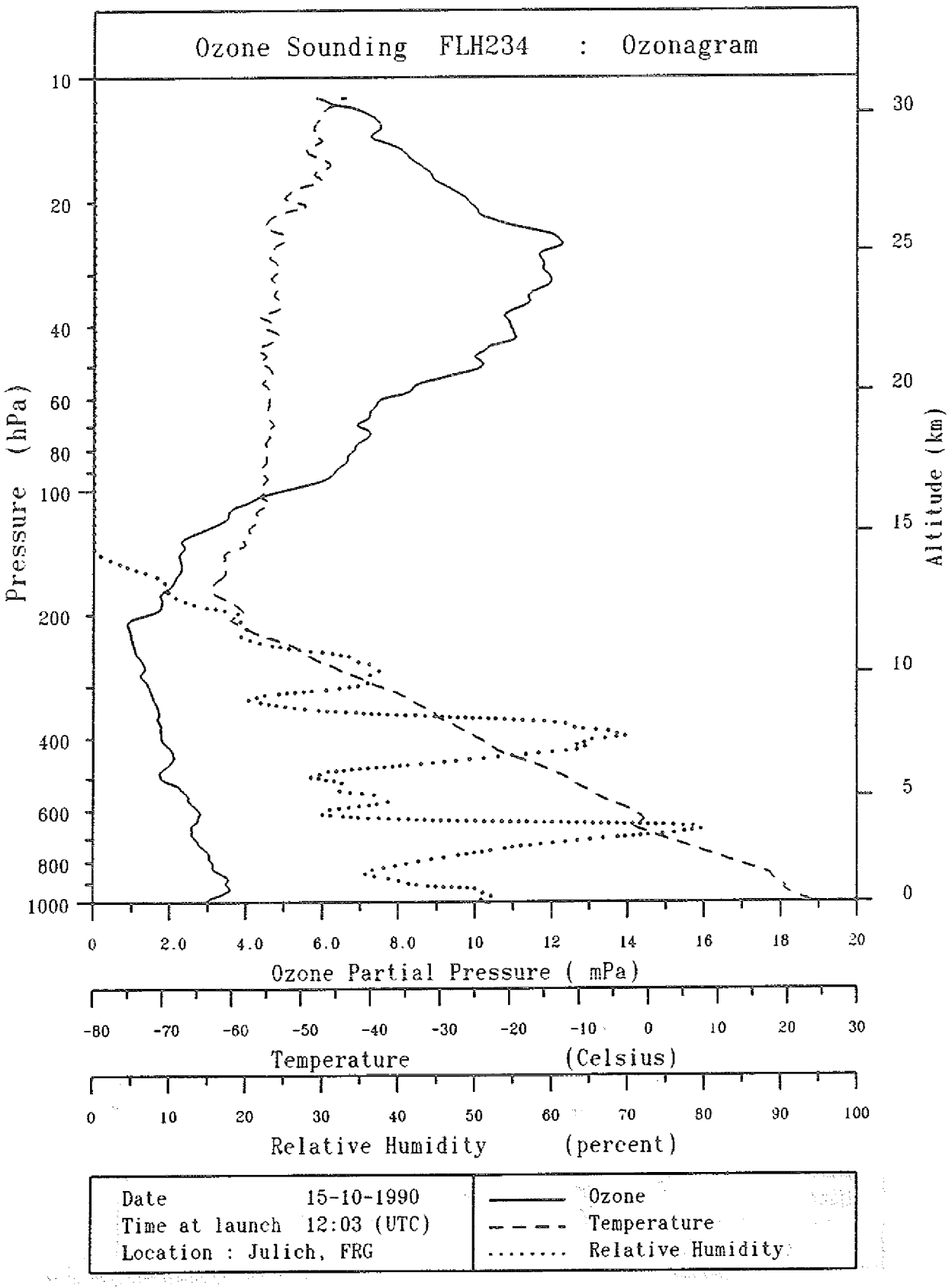

Ozone Sounding FLH231 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 04-10-1990
Time at launch 12:13 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

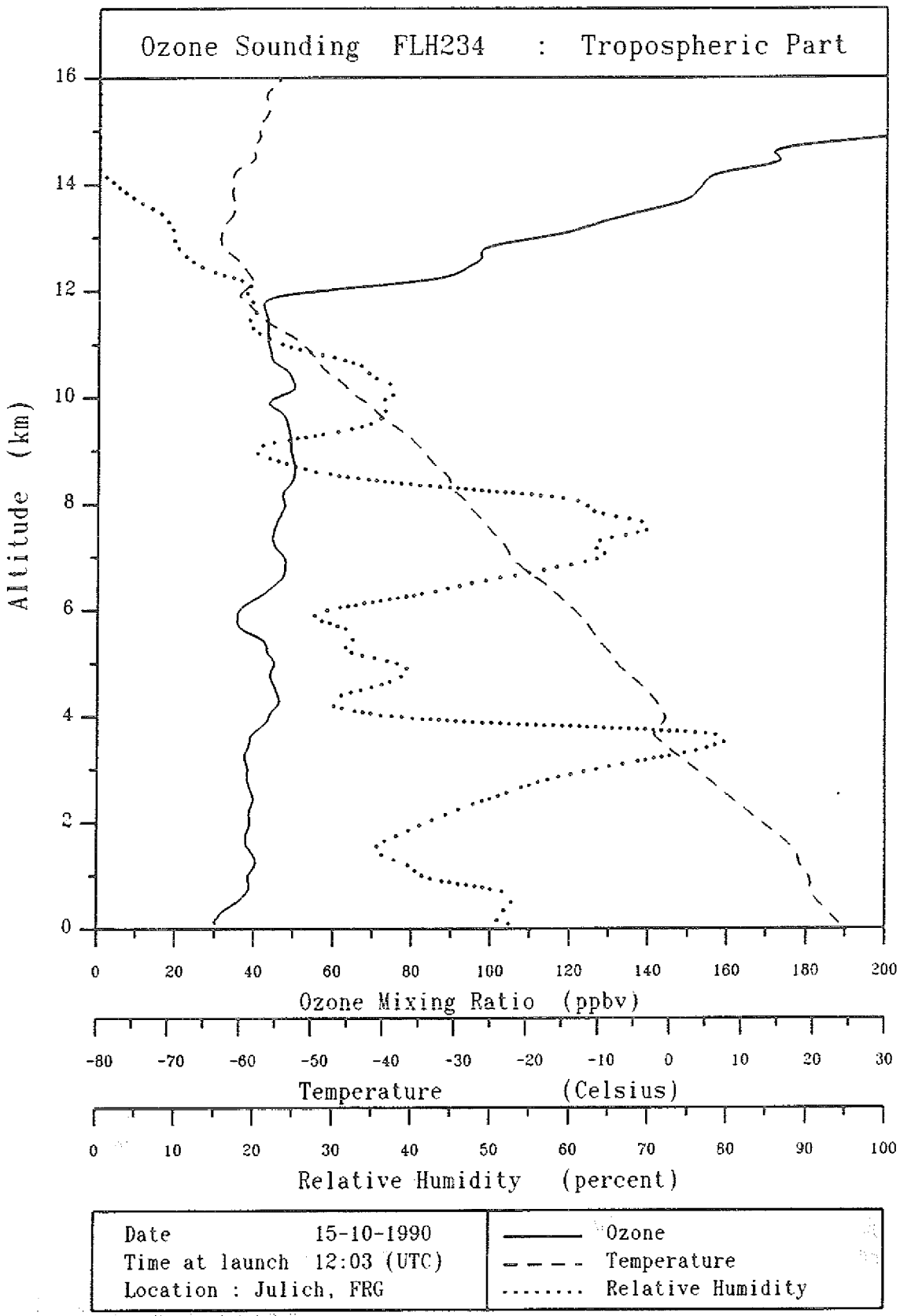

Ozone Sounding FLH232 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 08-10-1990
Time at launch 12:09 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH232 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 08-10-1990
Time at launch 12:09 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

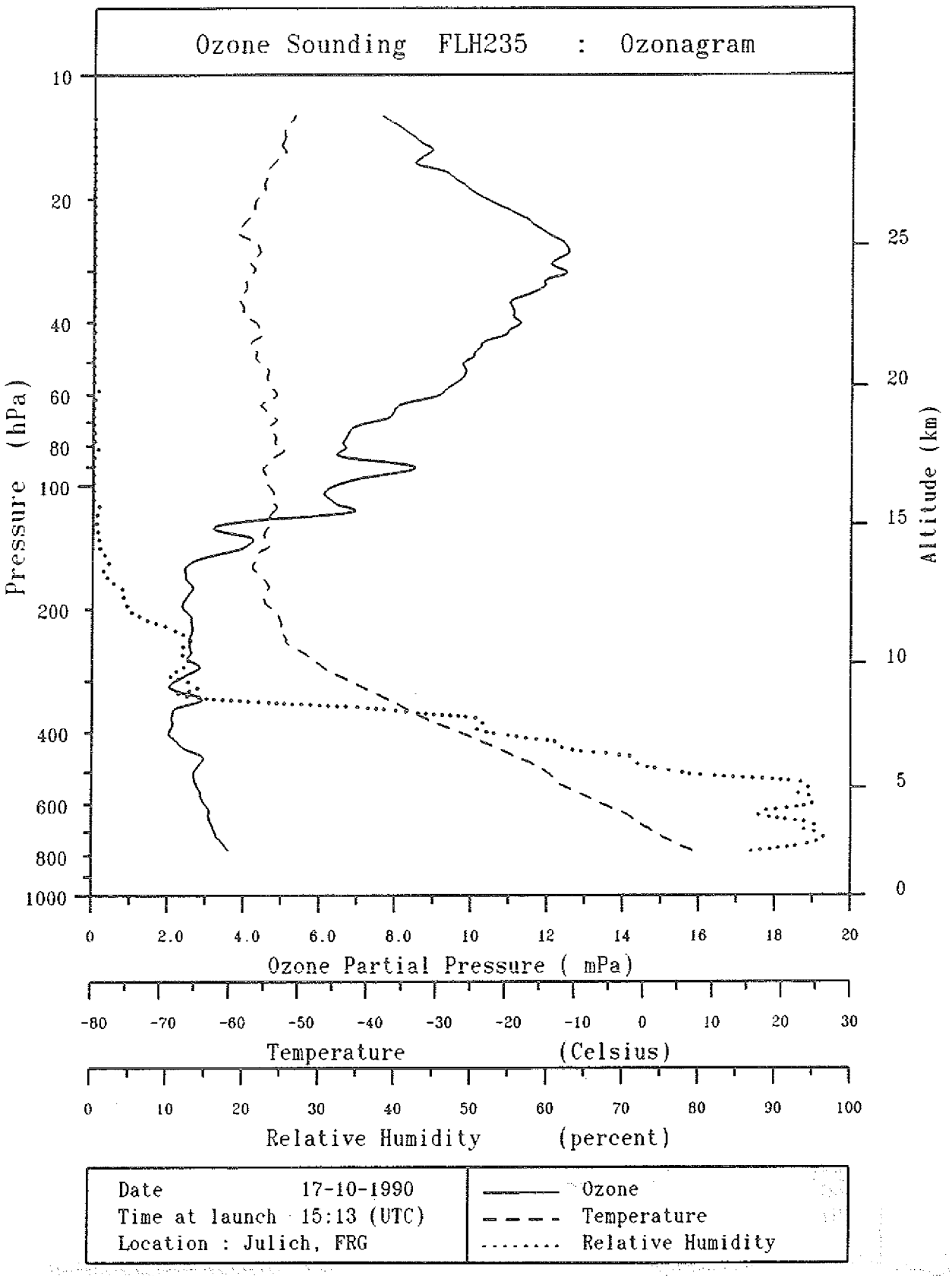

Ozone Sounding FLH233 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 11-10-1990
Time at launch 12:01 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

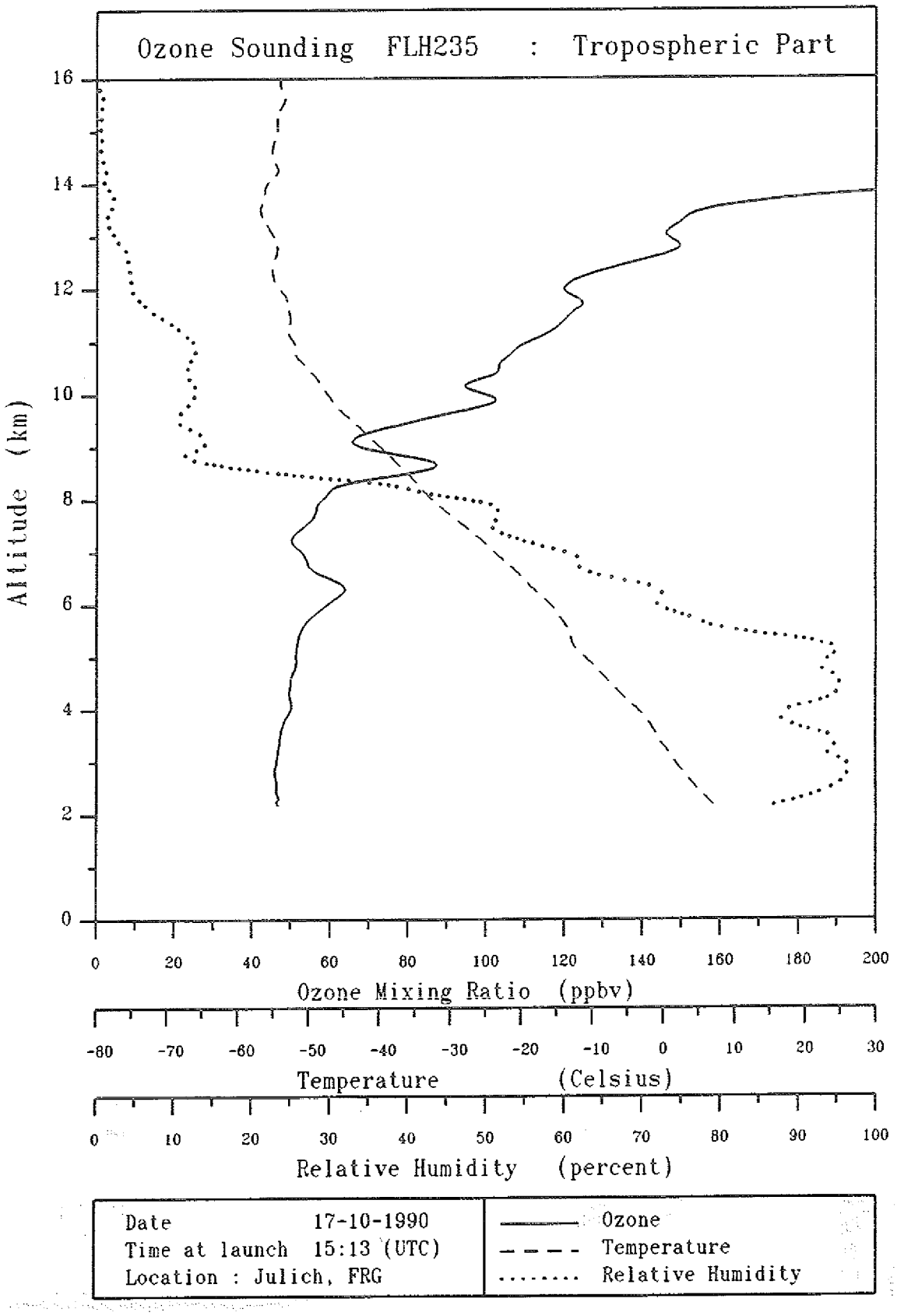

Ozone Sounding FLH233 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 11-10-1990
Time at launch 12:01 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

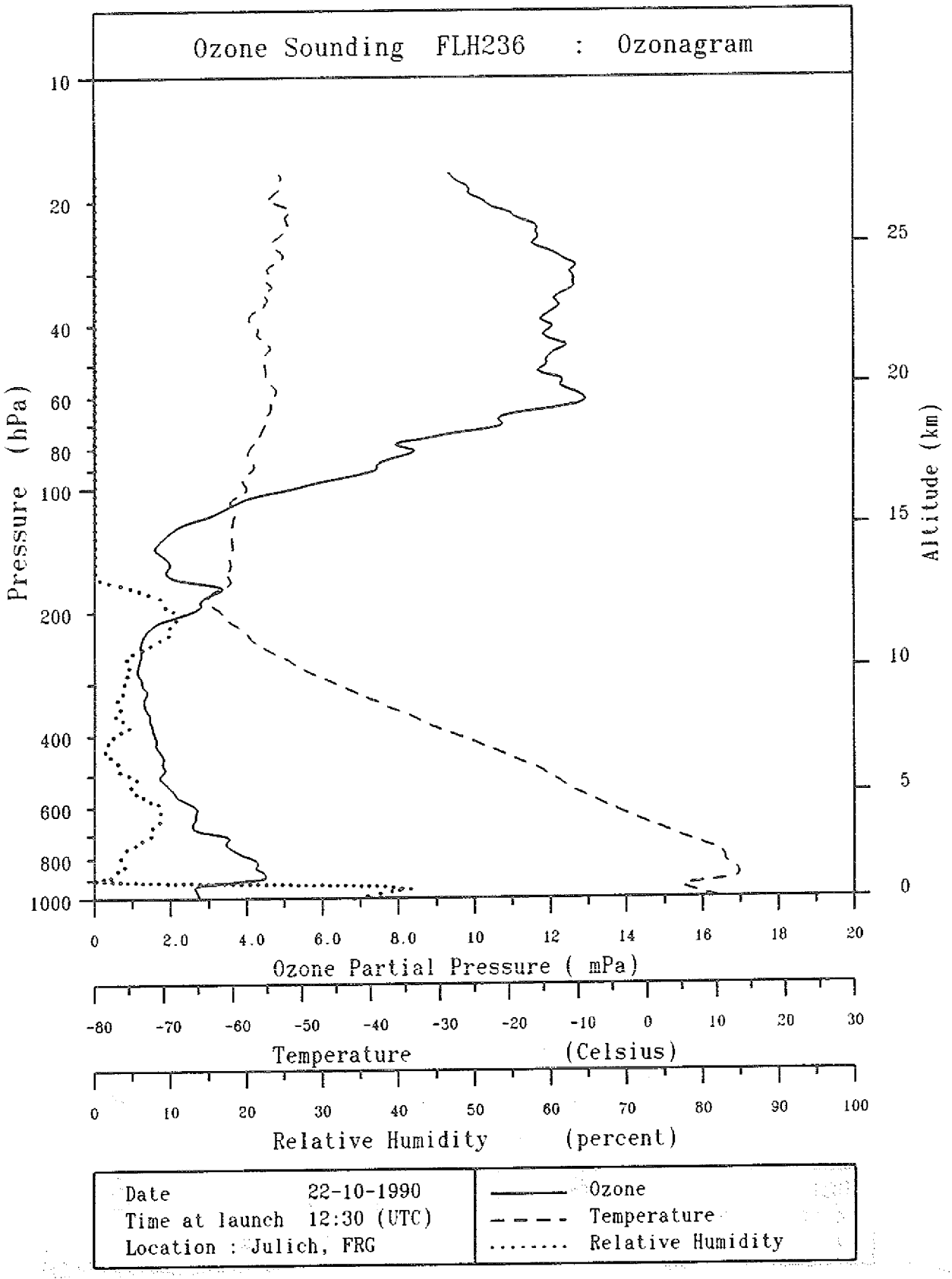

Ozone Sounding FLH234 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
30
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 15-10-1990
Time at launch 12:03 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

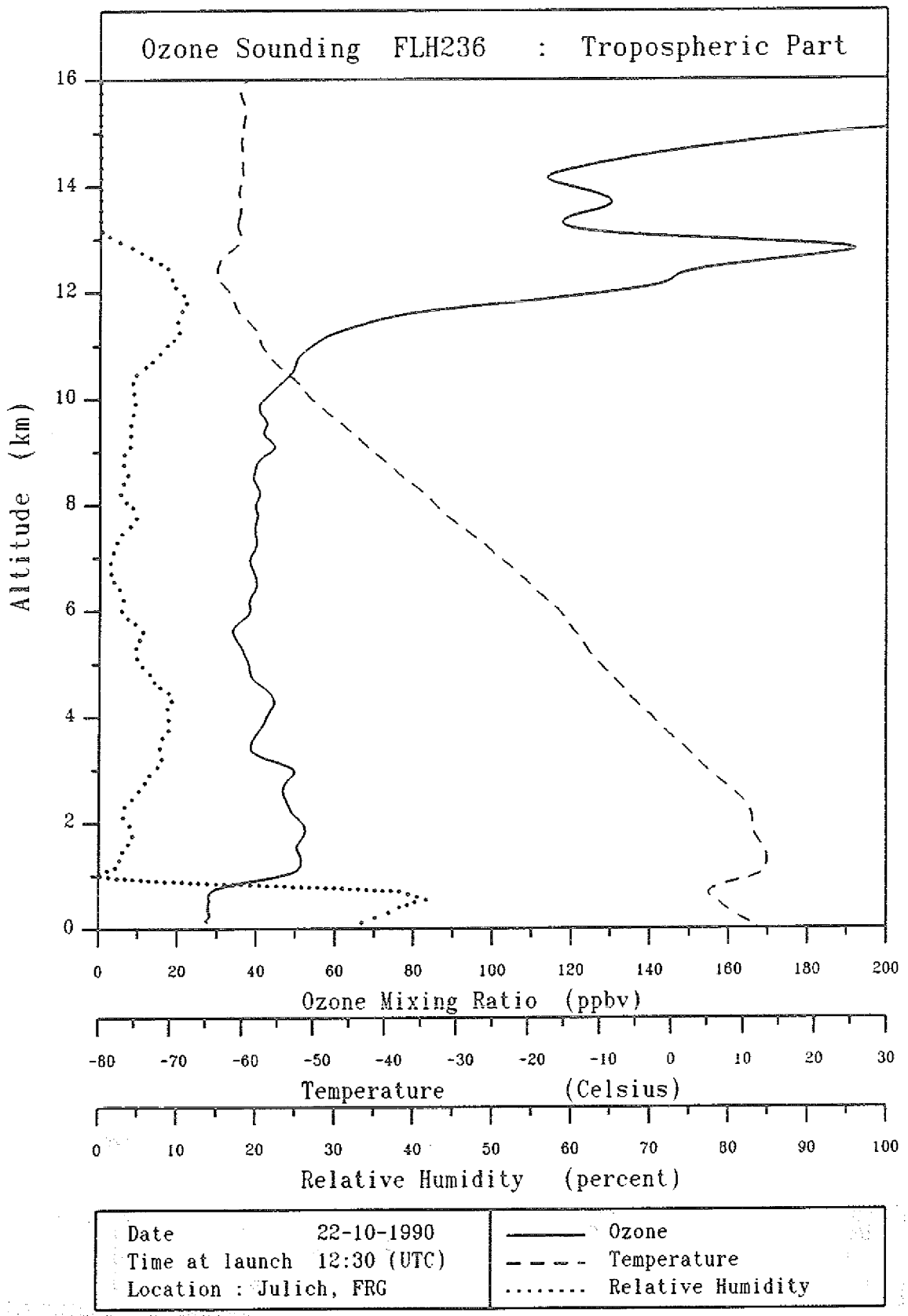


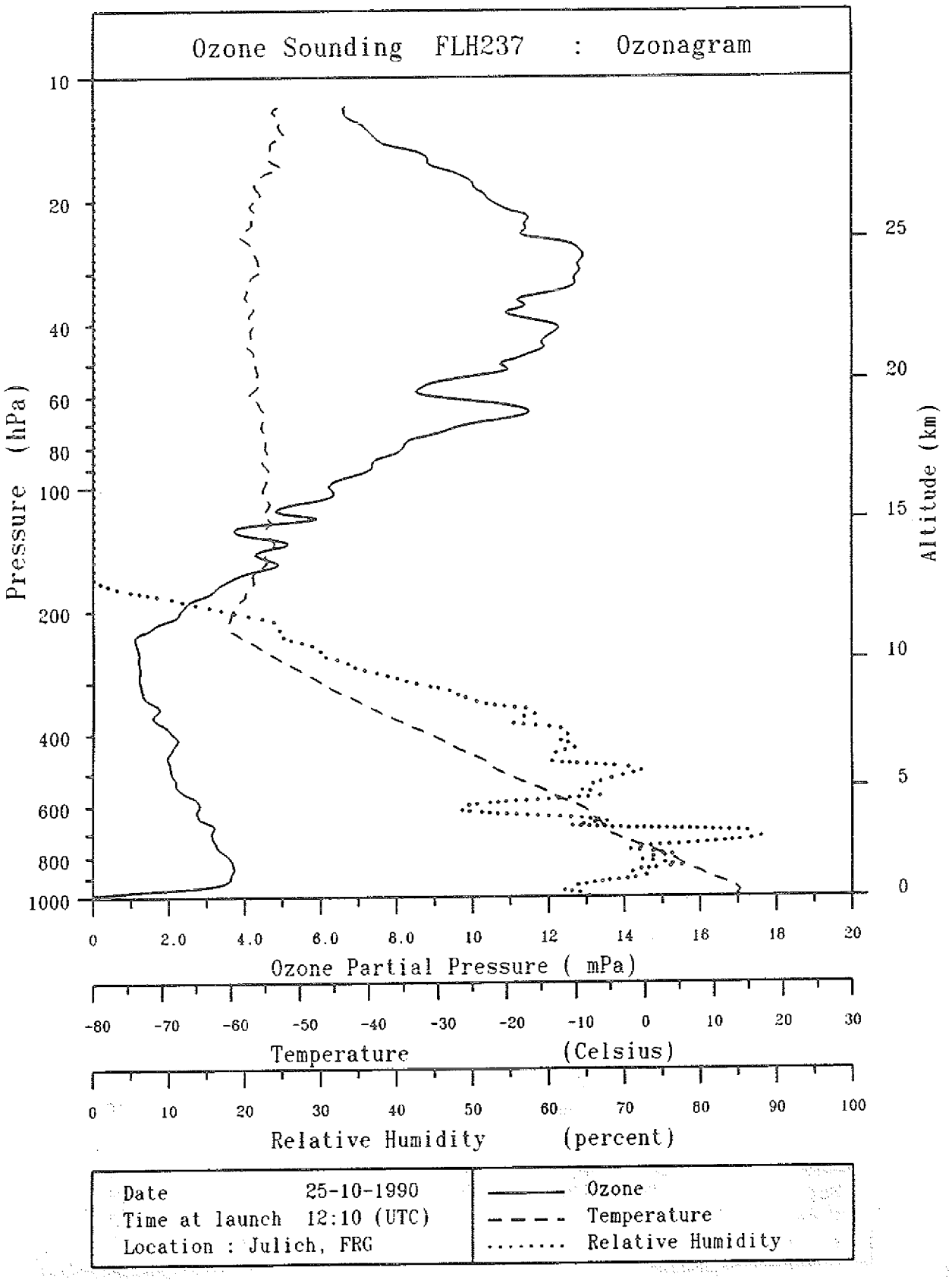
Date 15-10-1990	——— Ozone
Time at launch 12:03 (UTC)	– – – – Temperature
Location : Julich, FRG	..... Relative Humidity

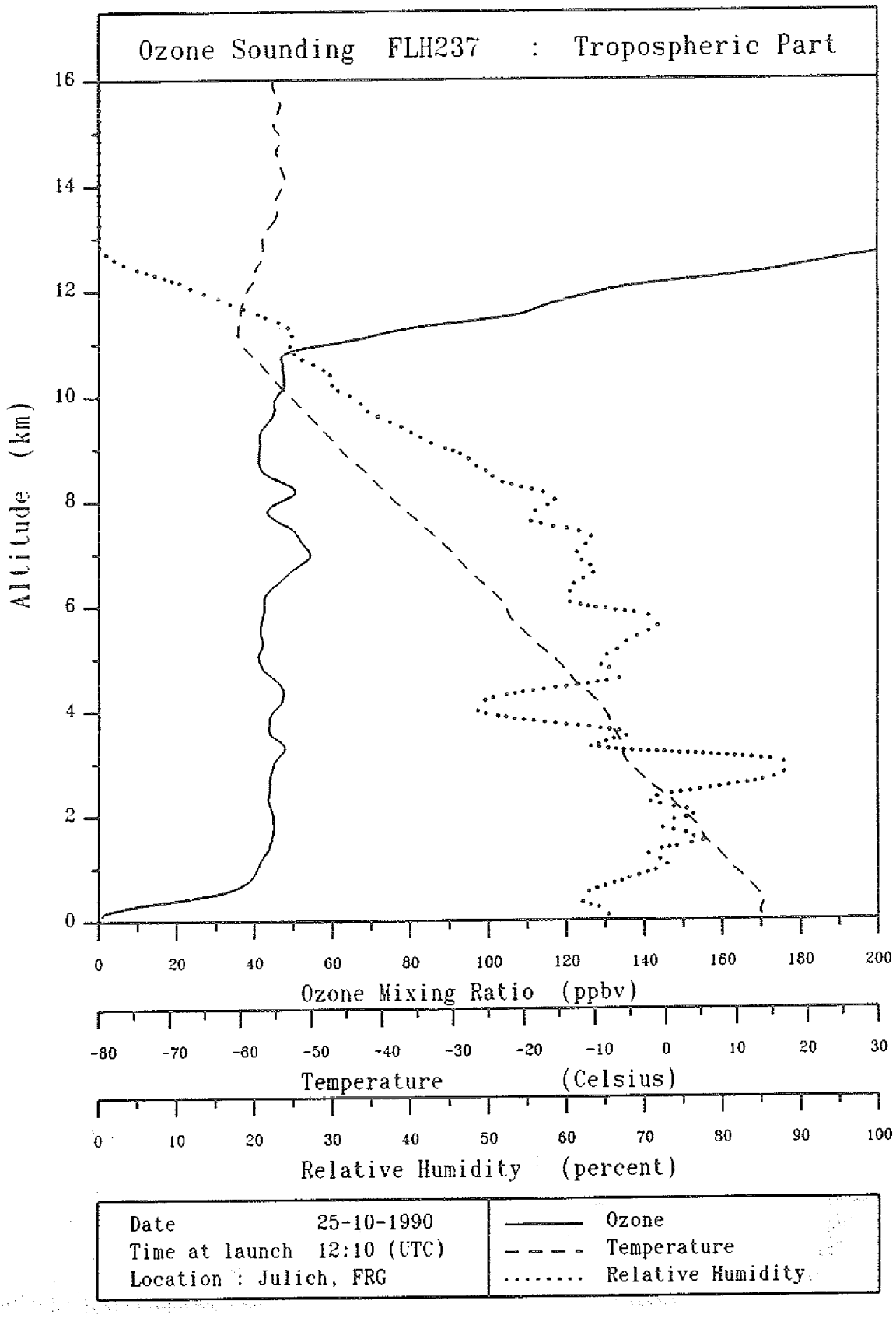

Ozone Sounding FLH235 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 17-10-1990
Time at launch 15:13 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

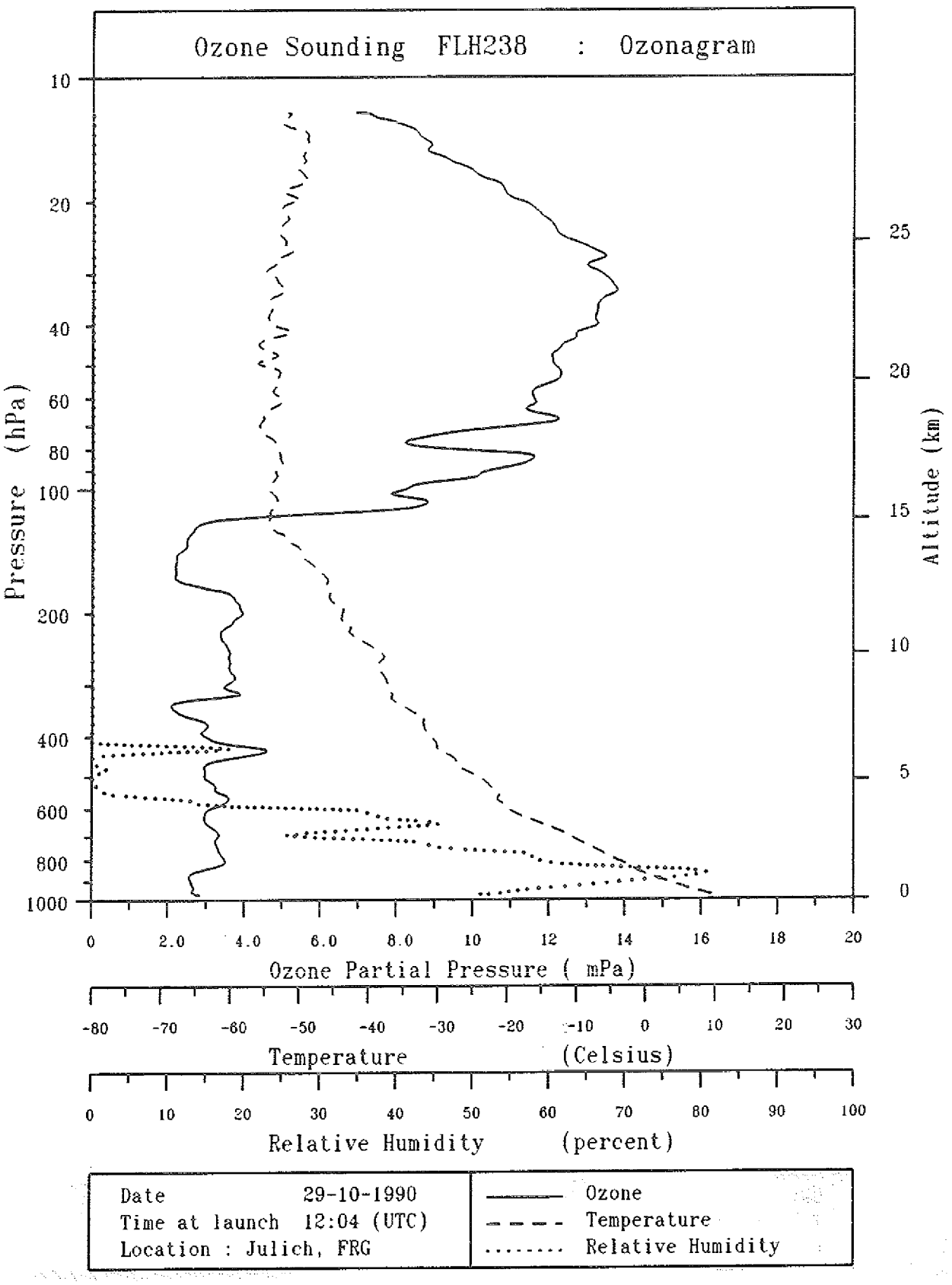

Ozone Sounding FLH235 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 17-10-1990
Time at launch 15:13 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

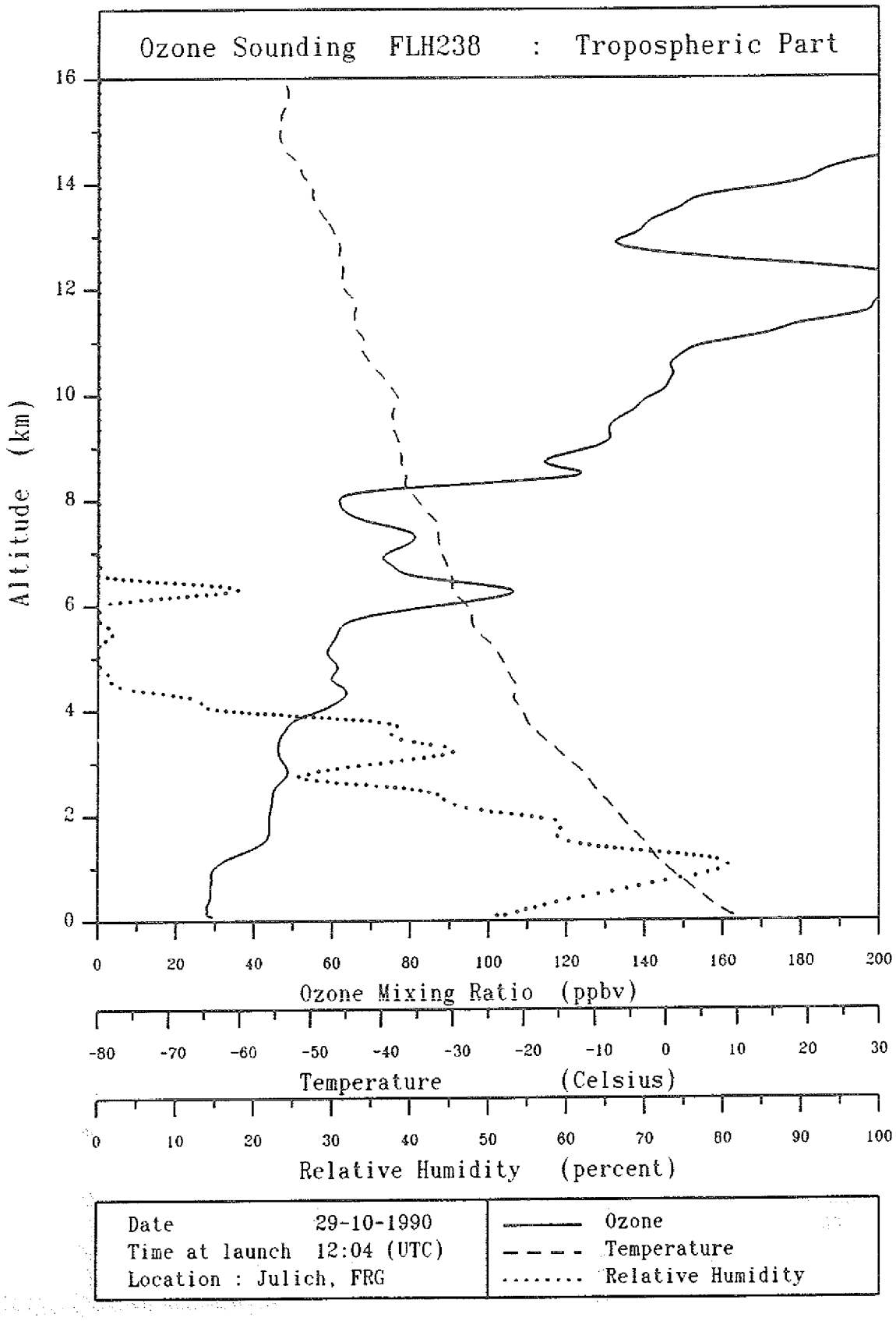

Ozone Sounding FLH236 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 22-10-1990
Time at launch 12:30 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

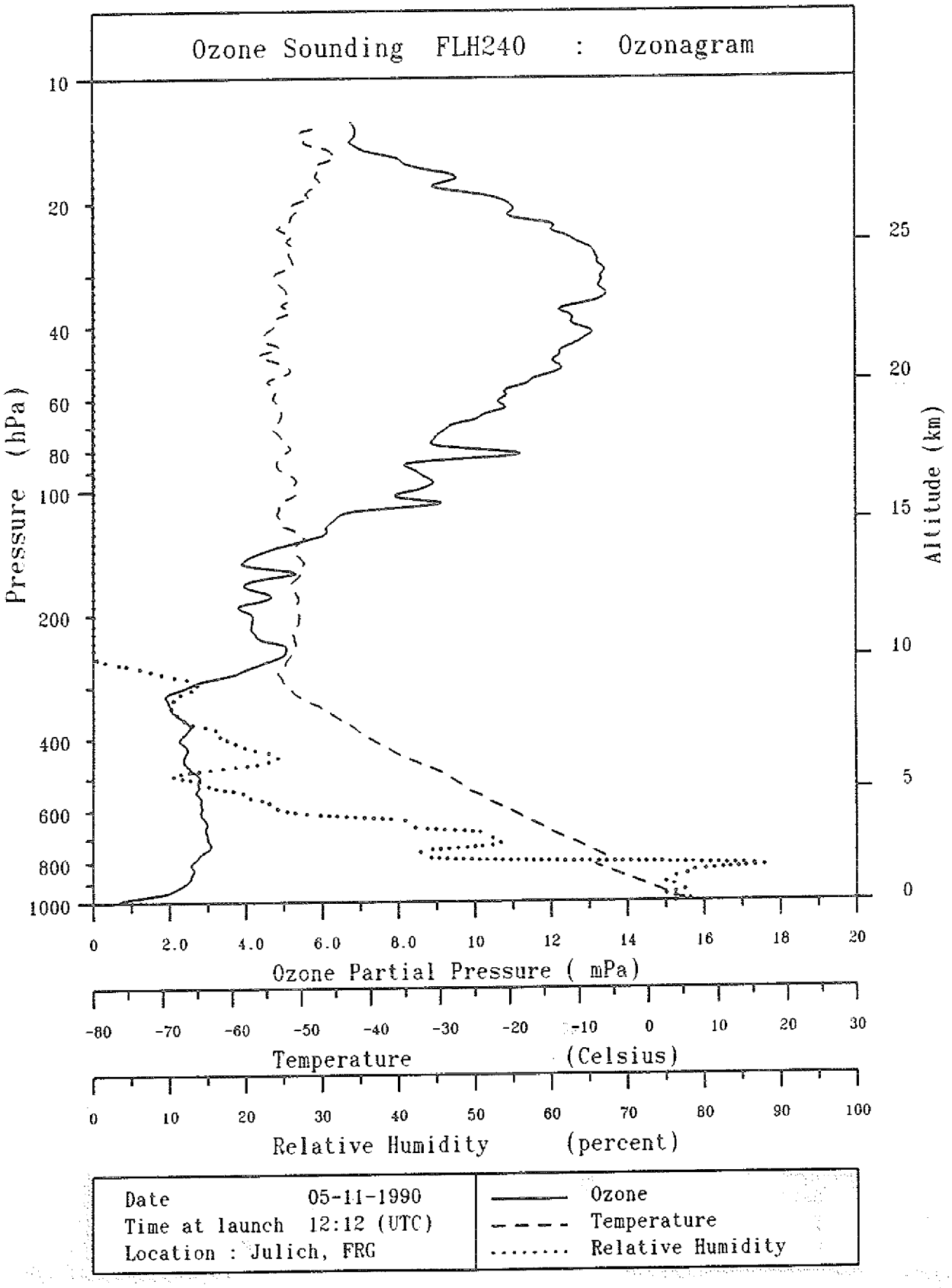

Ozone Sounding FLH236 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 22-10-1990
Time at launch 12:30 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

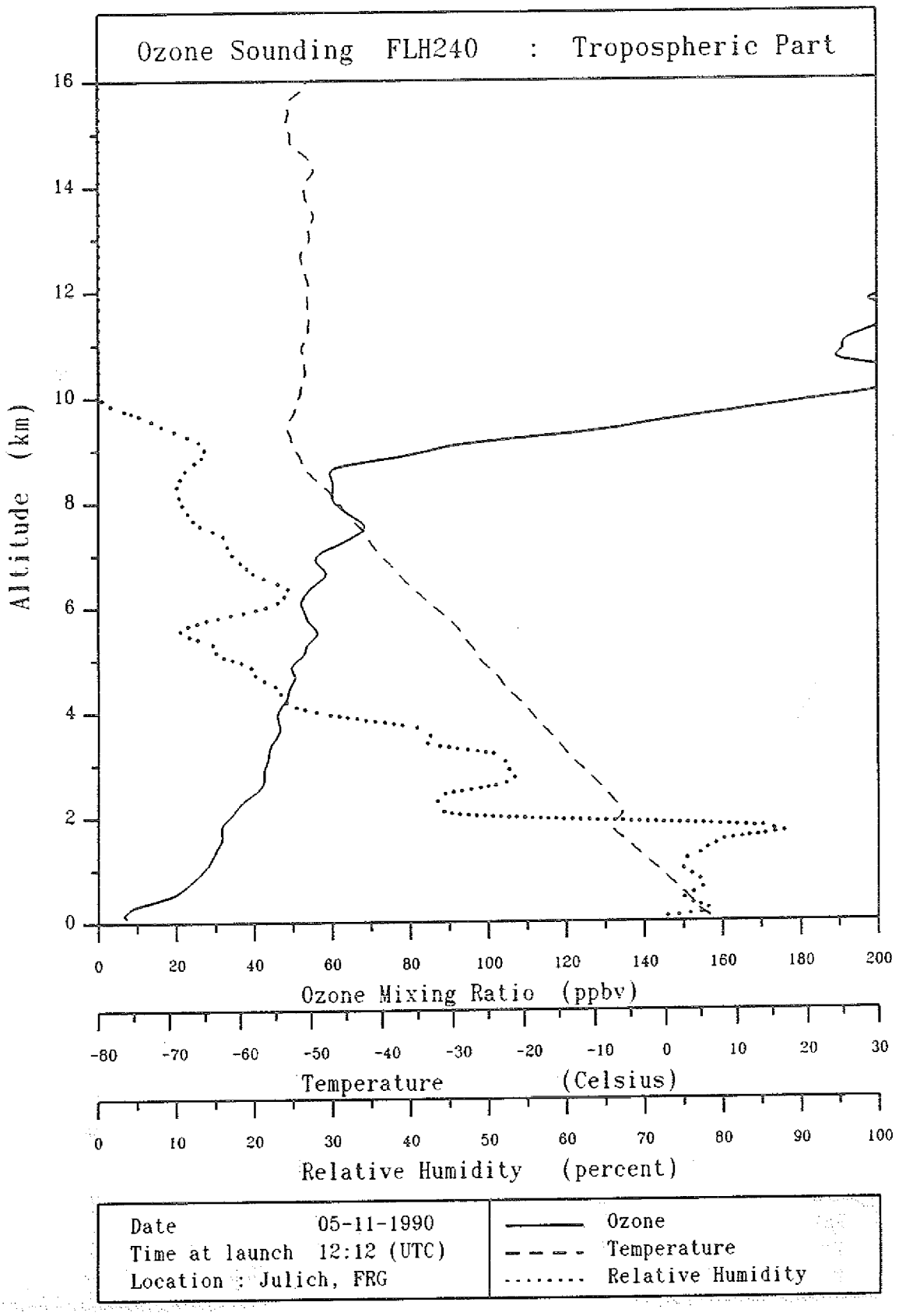

Ozone Sounding FLH237 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 25-10-1990
Time at launch 12:10 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

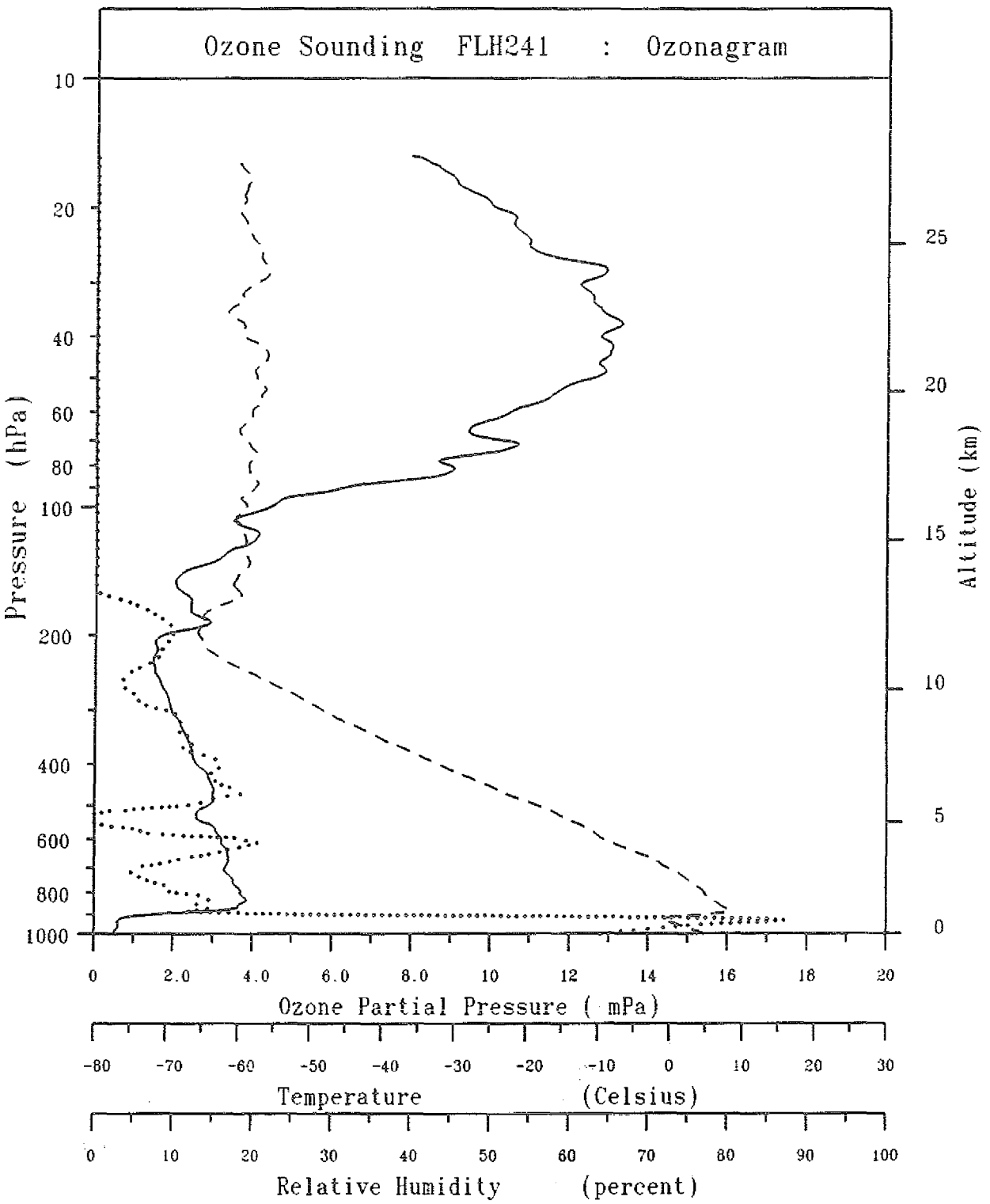

Ozone Sounding FLH237 : Tropospheric Part
Altitude (km)
16
14
12
10
8
6
4
2
0
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 25-10-1990
Time at launch 12:10 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

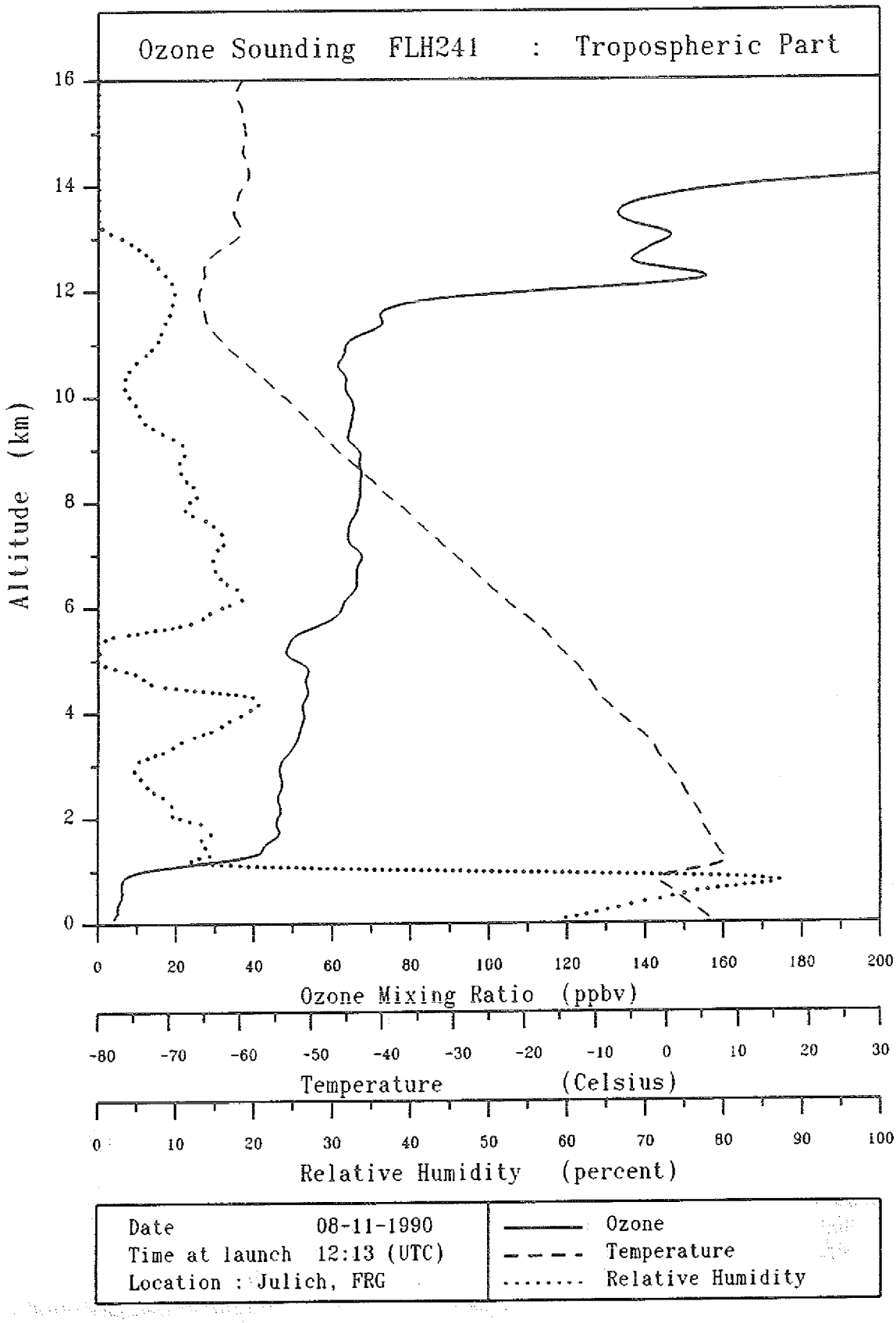

Ozone Sounding FLH238 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 29-10-1990
Time at launch 12:04 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

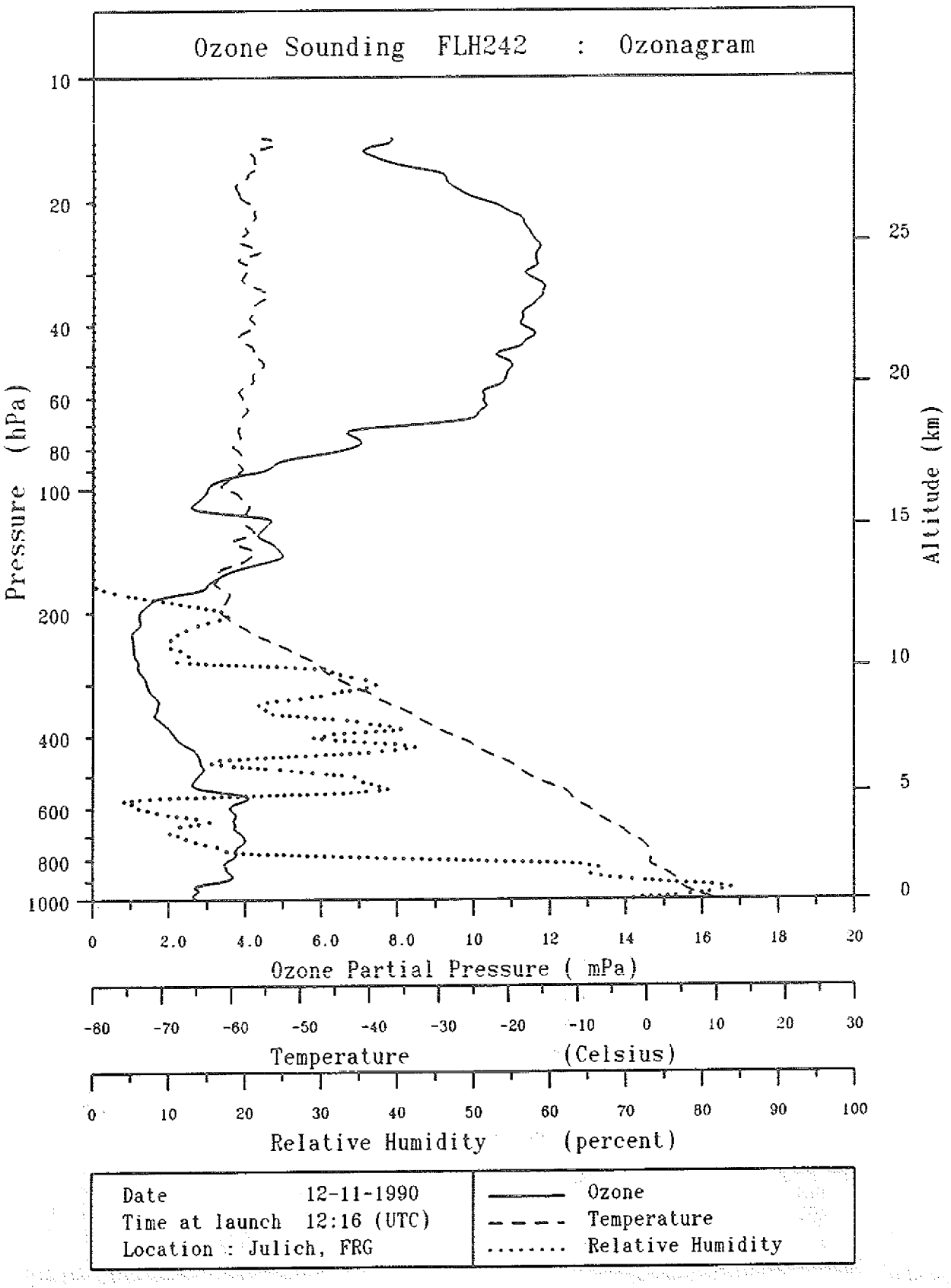

Ozone Sounding FLH238 : Tropospheric Part
Altitude (km)
16
14
12
10
8
6
4
2
0
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 29-10-1990
Time at launch 12:04 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

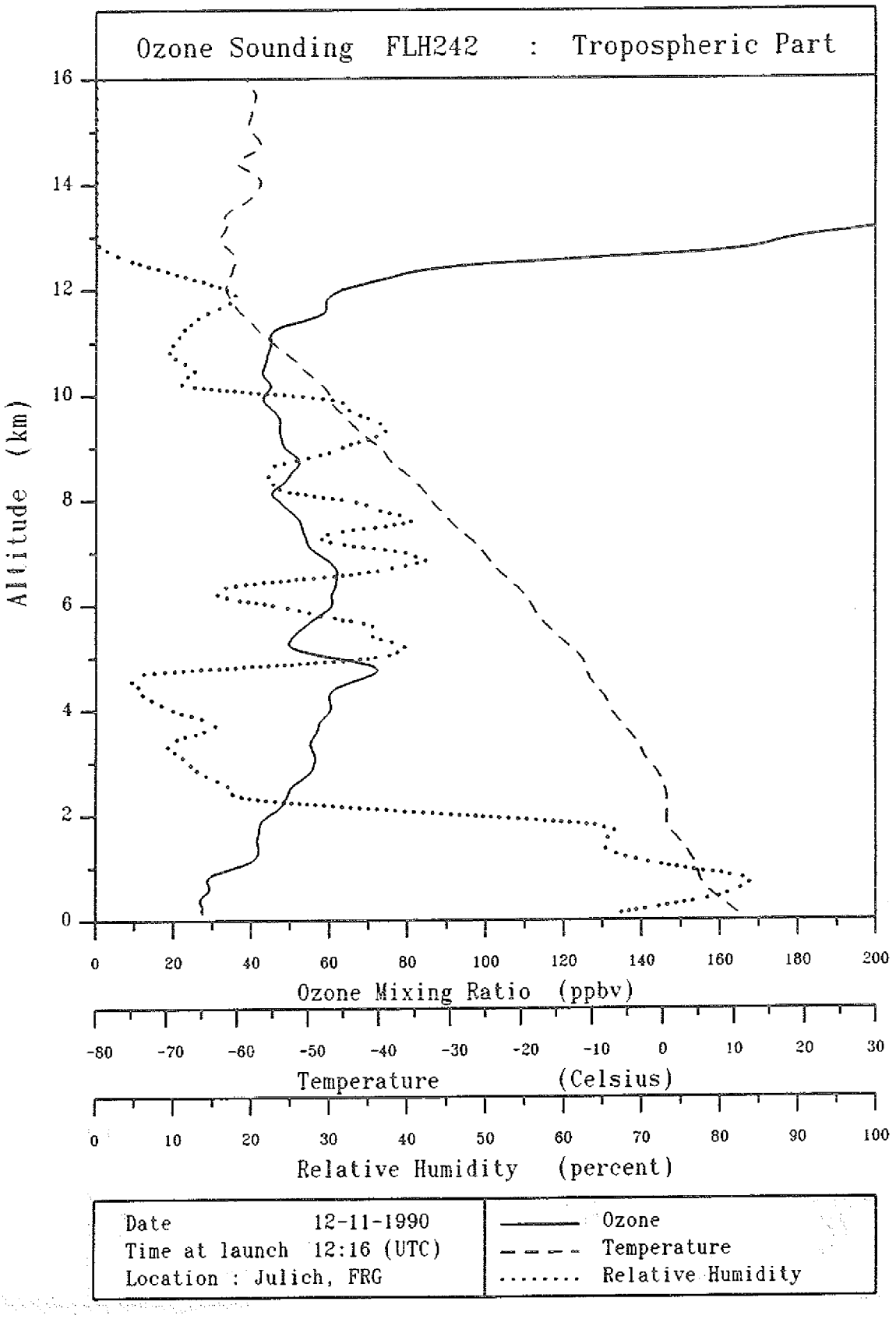

Ozone Sounding FLH240 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 05-11-1990
Time at launch 12:12 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

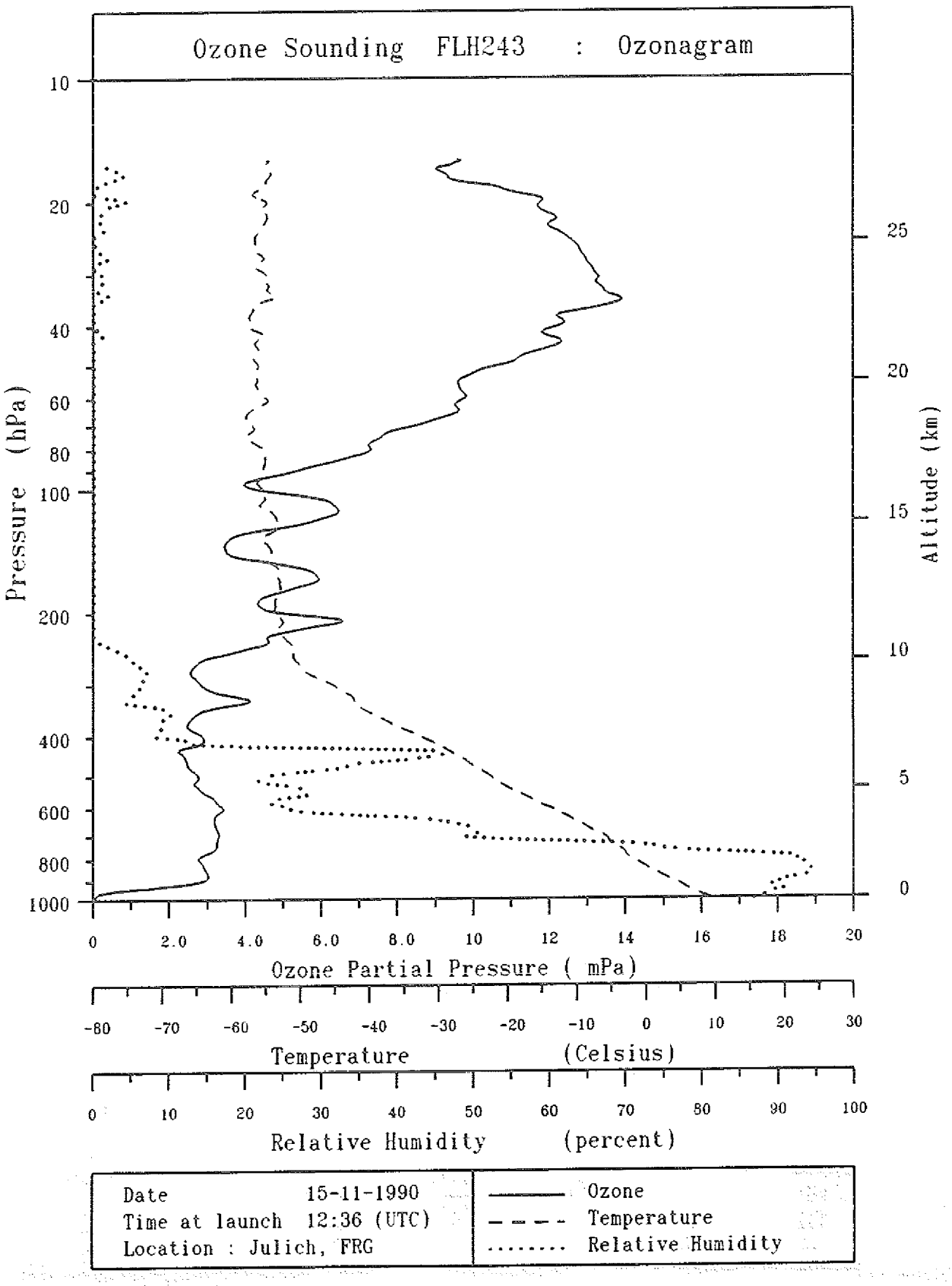

Ozone Sounding FLH240 : Tropospheric Part
Altitude (km)
16
14
12
10
8
6
4
2
0
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 05-11-1990
Time at launch 12:12 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

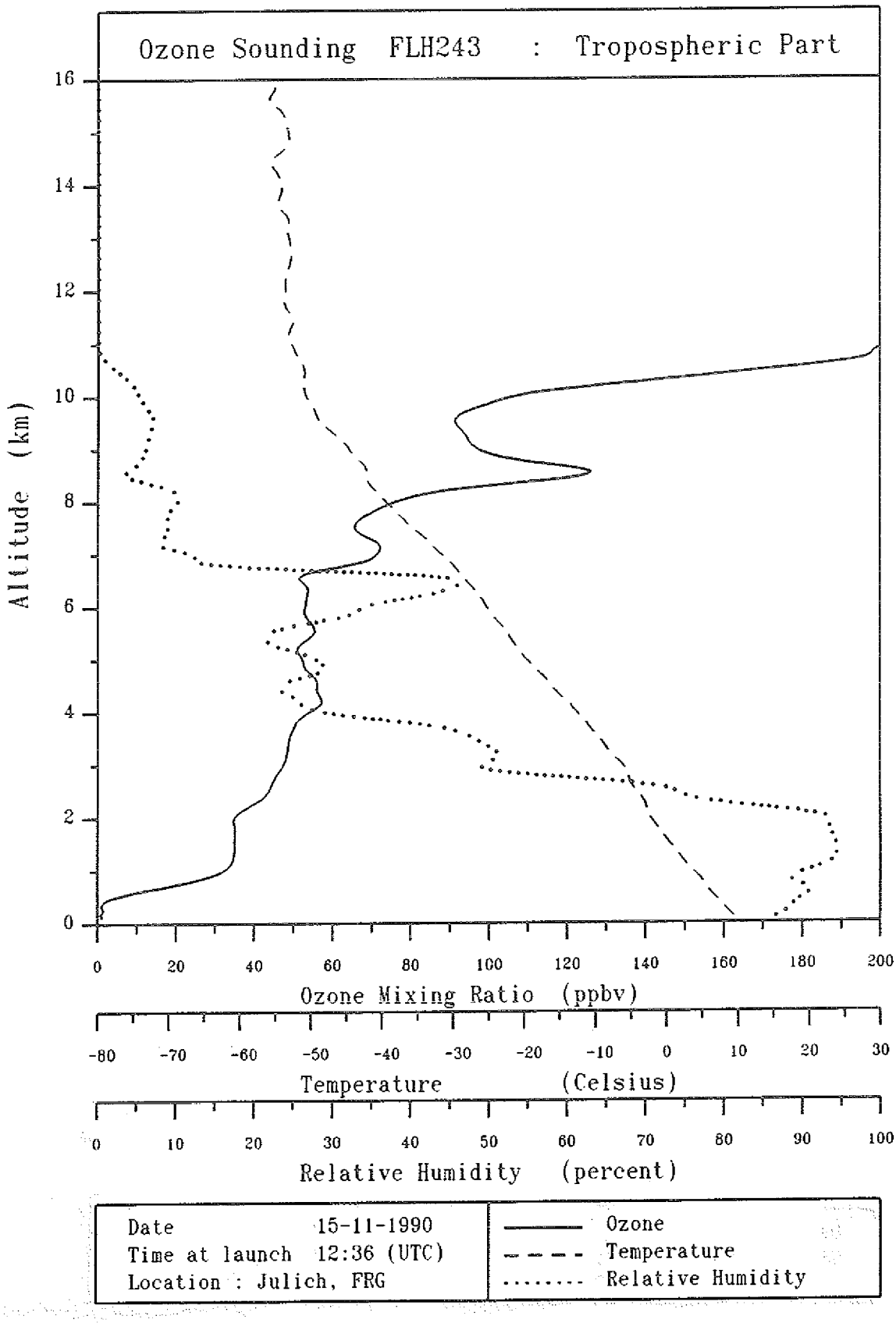

Ozone Sounding FLH241 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 08-11-1990
Time at launch 12:13 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

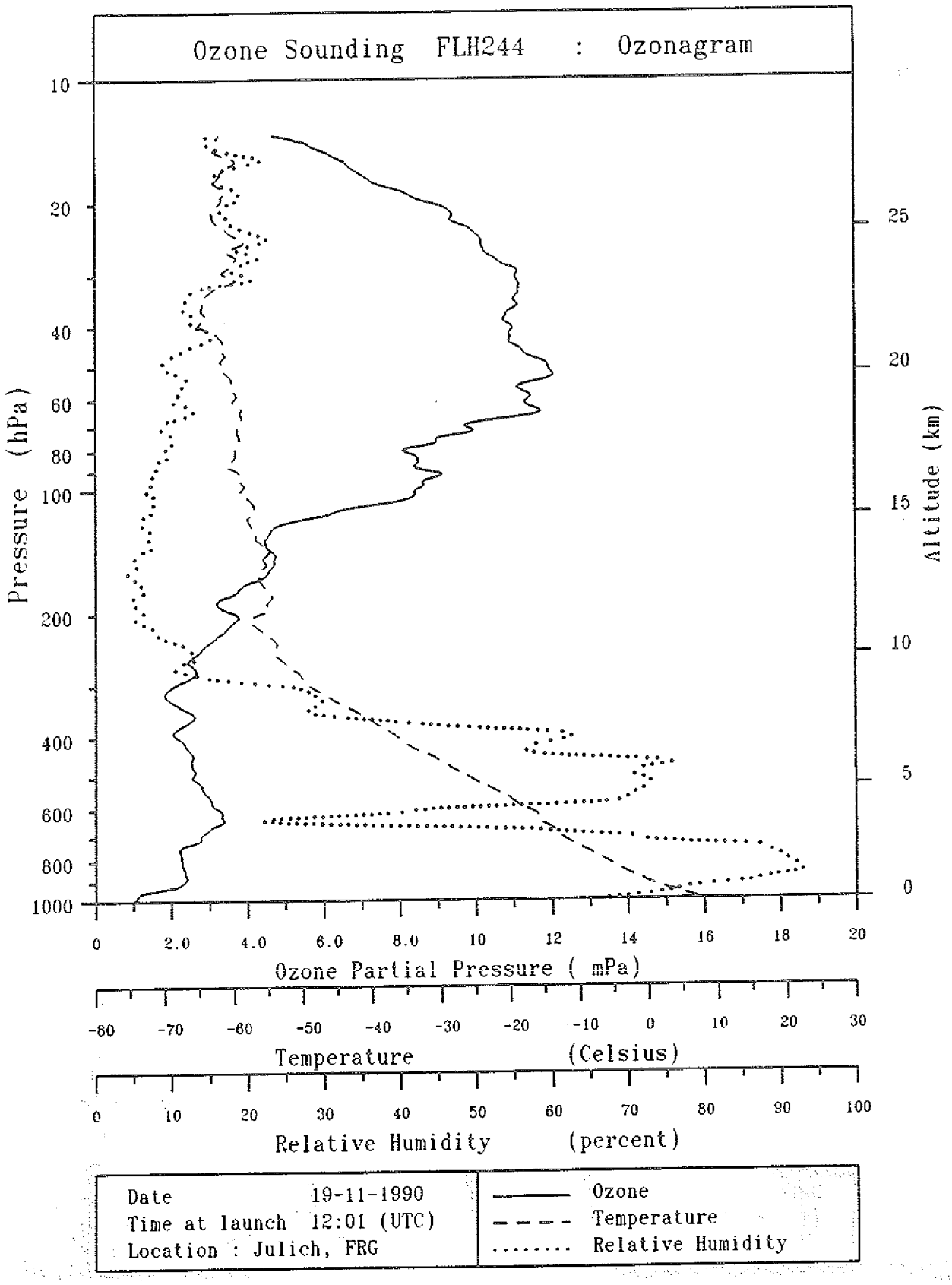

Ozone Sounding FLH241 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 08-11-1990
Time at launch 12:13 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

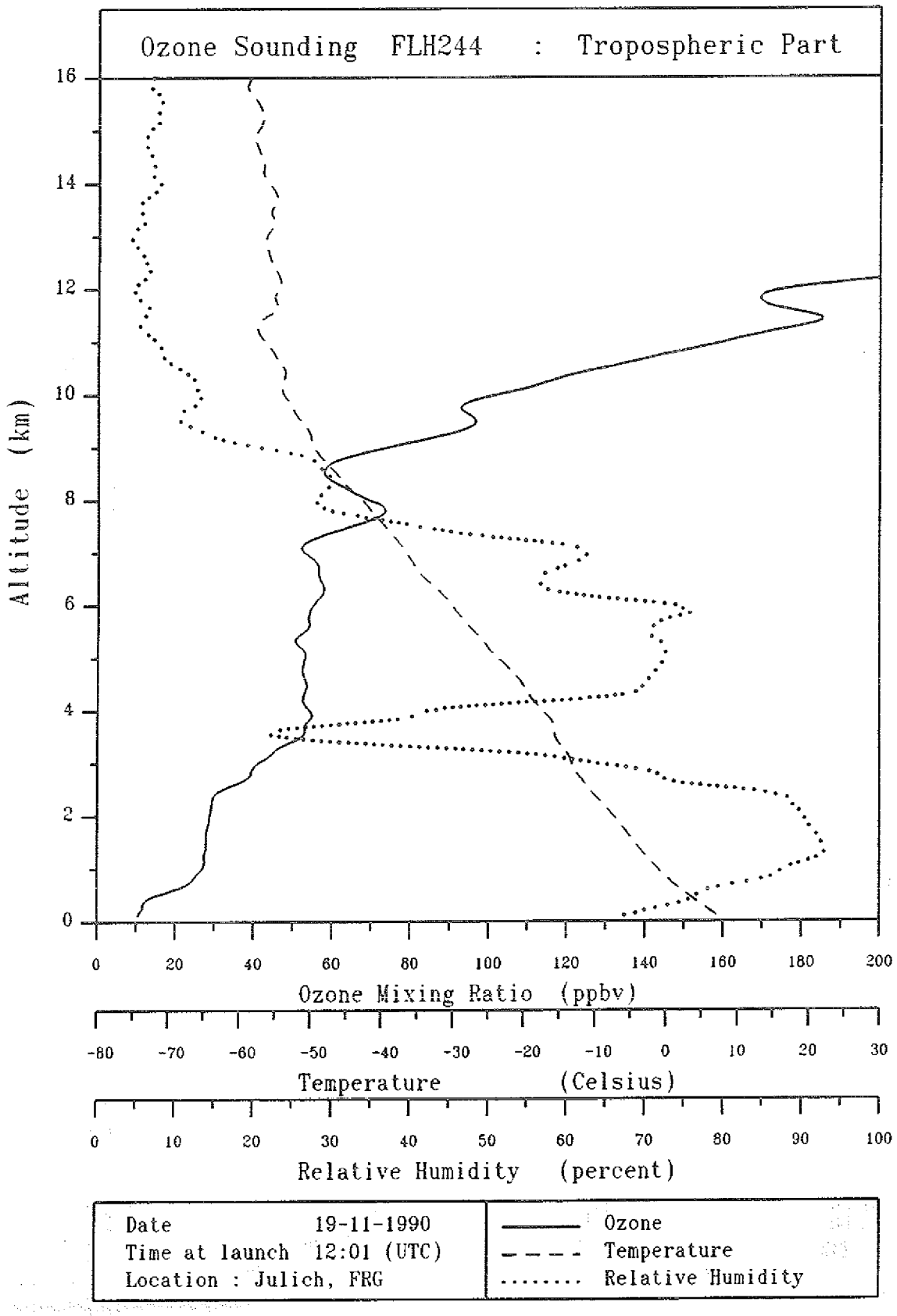

Ozone Sounding FLH242 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 12-11-1990
Time at launch 12:16 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

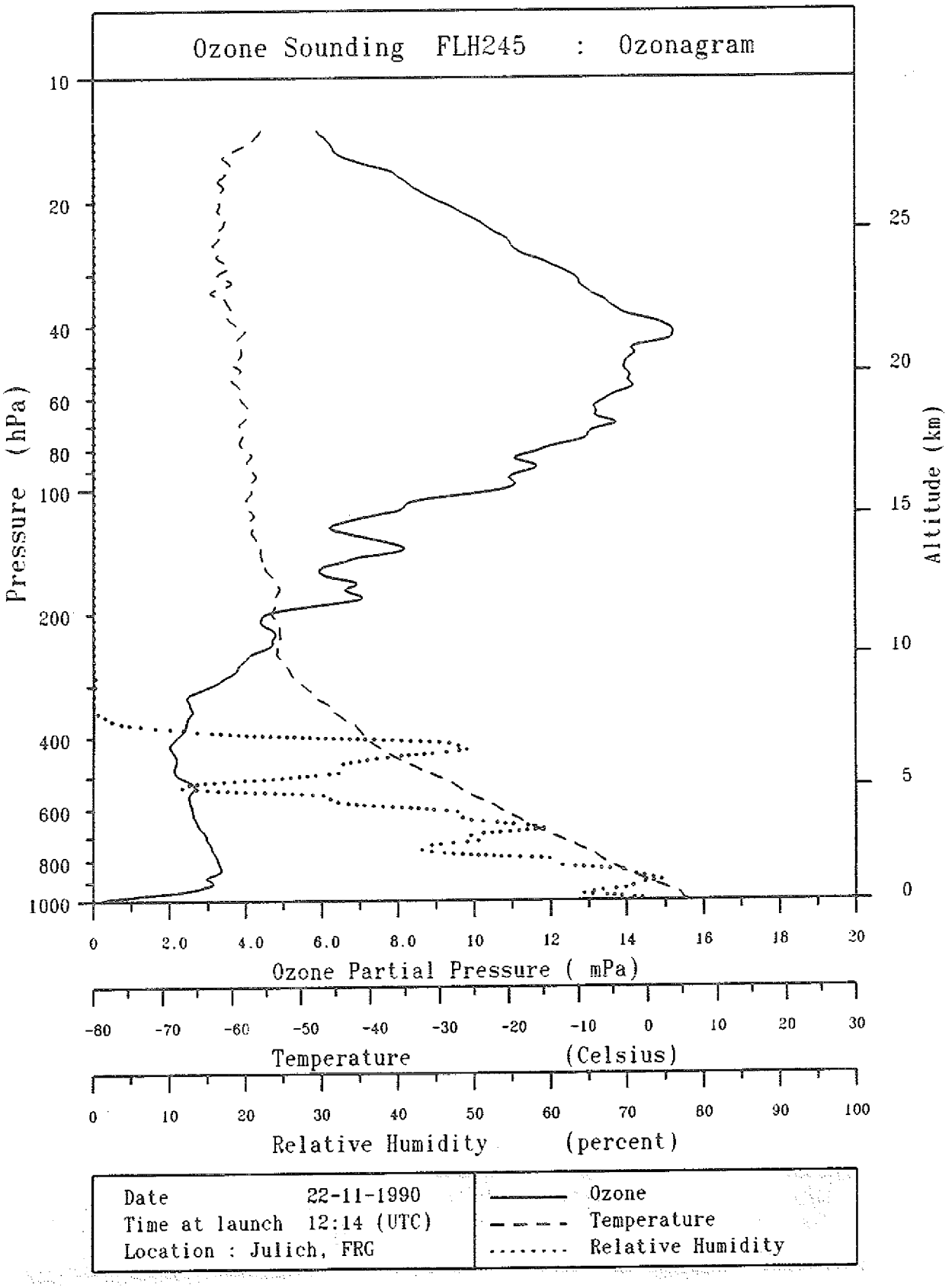

Ozone Sounding FLH242 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 12-11-1990
Time at launch 12:16 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH243 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 15-11-1990
Time at launch 12:36 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

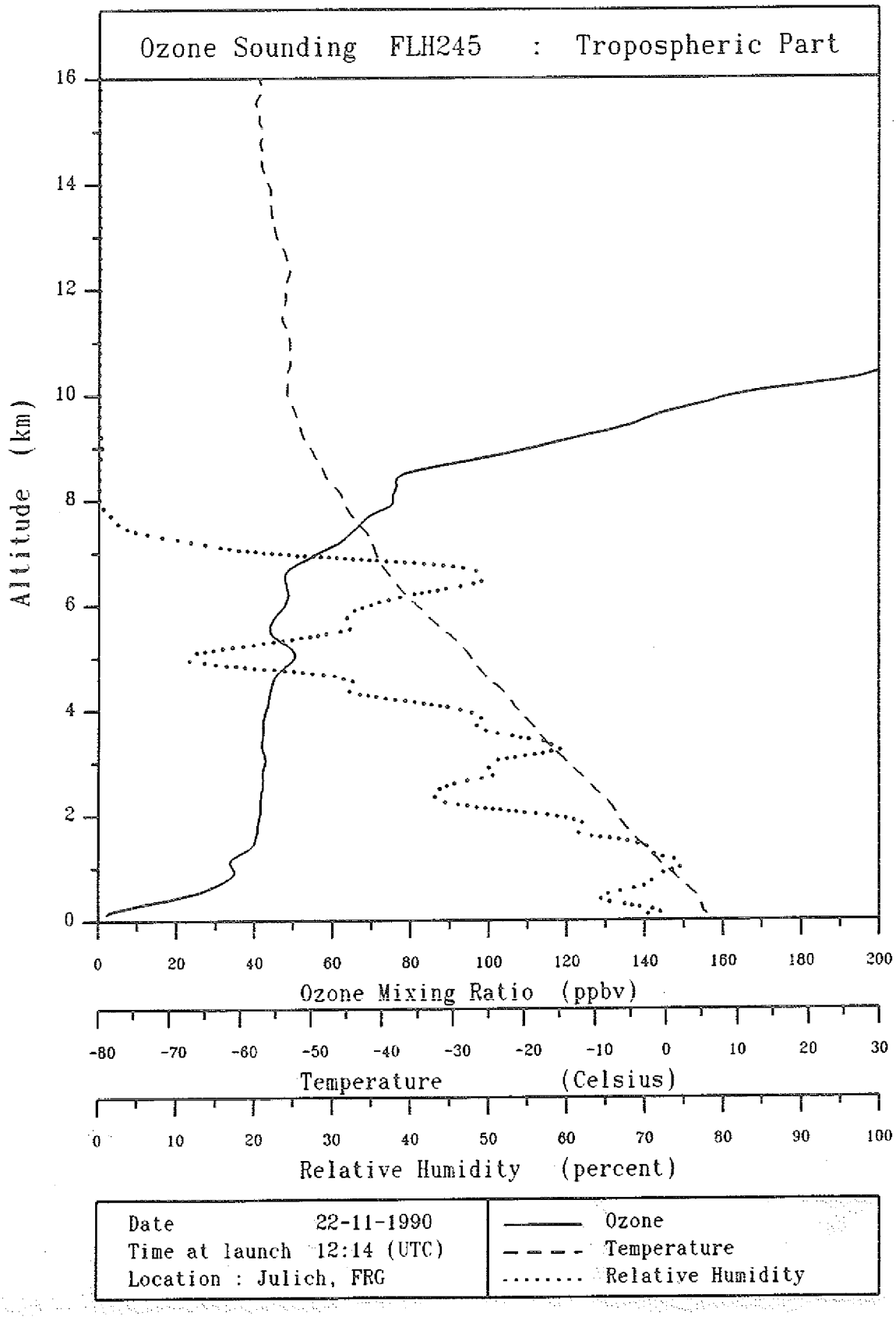

Ozone Sounding FLH243 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 15-11-1990
Time at launch 12:36 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

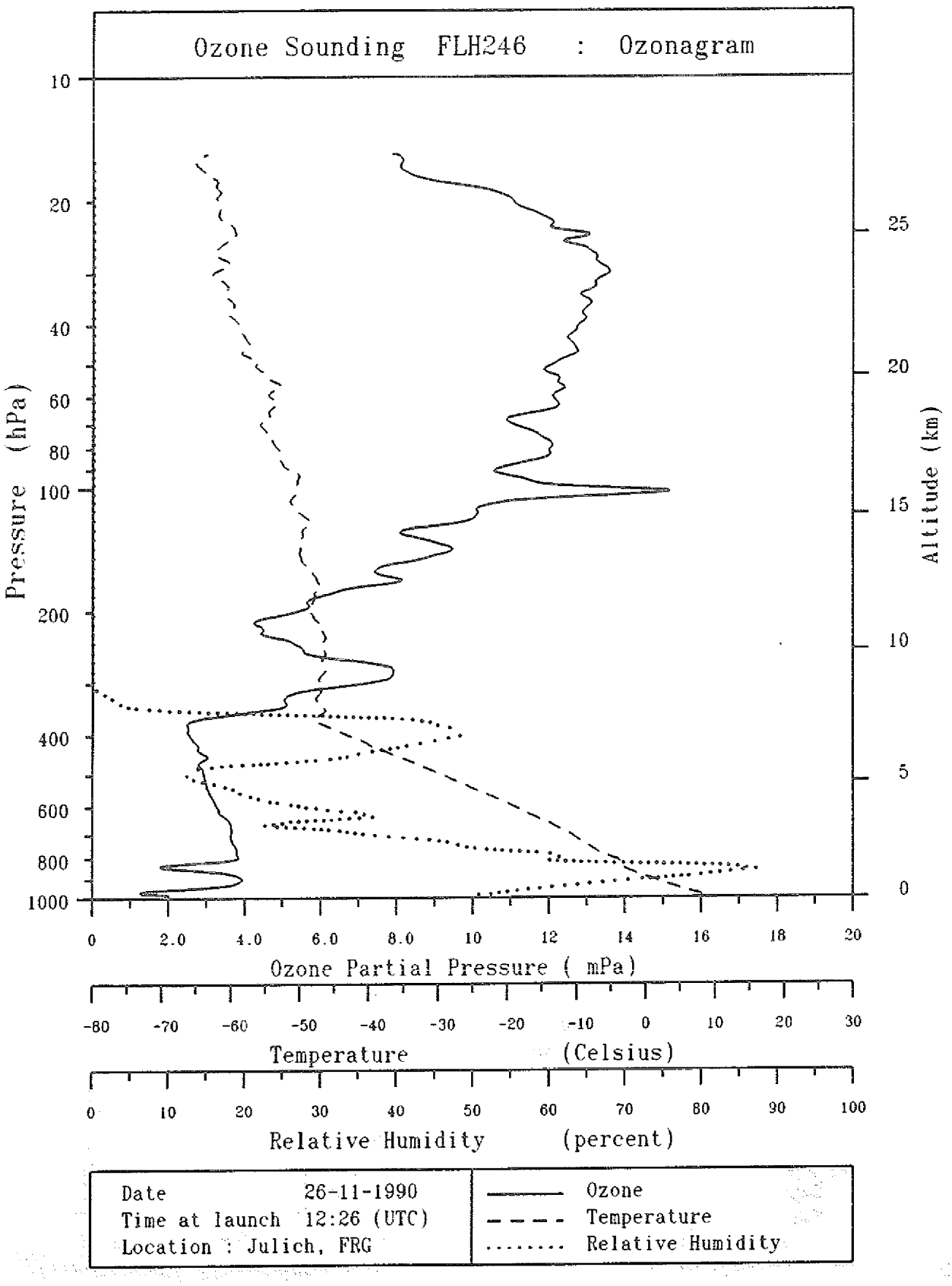

Ozone Sounding FLH244 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 19-11-1990
Time at launch 12:01 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

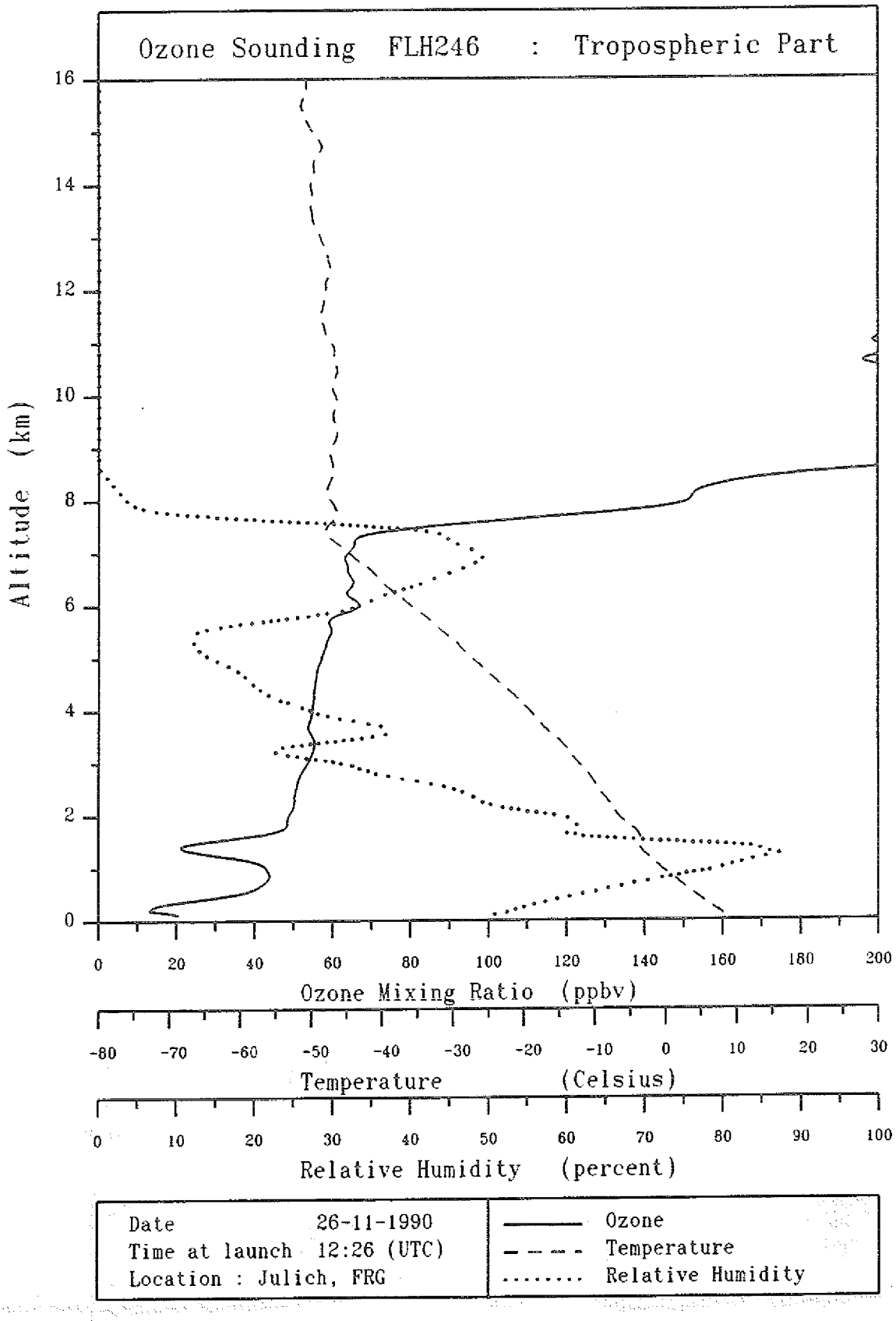

Ozone Sounding FLH244 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 19-11-1990
Time at launch 12:01 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

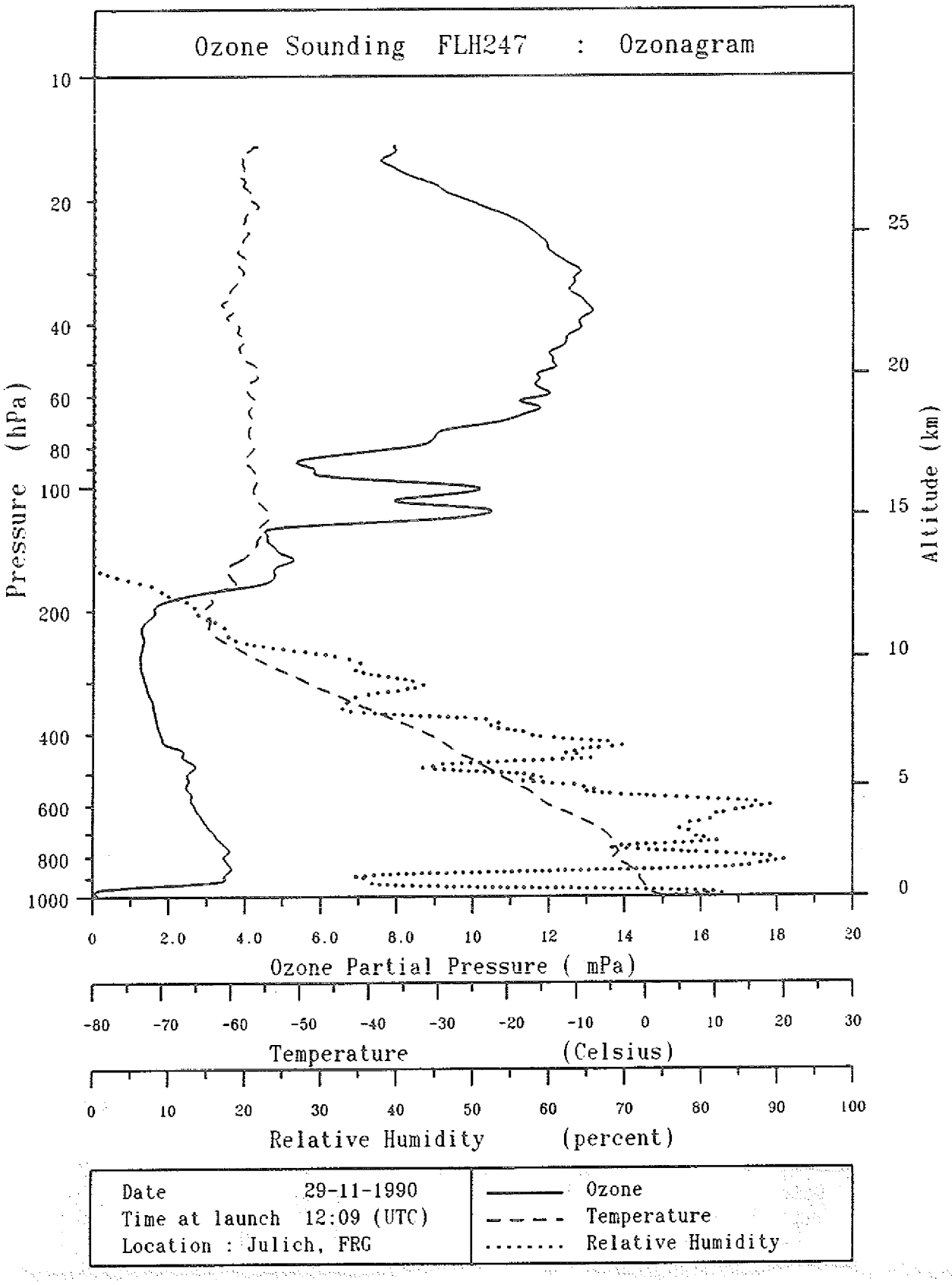


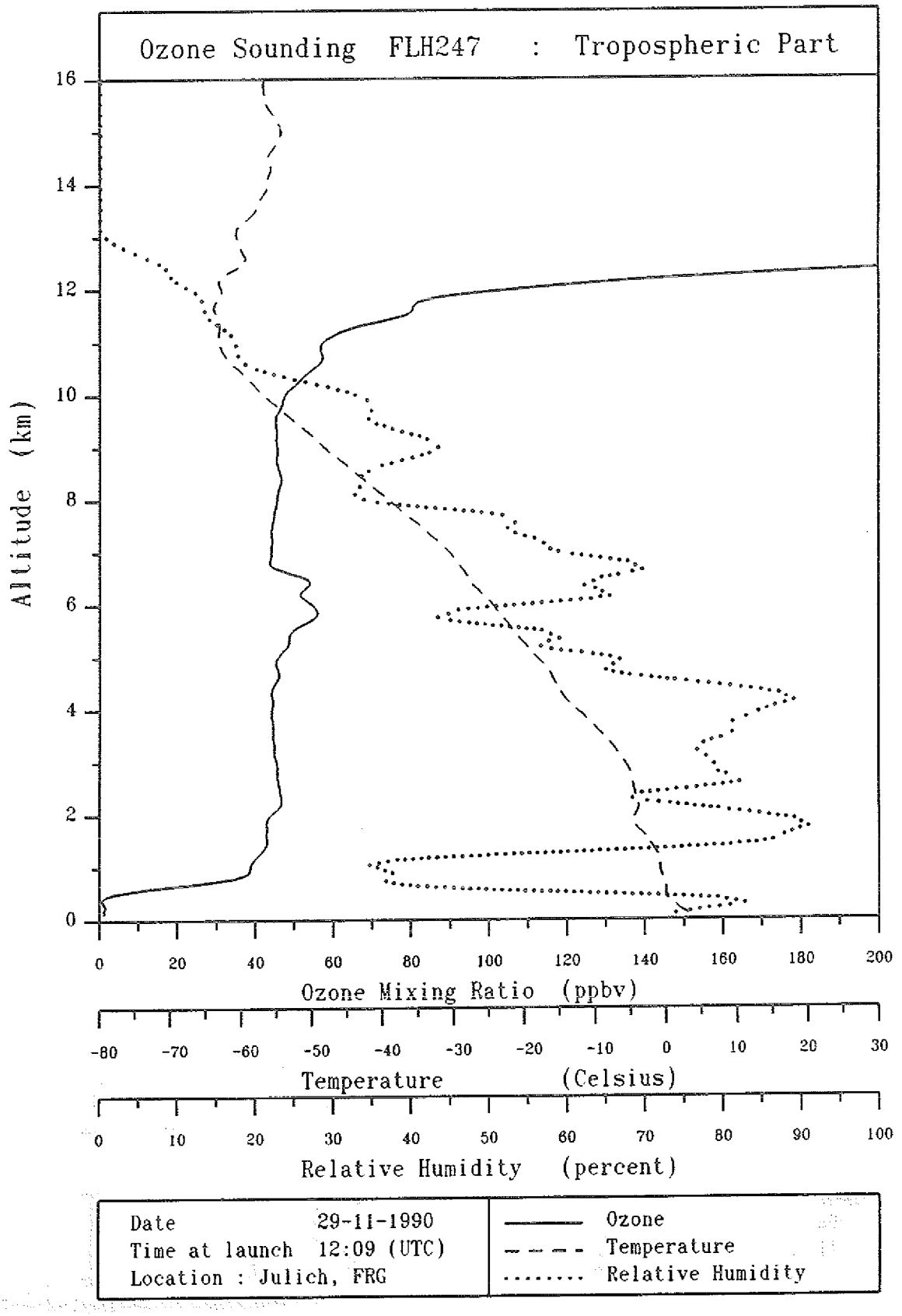
Date 22-11-1990	——— Ozone
Time at launch 12:14 (UTC)	- - - - Temperature
Location : Julich, FRG	..... Relative Humidity

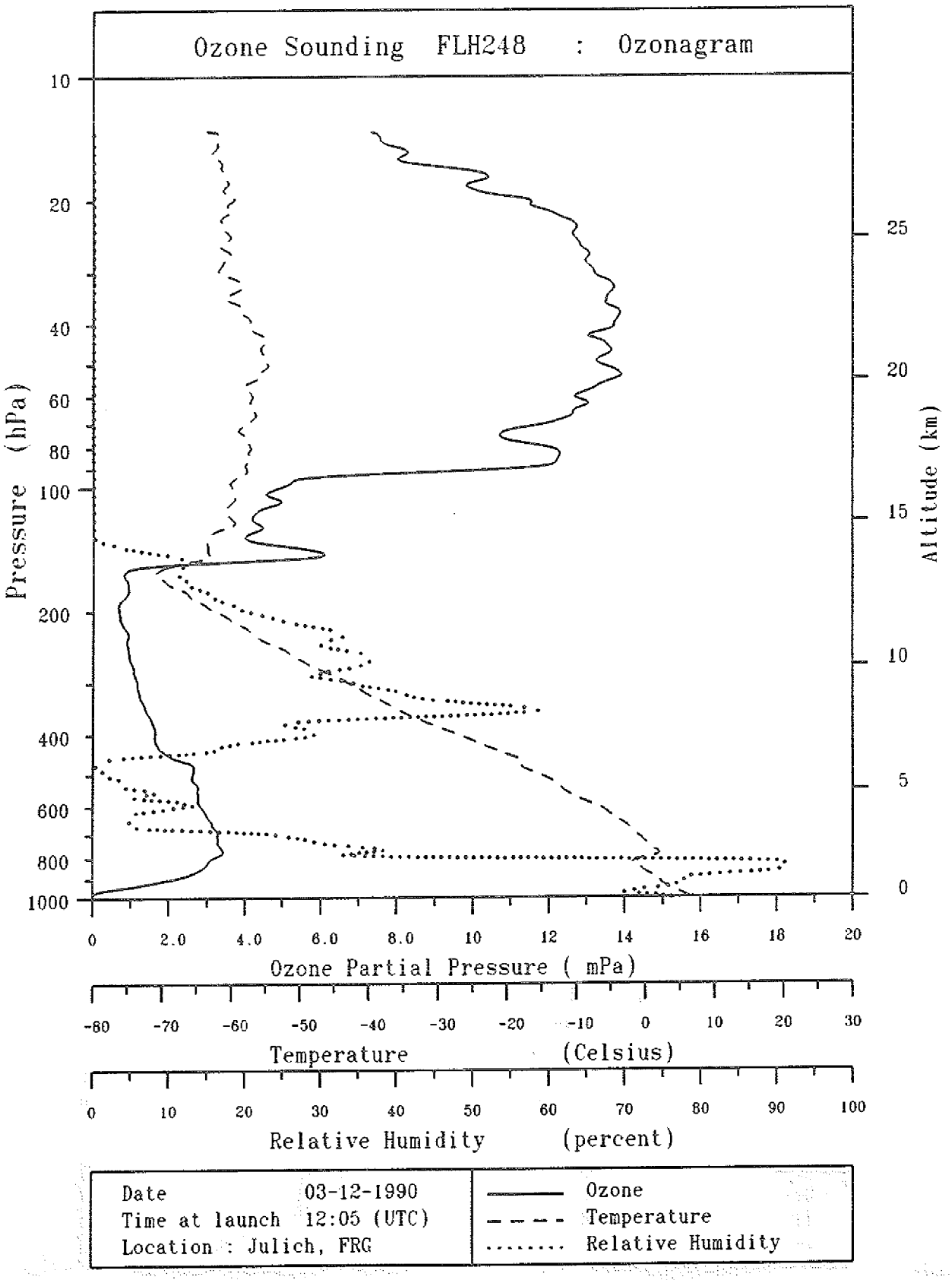

Ozone Sounding FLH245 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 22-11-1990
Time at launch 12:14 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

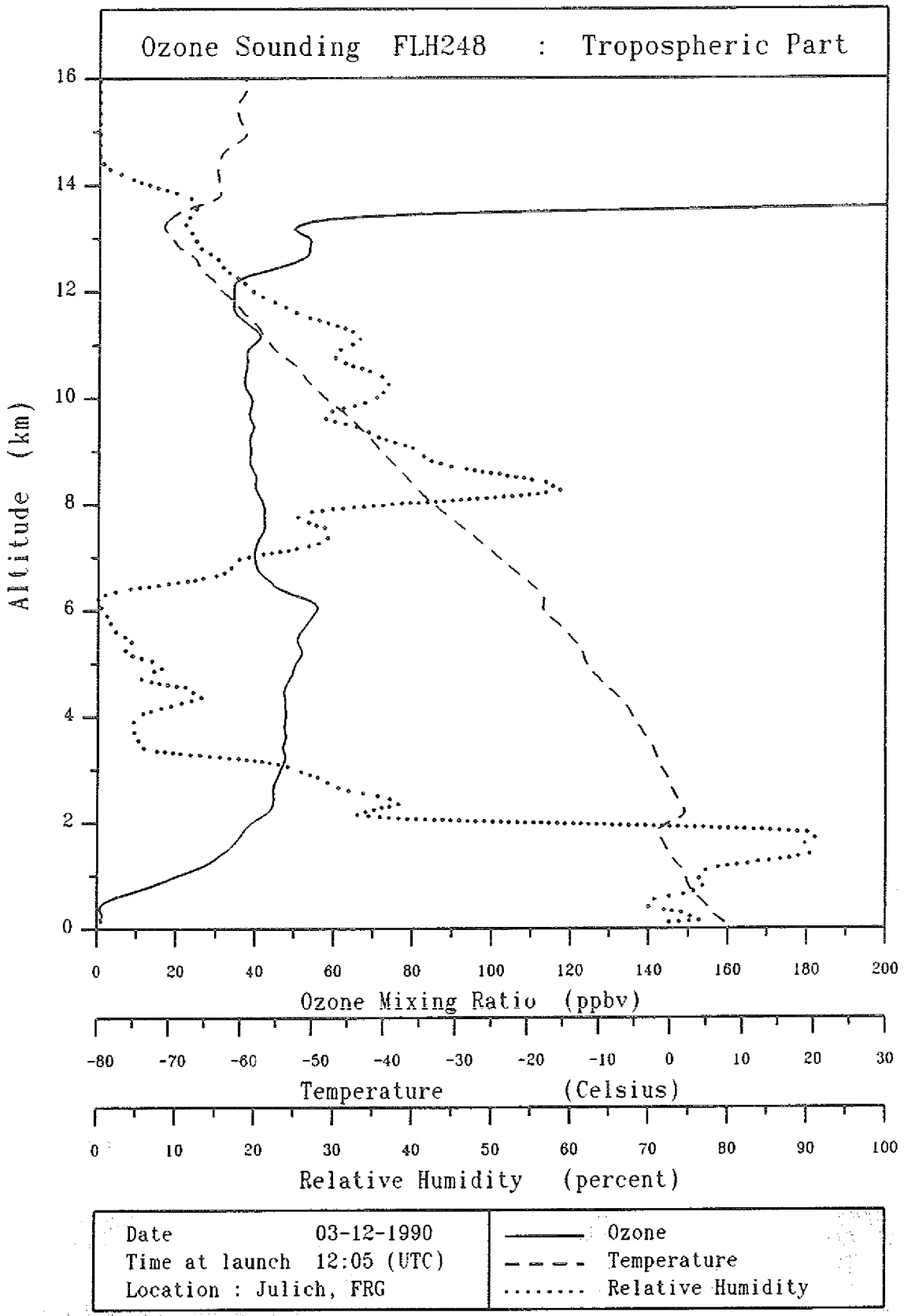

Ozone Sounding FLH246 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 26-11-1990
Time at launch 12:26 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

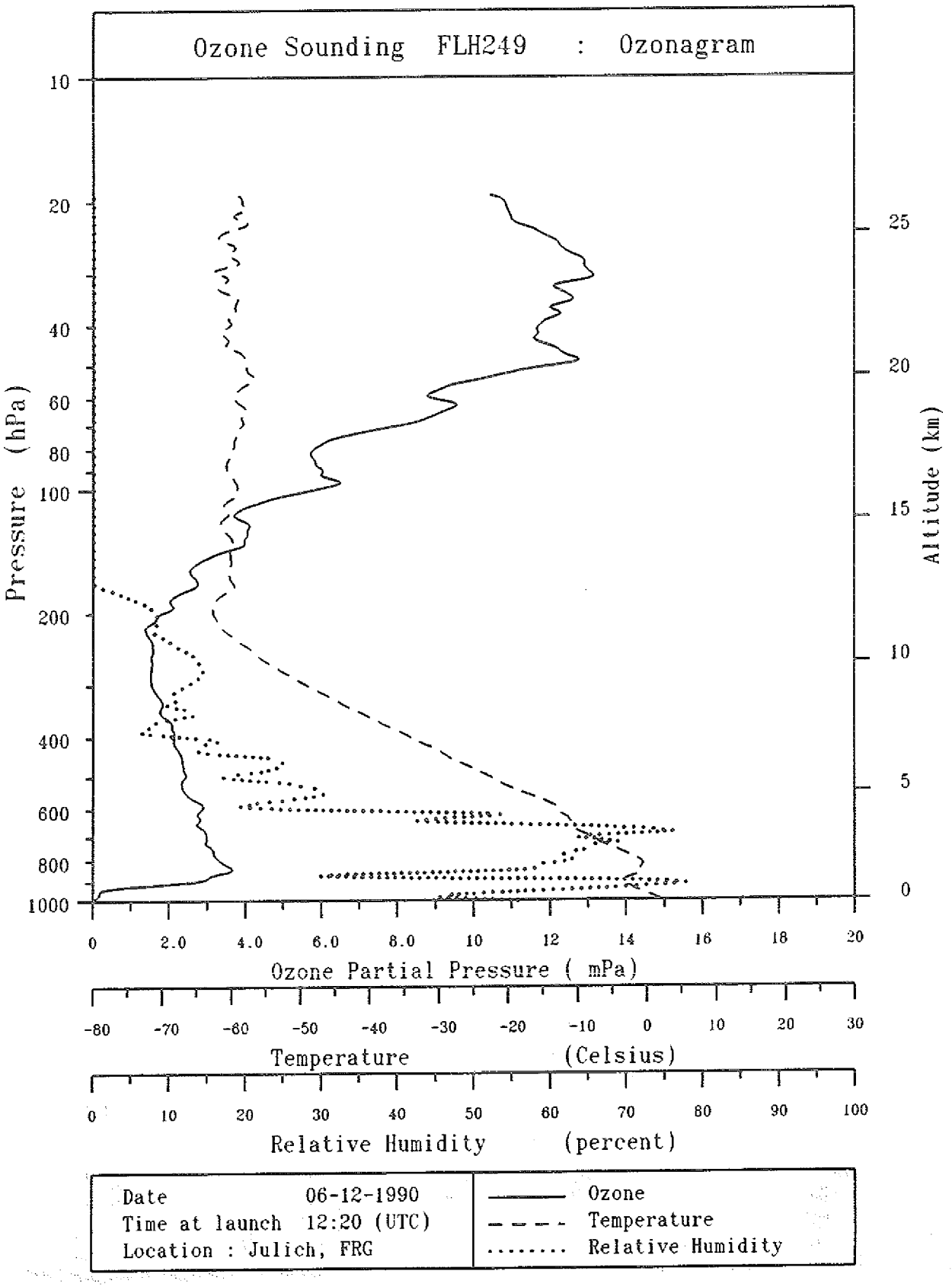

Ozone Sounding FLH246 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 26-11-1990
Time at launch 12:26 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

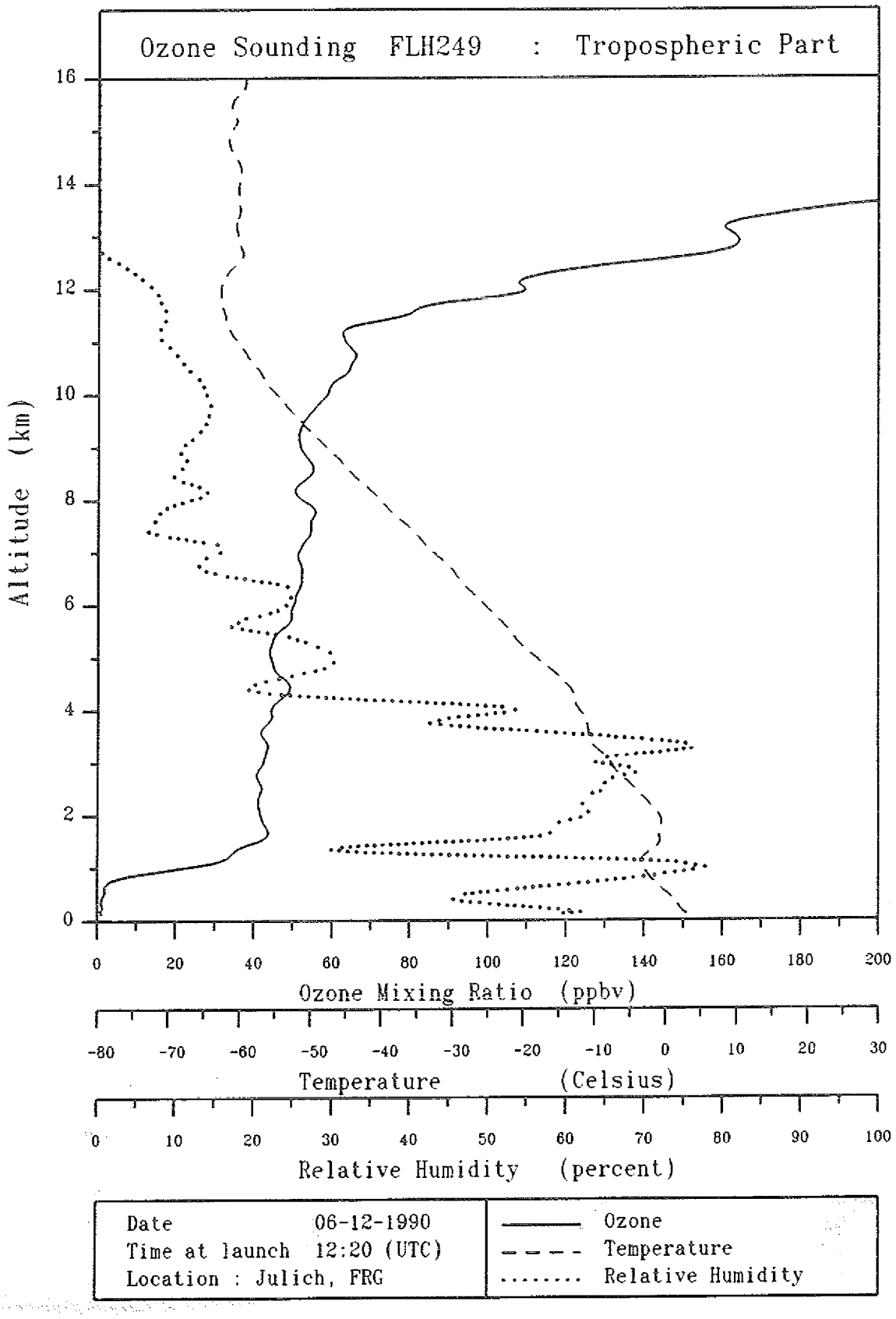

Ozone Sounding FLH247 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 29-11-1990
Time at launch 12:09 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

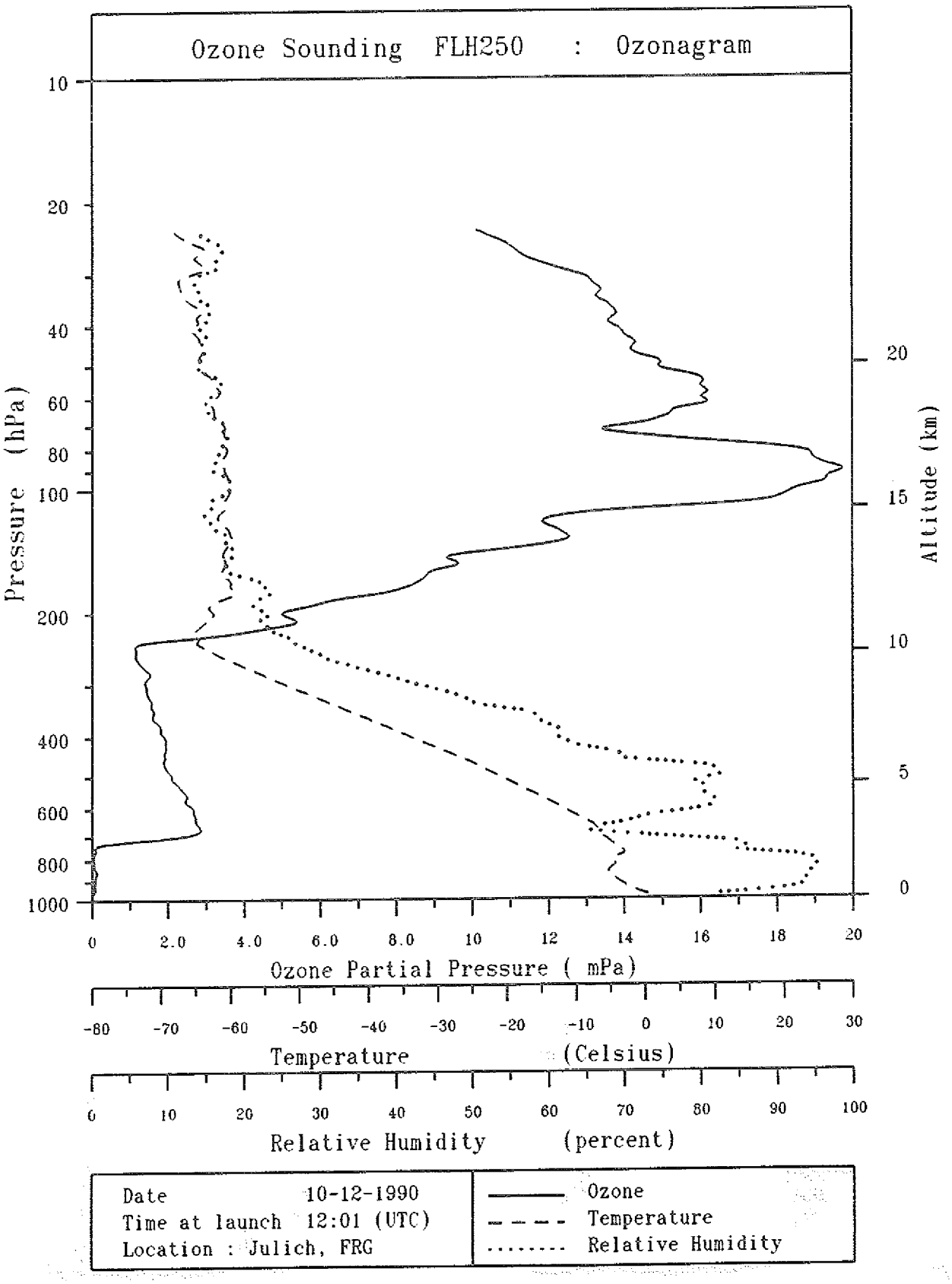

Ozone Sounding FLH247 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 29-11-1990
Time at launch 12:09 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

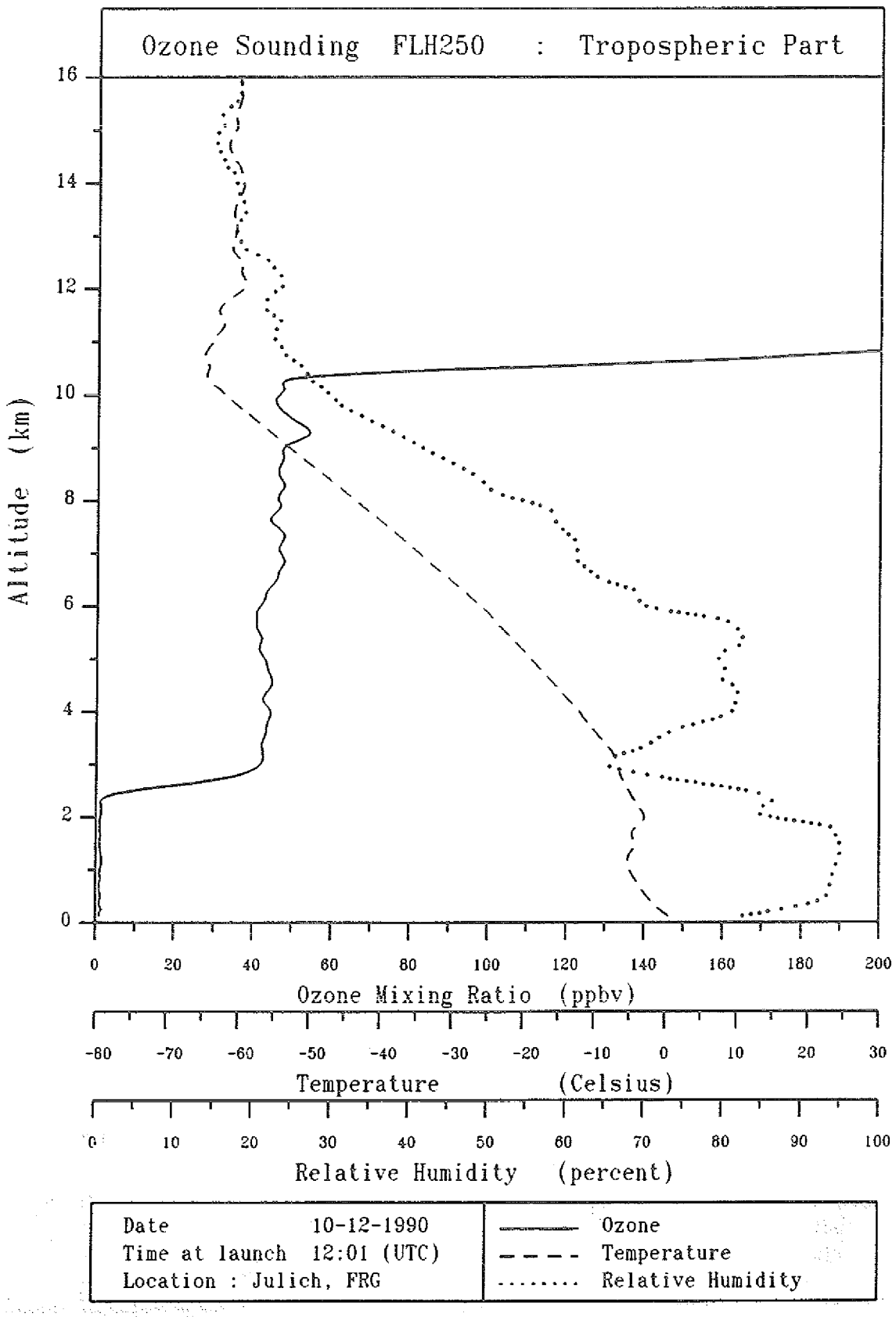

Ozone Sounding FLH248 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 03-12-1990
Time at launch 12:05 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

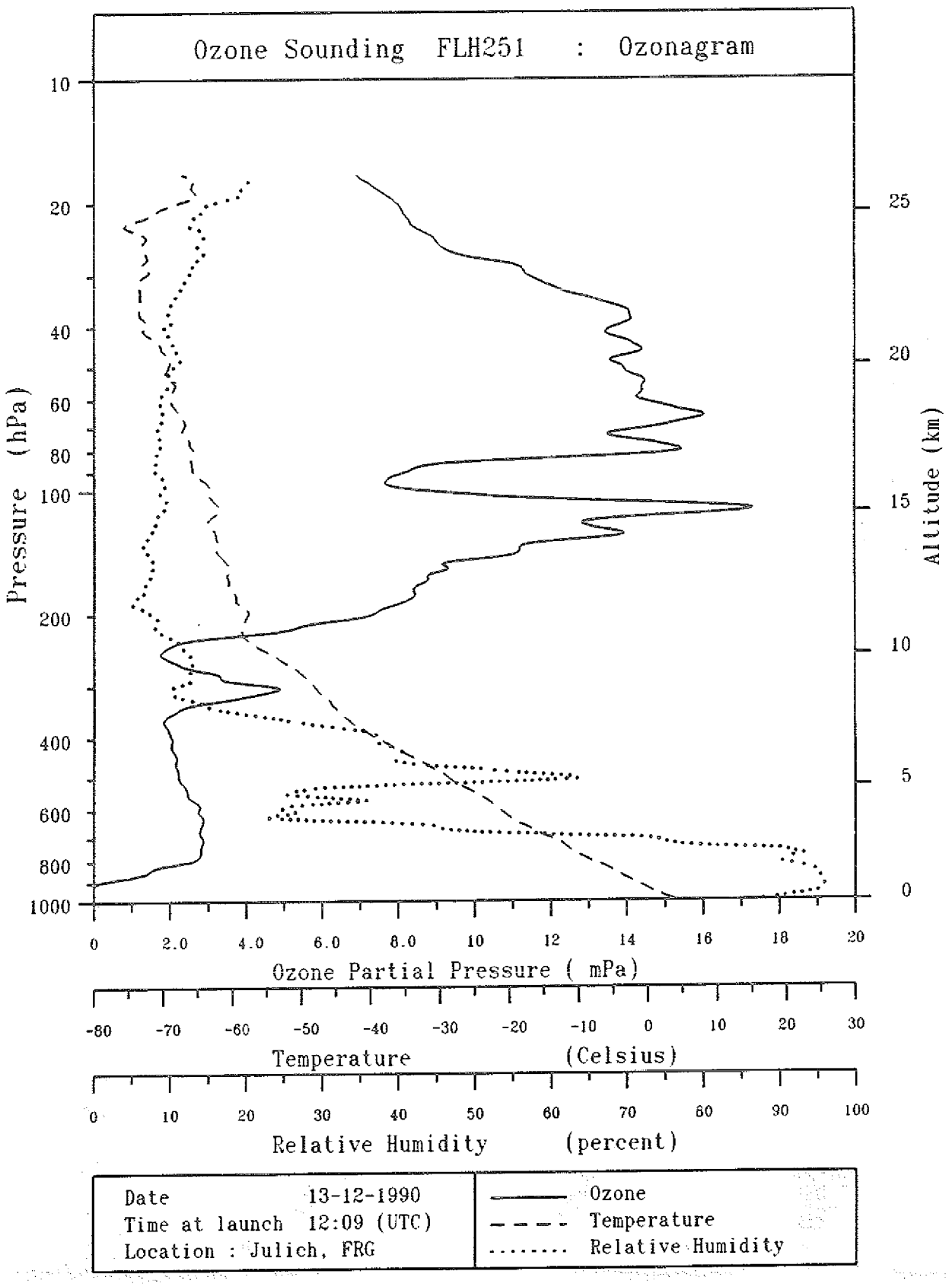

Ozone Sounding FLH248 : Tropospheric Part
Altitude (km)
16
14
12
10
8
6
4
2
0
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 03-12-1990
Time at launch 12:05 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

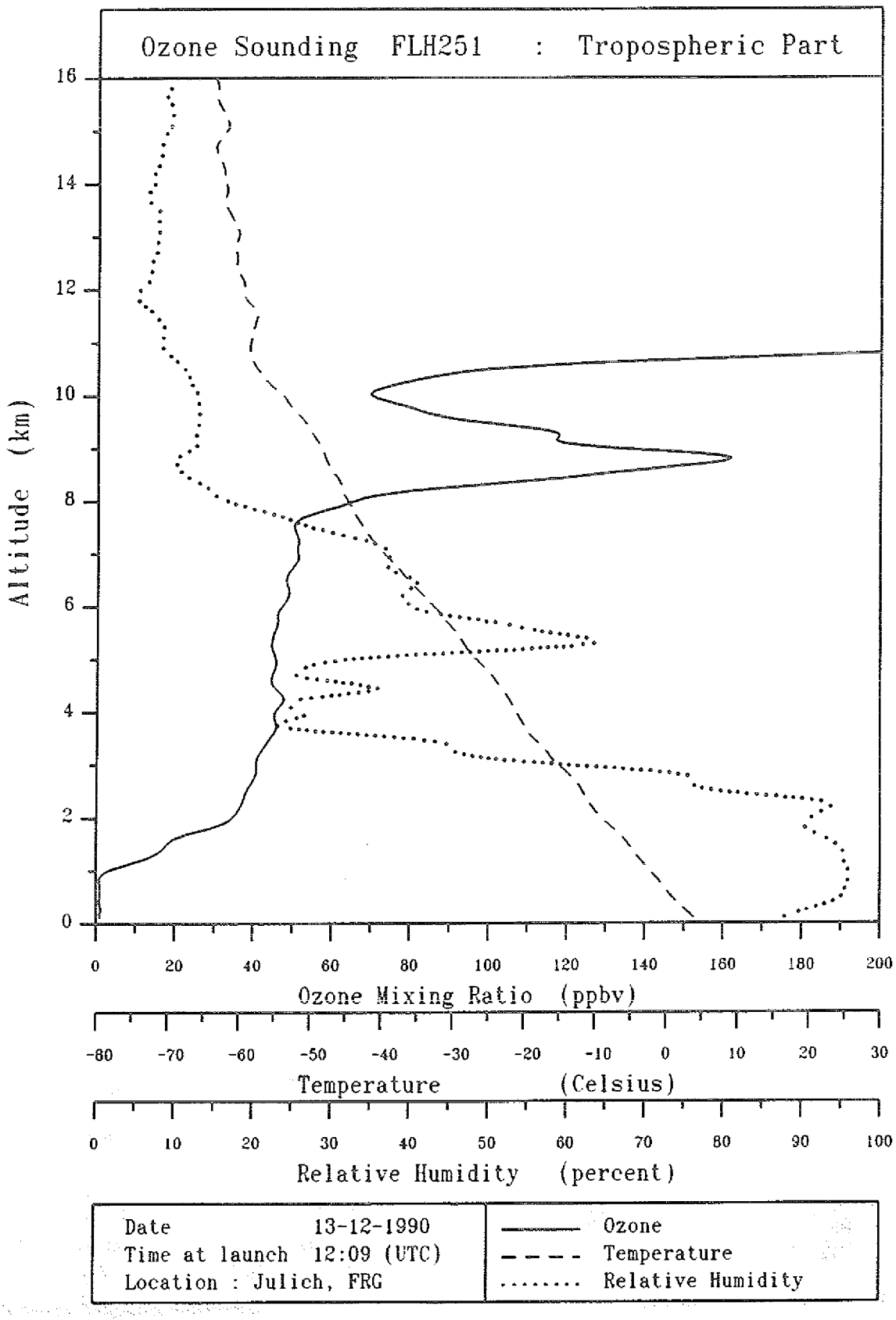

Ozone Sounding FLH249 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 06-12-1990
Time at launch 12:20 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

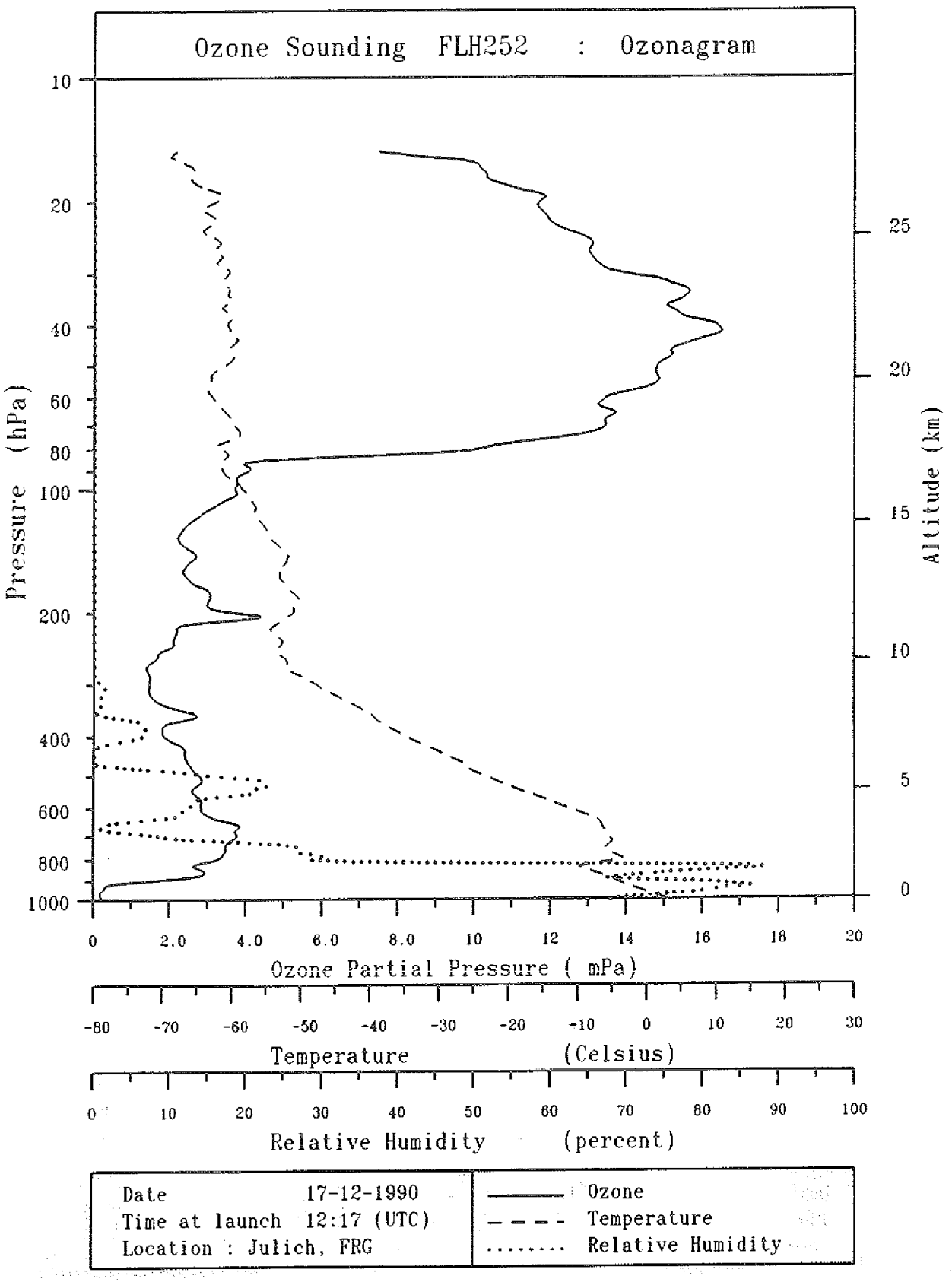

Ozone Sounding FLH249 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 06-12-1990
Time at launch 12:20 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

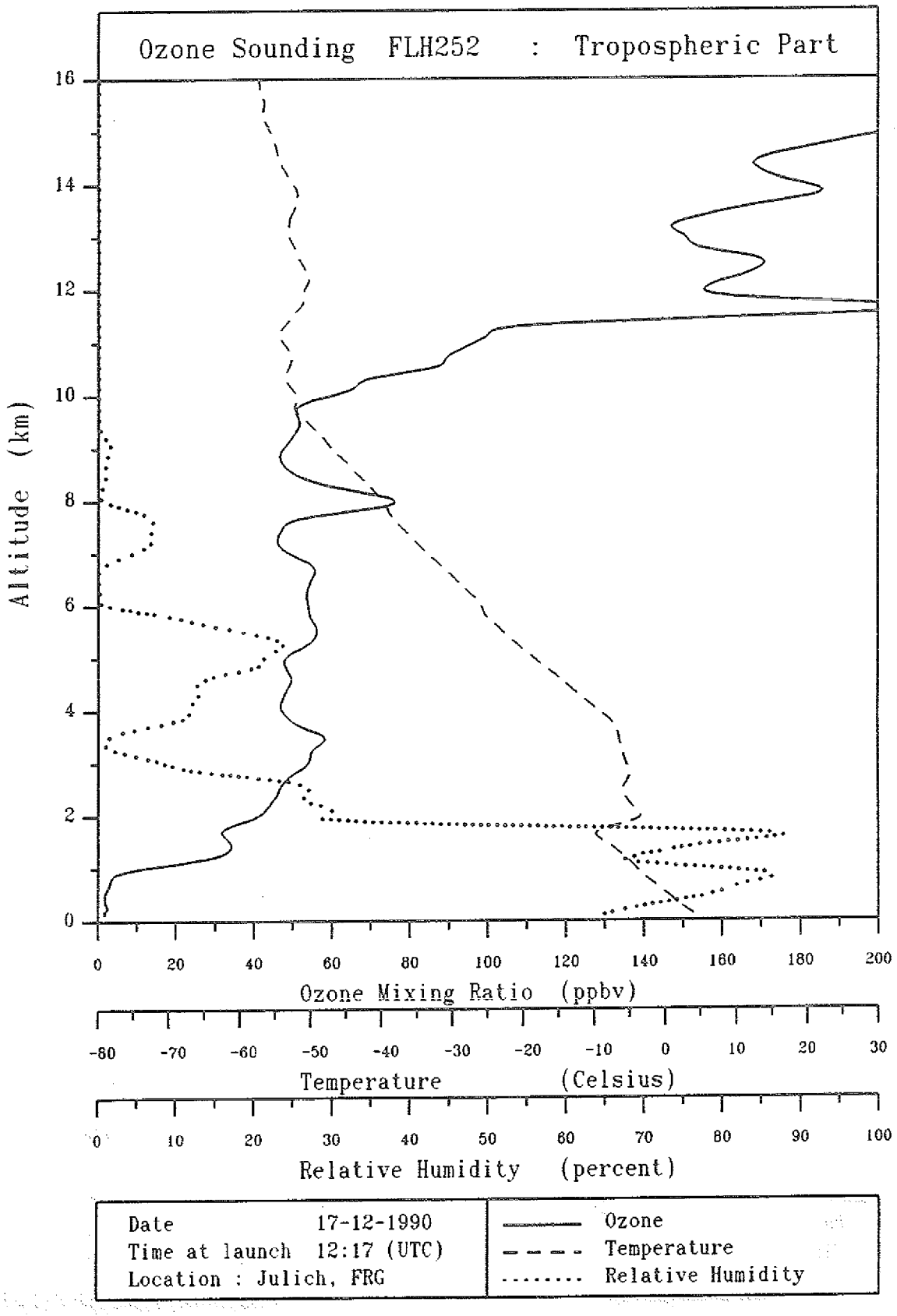

Ozone Sounding FLH250 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 10-12-1990
Time at launch 12:01 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

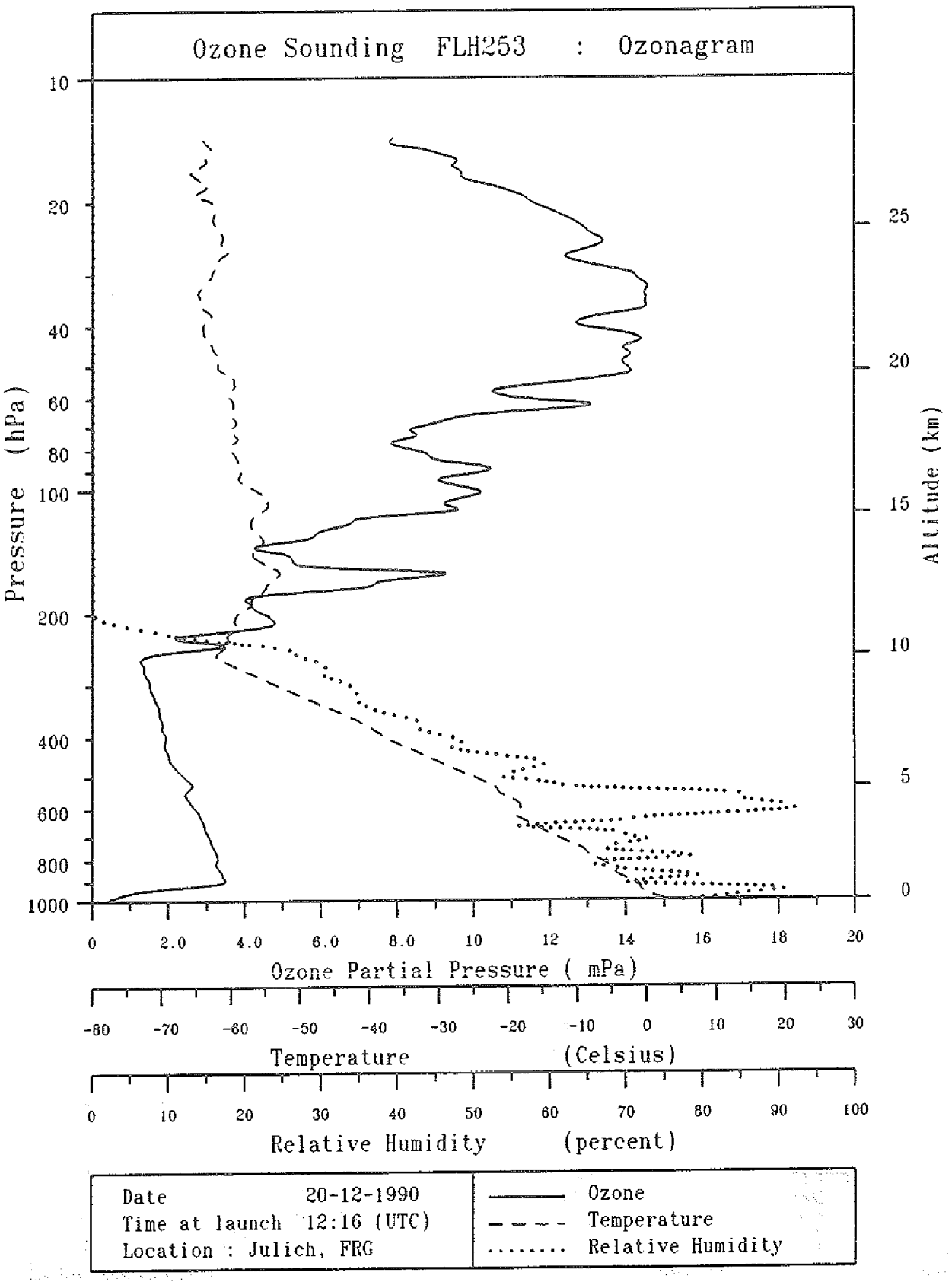

Ozone Sounding FLH250 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 10-12-1990
Time at launch 12:01 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

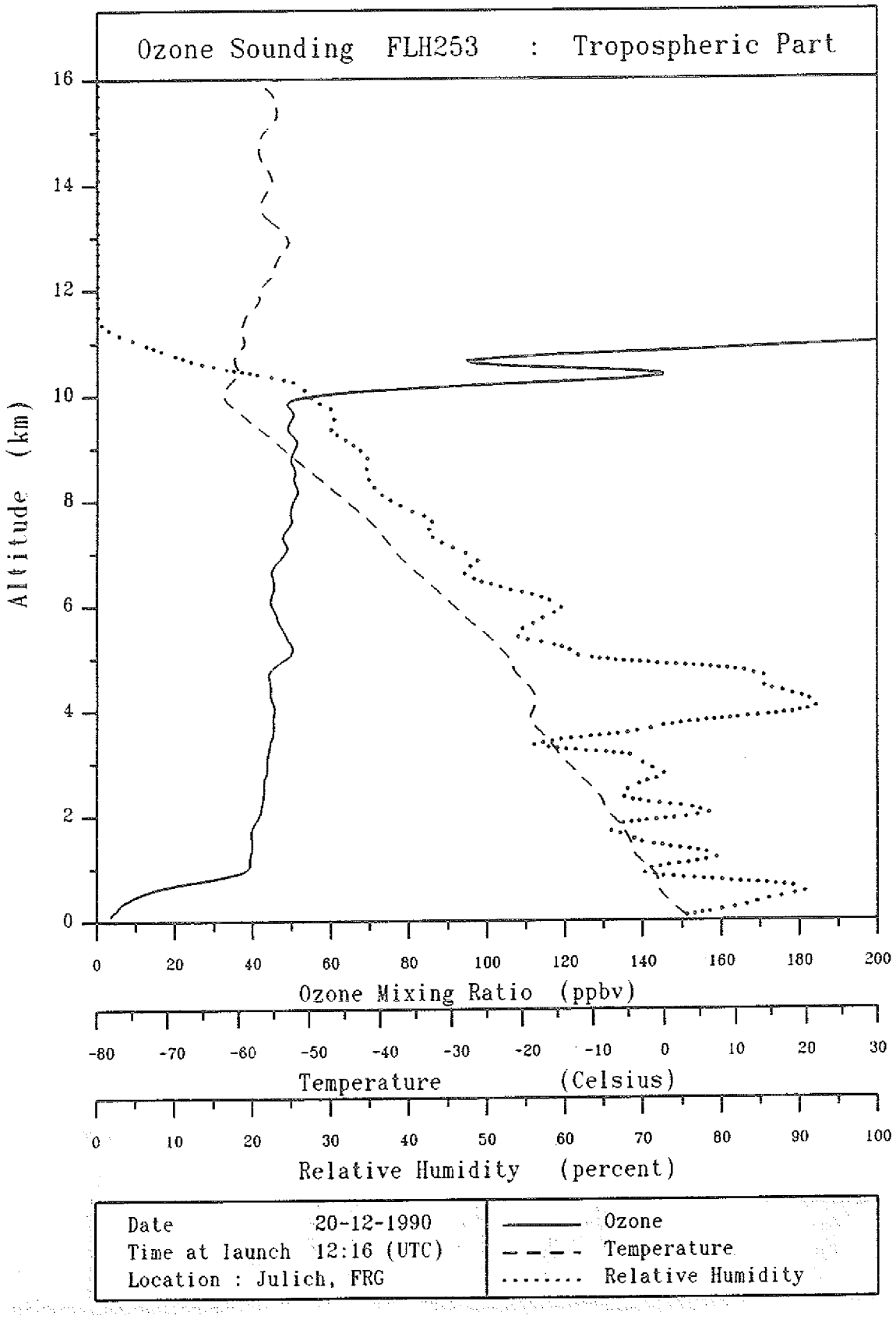

Ozone Sounding FLH251 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 13-12-1990
Time at launch 12:09 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

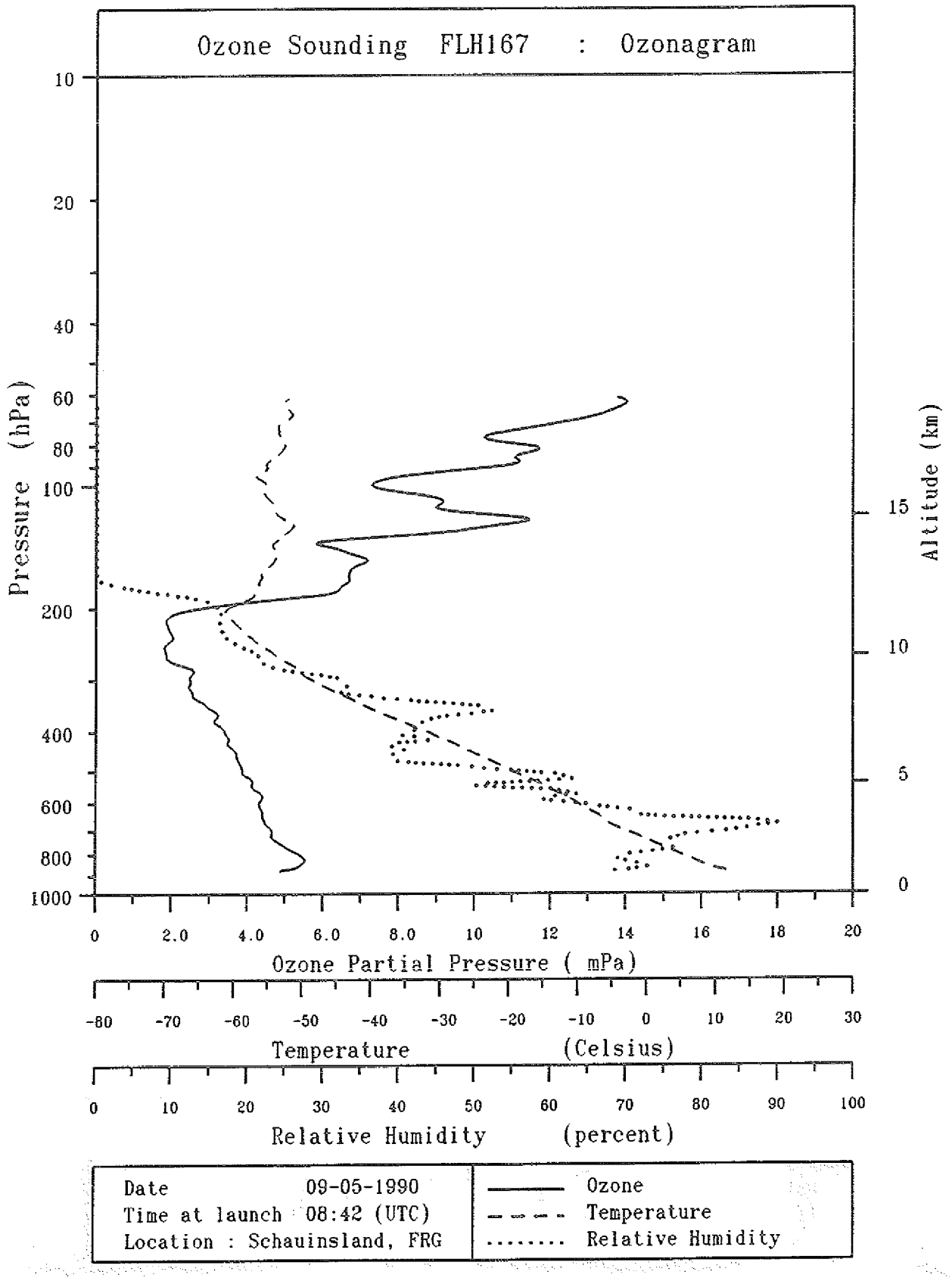

Ozone Sounding FLH251 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 13-12-1990
Time at launch 12:09 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH252 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 17-12-1990
Time at launch 12:17 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

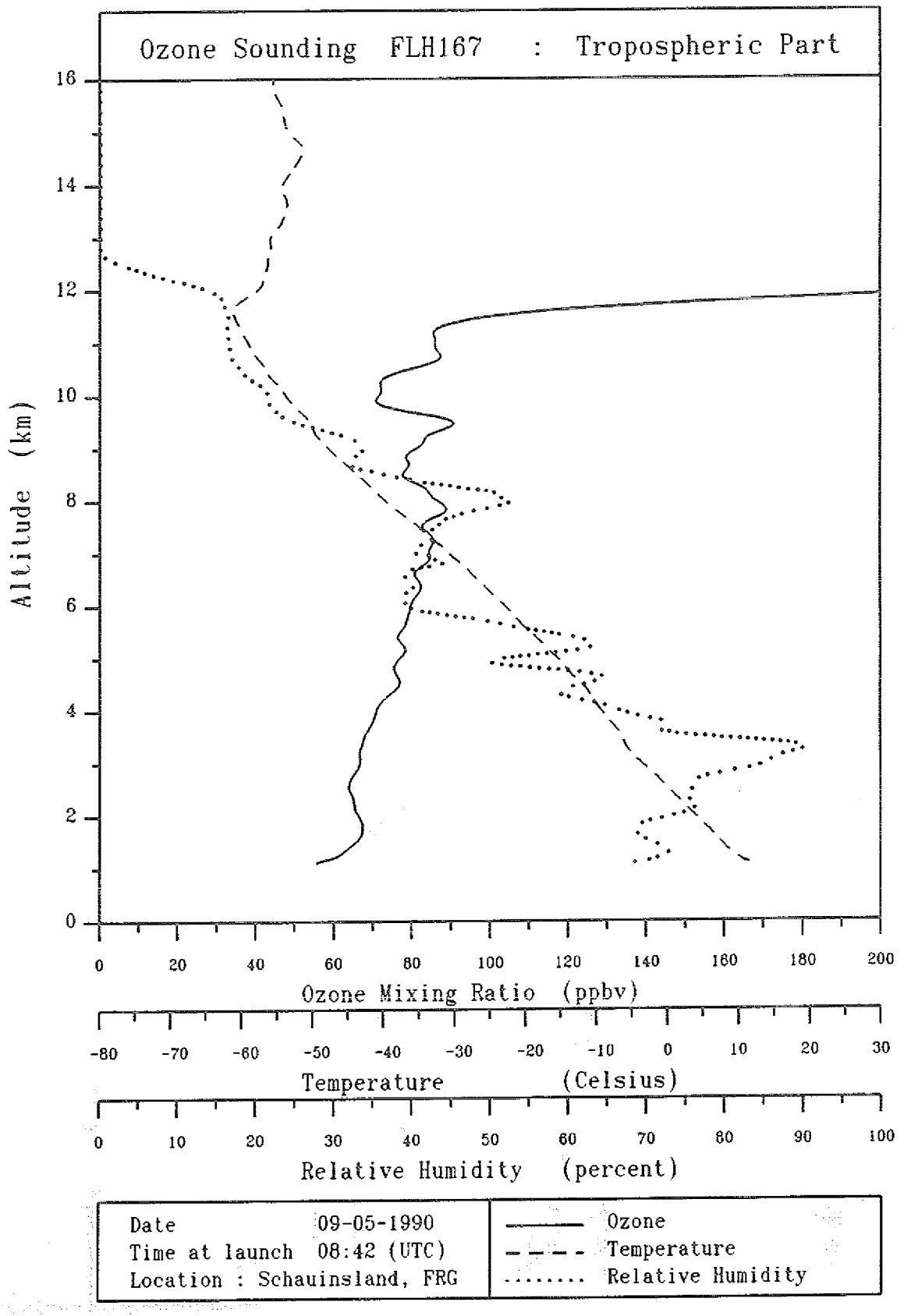

Ozone Sounding FLH252 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 17-12-1990
Time at launch 12:17 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

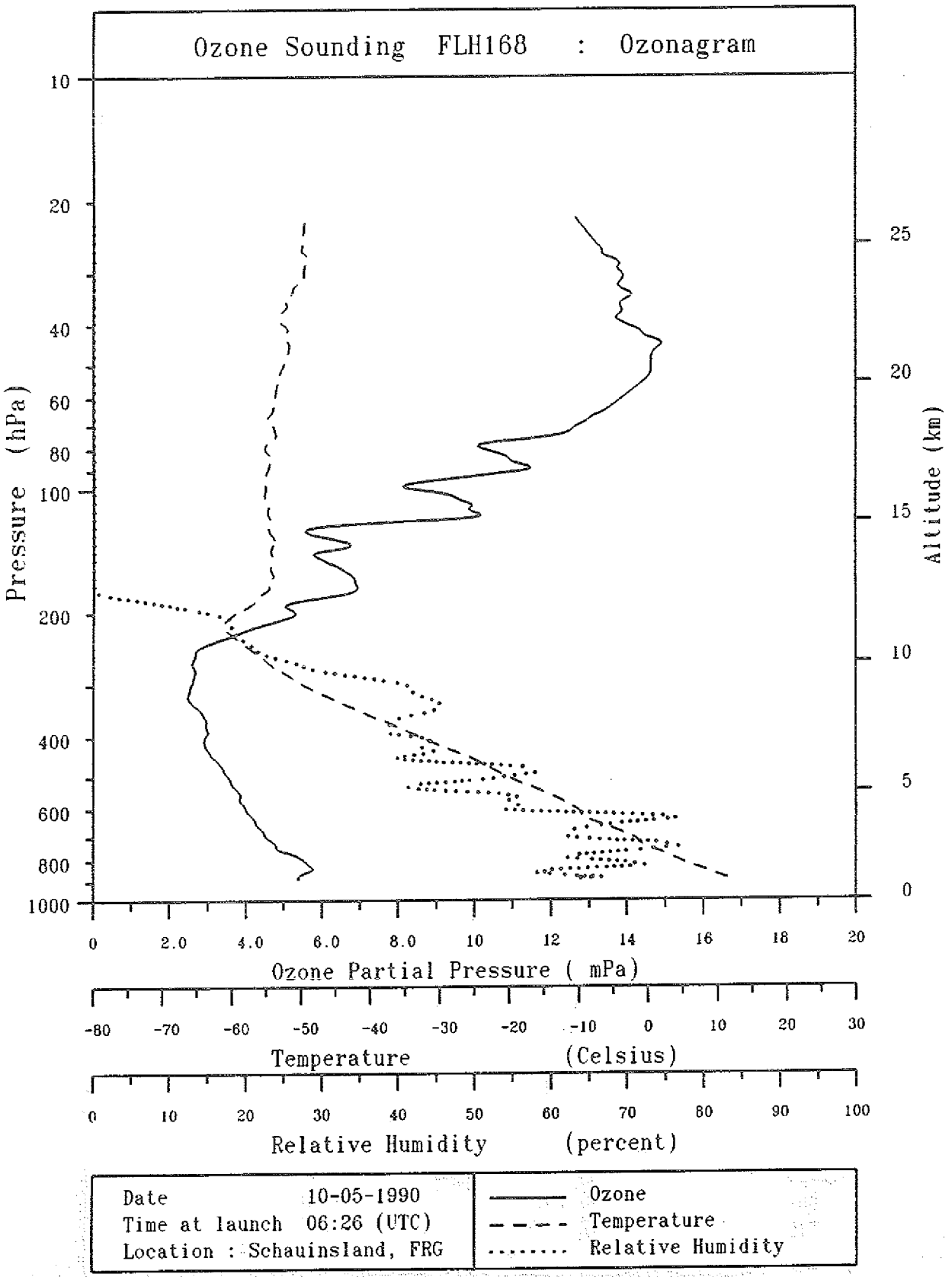

Ozone Sounding FLH253 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 20-12-1990
Time at launch 12:16 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

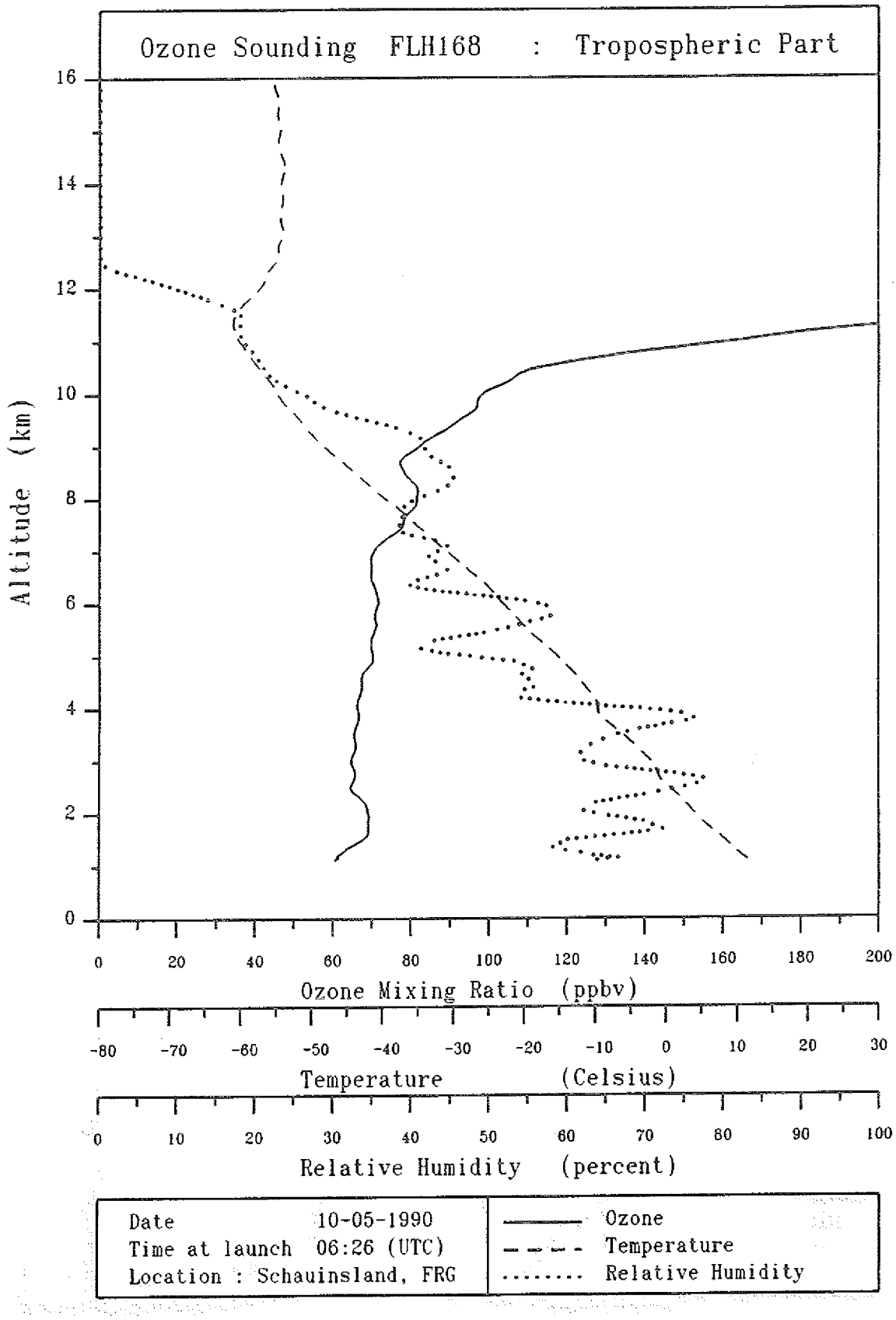

Ozone Sounding FLH253 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 20-12-1990
Time at launch 12:16 (UTC)
Location : Julich, FRG
Ozone
Temperature
Relative Humidity

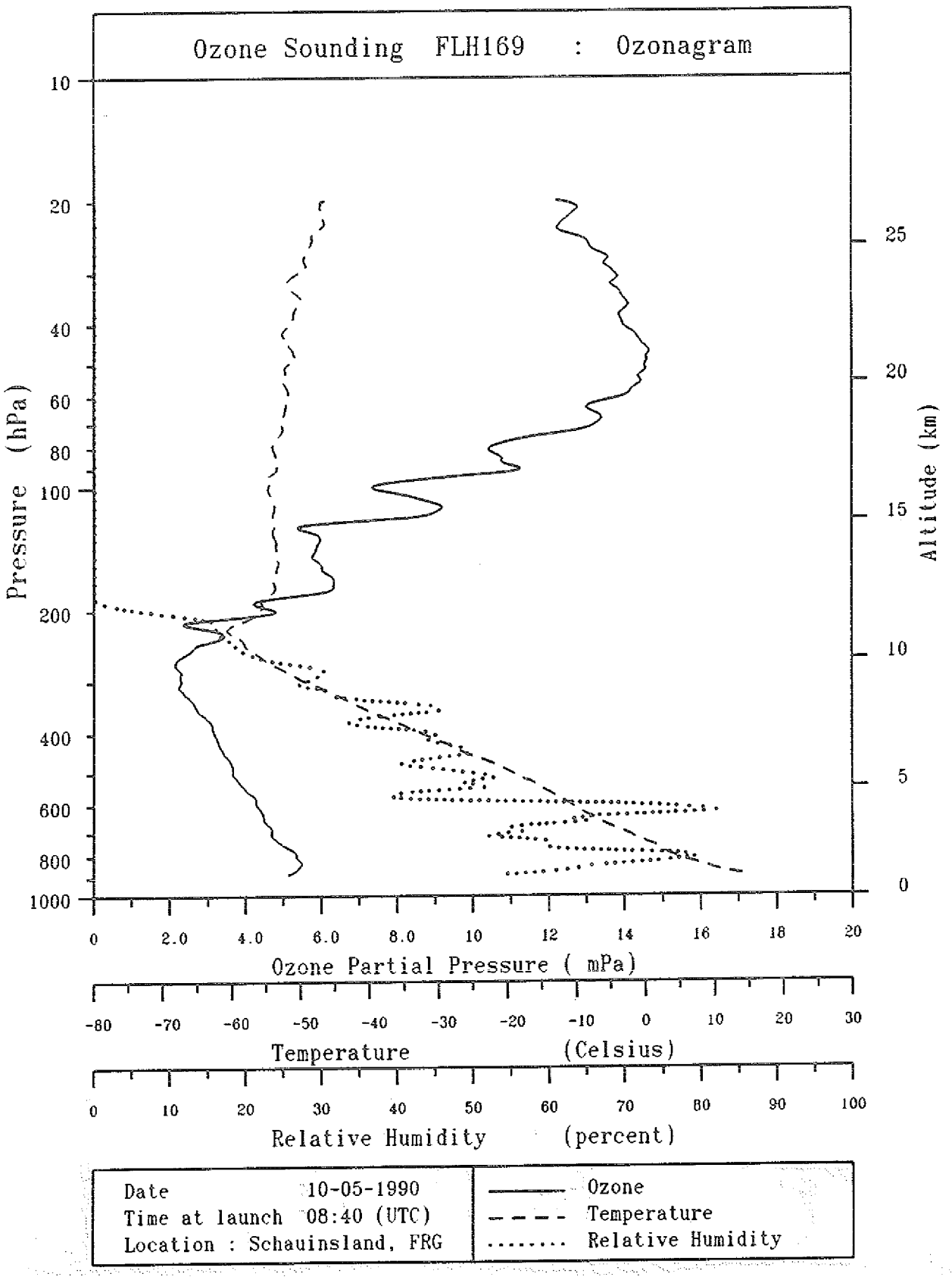


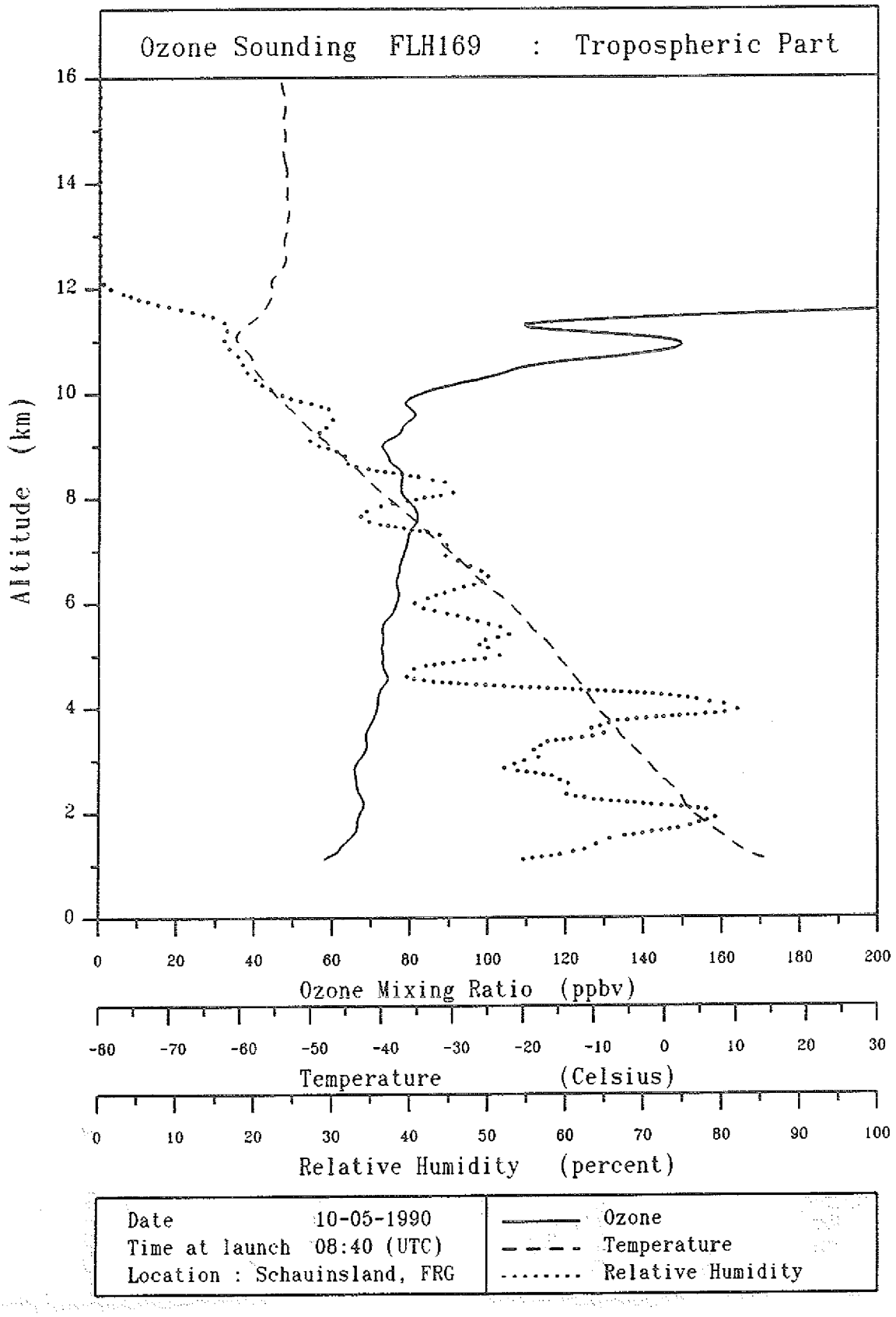
Date 09-05-1990	——— Ozone
Time at launch 08:42 (UTC)	– – – – Temperature
Location : Schauinsland, FRG	..... Relative Humidity

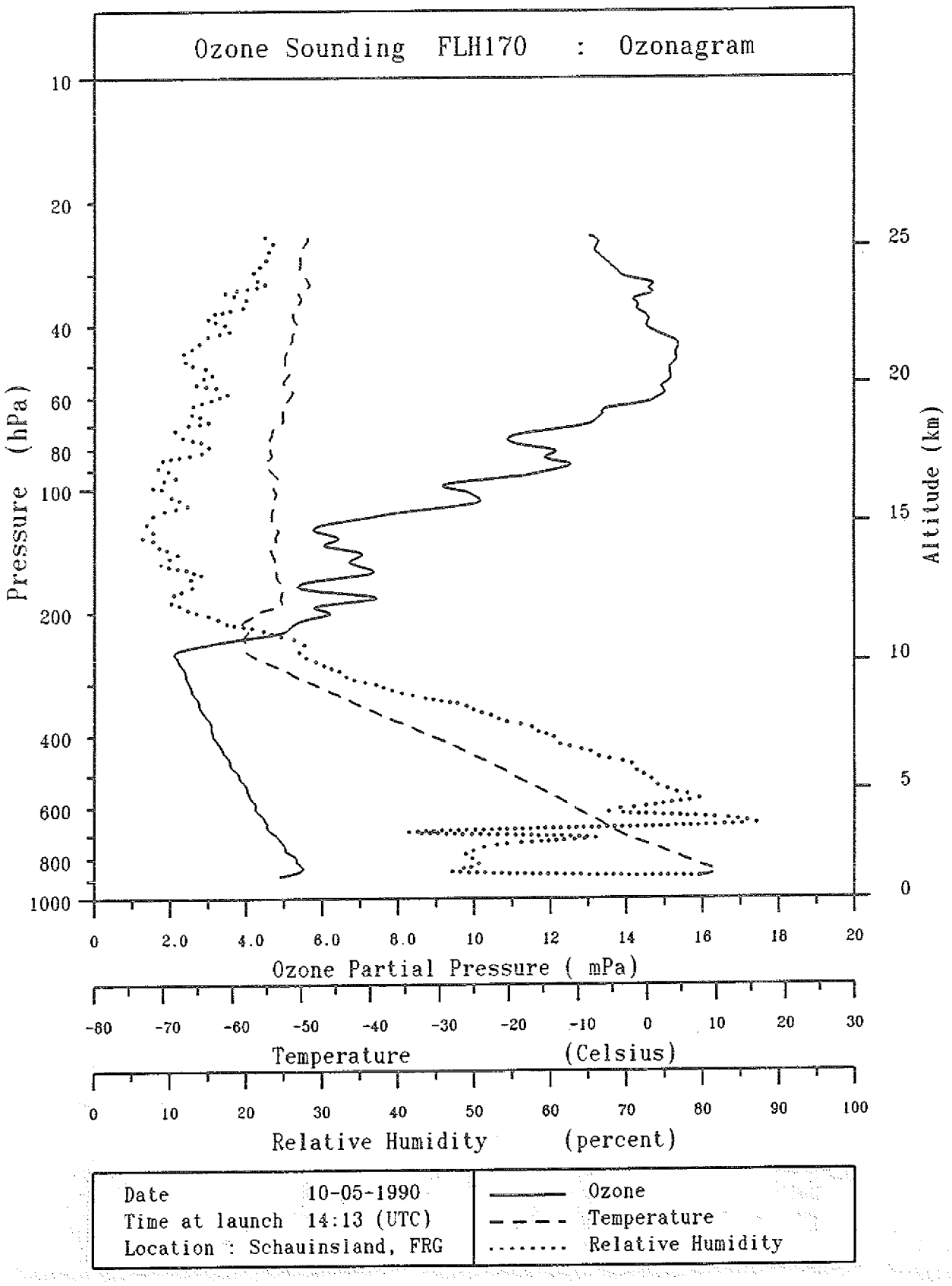

Ozone Sounding FLH167 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 09-05-1990
Time at launch 08:42 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

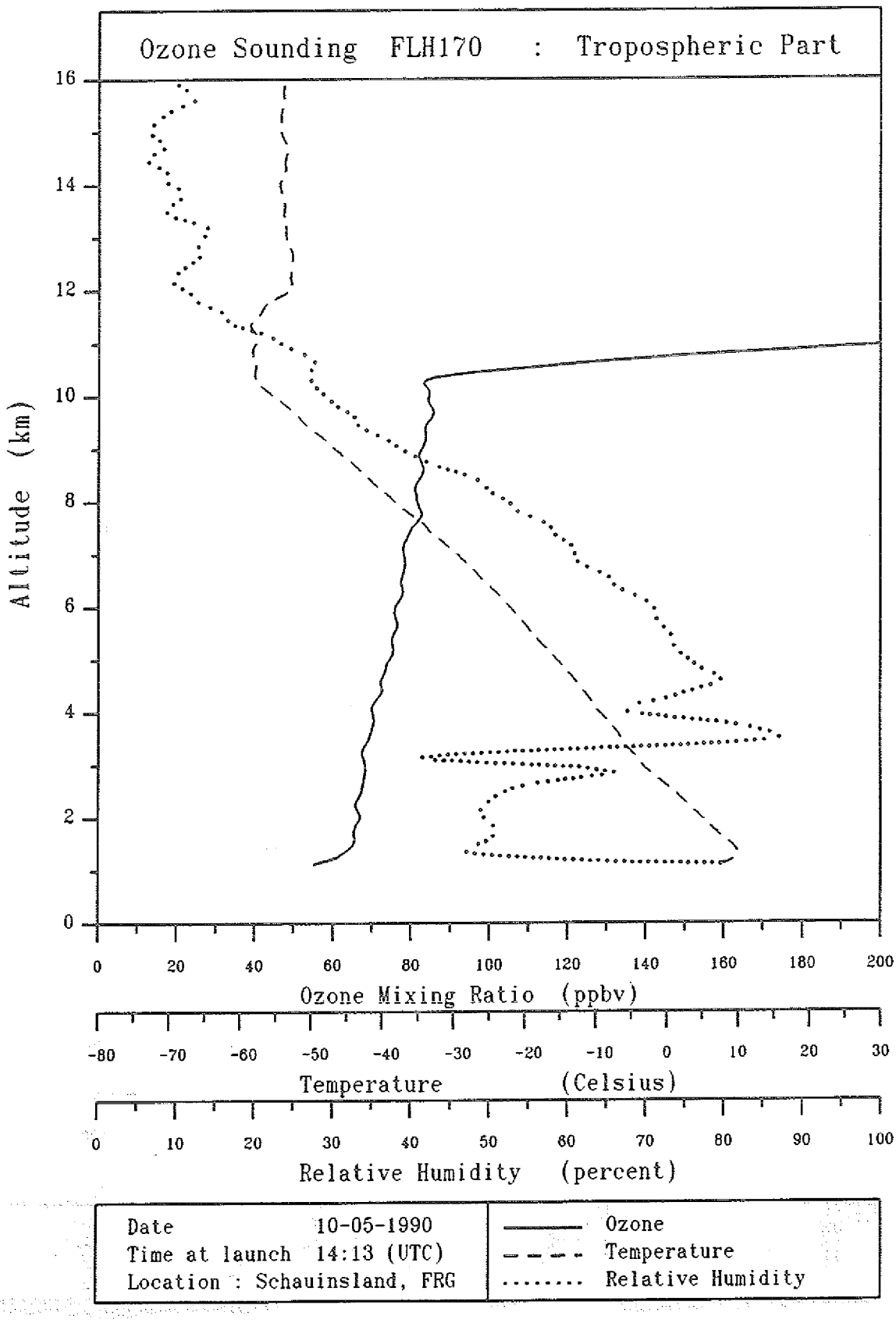

Ozone Sounding FLH168 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 10-05-1990
Time at launch 06:26 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH168 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 10-05-1990
Time at launch 06:26 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

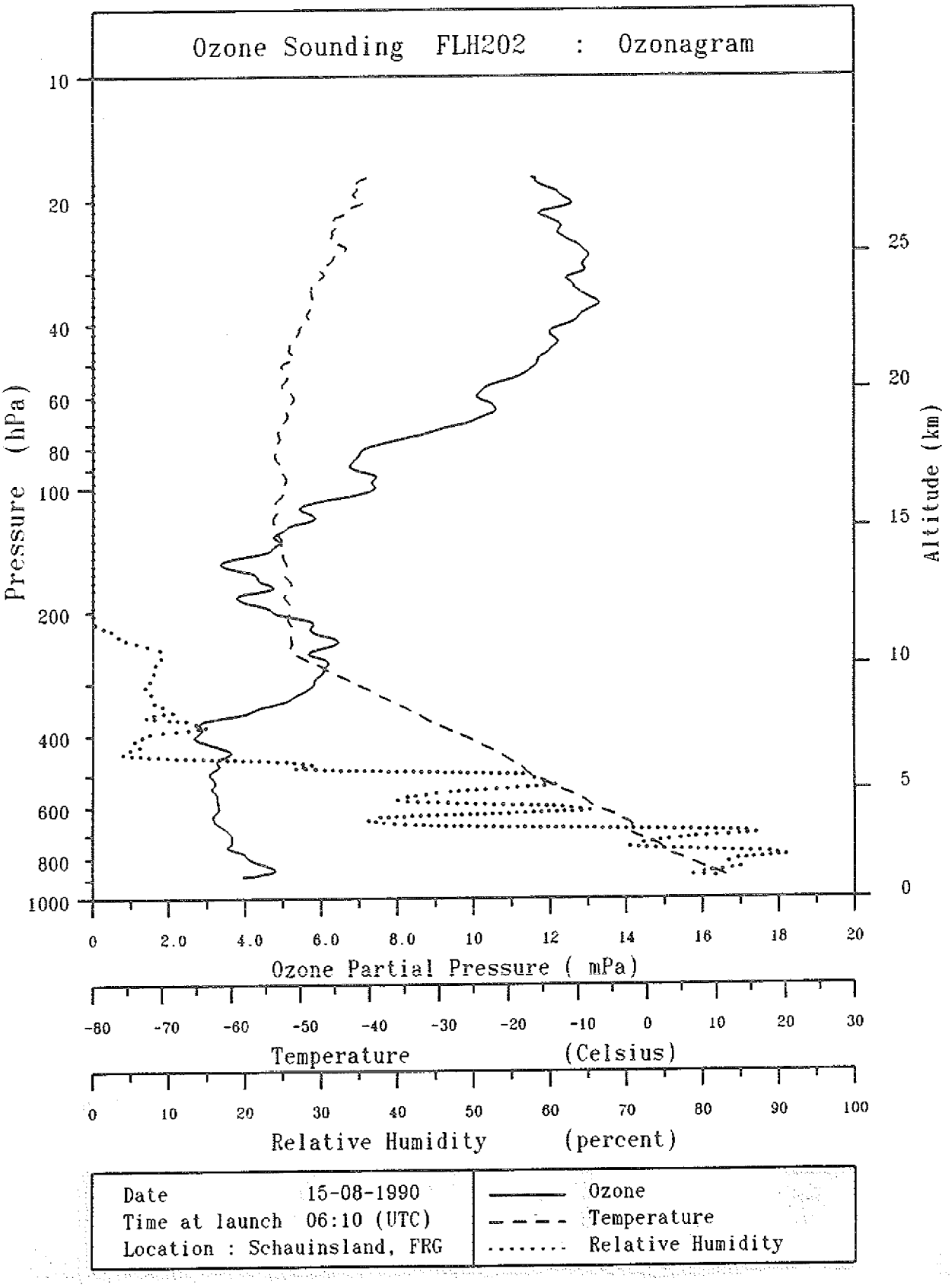

Ozone Sounding FLH169 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 10-05-1990
Time at launch 08:40 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

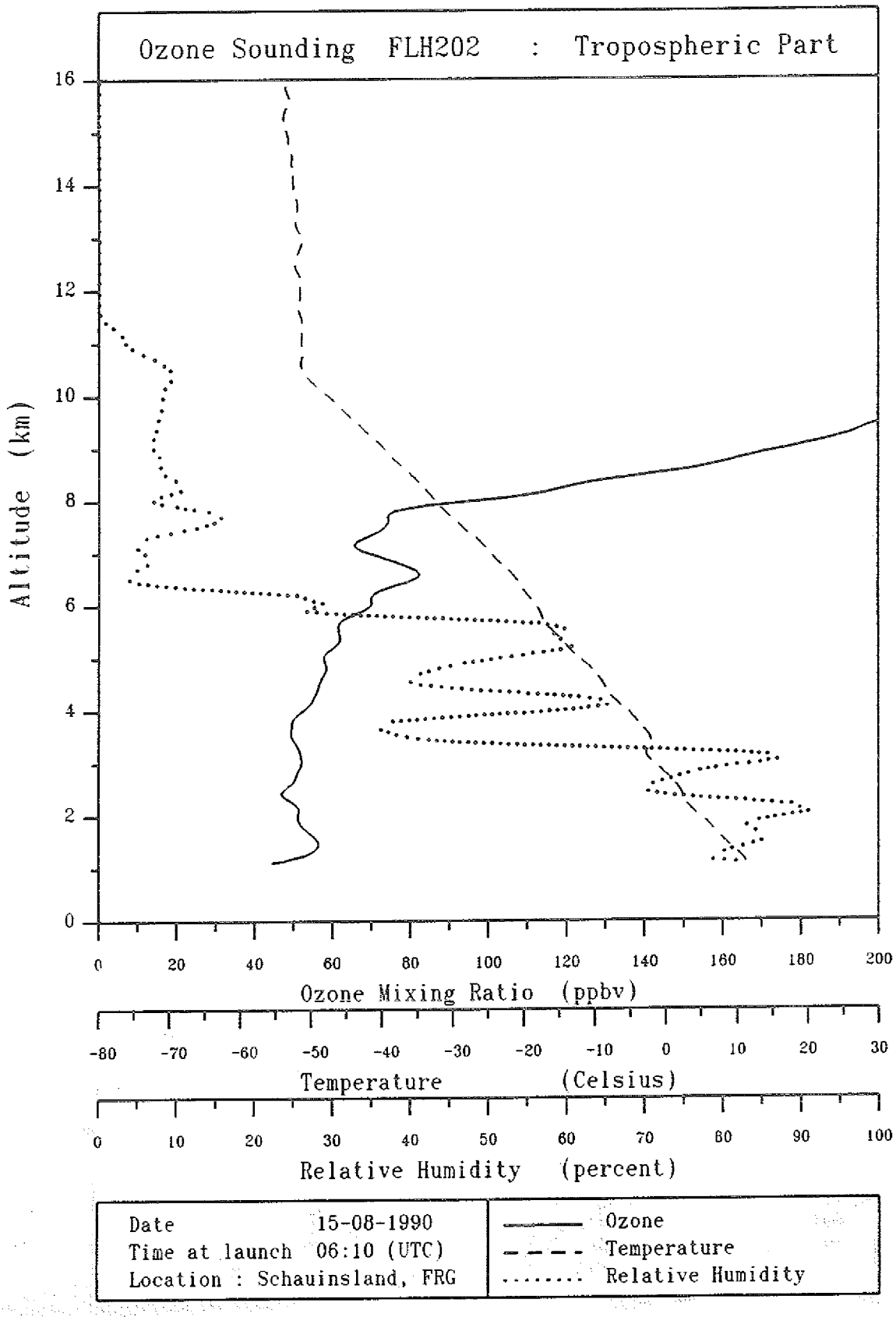

Ozone Sounding FLH169 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 10-05-1990
Time at launch 08:40 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

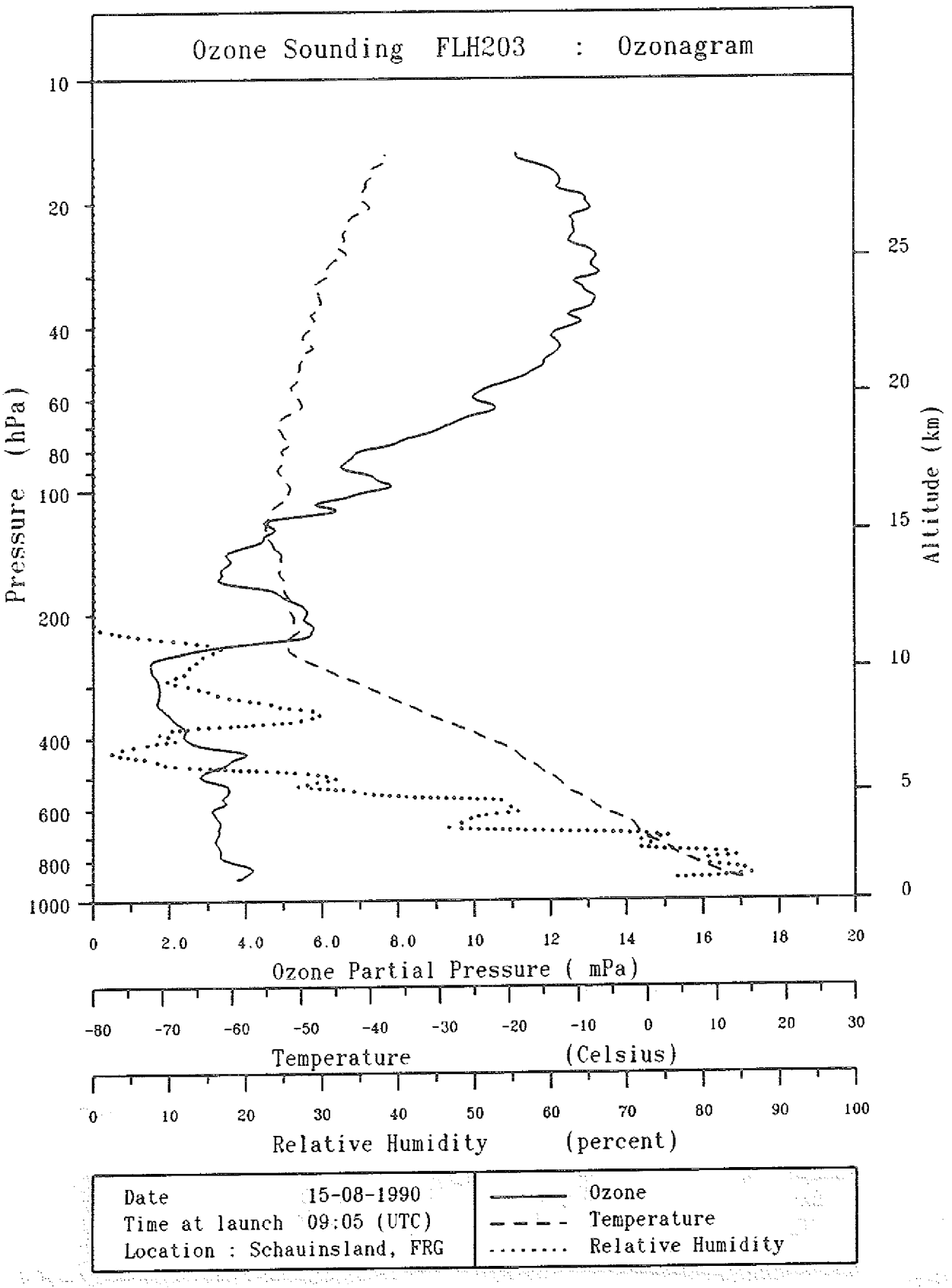

Ozone Sounding FLH170 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 10-05-1990
Time at launch 14:13 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

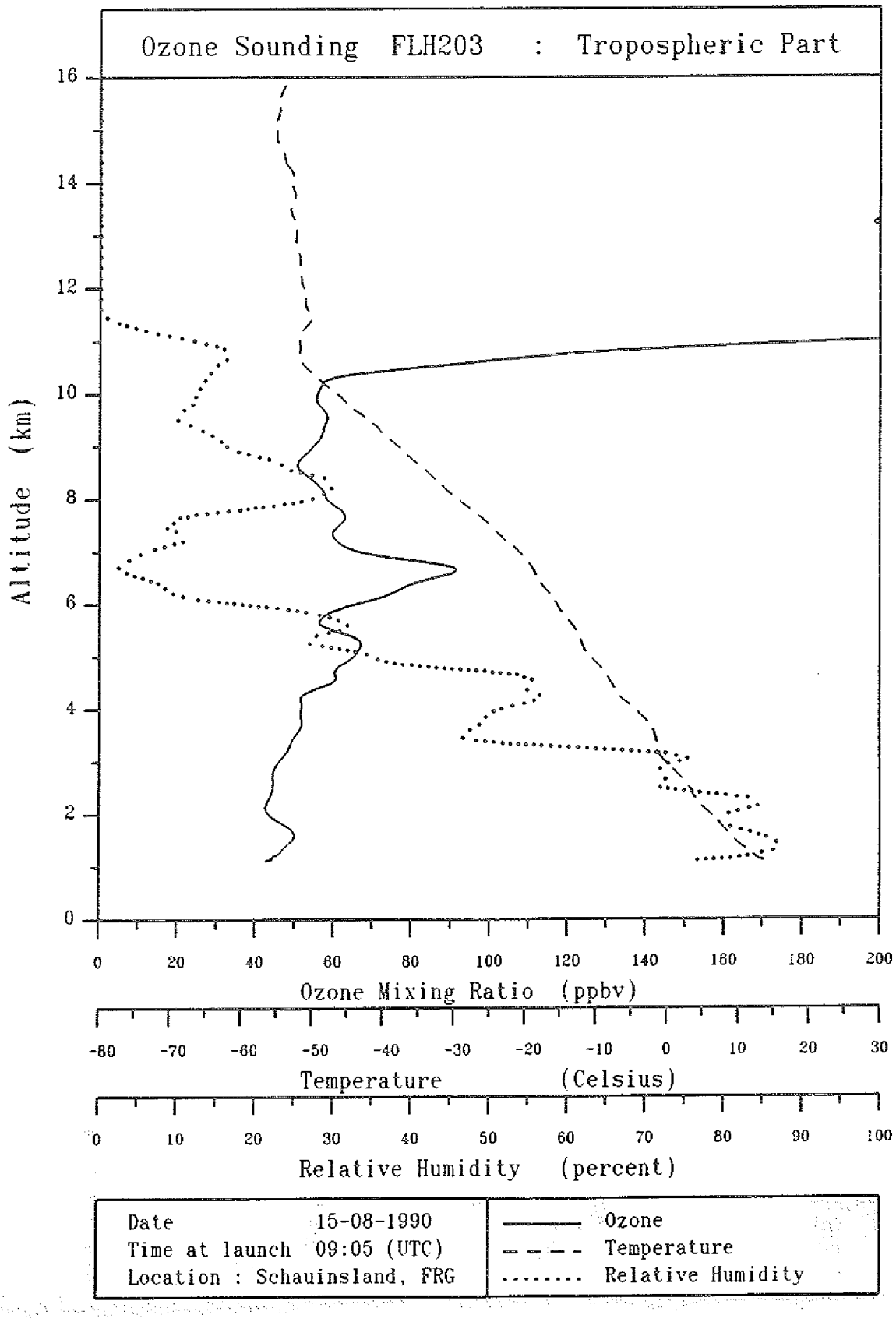


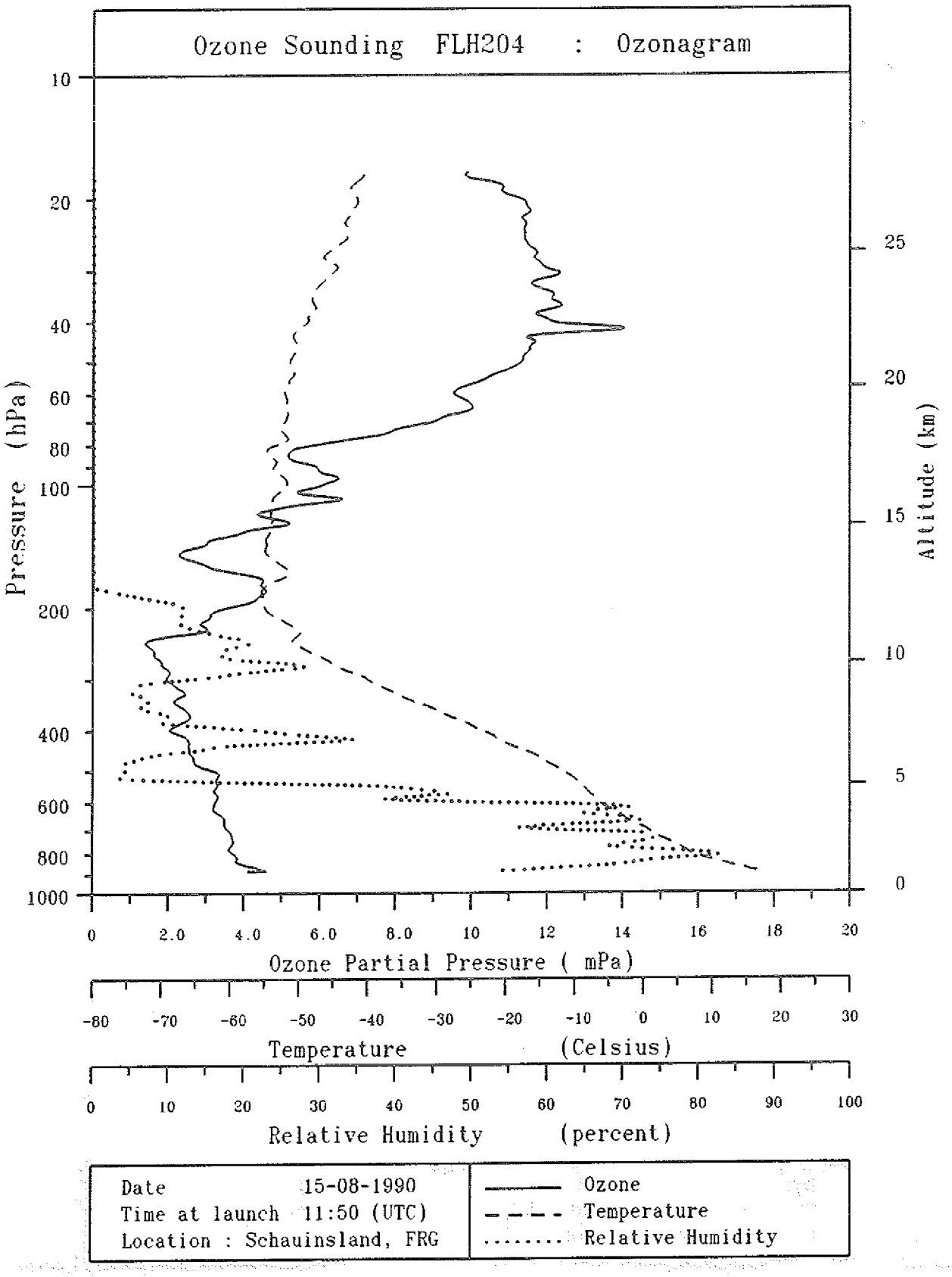
Date 10-05-1990	——— Ozone
Time at launch 14:13 (UTC)	- - - - Temperature
Location : Schauinsland, FRG	..... Relative Humidity

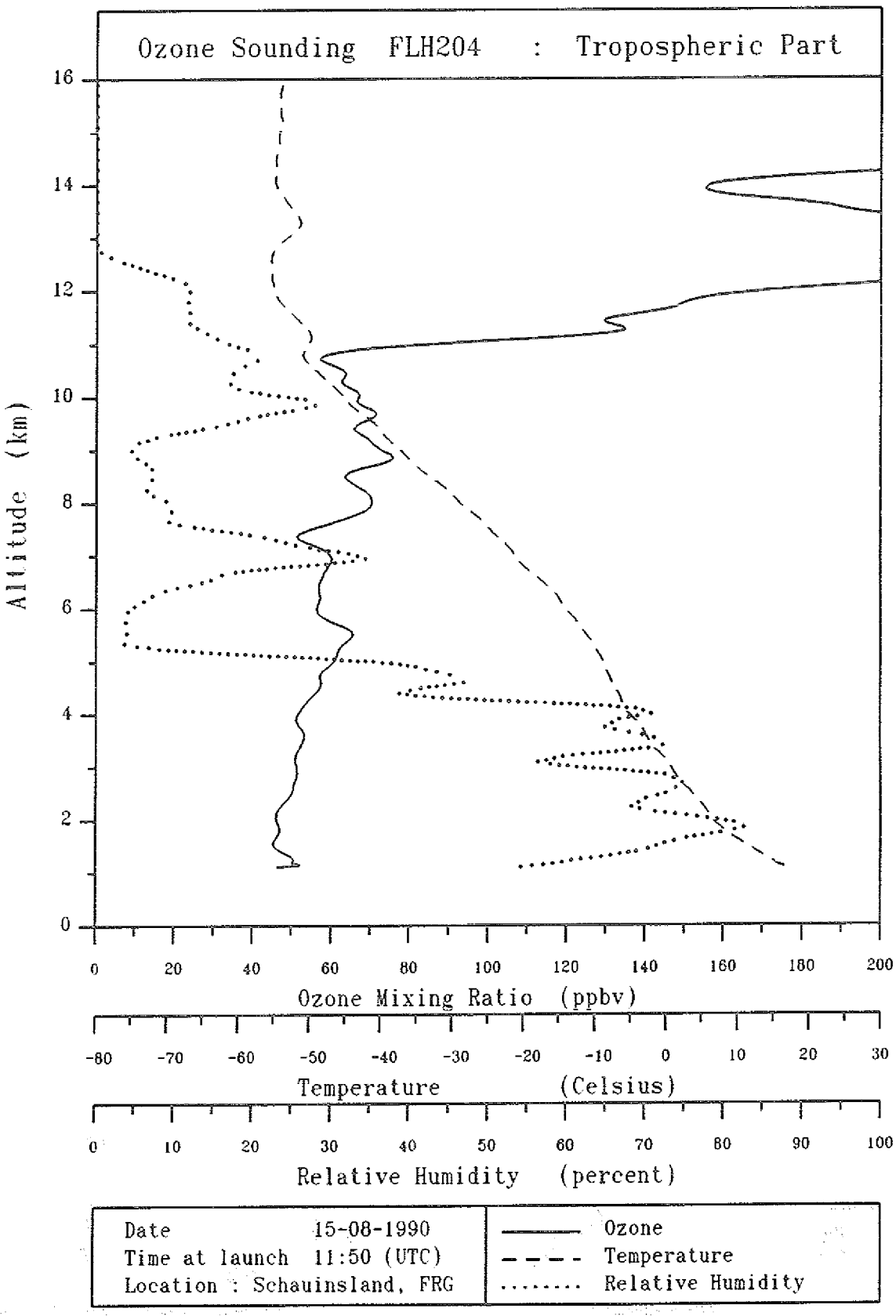

Ozone Sounding FLH202 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 15-08-1990
Time at launch 06:10 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

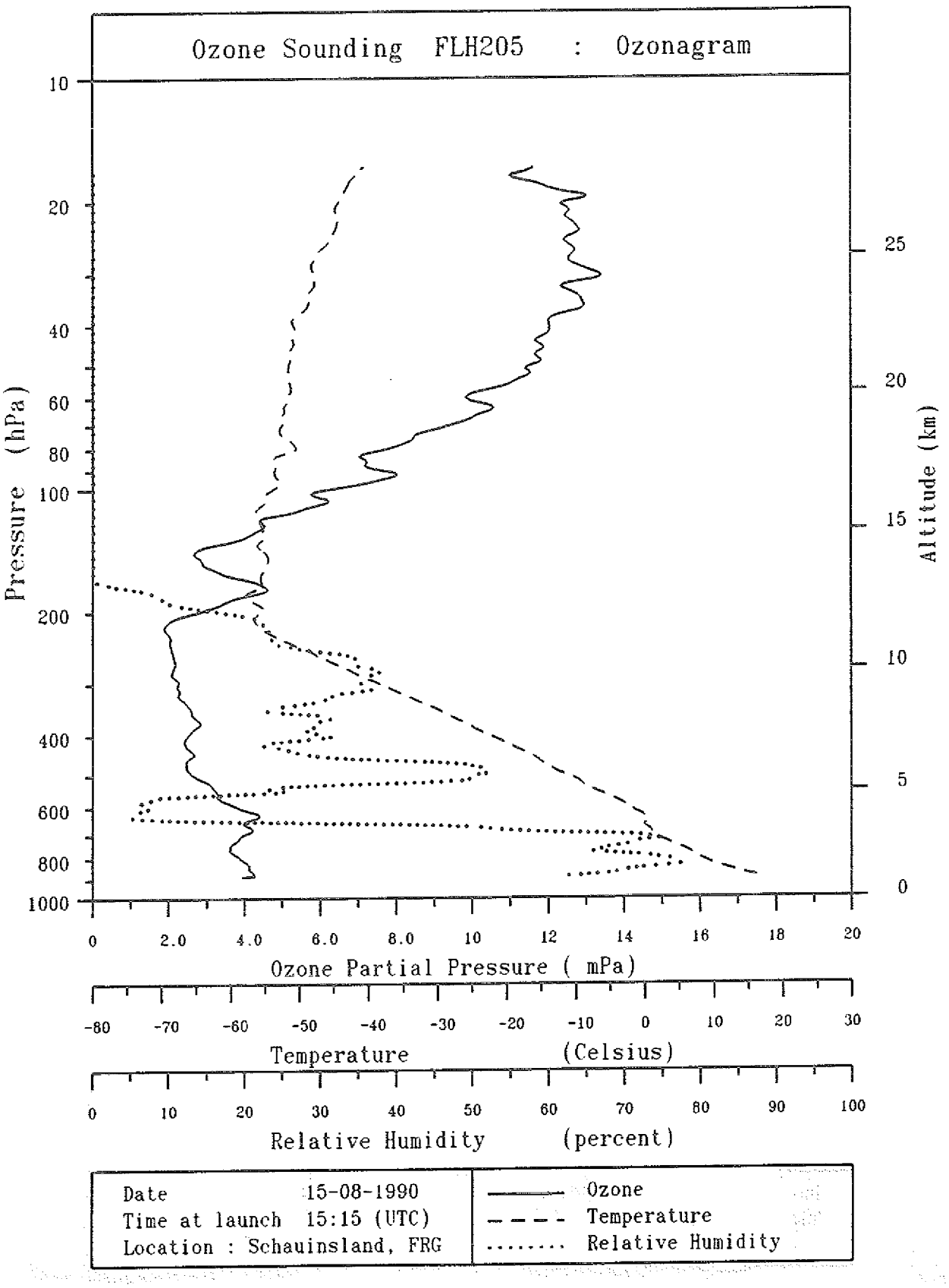

Ozone Sounding FLH202 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 15-08-1990
Time at launch 06:10 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

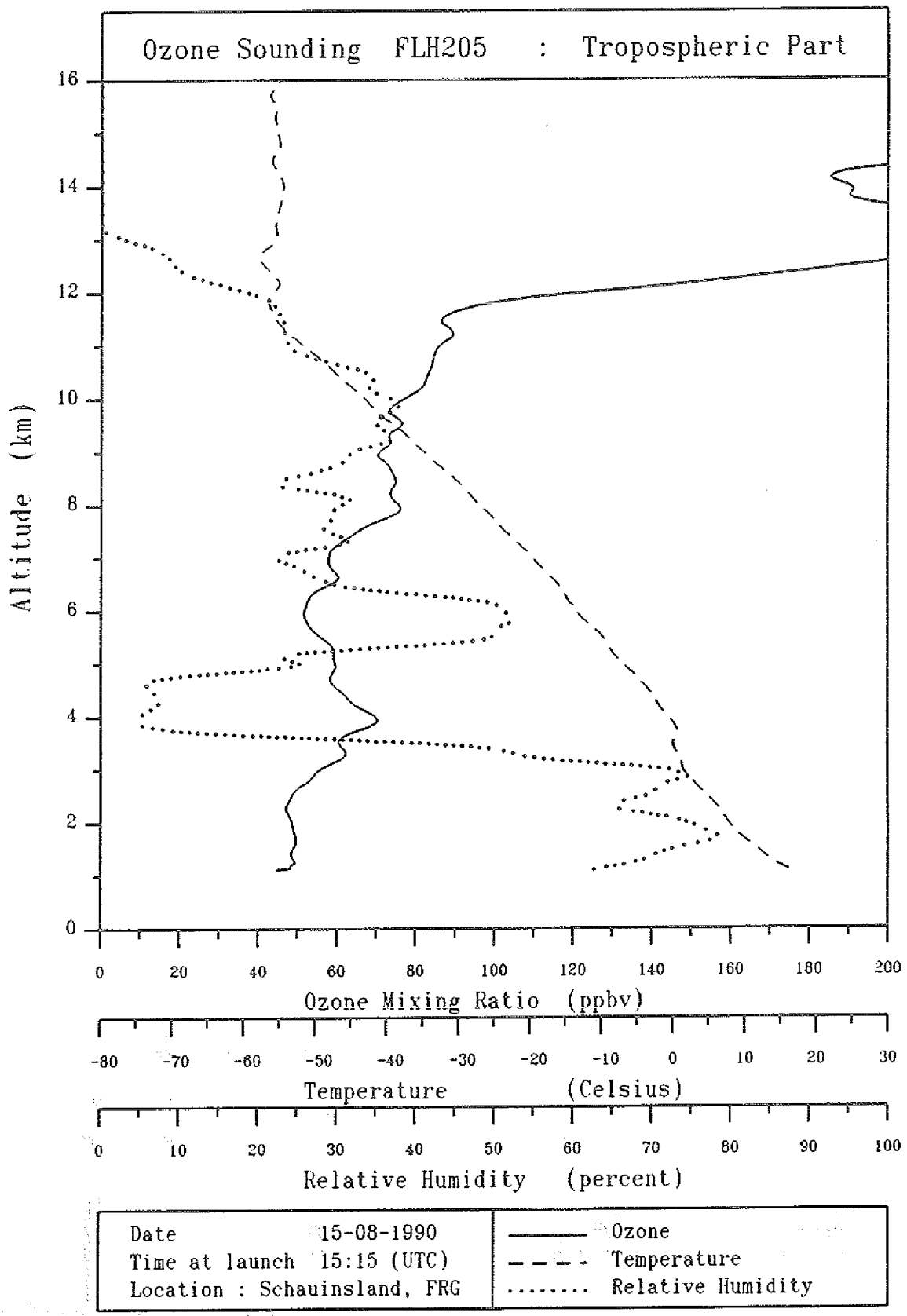

Ozone Sounding FLH203 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 15-08-1990
Time at launch 09:05 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

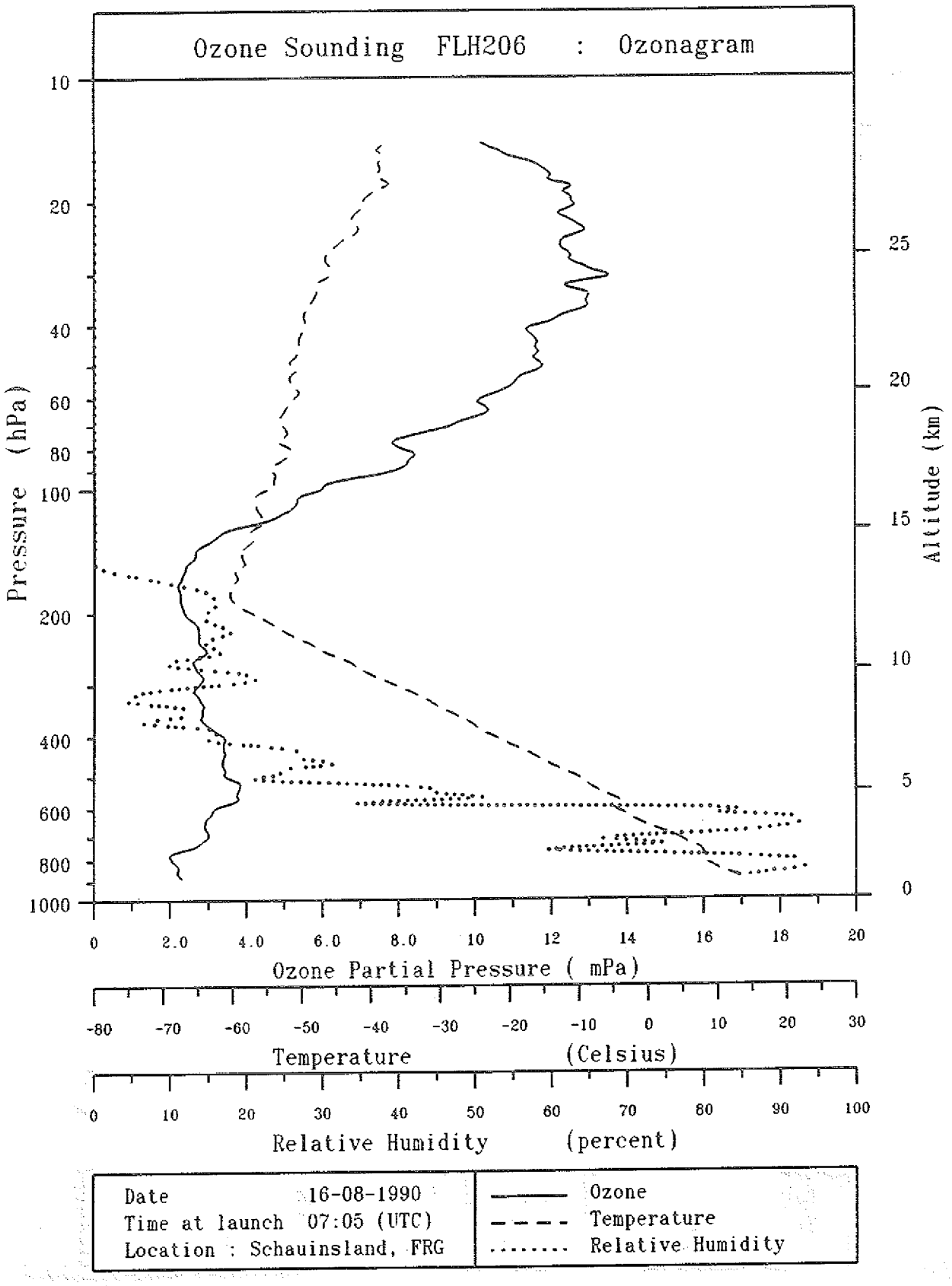

Ozone Sounding FLH203 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 15-08-1990
Time at launch 09:05 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

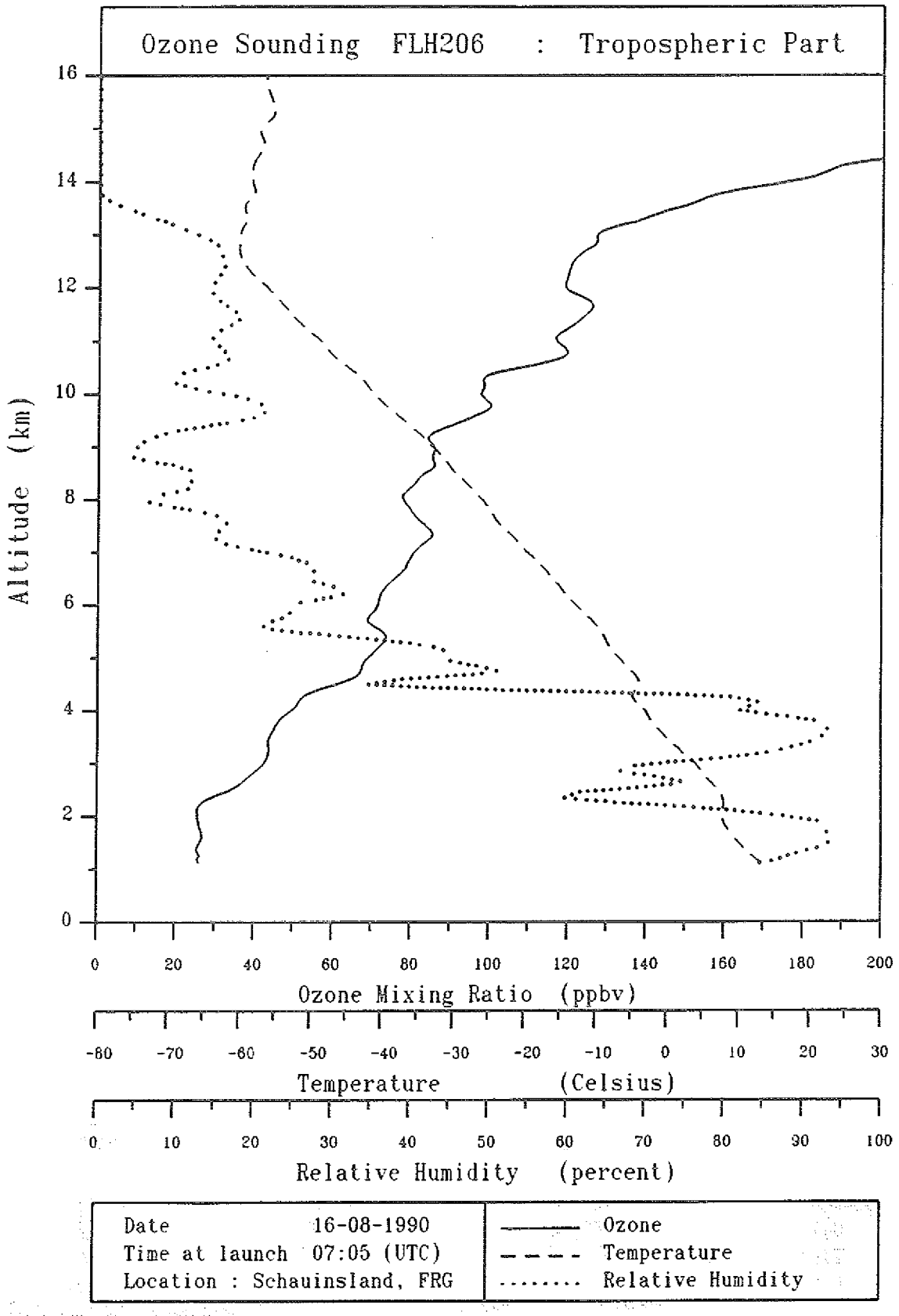

Ozone Sounding FLH204 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 15-08-1990
Time at launch 11:50 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

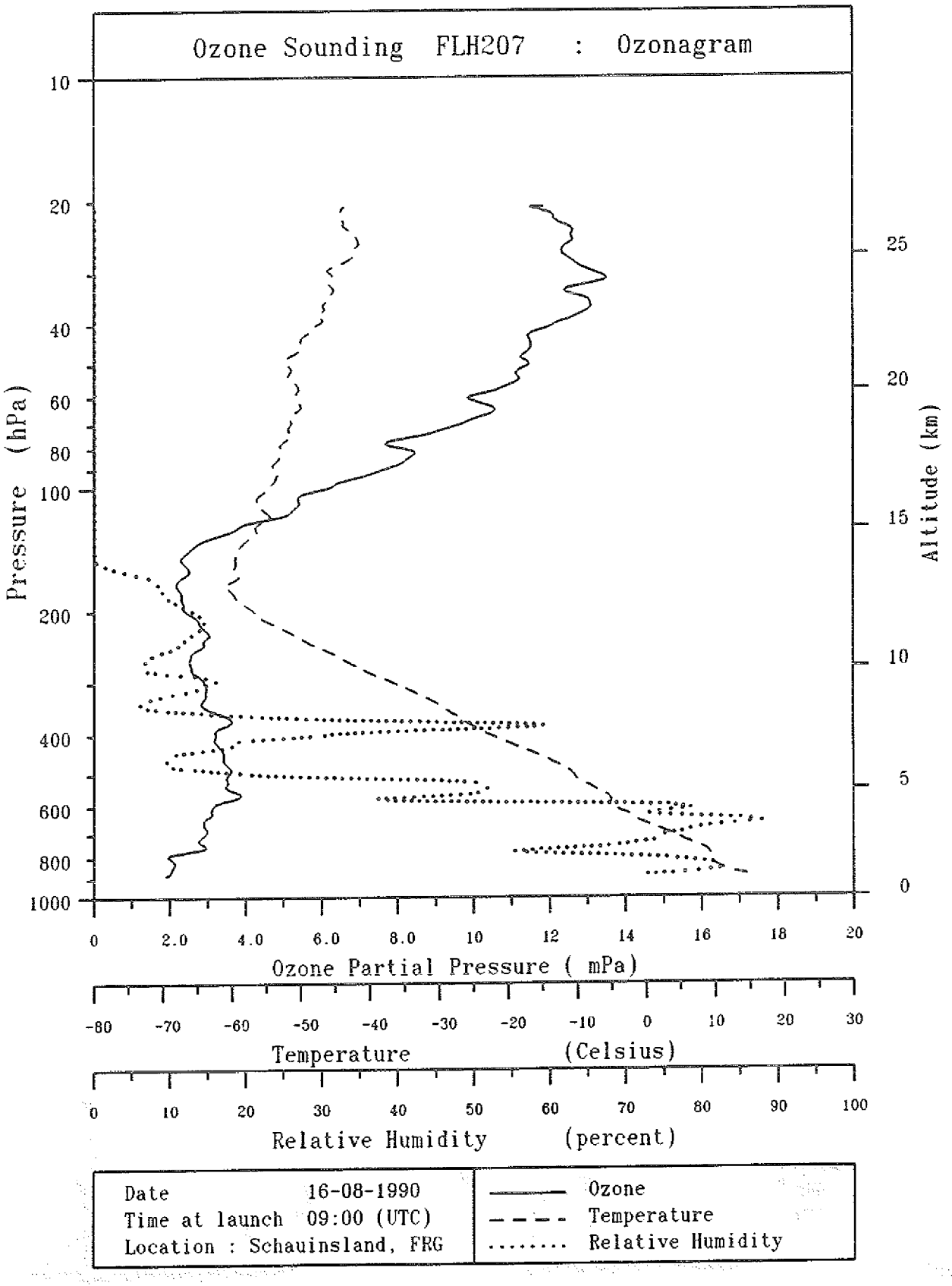

Ozone Sounding FLH204 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 15-08-1990
Time at launch 11:50 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

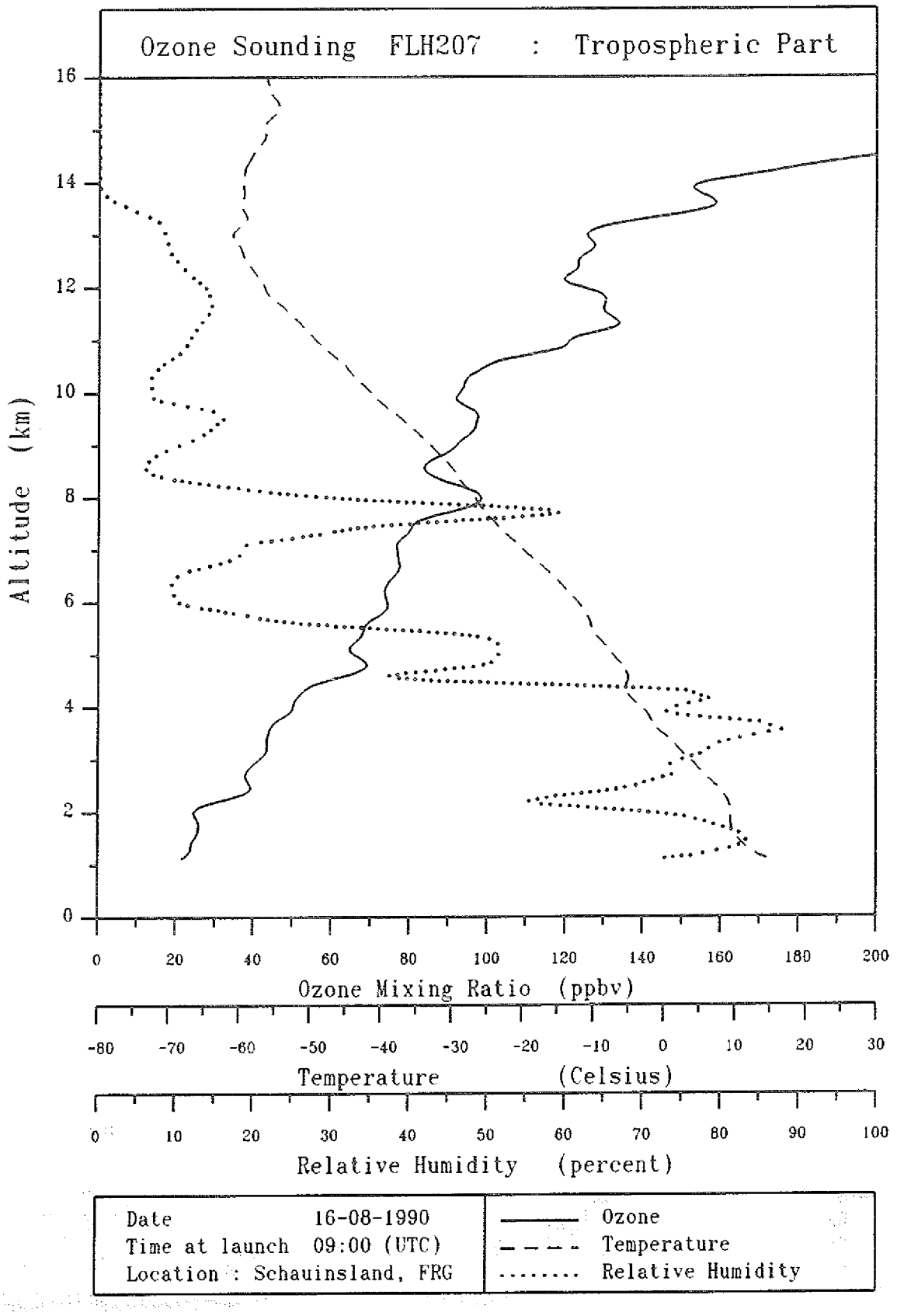

Ozone Sounding FLH205 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 15-08-1990
Time at launch 15:15 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

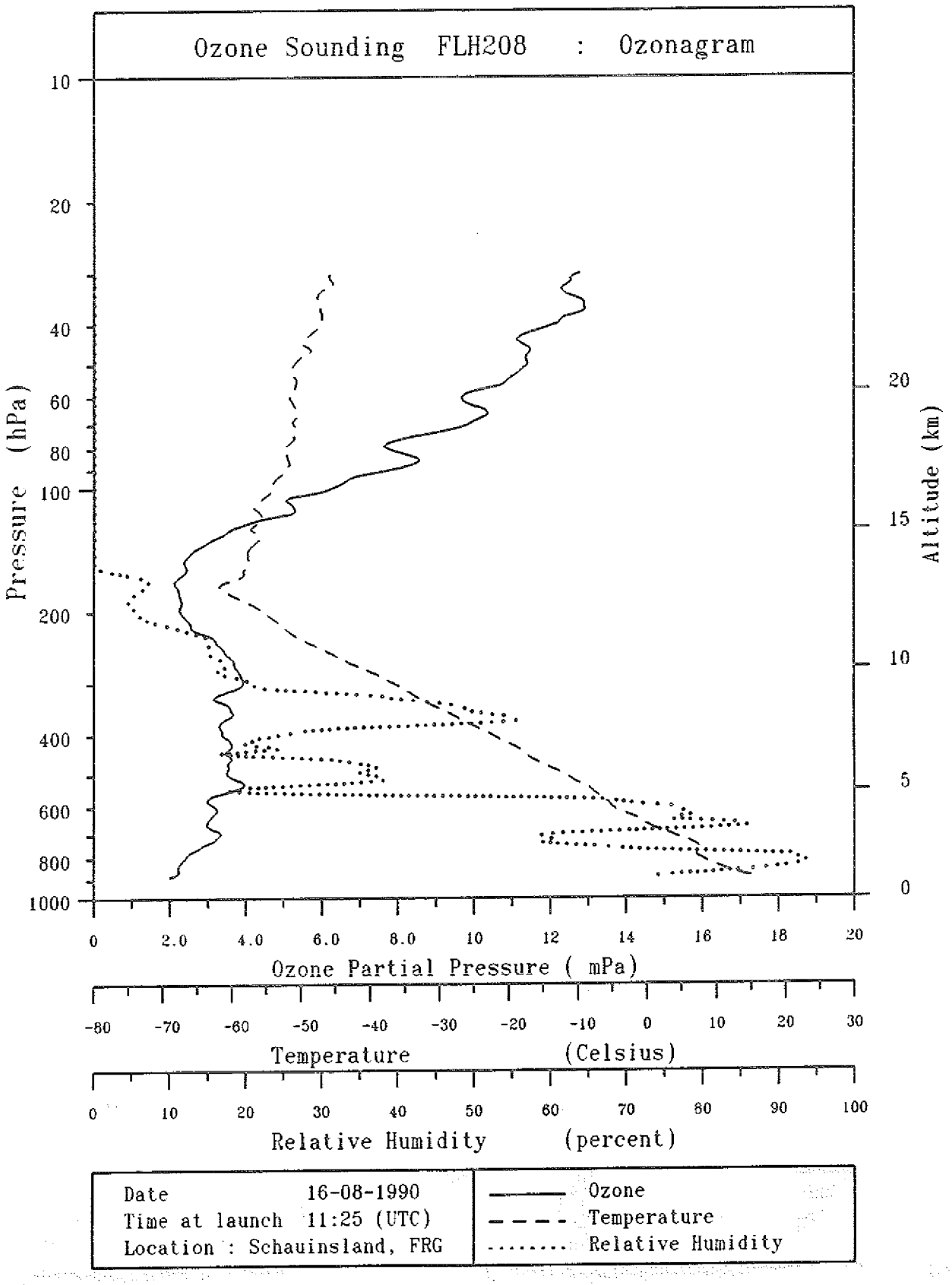

Ozone Sounding FLH205 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 15-08-1990
Time at launch 15:15 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH206 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 16-08-1990
Time at launch 07:05 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

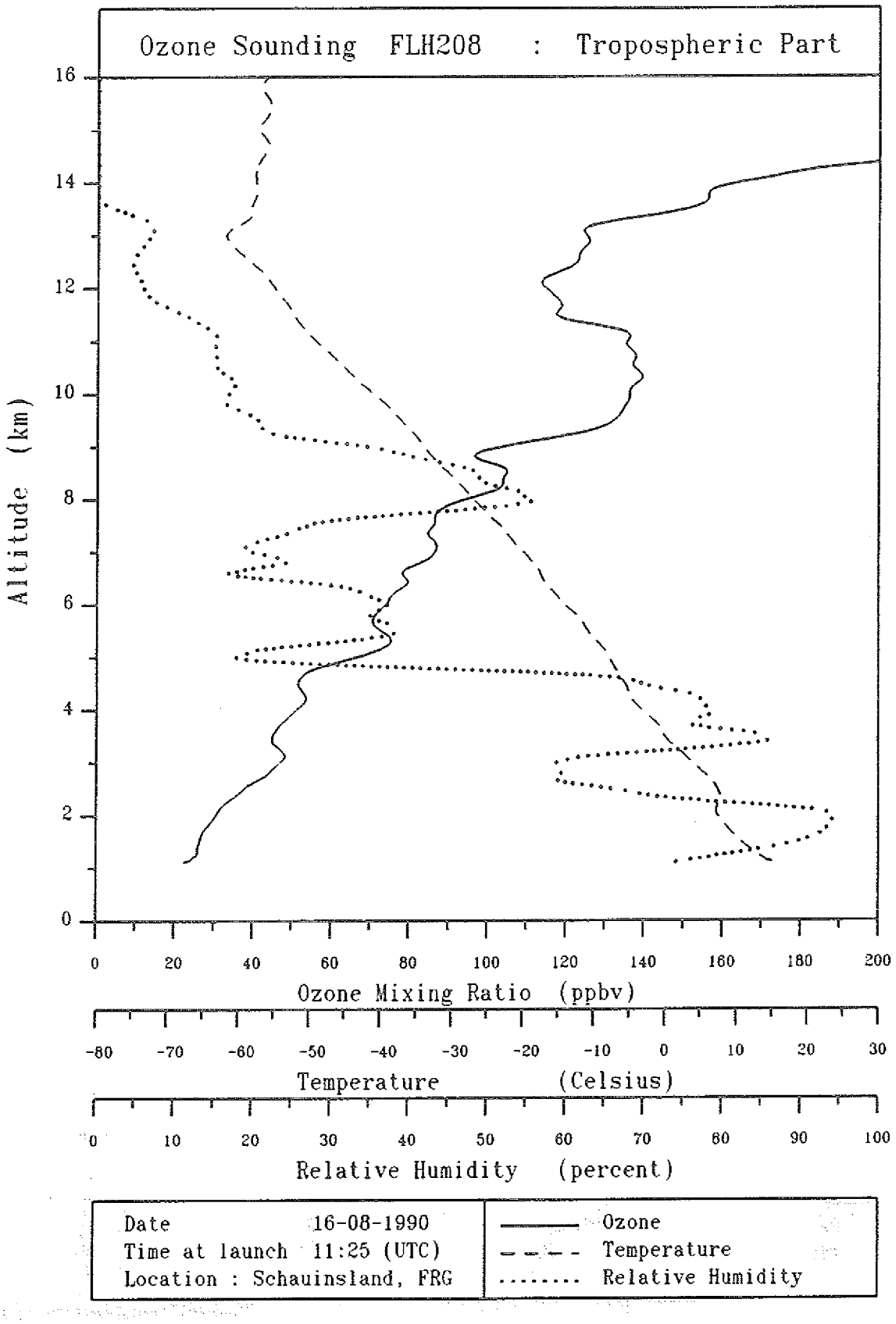

Ozone Sounding FLH206 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 16-08-1990
Time at launch 07:05 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

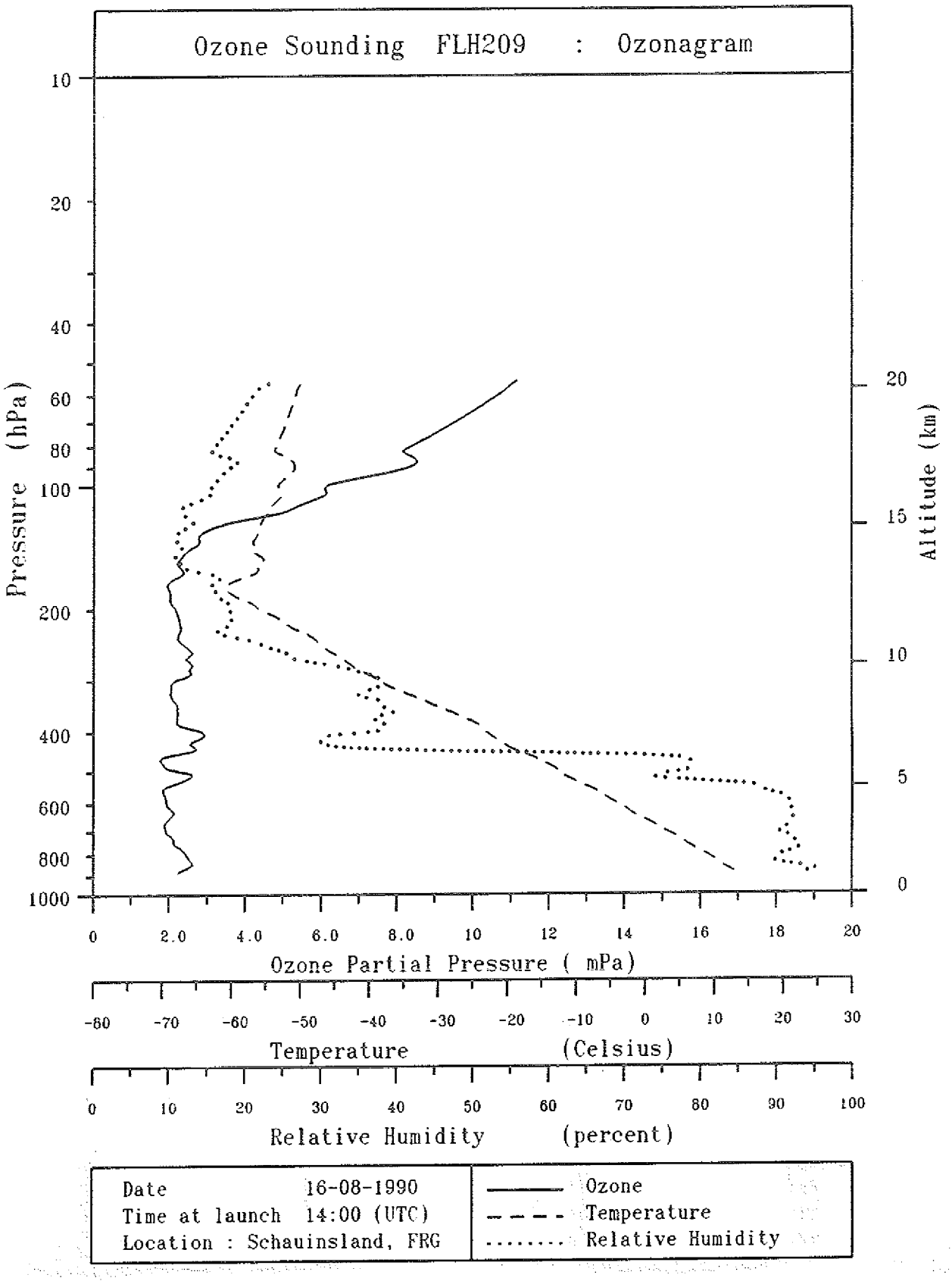

Ozone Sounding FLH207 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 16-08-1990
Time at launch 09:00 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

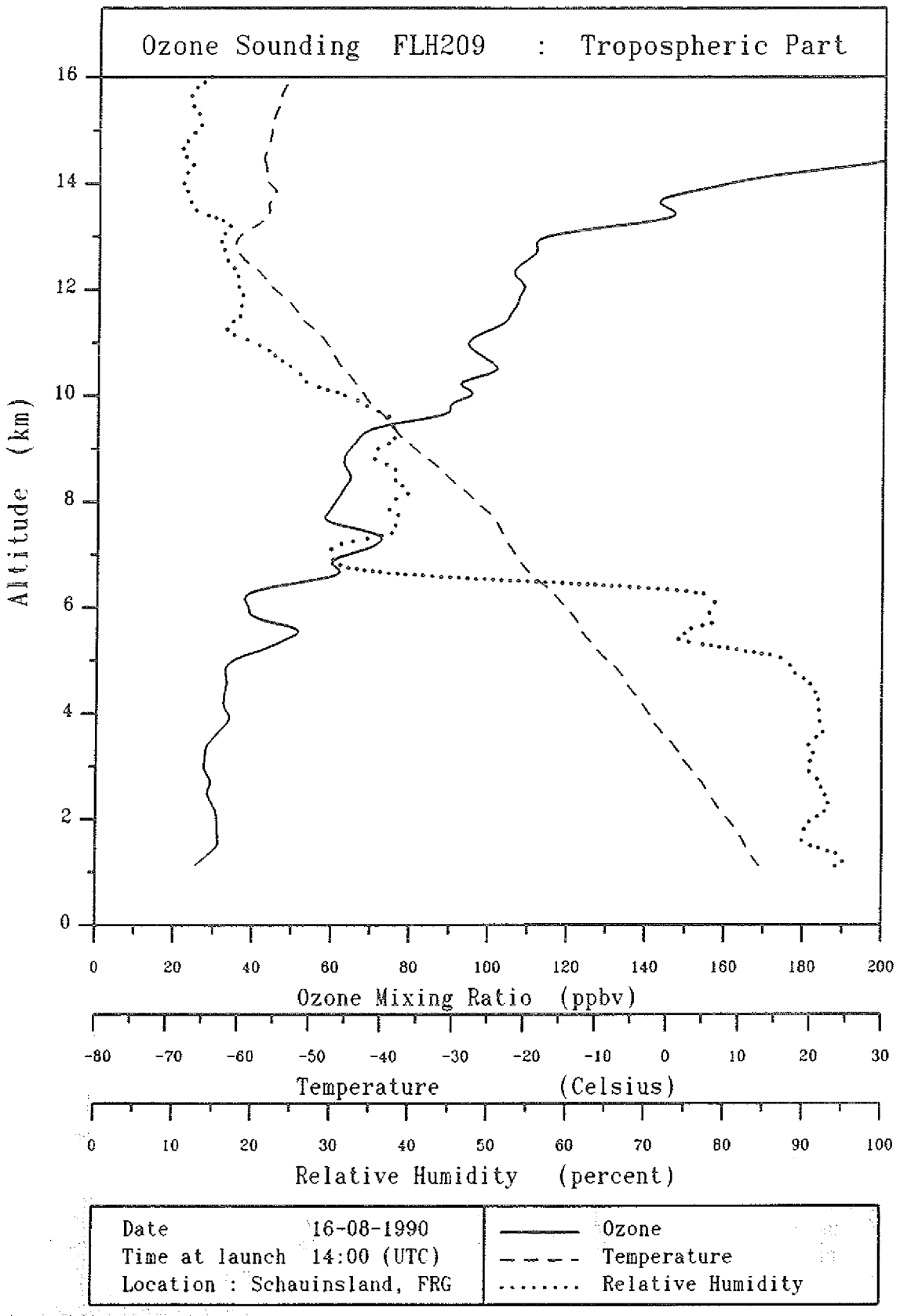

Ozone Sounding FLH207 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 16-08-1990
Time at launch 09:00 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

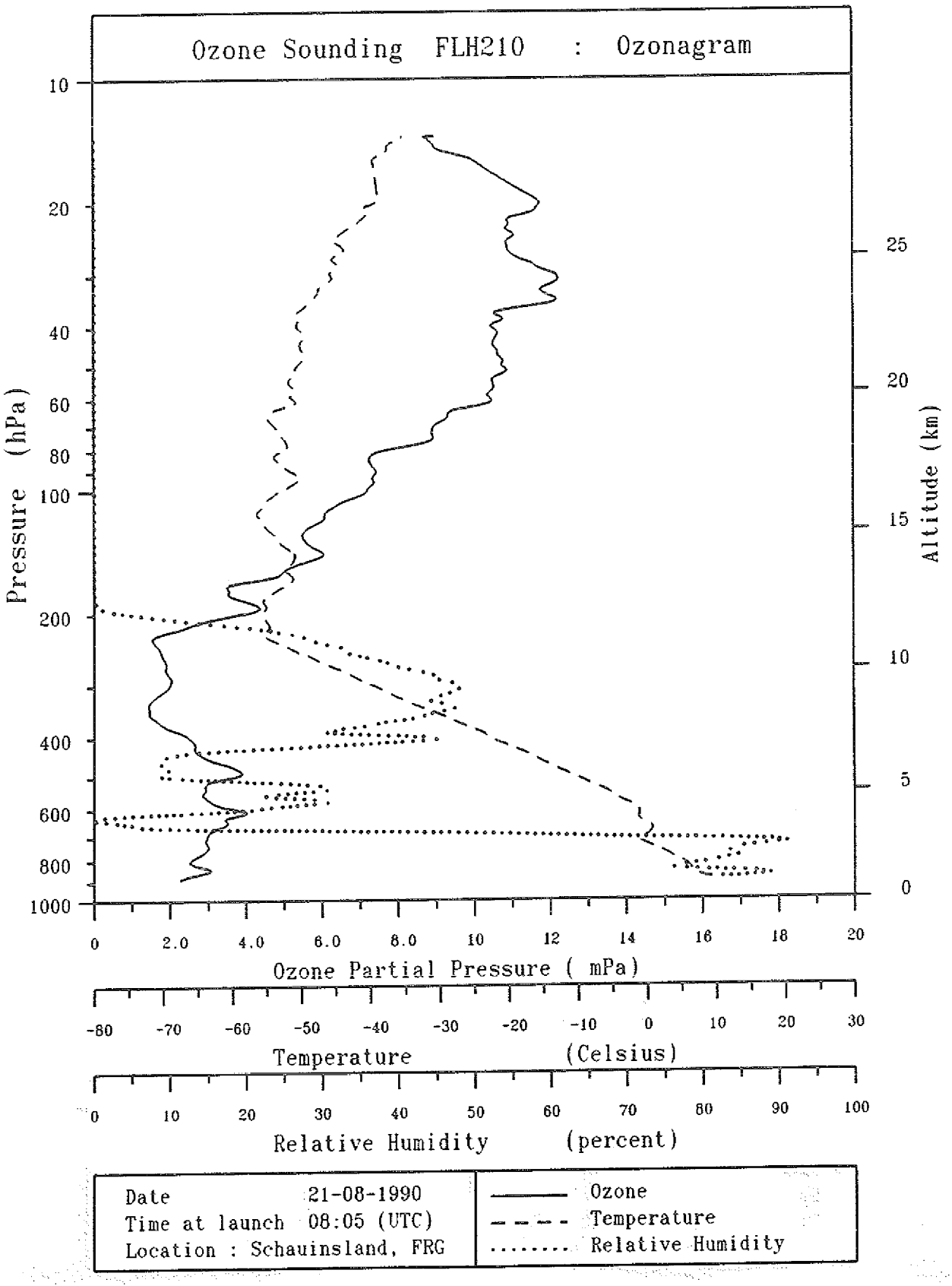


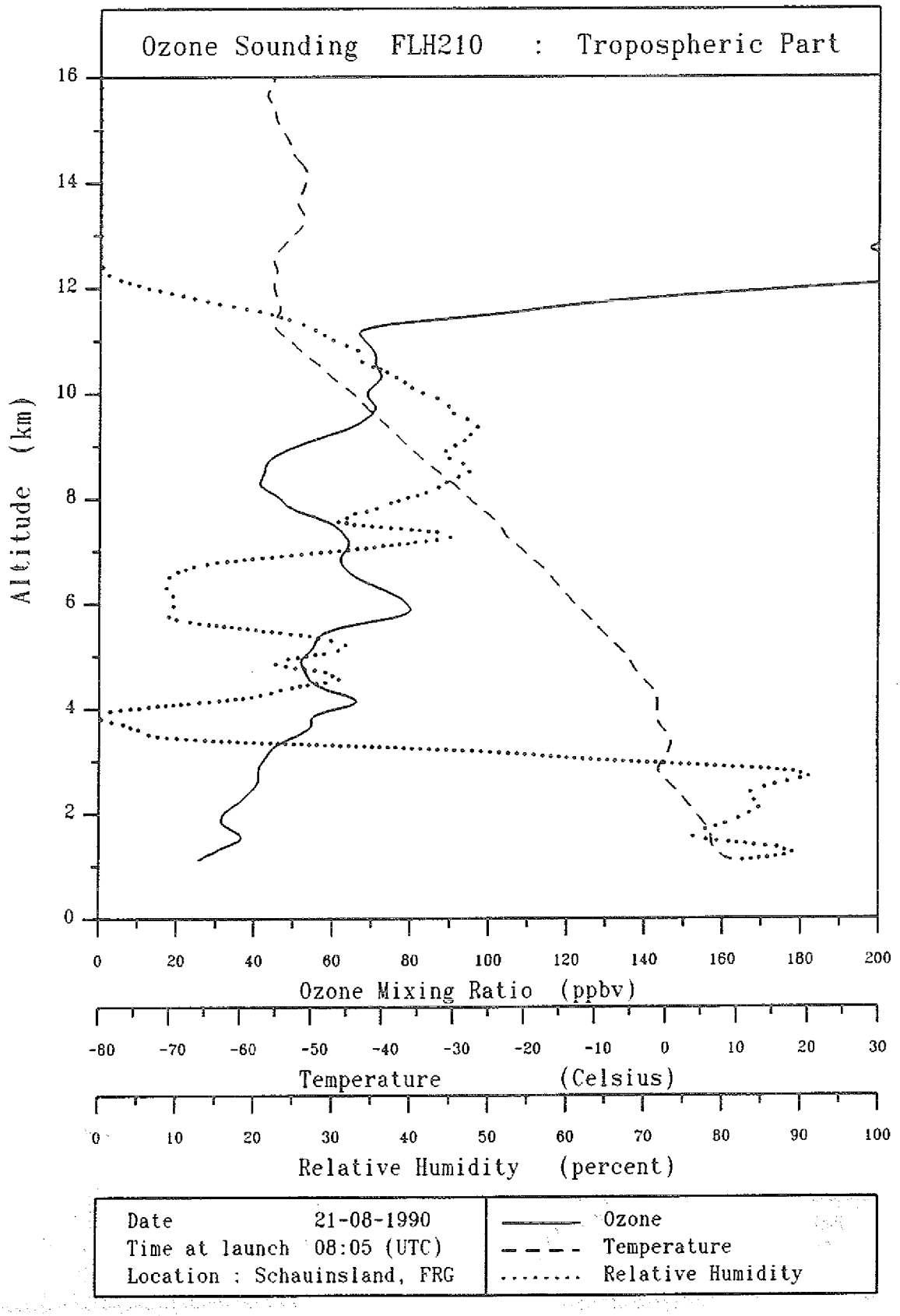
Date 16-08-1990	——— Ozone
Time at launch 11:25 (UTC)	- - - - Temperature
Location : Schauinsland, FRG	..... Relative Humidity

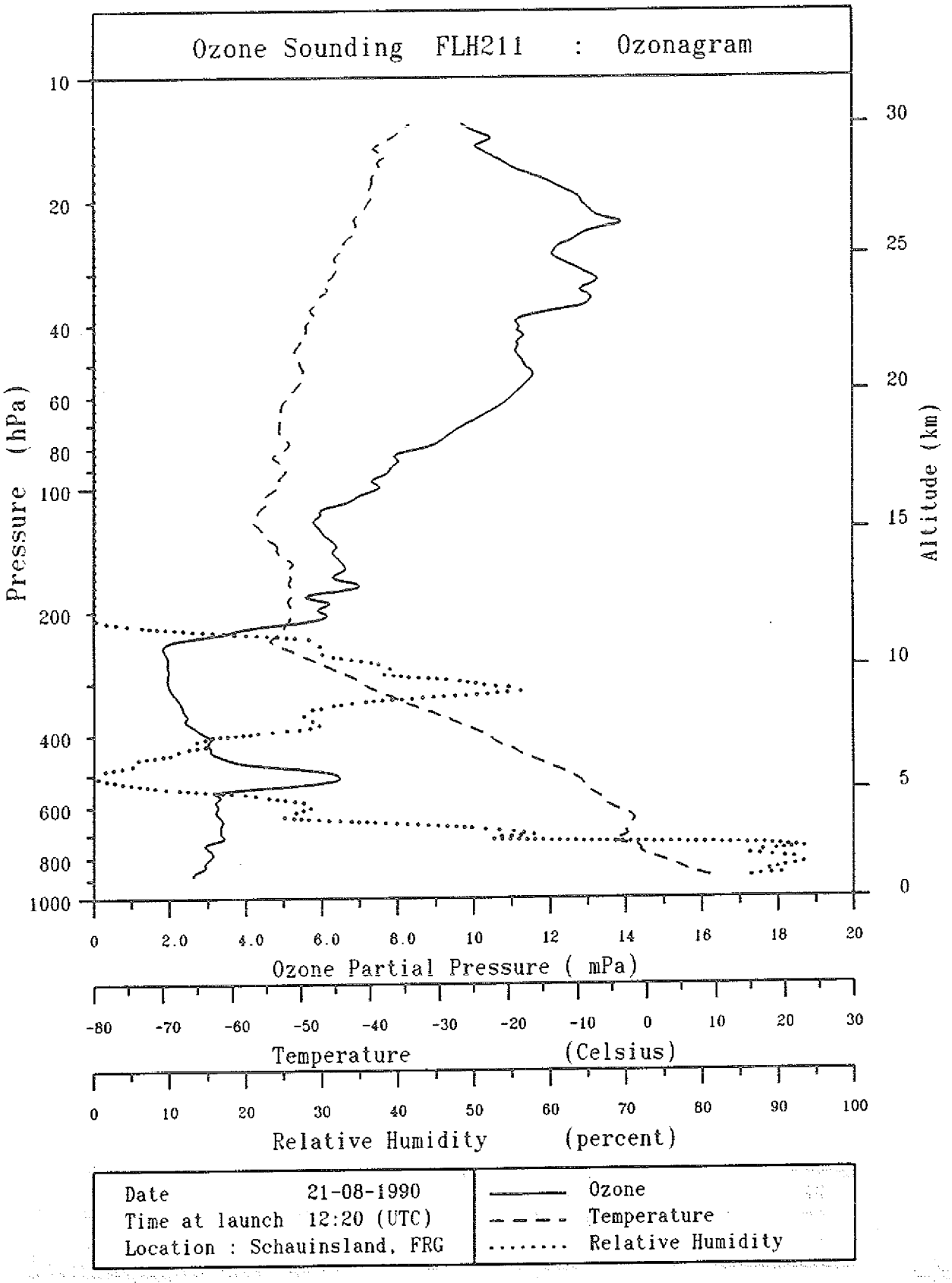

Ozone Sounding FLH208 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 16-08-1990
Time at launch 11:25 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

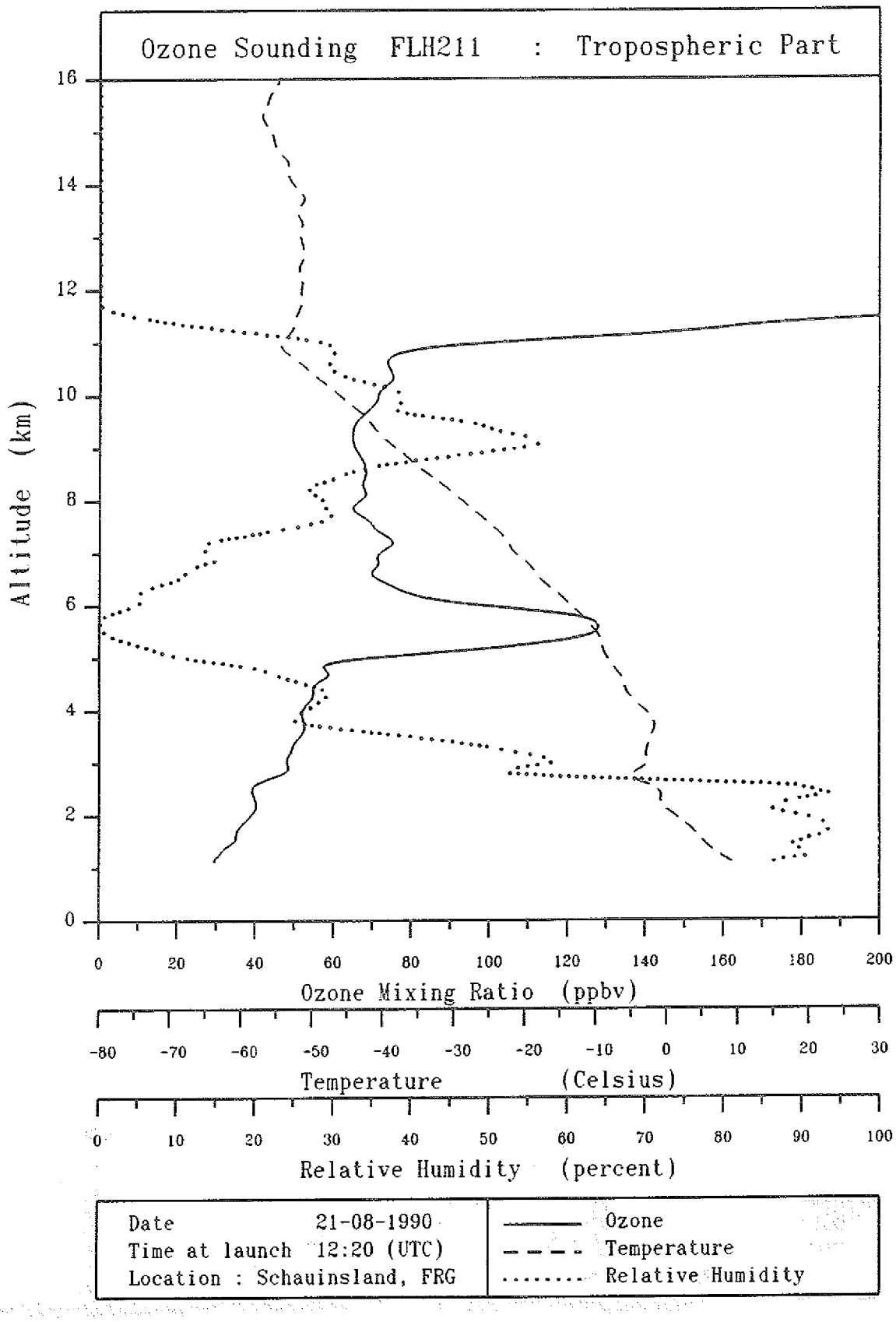

Ozone Sounding FLH209 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 16-08-1990
Time at launch 14:00 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

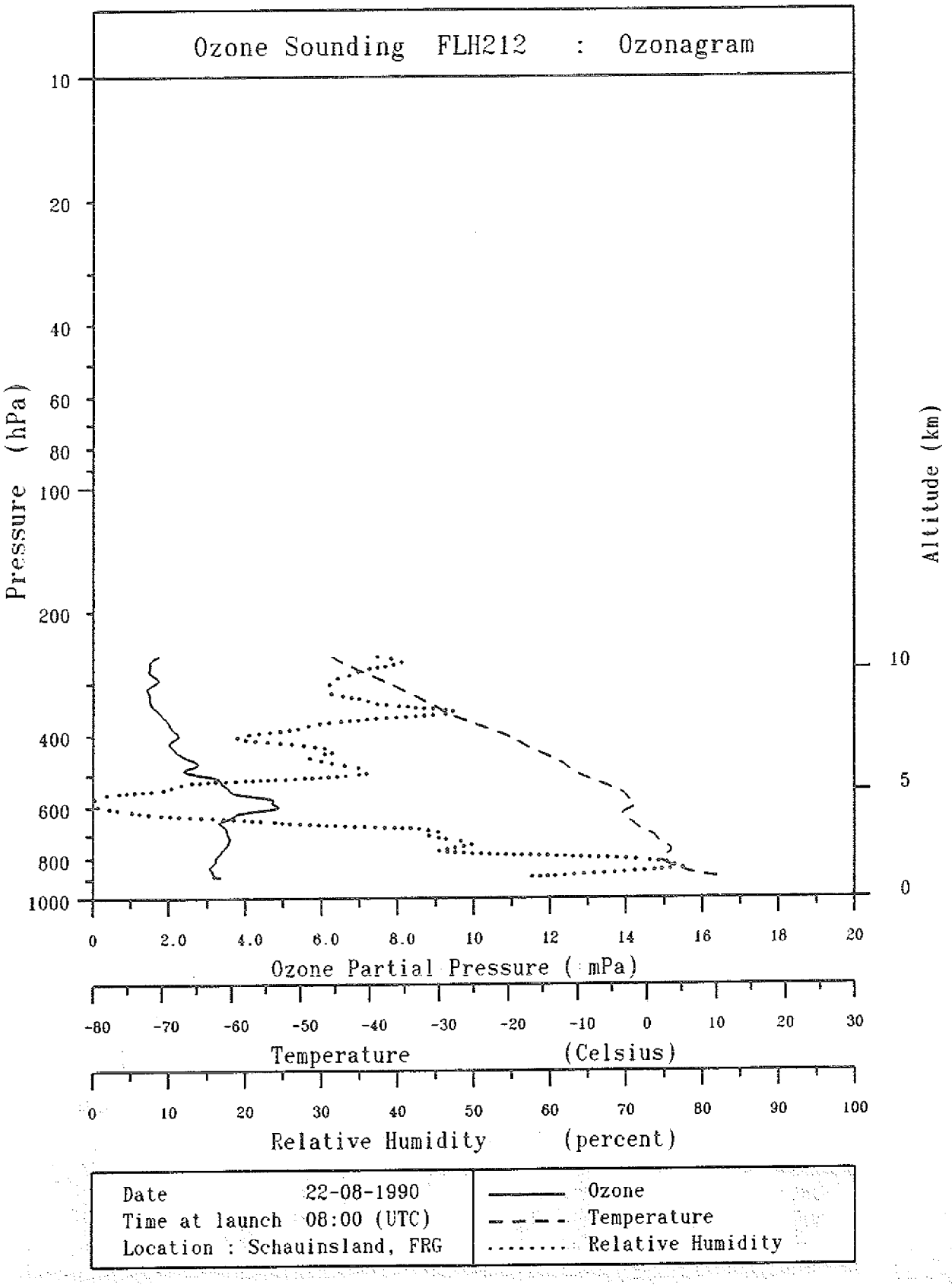

Ozone Sounding FLH209 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 16-08-1990
Time at launch 14:00 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH210 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 21-08-1990
Time at launch 08:05 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

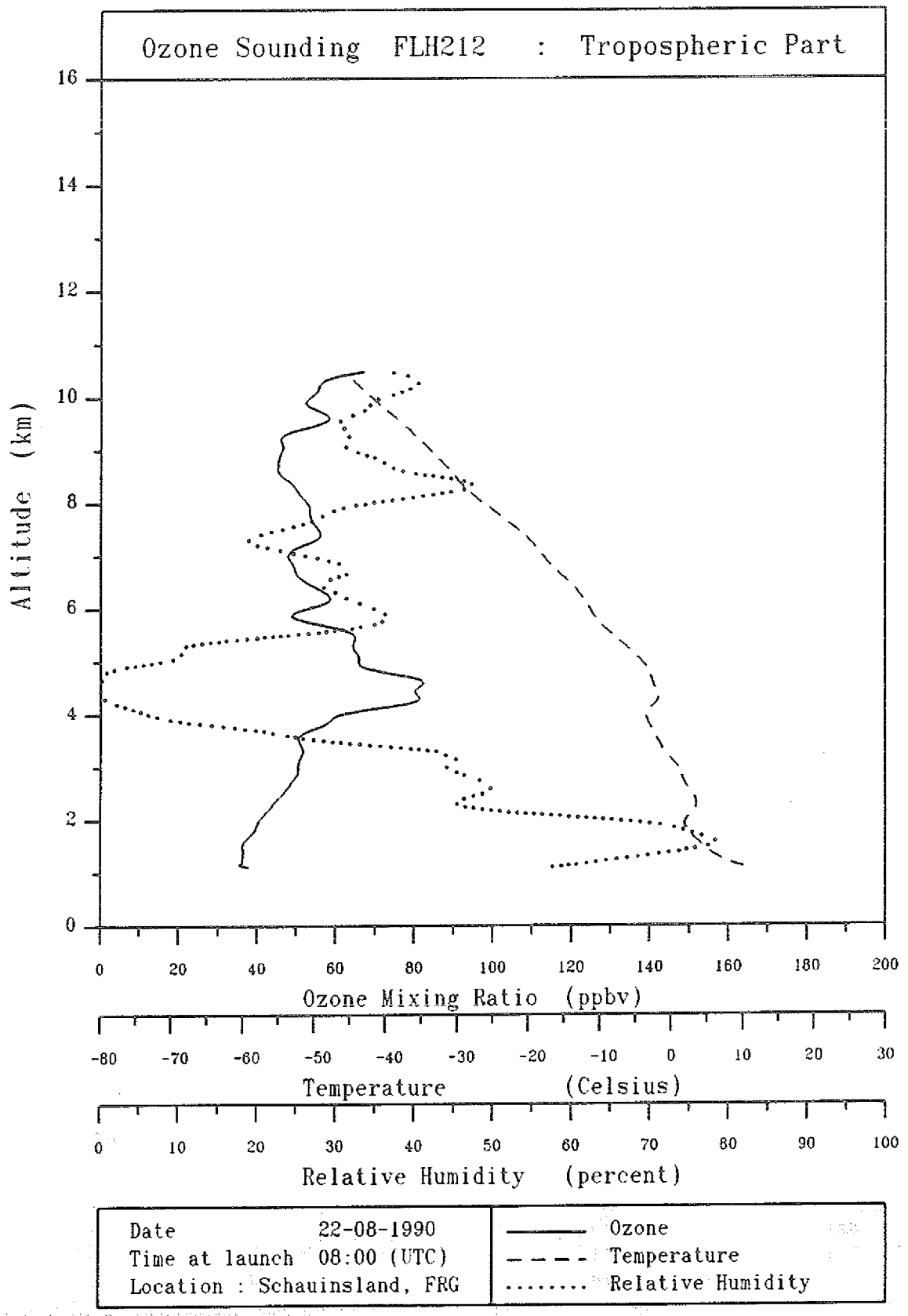

Ozone Sounding FLH210 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 21-08-1990
Time at launch 08:05 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

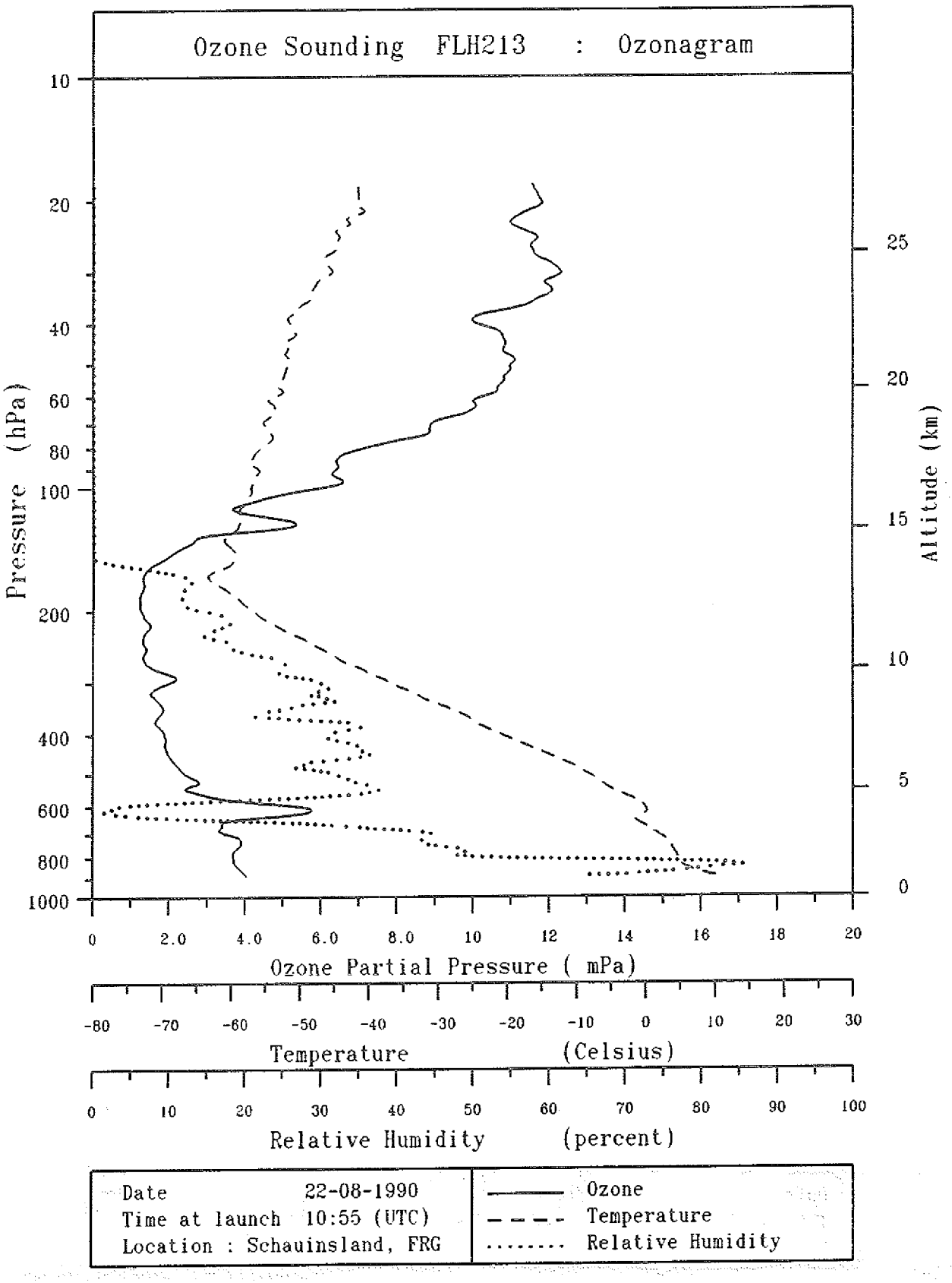

Ozone Sounding FLH211 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
30
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 21-08-1990
Time at launch 12:20 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

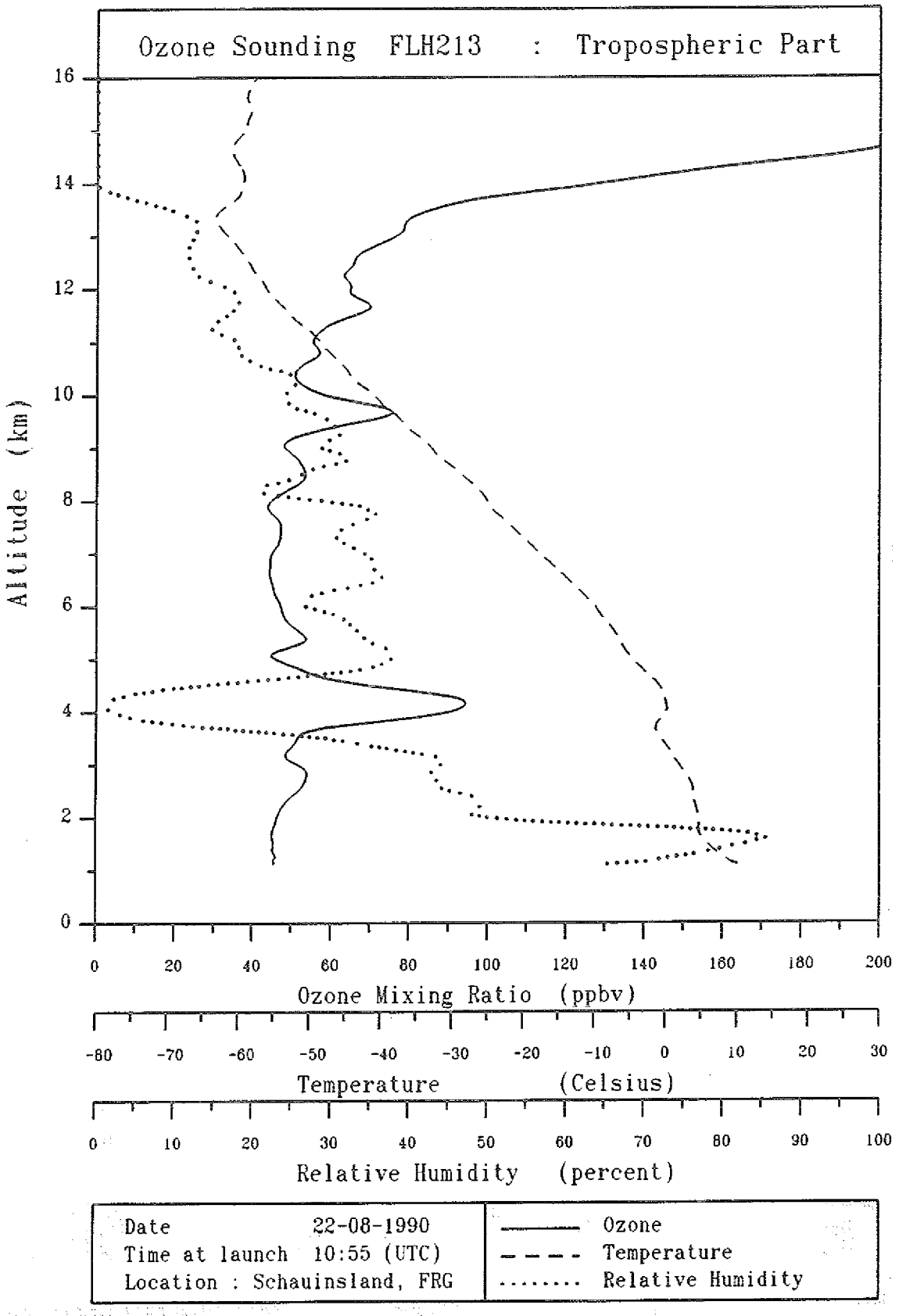

Ozone Sounding FLH211 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 21-08-1990
Time at launch 12:20 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

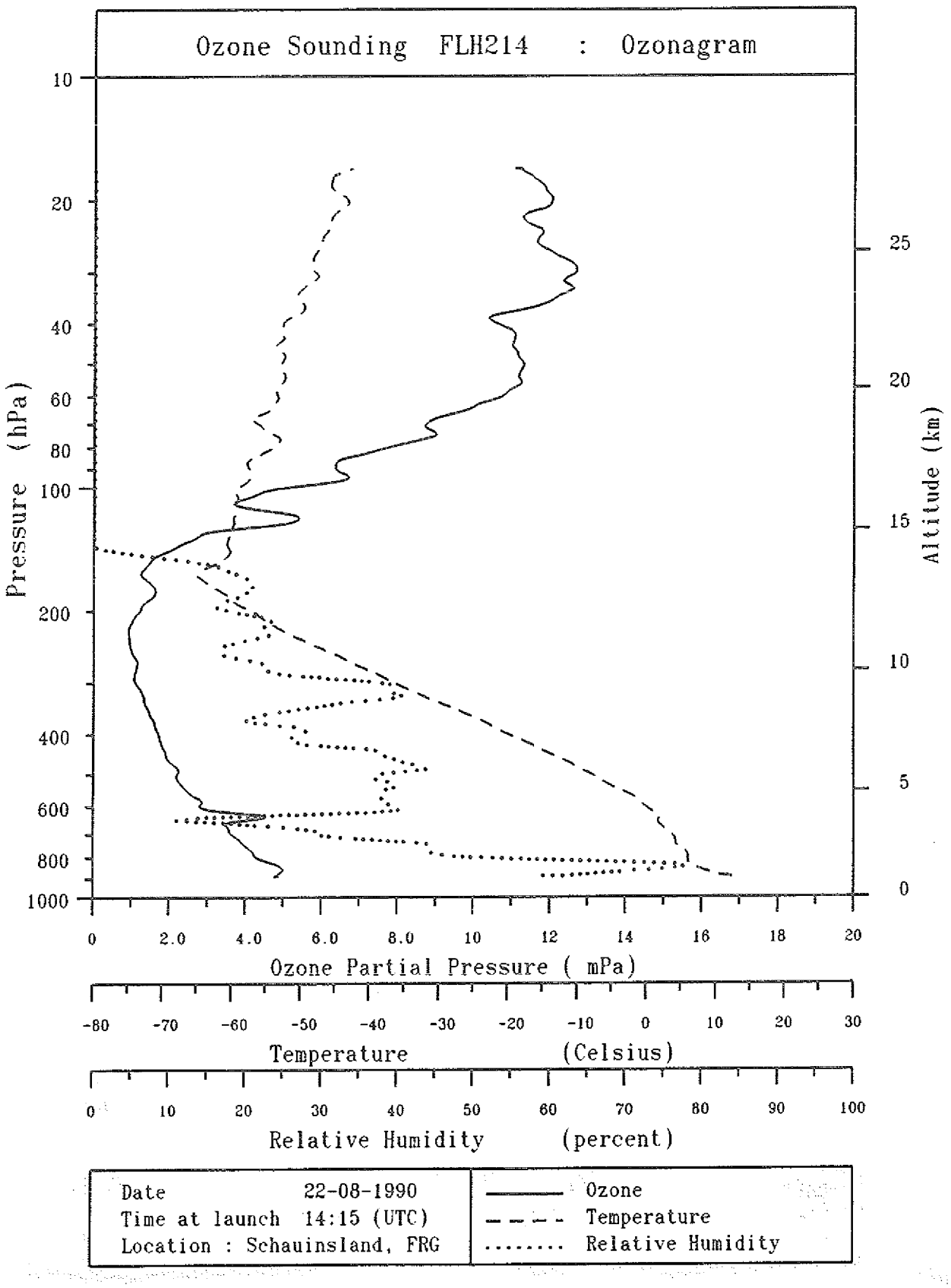


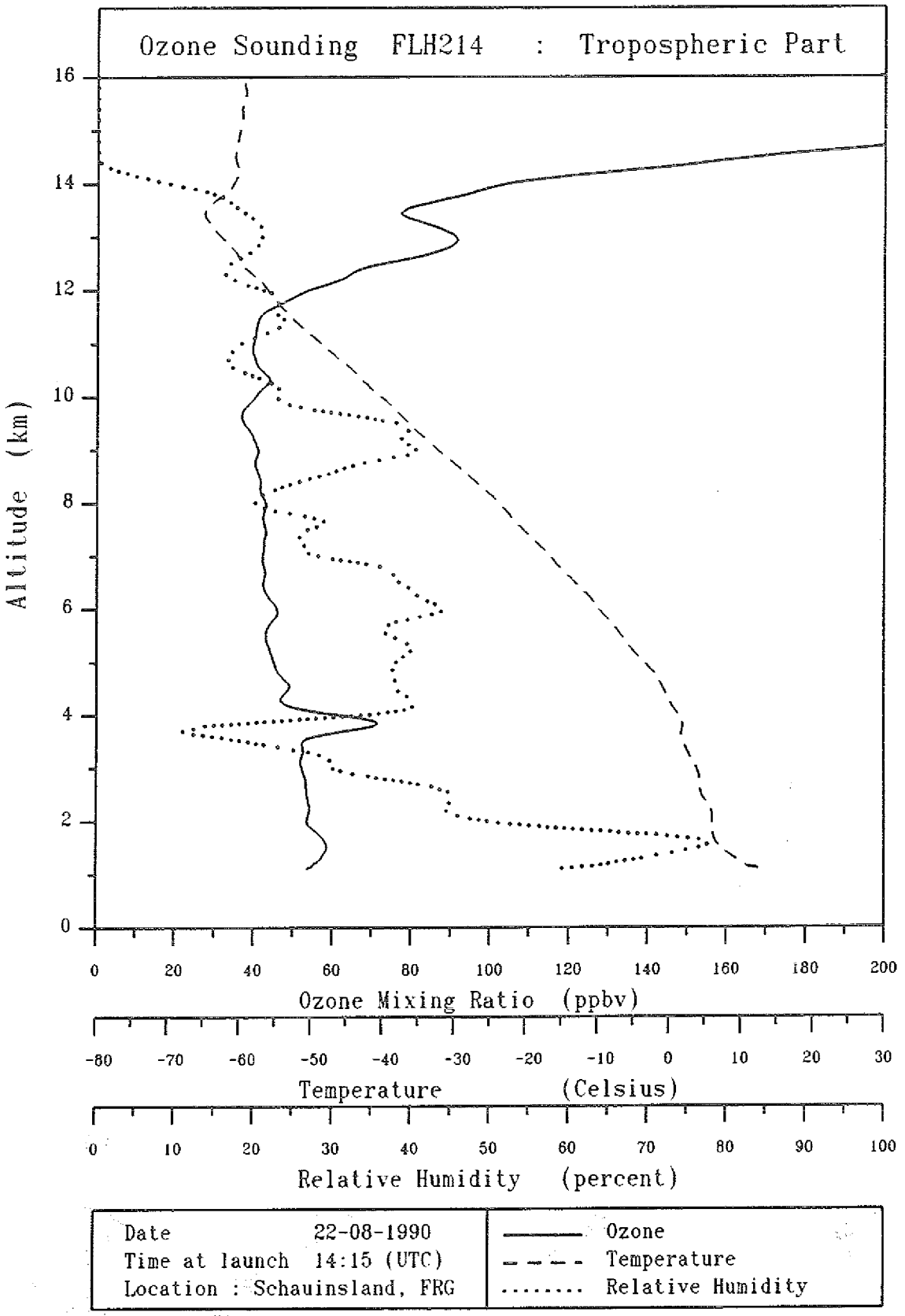
Date 22-08-1990	——— Ozone
Time at launch 08:00 (UTC)	- - - - Temperature
Location : Schauinsland, FRG	..... Relative Humidity

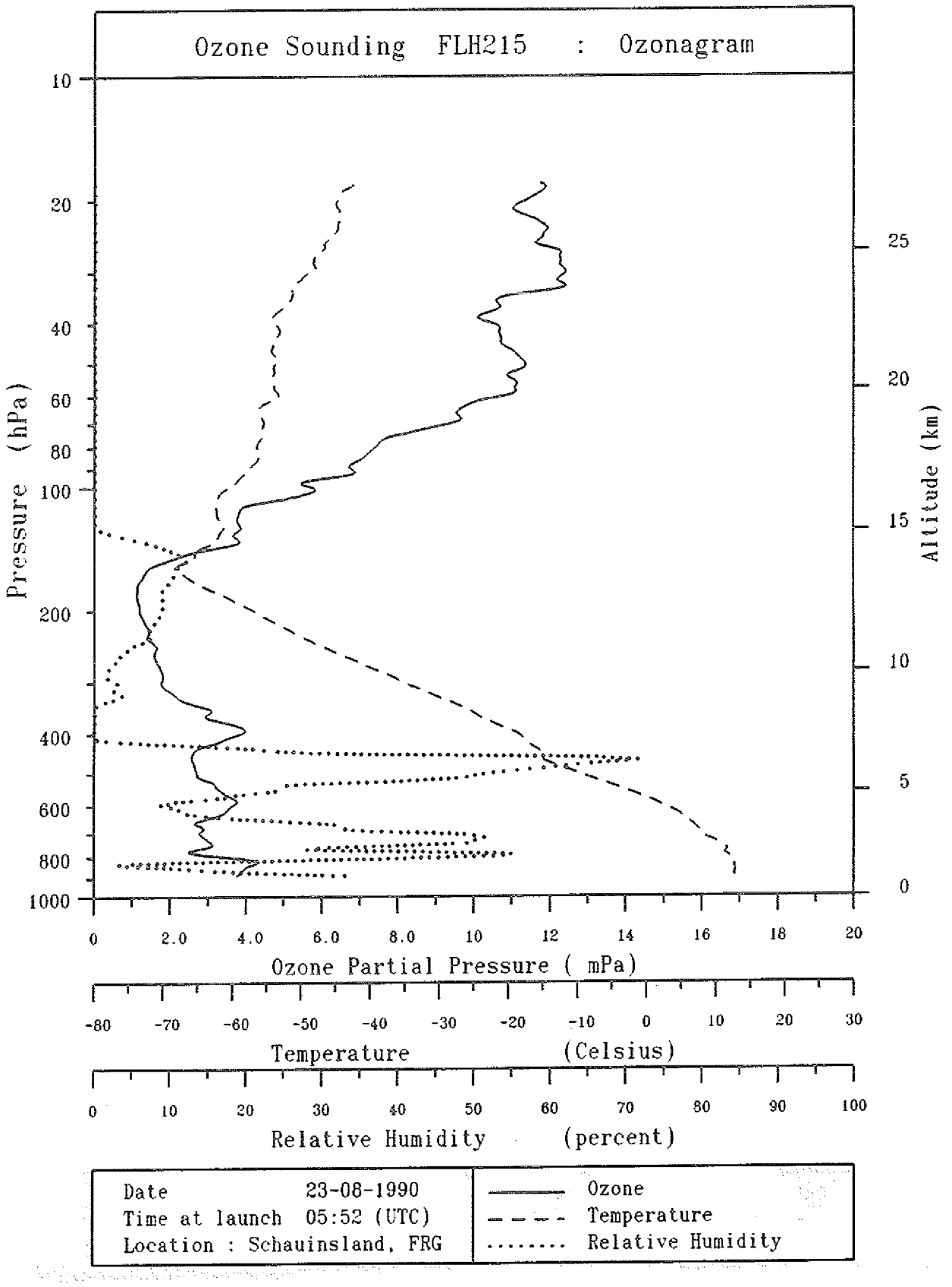

Ozone Sounding FLH212 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 22-08-1990
Time at launch 08:00 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

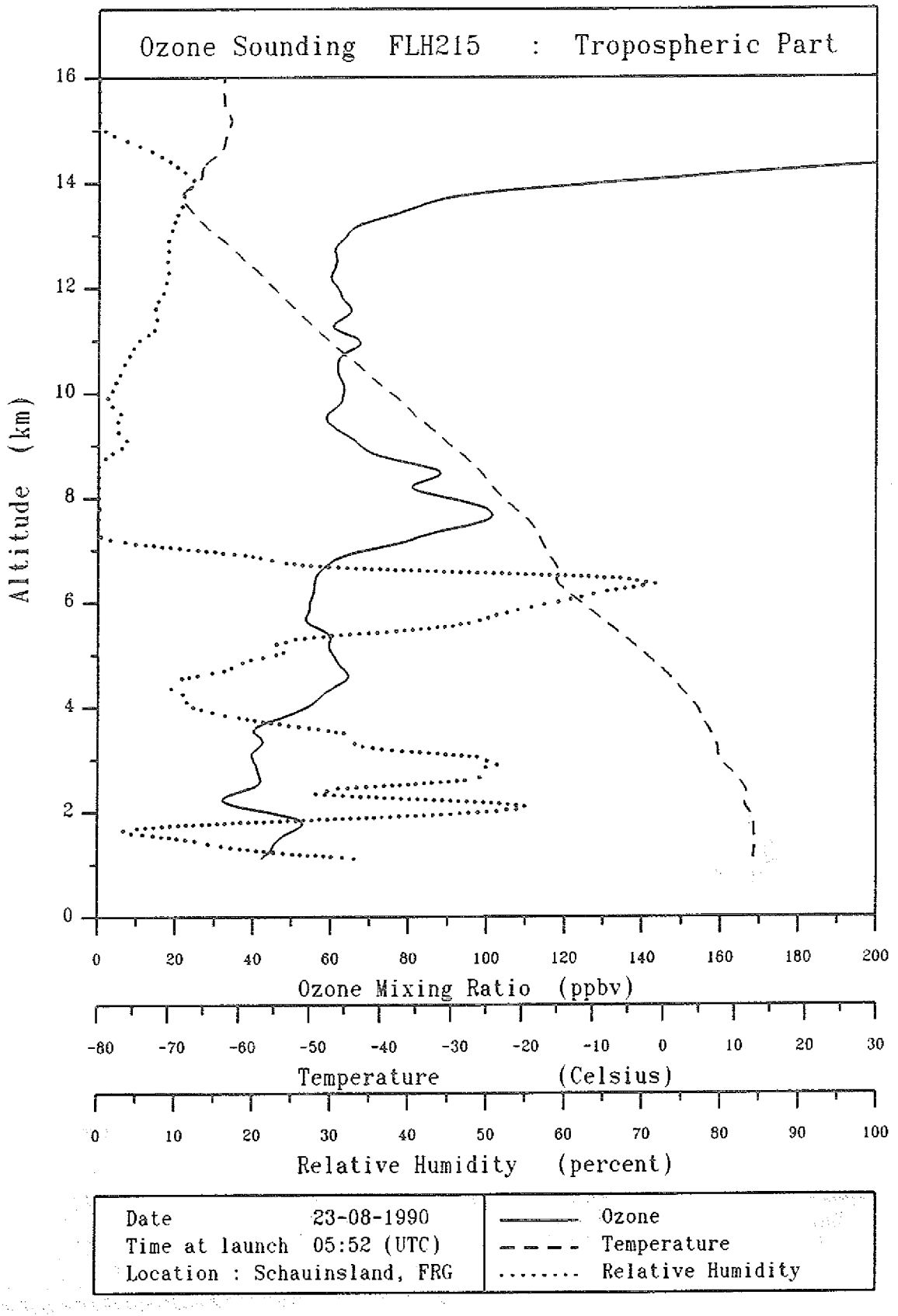

Ozone Sounding FLH213 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 22-08-1990
Time at launch 10:55 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

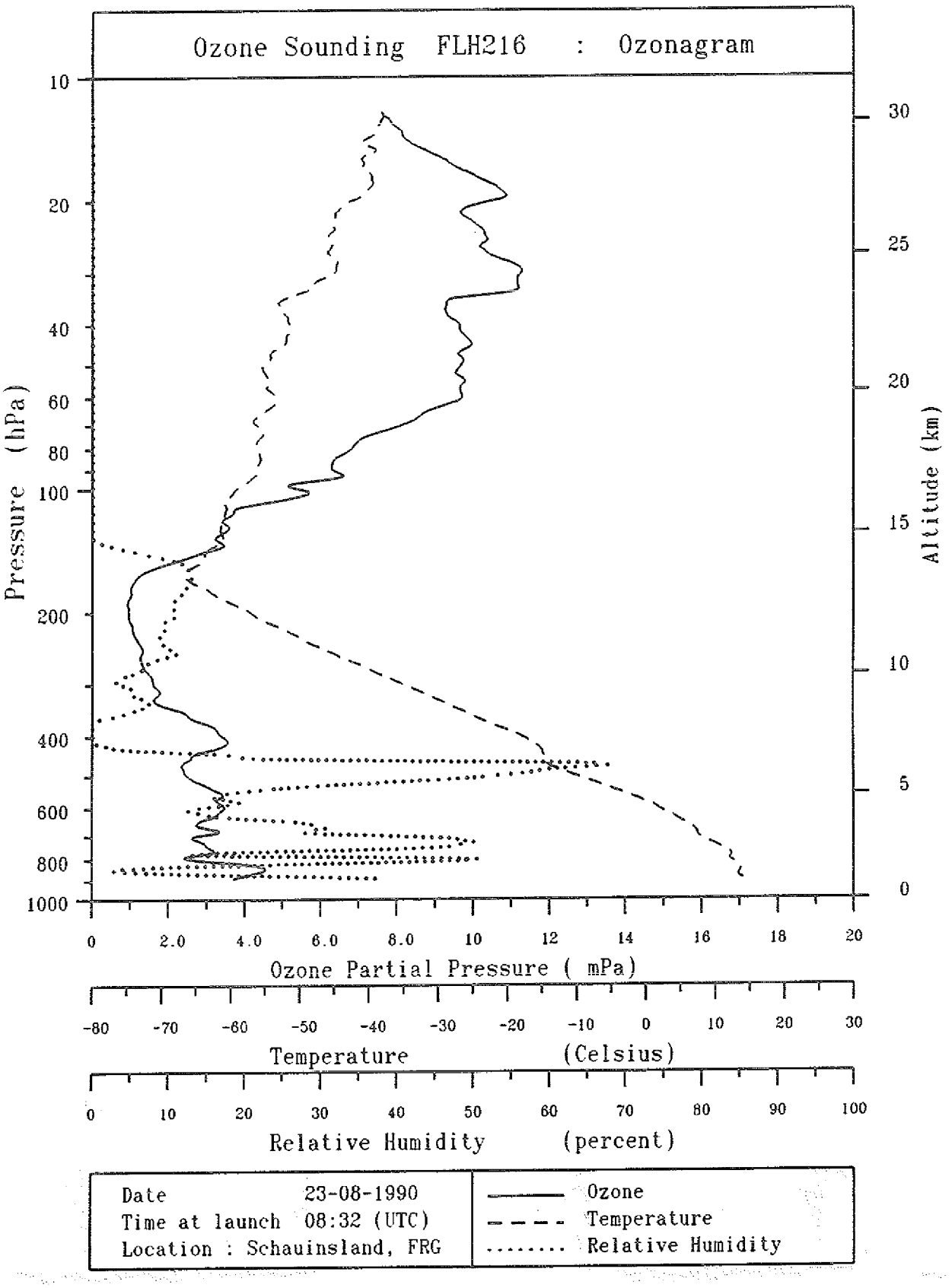

Ozone Sounding FLH213 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 22-08-1990
Time at launch 10:55 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

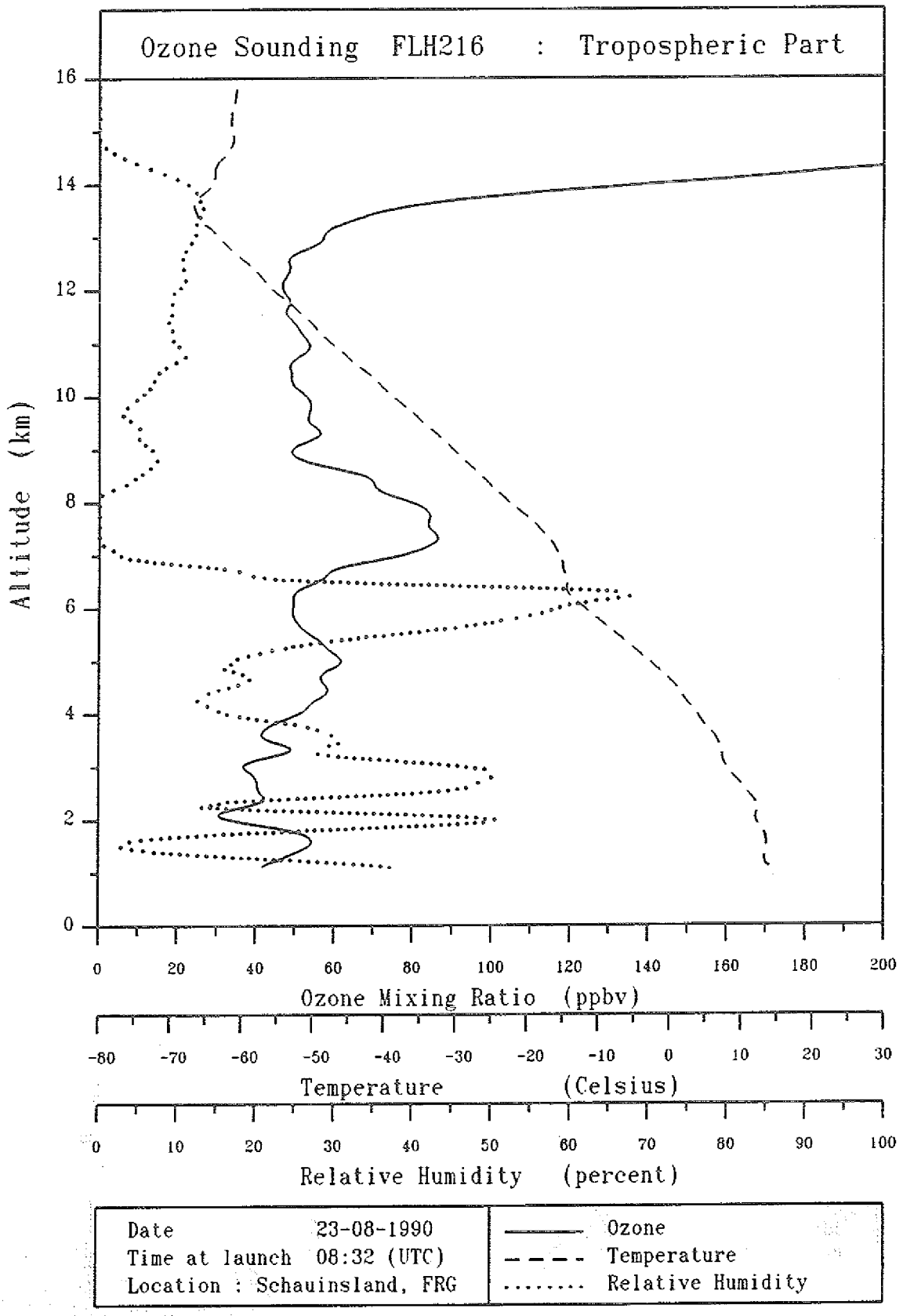

Ozone Sounding FLH214 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 22-08-1990
Time at launch 14:15 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

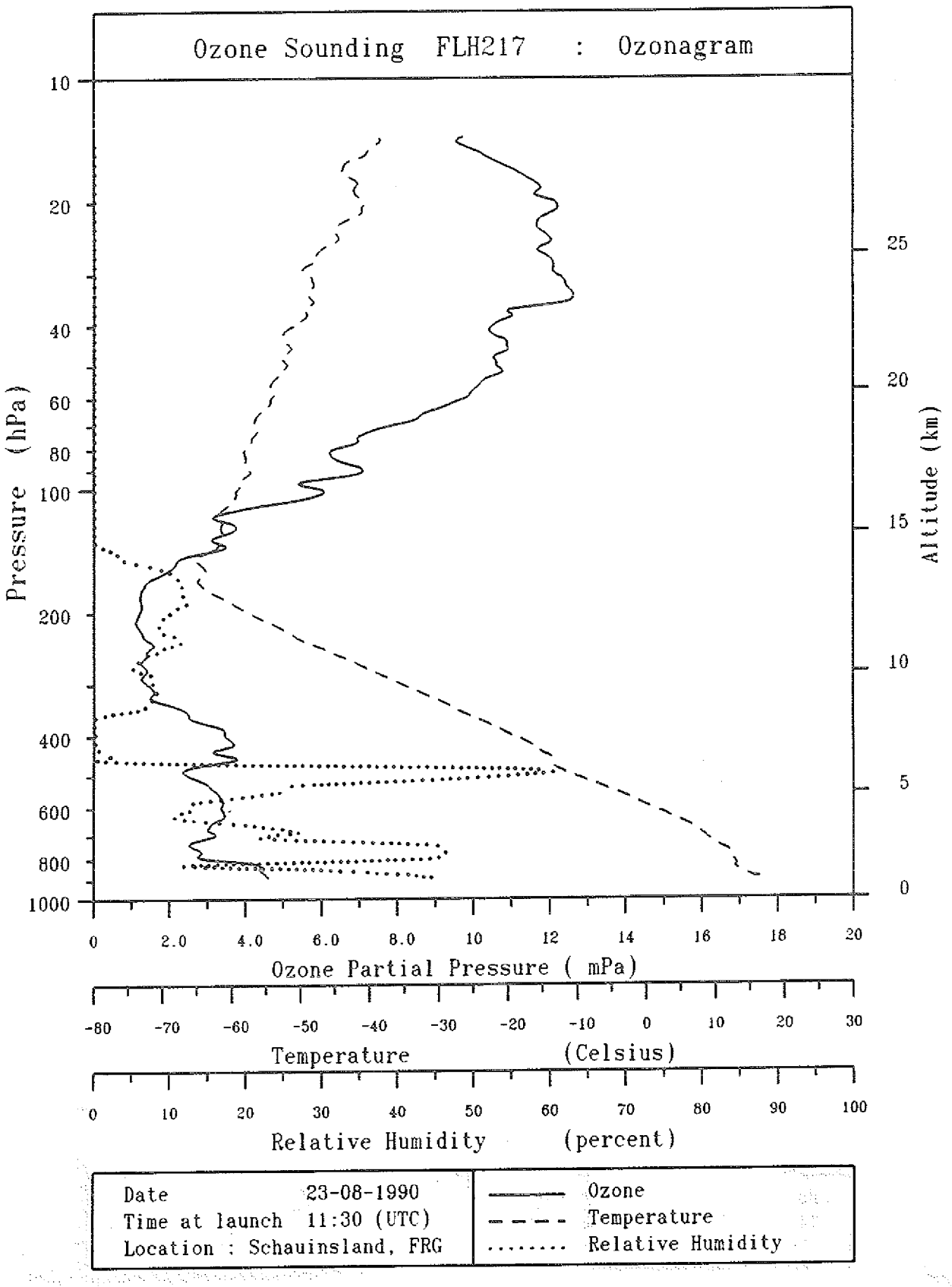

Ozone Sounding FLH214 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 22-08-1990
Time at launch 14:15 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

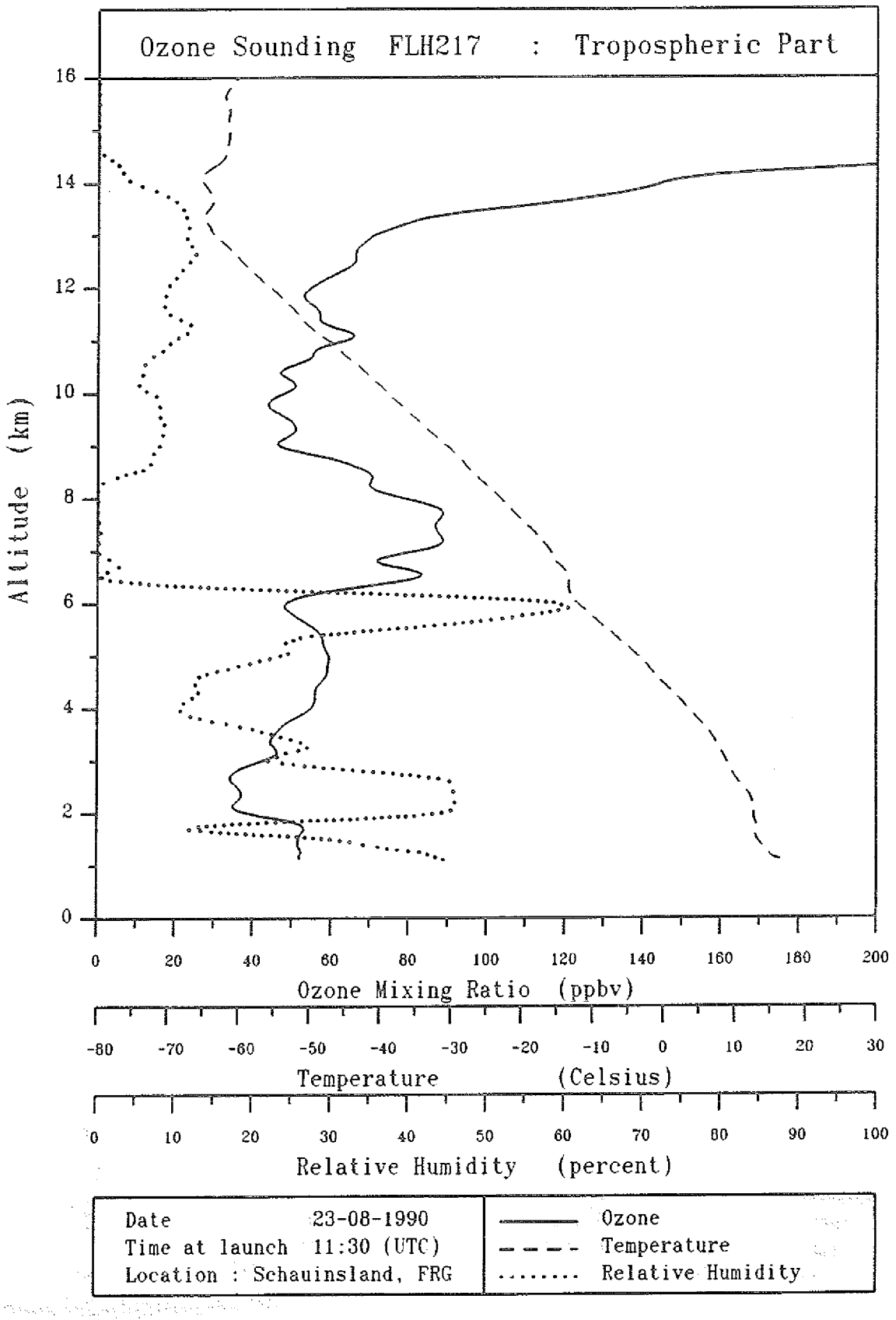

Ozone Sounding FLH215 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 23-08-1990
Time at launch 05:52 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

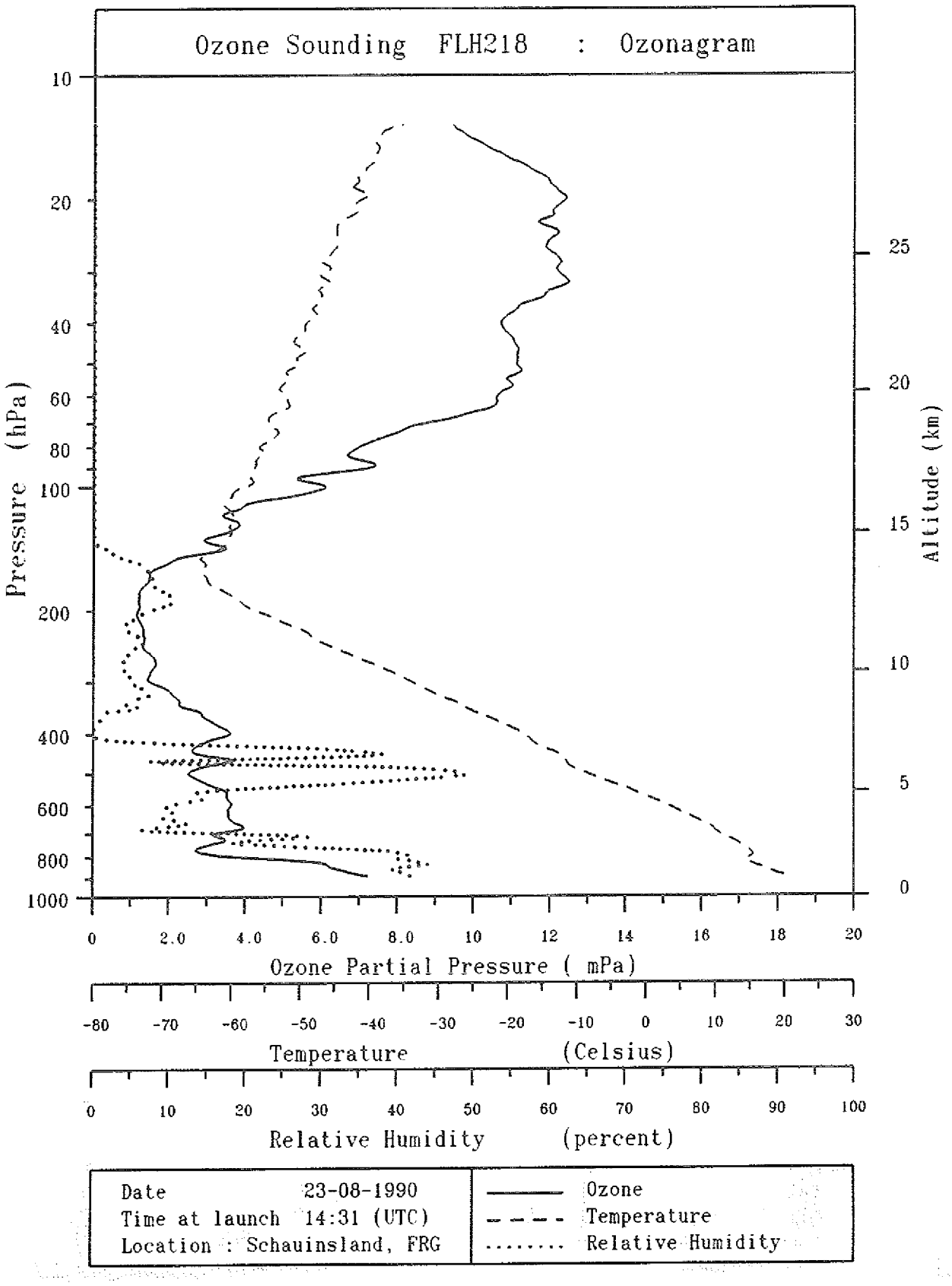

Ozone Sounding FLH215 : Tropospheric Part
Altitude (km)
16
14
12
10
8
6
4
2
0
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 23-08-1990
Time at launch 05:52 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

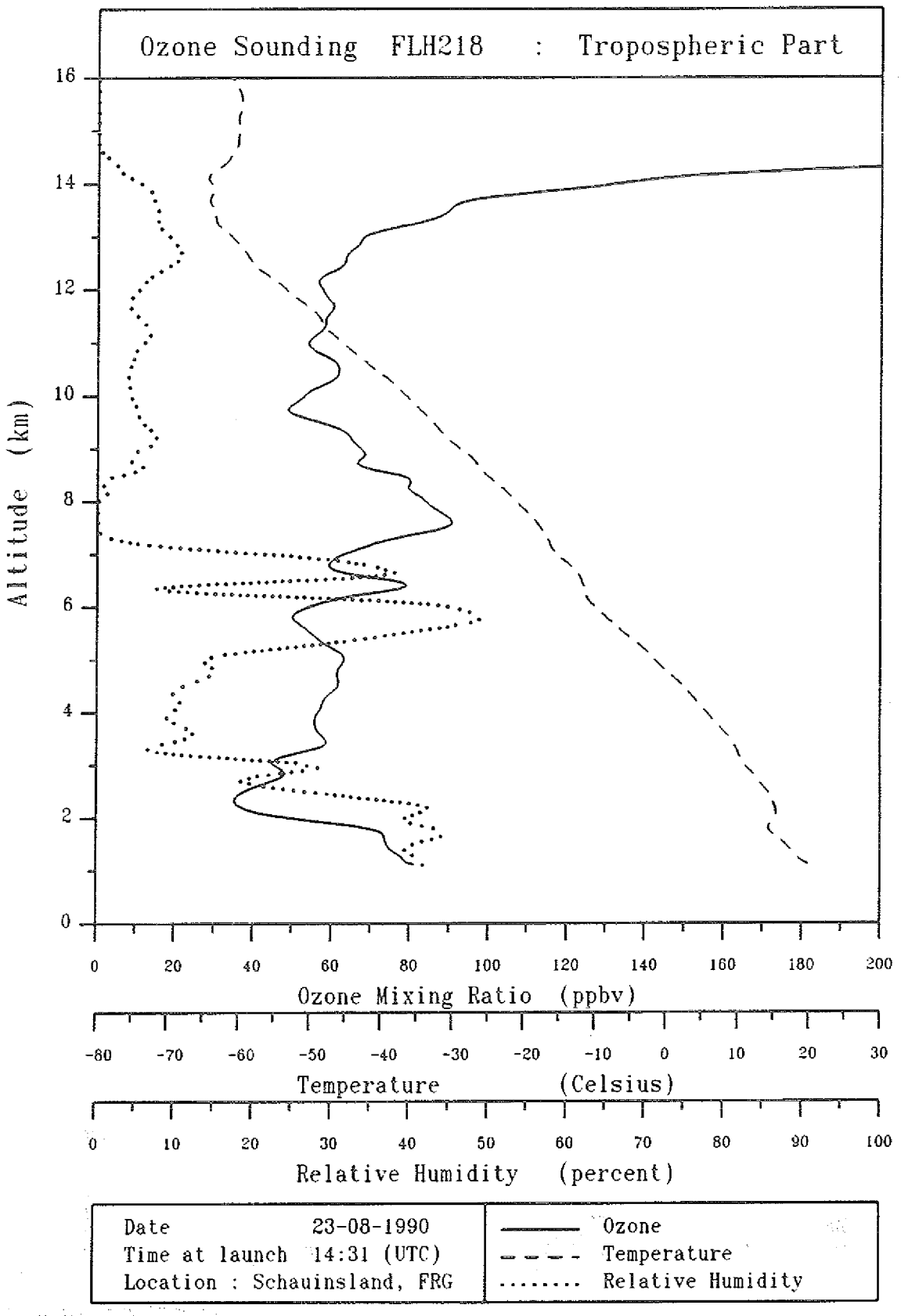

Ozone Sounding FLH216 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
30
25
20
15
10
5
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 23-08-1990
Time at launch 08:32 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

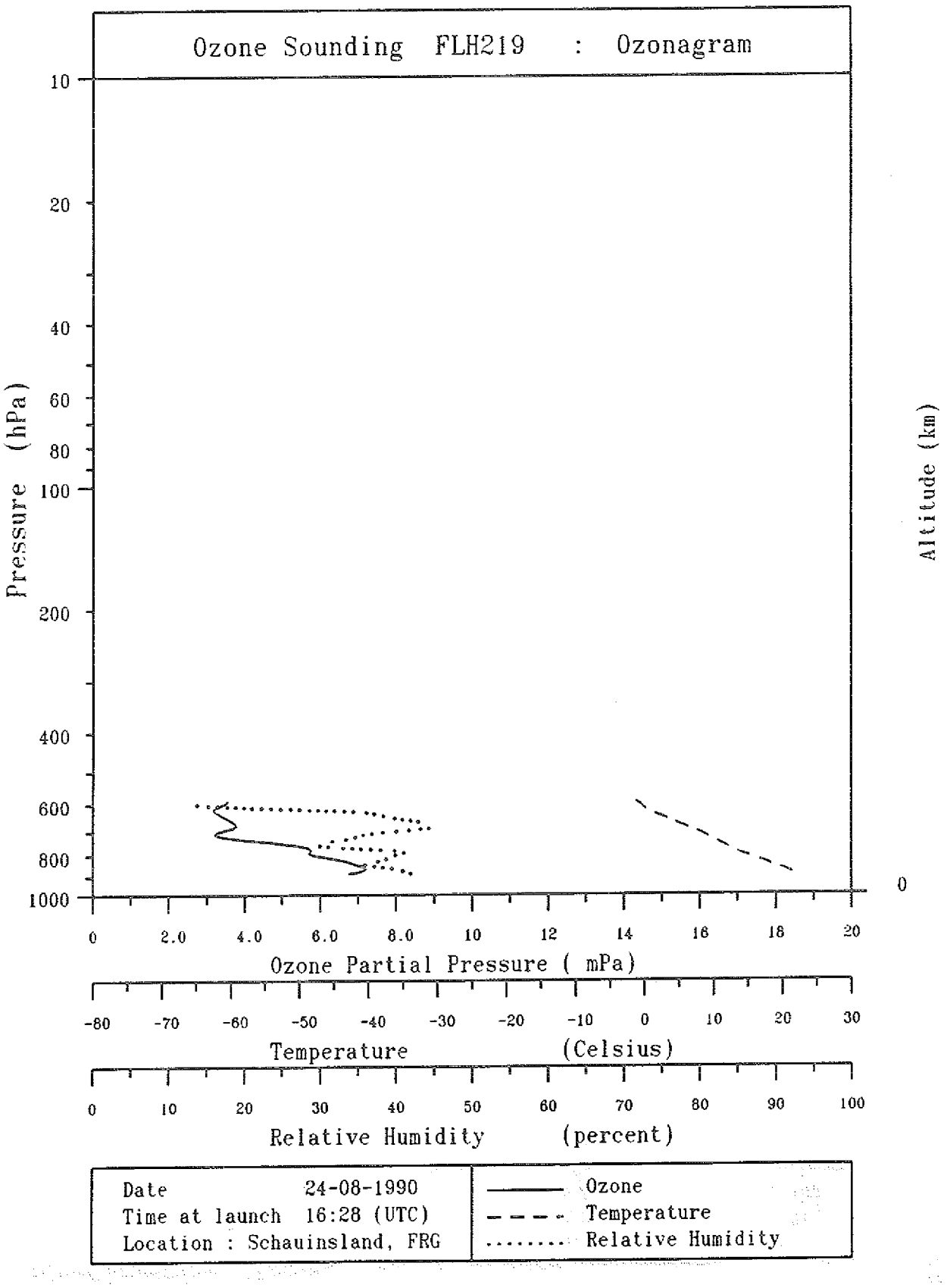

Ozone Sounding FLH216 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 23-08-1990
Time at launch 08:32 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

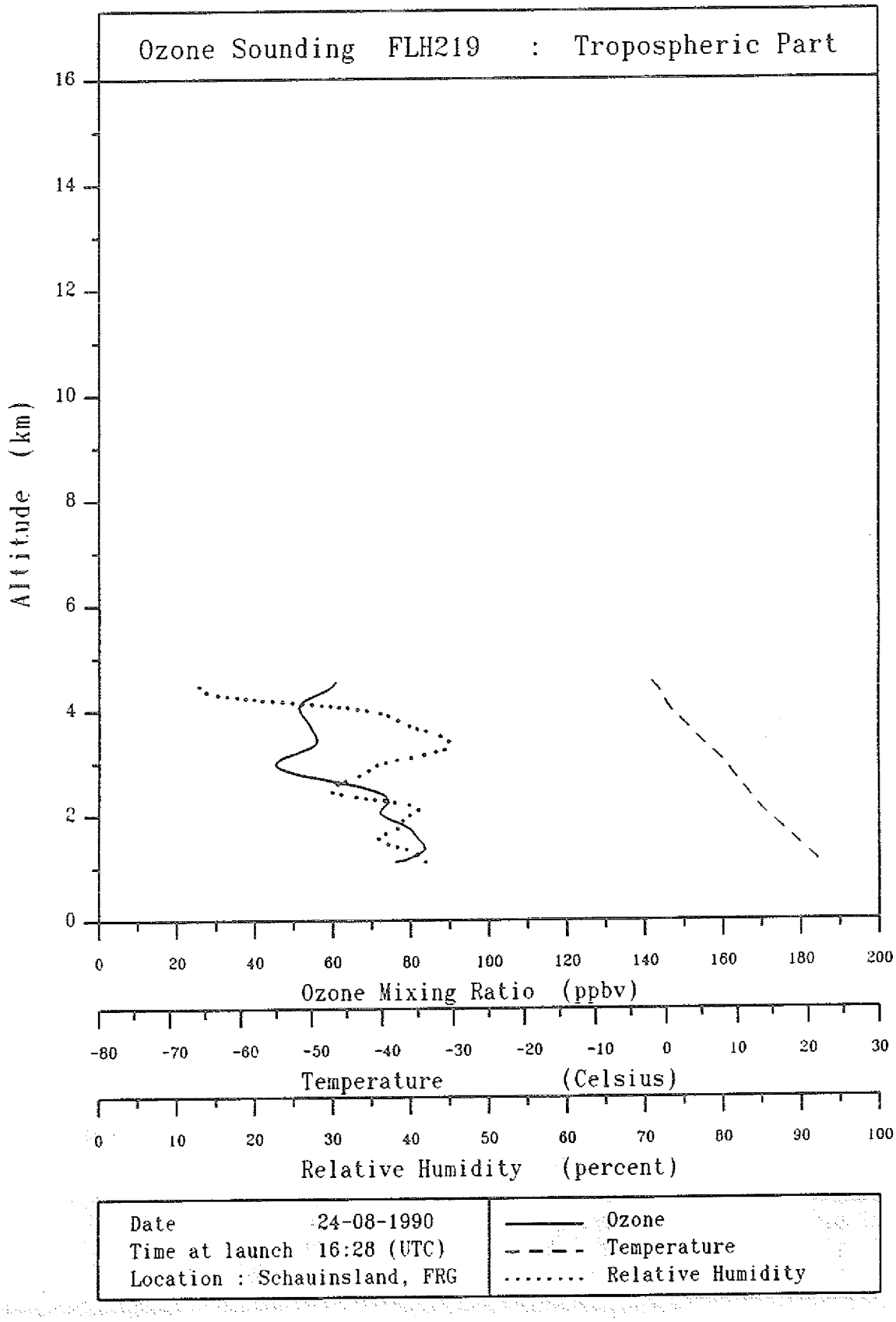

Ozone Sounding FLH217 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 23-08-1990
Time at launch 11:30 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

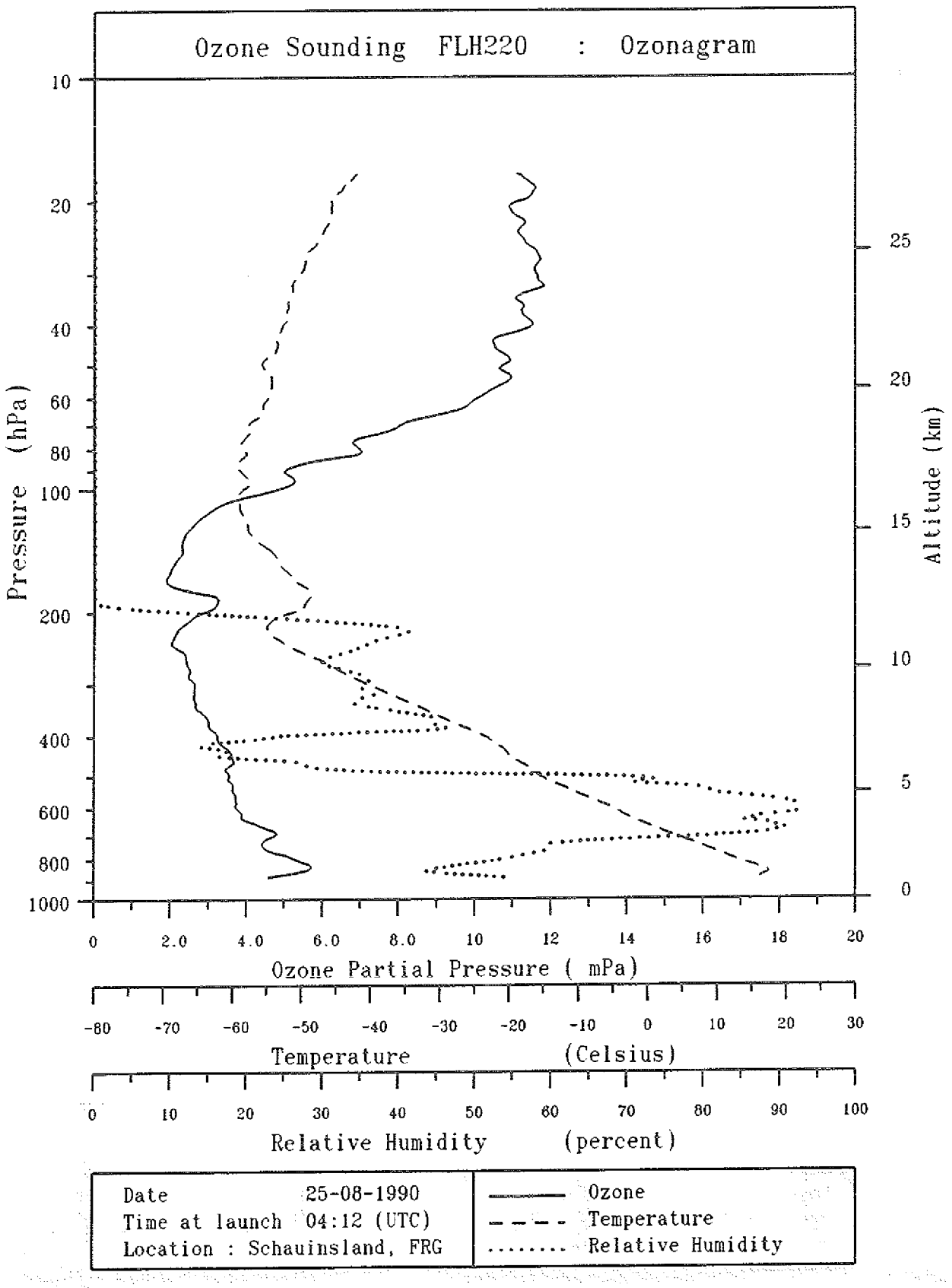

Ozone Sounding FLH217 : Tropospheric Part
Altitude (km)
16
14
12
10
8
6
4
2
0
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 23-08-1990
Time at launch 11:30 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

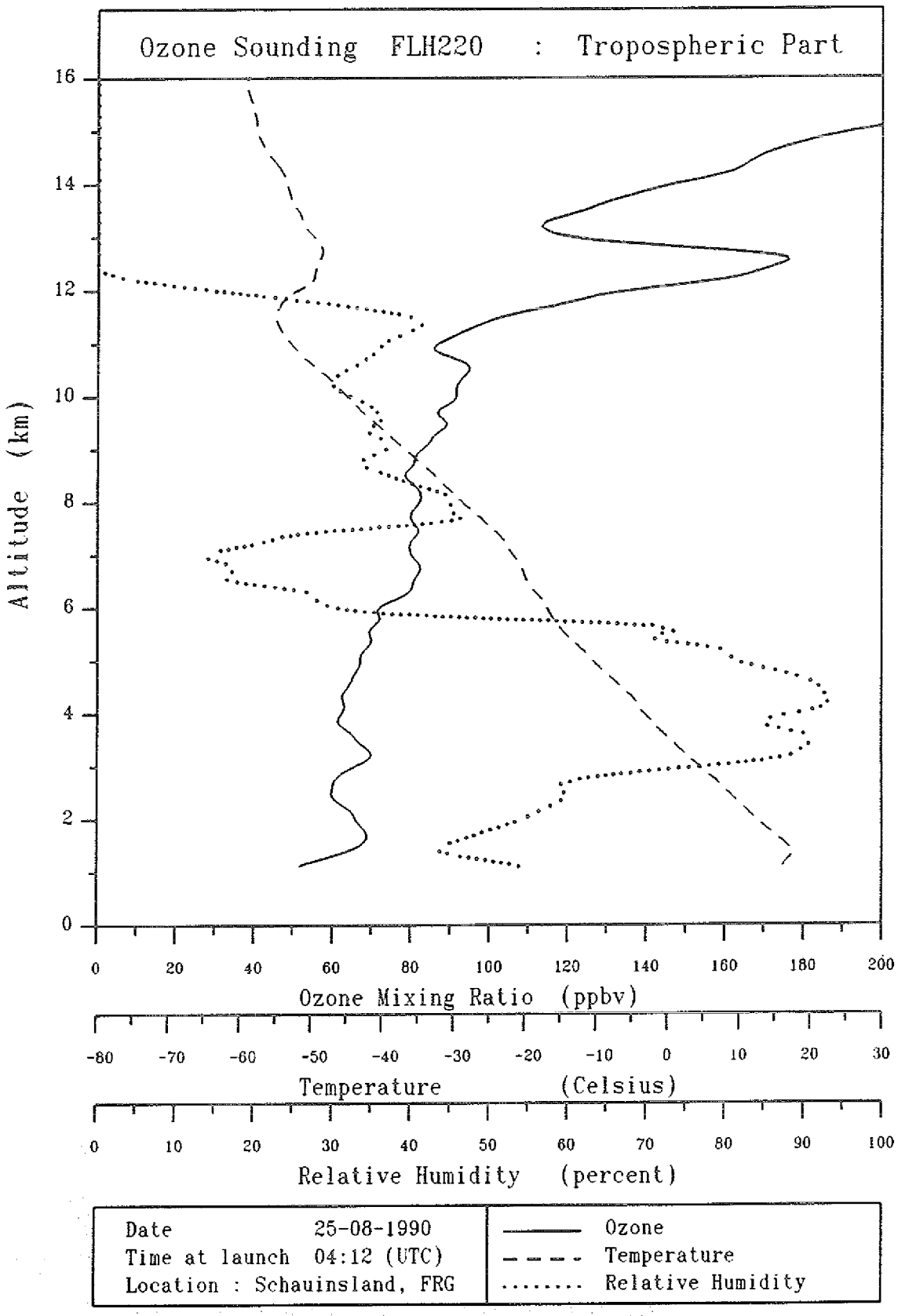

Ozone Sounding FLH218 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 23-08-1990
Time at launch 14:31 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH218 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 23-08-1990
Time at launch 14:31 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH219 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
0
0 2.0 4.0 6.0 8.0 10 12 14 16 18 20
Ozone Partial Pressure (mPa)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 24-08-1990
Time at launch 16:28 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH219 : Tropospheric Part
Altitude (km)
16
14
12
10
8
6
4
2
0
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 24-08-1990
Time at launch 16:28 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH220 : Ozonagram
Pressure (hPa)
10
20
40
60
80
100
200
400
600
800
1000
Altitude (km)
25
20
15
10
5
0
0
2.0
4.0
6.0
8.0
10
12
14
16
18
20
Ozone Partial Pressure (mPa)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
Temperature (Celsius)
0
10
20
30
40
50
60
70
80
90
100
Relative Humidity (percent)
Date 25-08-1990
Time at launch 04:12 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity


Ozone Sounding FLH220 : Tropospheric Part
Altitude (km)
0
2
4
6
8
10
12
14
16
0 20 40 60 80 100 120 140 160 180 200
Ozone Mixing Ratio (ppbv)
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (Celsius)
0 10 20 30 40 50 60 70 80 90 100
Relative Humidity (percent)
Date 25-08-1990
Time at launch 04:12 (UTC)
Location : Schauinsland, FRG
Ozone
Temperature
Relative Humidity

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