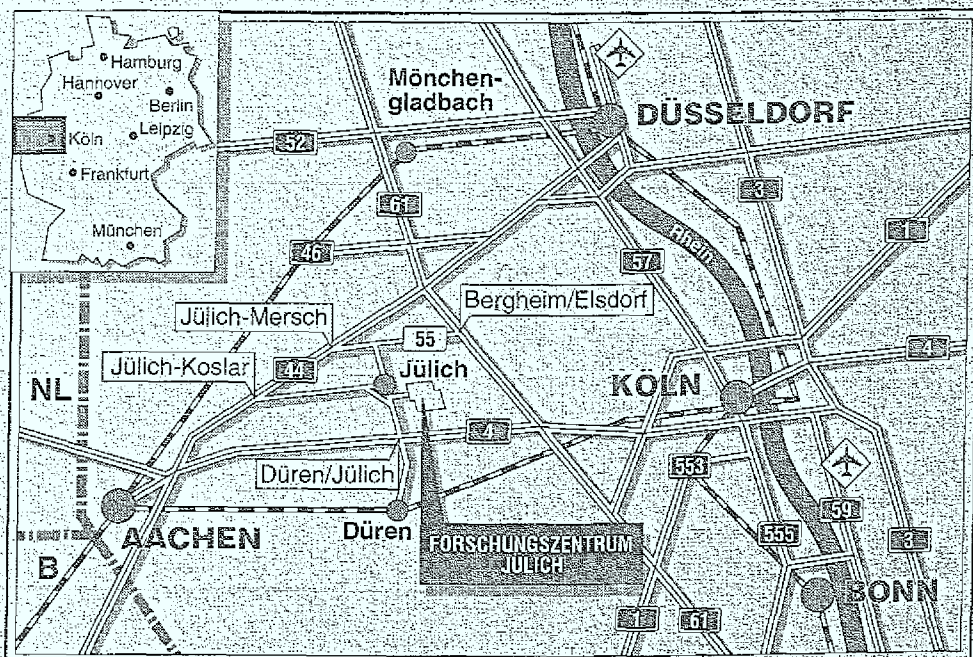


*Institut für Chemie und Dynamik der Geosphäre 2:
Chemie der Belasteten Atmosphäre*

**Ozone Profiles at Jülich
and Schauinsland, Germany
during 1992**

H.G.J. Smit W. Sträter B. Hermanns D. Kley



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H.G.J. Smit W. Sträter B. Hermanns D. Kley

1911

1911

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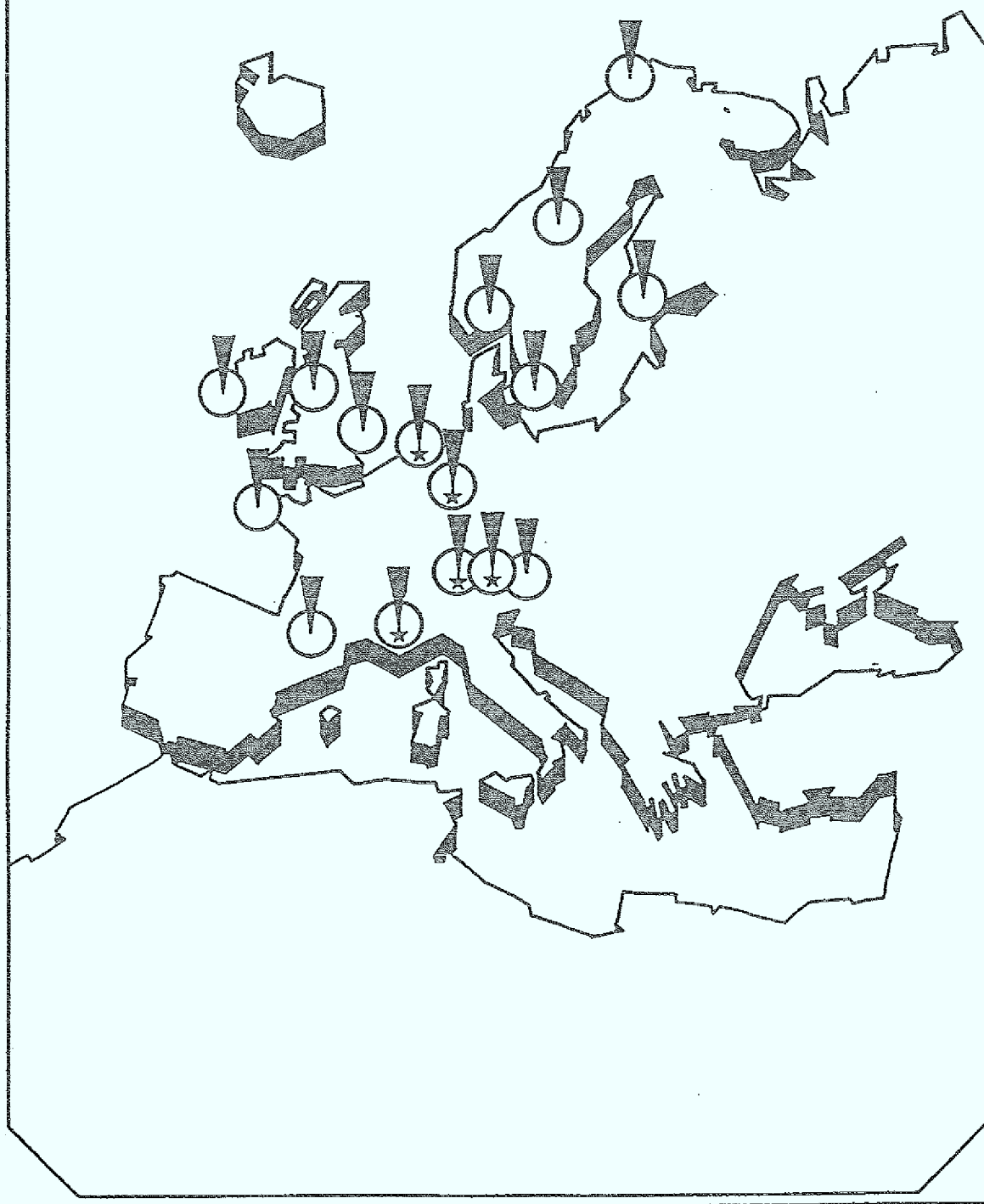
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Summary

This fourth report of a series of ozone profiles contains the individual measured vertical profiles of ozone and the meteorological parameters like pressure, temperature and relative humidity obtained from regular soundings at Jülich, Germany ($50^{\circ} 41' \text{ N}$, $6^{\circ} 24' \text{ E}$) during 1992. It also includes vertical profiles measured incidental at the Schauinsland (Black Forest), Germany ($47^{\circ} 55' \text{ N}$, $7^{\circ} 55' \text{ E}$) during an intensive field campaign in September 1992.

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 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 role of stratosphere/troposphere exchange and transport from the atmospheric boundary layer into the free troposphere. Especially the relation of ozone and the simultaneously measured water vapor enables us to investigate the influences of both transport and chemistry on the tropospheric ozone budget [Smit et al. (1993)].

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 January 1990 the frequency of soundings was extended to two flights per week. In the second volume in these series the results obtained at Jülich during 1990, as well as the results of incidental soundings performed at the Schauinsland (Blackforest, Germany) mainly during an intensive field campaign in August 1990, were reported [Smit et al. (1991-A)]. The third volume reports the results of individual flights made at different latitudes over the Central Atlantic Ocean during two scientific cruises aboard the research vessel "Polarstern" in March/April 1987 and

September/October 1988 respectively [Smit et al. (1991-B)]. In the fourth volume in these series the results of individual soundings made at Jülich during 1991, were reported [Smit et al. (1994-B)].

The ozone sounding system, instrumental set up and data processing, has been described in the first volume of these series [Smit et al. (1989)]. A detailed description of the TOR ozone sounding station at Jülich has been reported by Smit et al (1994-A). In this report, the fifth volume, we present the results from regular flights with a frequency of two ozone soundings per week obtained at Jülich during 1992, as well as the results of incidental soundings performed at the Schauinsland (Blackforest, Germany) mainly during an intensive field campaign in September 1992.

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. This flight schedule of two soundings per week was continued in 1991 and 1992

The results of the soundings performed during 1992 are presented in the form of individual vertical profiles of ozone and the simultaneously 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 ozonogram with the partial pressure of ozone (mPa), temperature ($^{\circ}\text{C}$) and relative humidity (%) on the abscissa as a function of pressure (hPa) on a logarithmic 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 Mrs. C. Fries for assistance during the preparation of the ozone sondes and Mr. W. Petrick for modification of the radiosondes.

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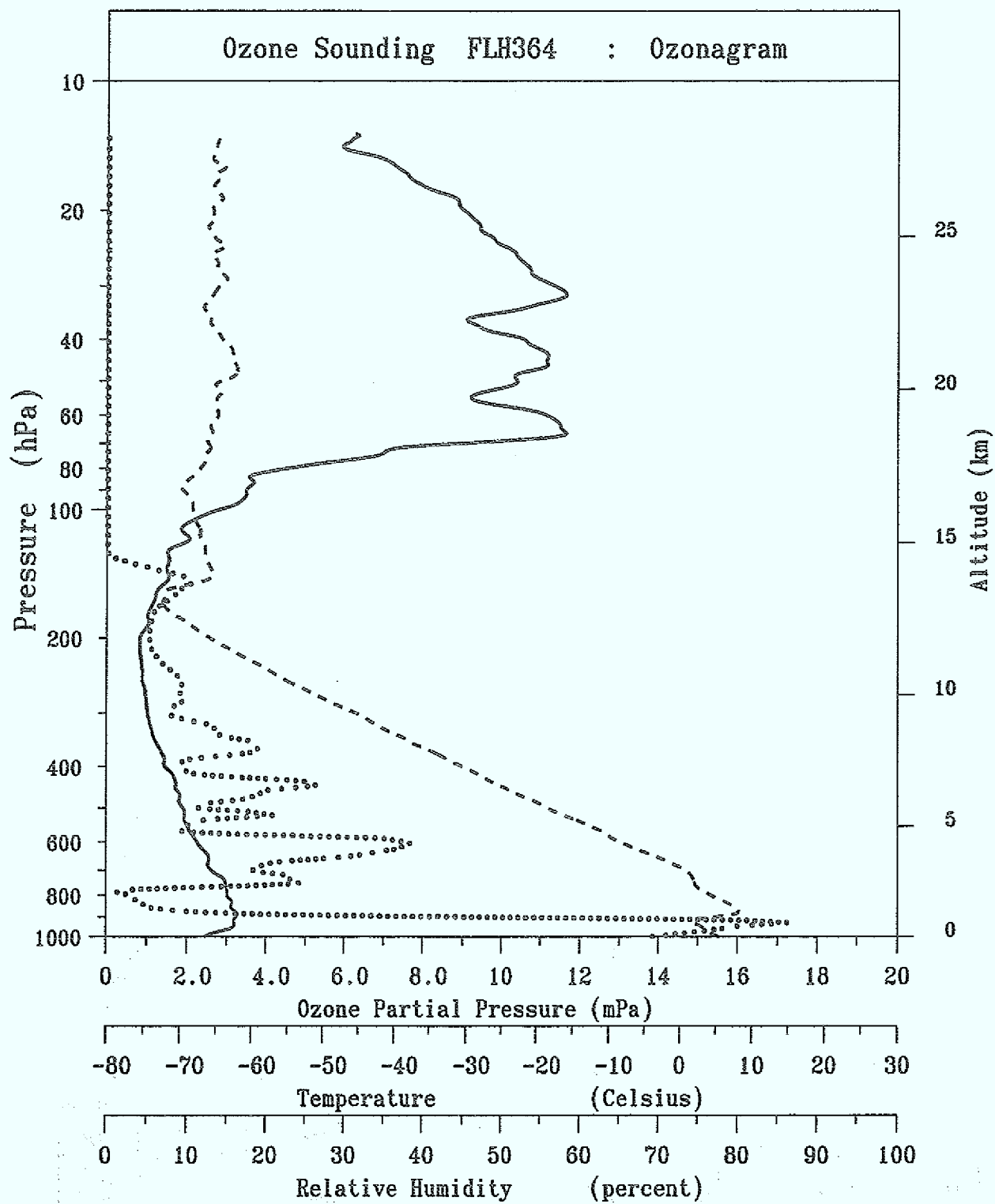
4. Individual vertical profiles

Ozone Soundings at Jülich			
Flight- Number	Date dd-mm-year	Time hh:mm (UTC)	Page
364	2- 1-1992	12:18	8
366	9- 1-1992	13: 0	10
367	13- 1-1992	12:13	12
368	16- 1-1992	12:13	14
369	20- 1-1992	12:27	16
370	22- 1-1992	11:15	18
371	27- 1-1992	12:14	20
372	30- 1-1992	12:15	22
373	3- 2-1992	12:18	24
374	6- 2-1992	12:13	26
375	10- 2-1992	12:15	28
376	13- 2-1992	12:14	30
377	17- 2-1992	12:20	32
378	20- 2-1992	12:10	34
379	24- 2-1992	12:16	36
380	27- 2-1992	12:23	38
381	3- 3-1992	12:16	40
382	5- 3-1992	12:20	42
383	9- 3-1992	12:18	44
384	12- 3-1992	12:30	46
385	16- 3-1992	12:25	48
386	19- 3-1992	12:15	50
387	23- 3-1992	12:13	52
388	26- 3-1992	12:19	54
389	30- 3-1992	12:10	56
390	2- 4-1992	12: 1	58
391	6- 4-1992	12: 5	60
392	9- 4-1992	12:23	62
393	13- 4-1992	12: 0	64
394	16- 4-1992	12: 4	66
396	23- 4-1992	12:24	68
397	27- 4-1992	11:57	70
398	30- 4-1992	12: 5	72
399	4- 5-1992	11:56	74
400	7- 5-1992	12:14	76
401	11- 5-1992	12:10	78
402	14- 5-1992	12: 8	80
403	18- 5-1992	12: 3	82
404	21- 5-1992	12: 8	84
405	25- 5-1992	12: 0	86
406	29- 5-1992	11:15	88
407	1- 6-1992	12: 3	90
408	4- 6-1992	12: 5	92
409	9- 6-1992	12: 7	94
410	12- 6-1992	11:30	96
411	15- 6-1992	12: 6	98
412	19- 6-1992	11:16	100
413	22- 6-1992	12: 7	102
414	25- 6-1992	11:41	104

Ozone Soundings at Jülich			
Flight- Number	Date dd-mm-year	Time hh:mm (UTC)	Page
415	29- 6-1992	11:58	106
416	2- 7-1992	12: 0	108
417	6- 7-1992	12: 9	110
418	9- 7-1992	12: 0	112
419	13- 7-1992	11:59	114
421	20- 7-1992	11:59	116
422	23- 7-1992	11:59	118
423	27- 7-1992	12: 9	120
424	30- 7-1992	12:15	122
425	3- 8-1992	12: 3	124
426	6- 8-1992	12: 0	126
427	10- 8-1992	11:59	128
428	13- 8-1992	12: 9	130
429	17- 8-1992	12: 6	132
430	20- 8-1992	12: 2	134
431	24- 8-1992	12: 0	136
432	27- 8-1992	11:58	138
433	31- 8-1992	12: 5	140
435	7- 9-1992	12: 9	142
436	10- 9-1992	12: 0	144
438	17- 9-1992	11:56	146
439	21- 9-1992	12:52	148
440	24- 9-1992	11:37	150
441	28- 9-1992	12:10	152
442	1-10-1992	12:25	154
444	8-10-1992	12: 9	156
445	12-10-1992	12:21	158
446	15-10-1992	12:12	160
447	19-10-1992	12:17	162
448	22-10-1992	12:12	164
449	26-10-1992	12:31	166
467	29-10-1992	12: 4	168
468	2-11-1992	12:11	170
469	5-11-1992	11:58	172
470	9-11-1992	12:23	174
471	12-11-1992	12: 4	176
472	16-11-1992	12: 4	178
474	23-11-1992	12:13	180
475	26-11-1992	12:45	182
476	30-11-1992	12:34	184
477	3-12-1992	12: 7	186
478	7-12-1992	12:33	188
479	10-12-1992	12: 3	190
480	14-12-1992	12:17	192
481	16-12-1992	12:59	194
482	17-12-1992	12: 1	196
483	18-12-1992	12: 6	198
484	21-12-1992	12:20	200

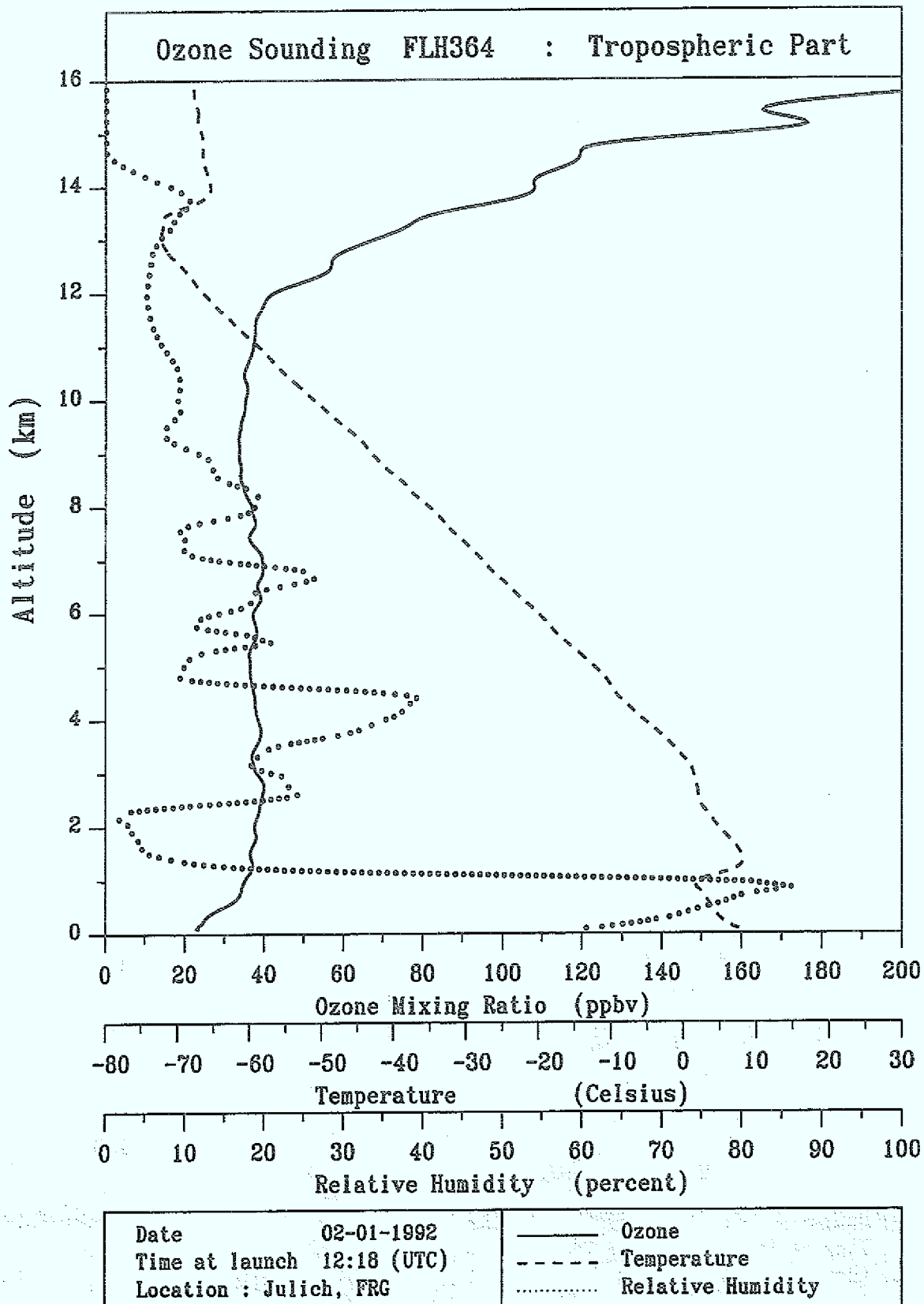
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Flight- Number	Date dd-mm-year	Time hh:mm (UTC)	Page
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451	11- 9-1992	6:15	204
452	11- 9-1992	9:58	206
453	11- 9-1992	12:59	208
454	16- 9-1992	5: 2	210
455	16- 9-1992	7:57	212
456	16- 9-1992	11:50	214
457	16- 9-1992	15: 1	216
458	17- 9-1992	7:24	218

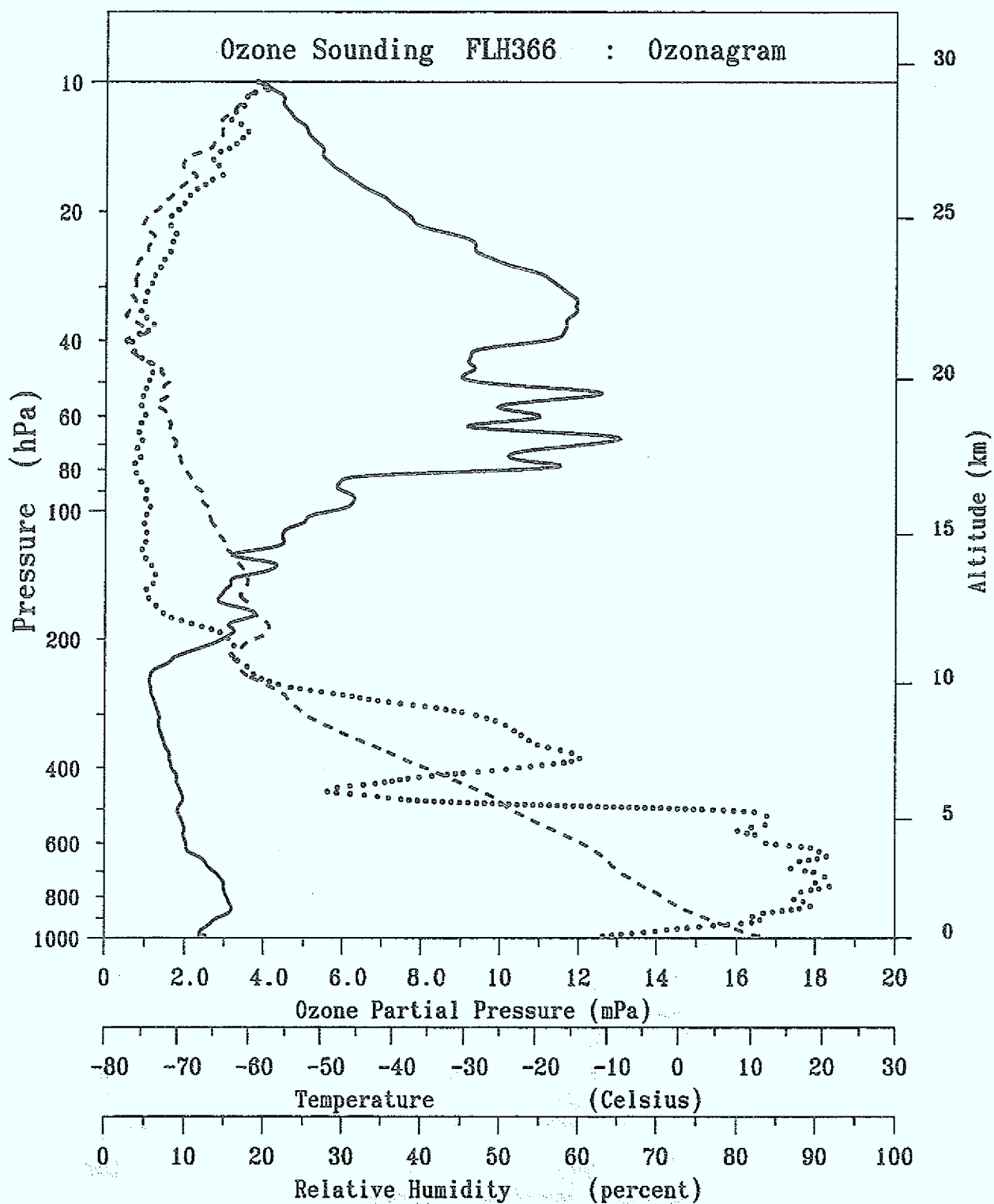
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Flight- Number	Date dd-mm-year	Time hh:mm (UTC)	Page
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460	17- 9-1992	14:54	222
461	18- 9-1992	9:55	224
462	20- 9-1992	8:50	226
463	21- 9-1992	5: 1	228
464	21- 9-1992	8:29	230
465	21- 9-1992	11:26	232
466	21- 9-1992	14:46	234



Date 02-01-1992
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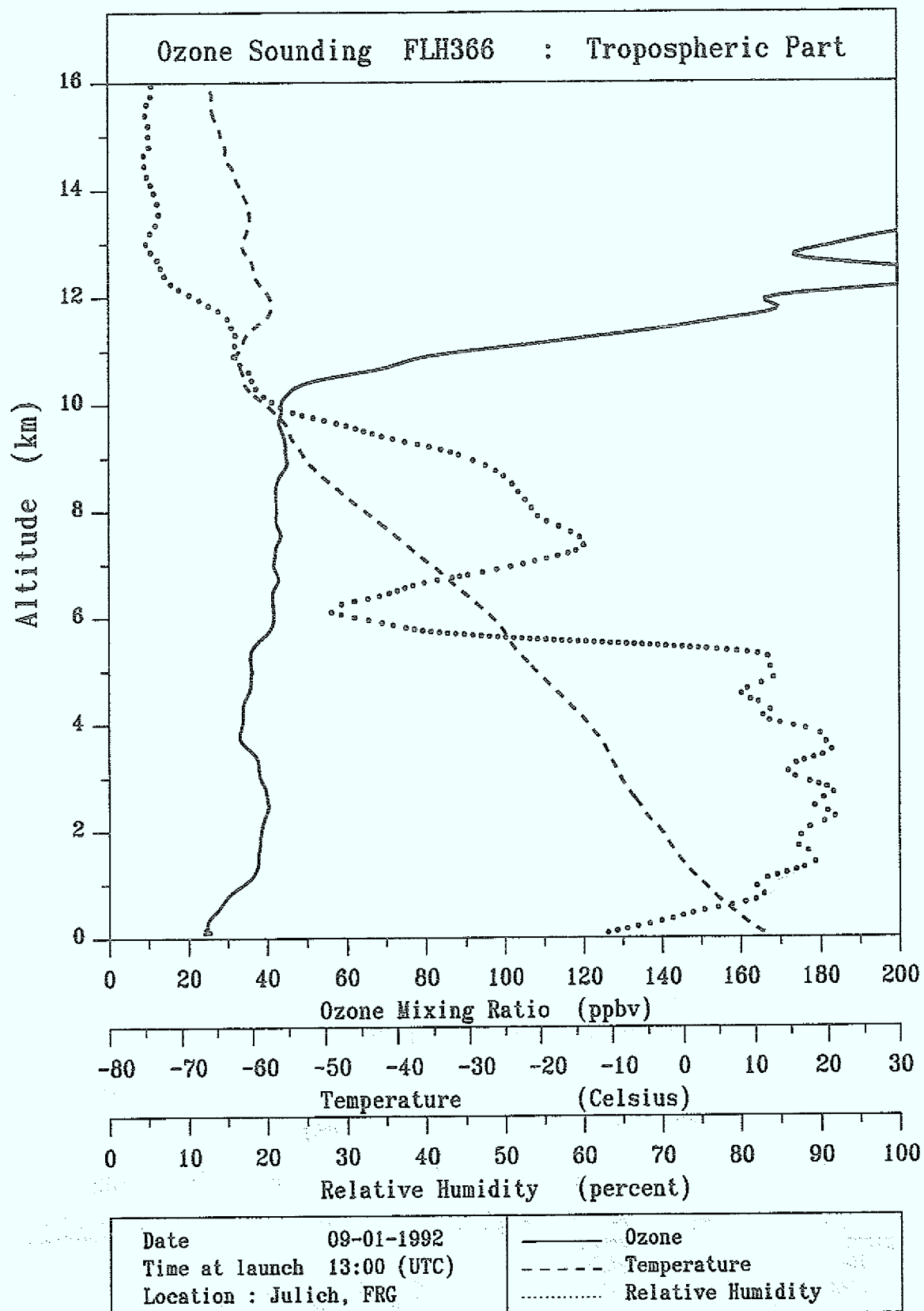
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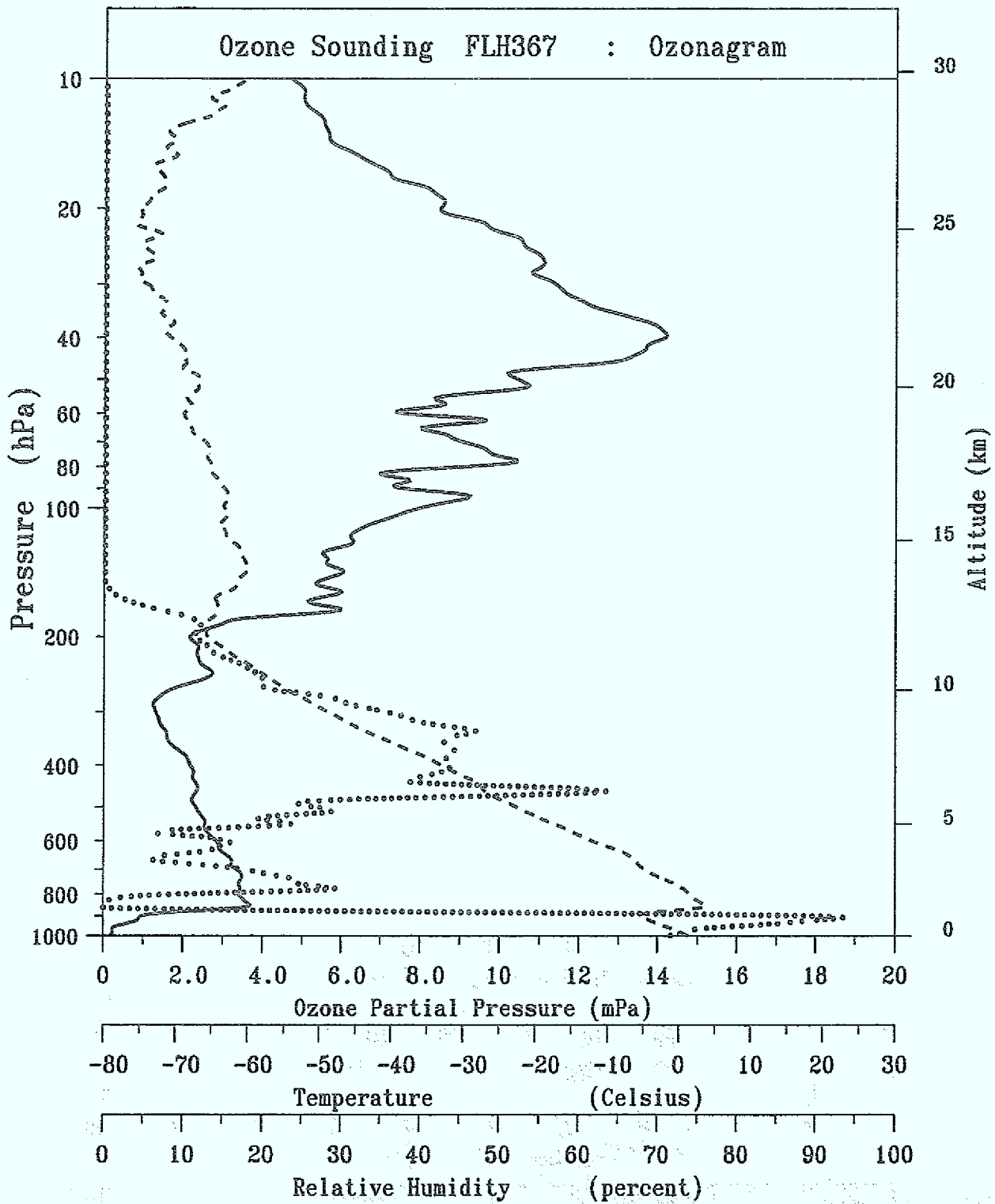




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 Relative Humidity

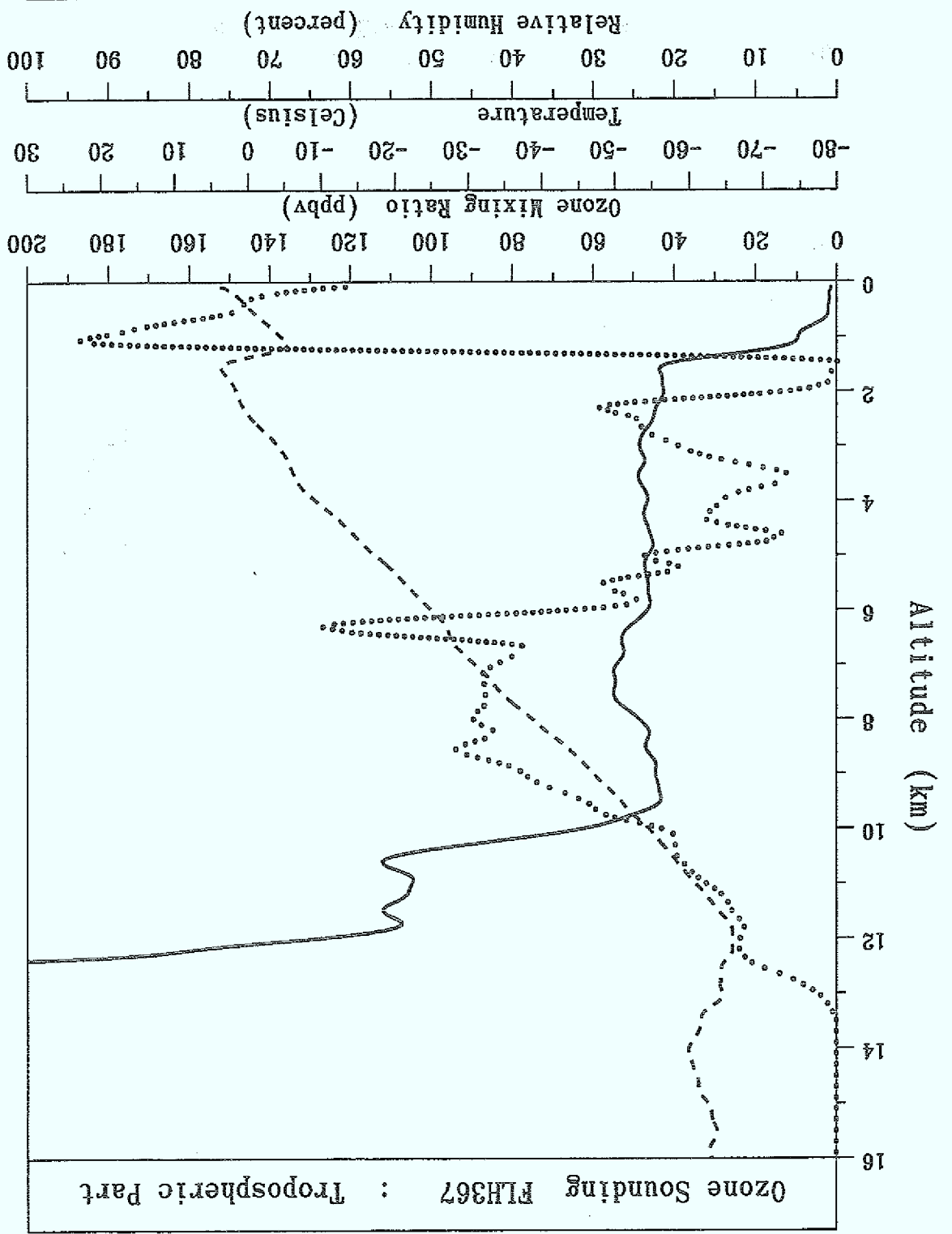


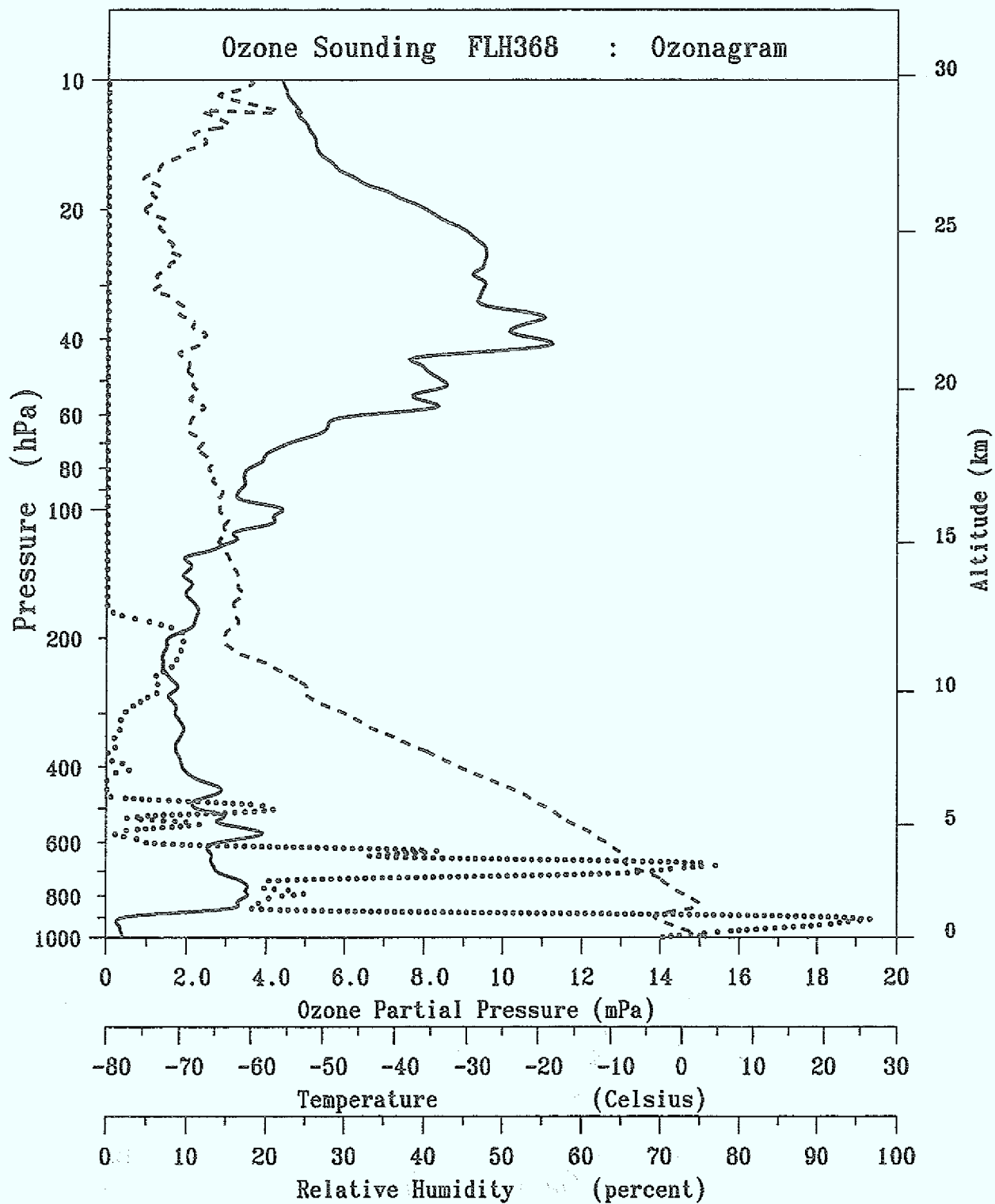


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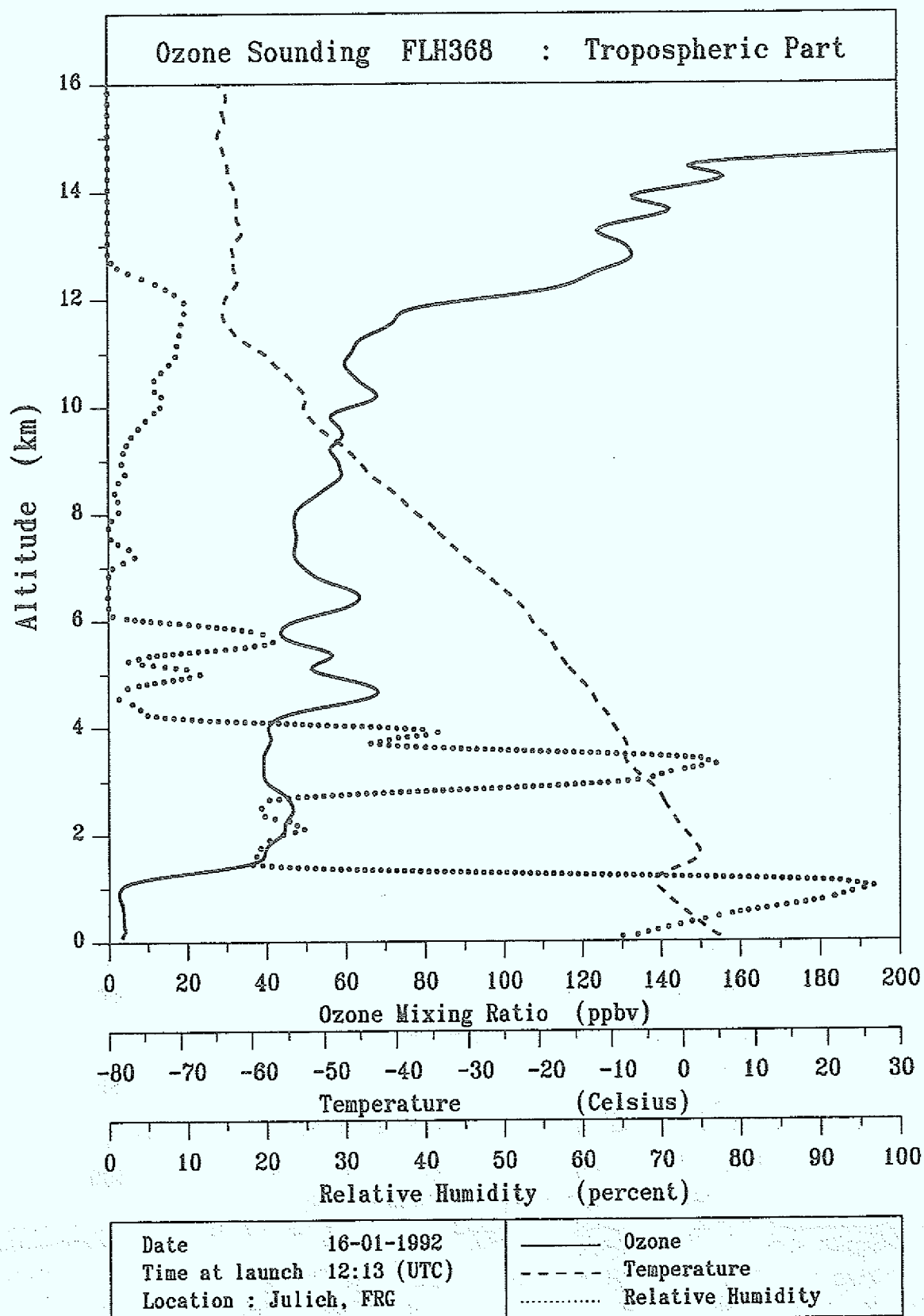
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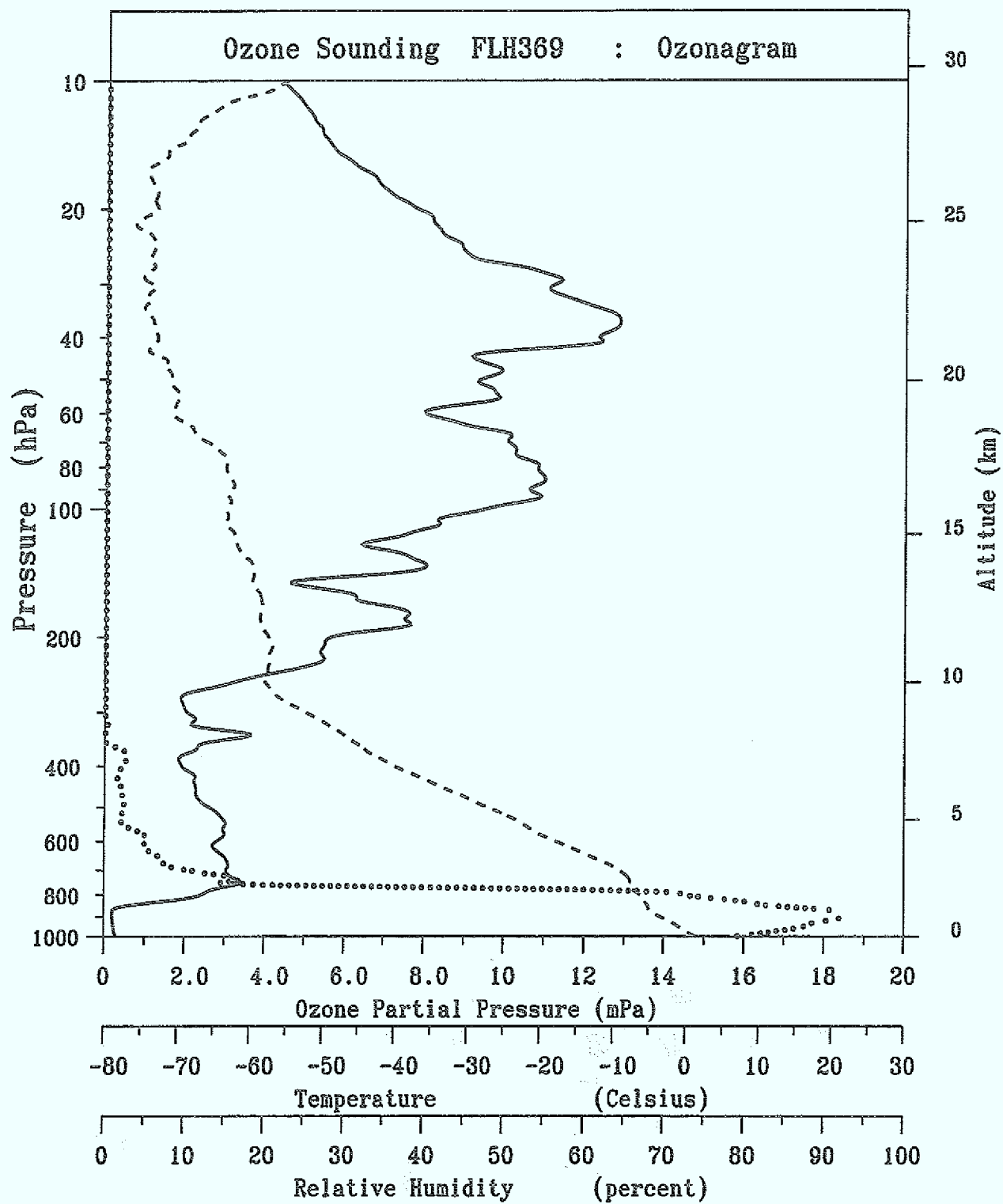
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Time at launch	12:13 (UTC)	
—	Ozone	
- - -	Temperature	
.....	Relative Humidity	



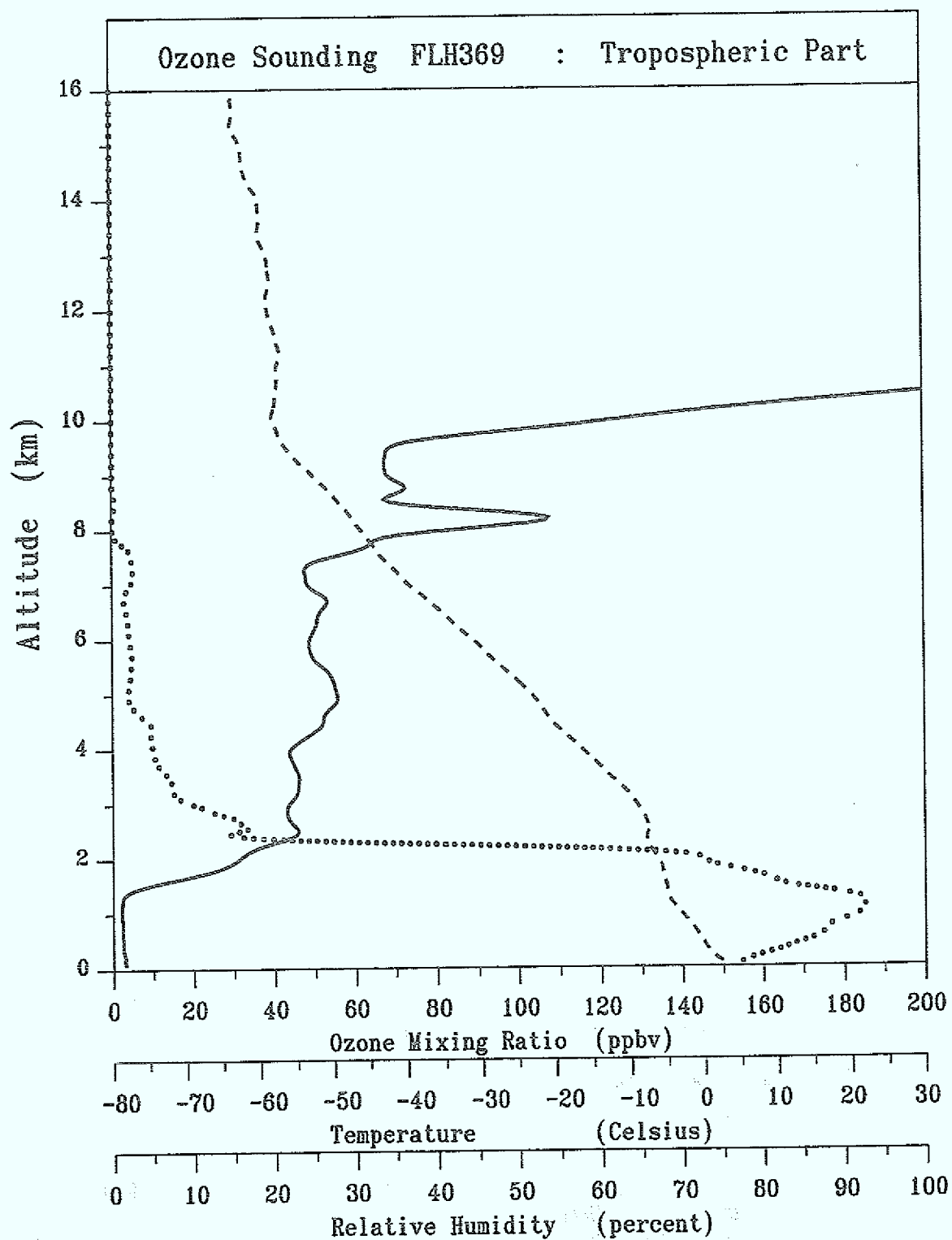


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Location : Julich, FRG			Relative Humidity



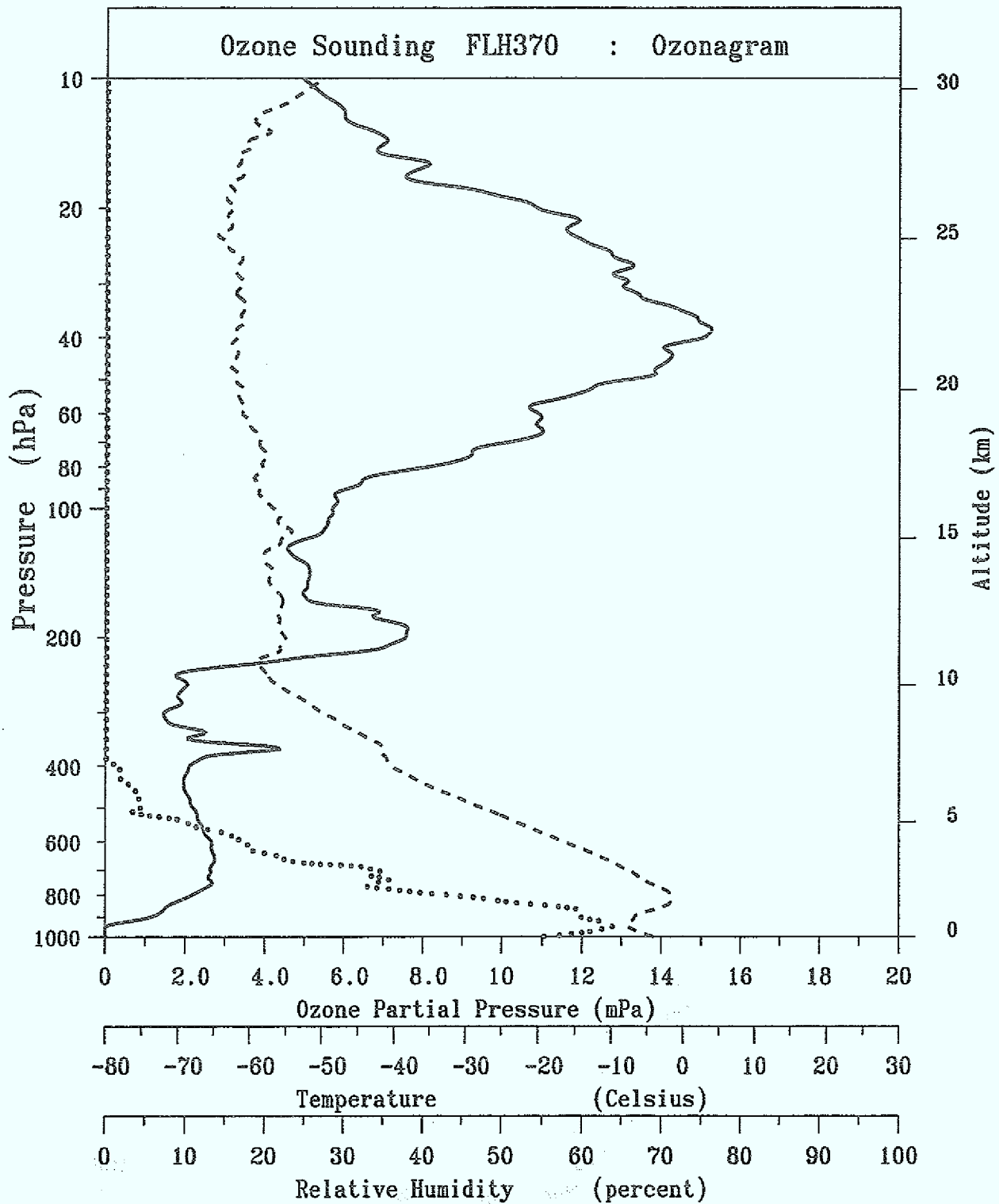


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Location	Julich, FRG		Relative Humidity



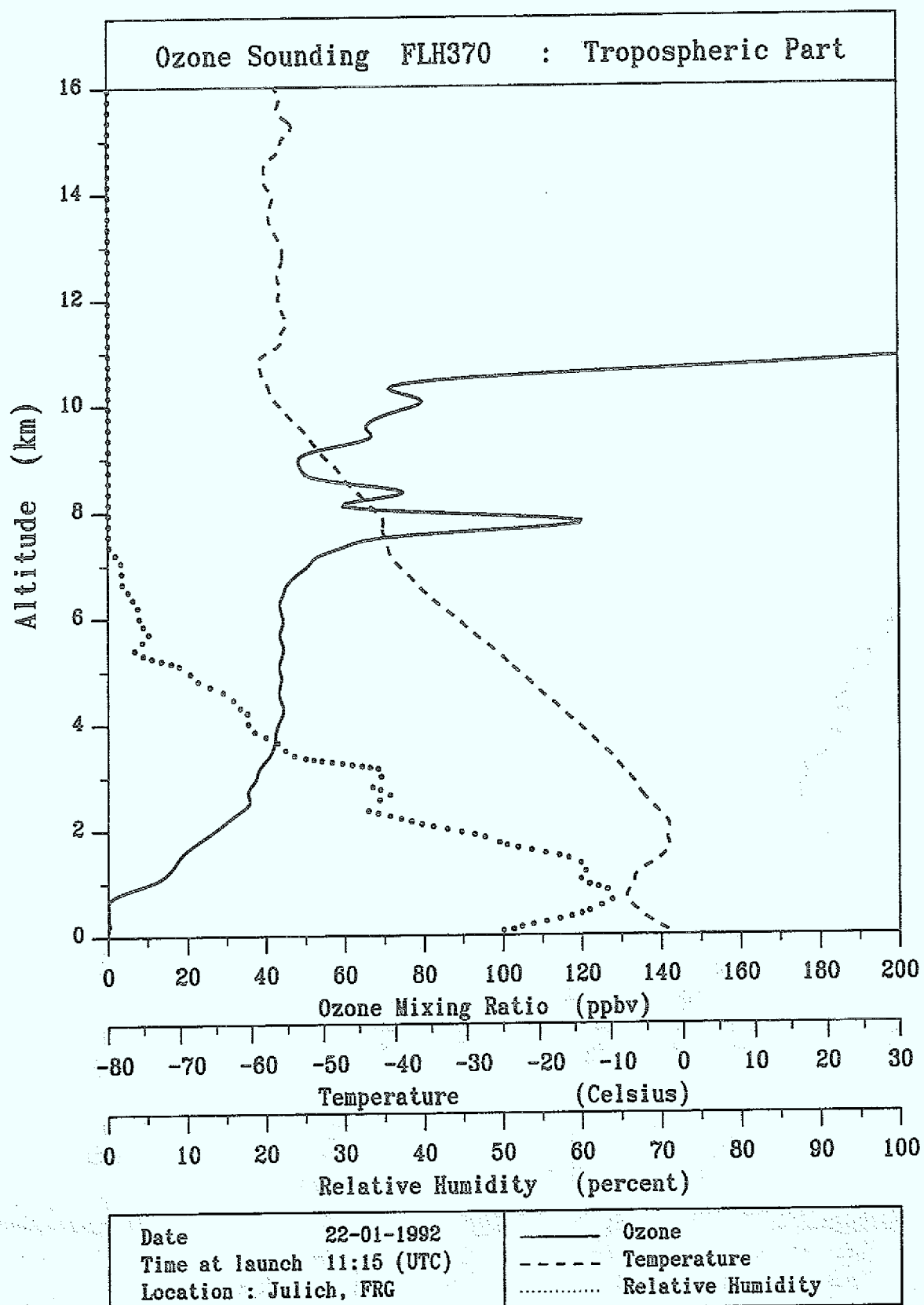
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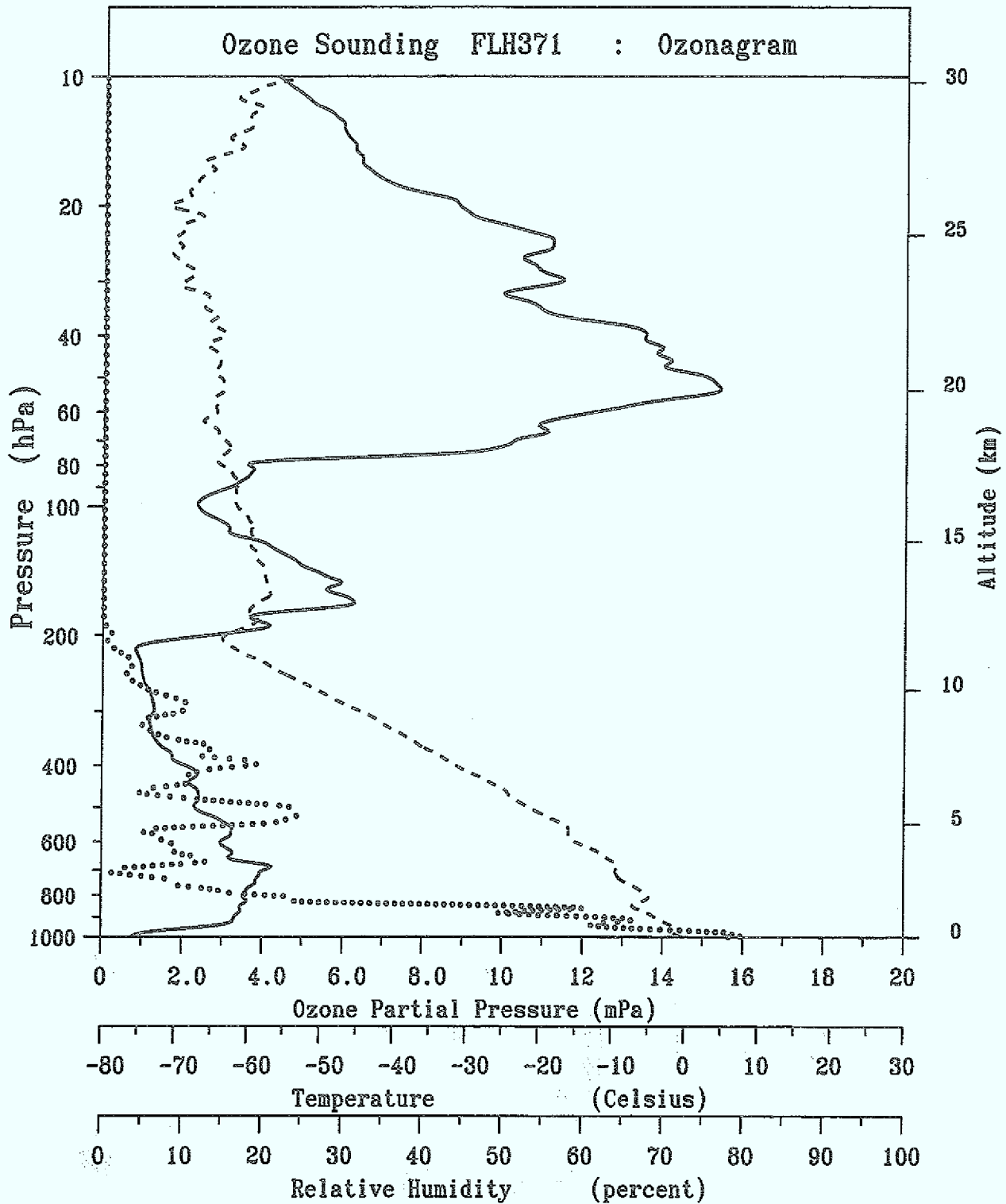
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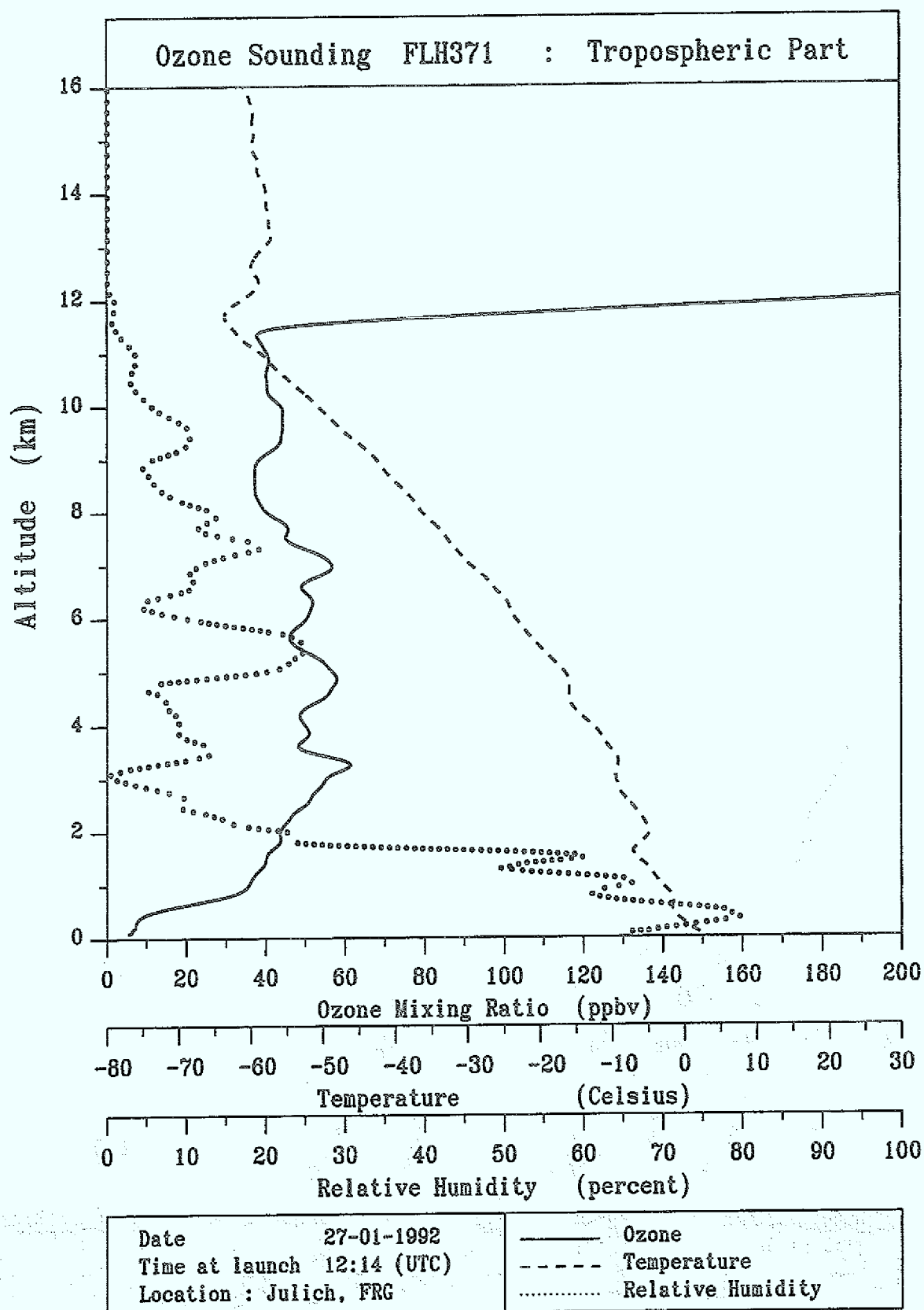
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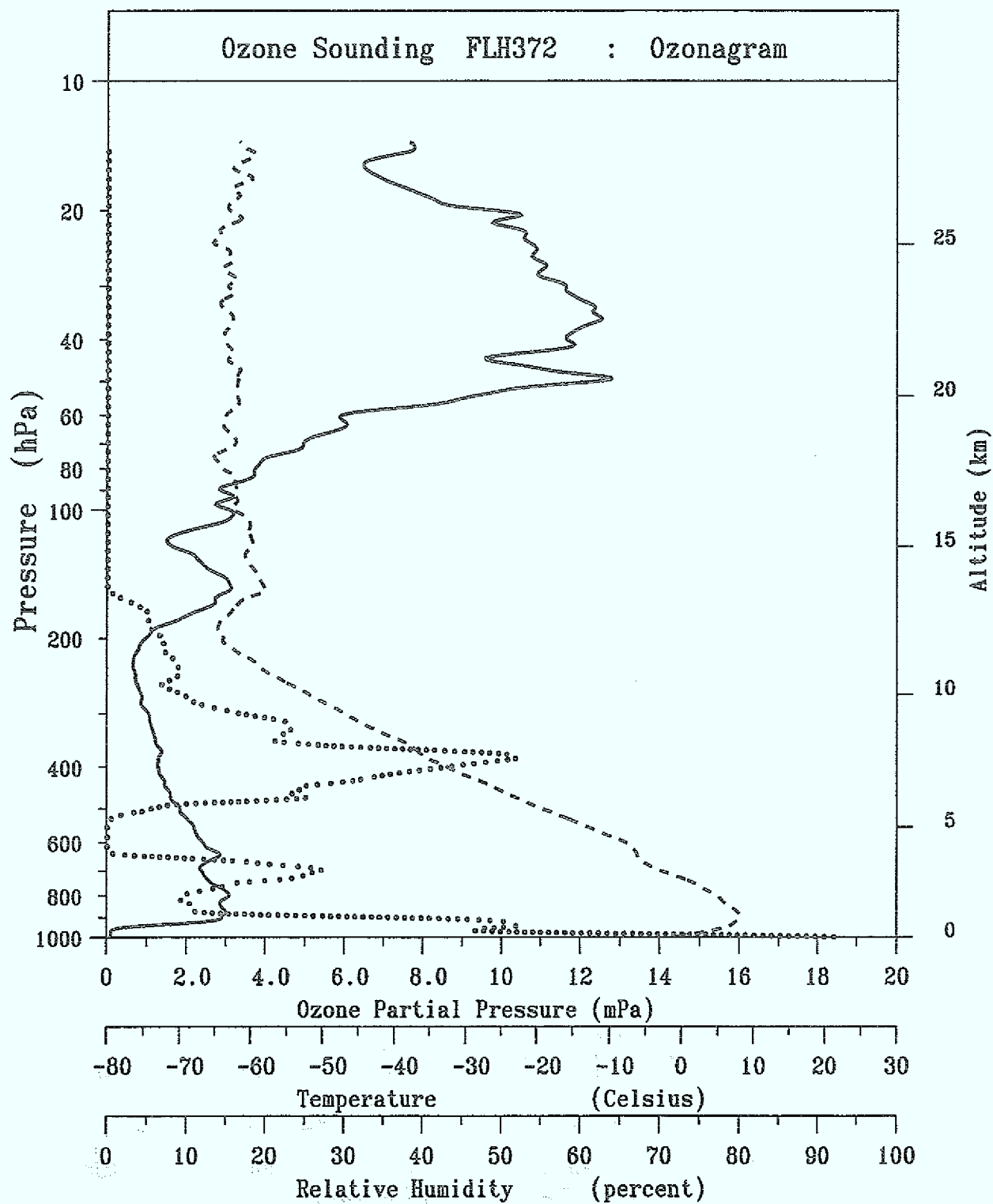
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 --- Temperature
 Relative Humidity



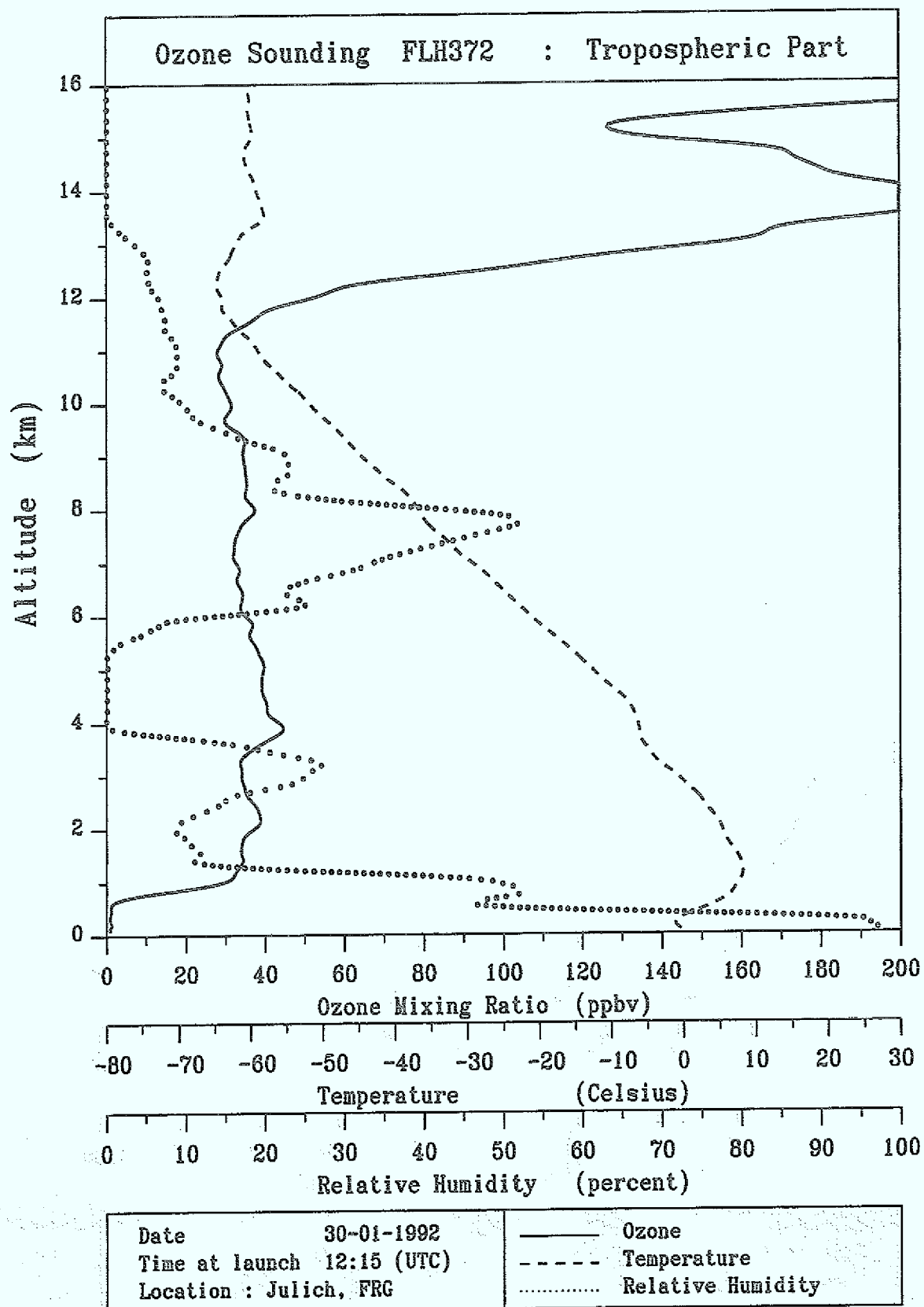


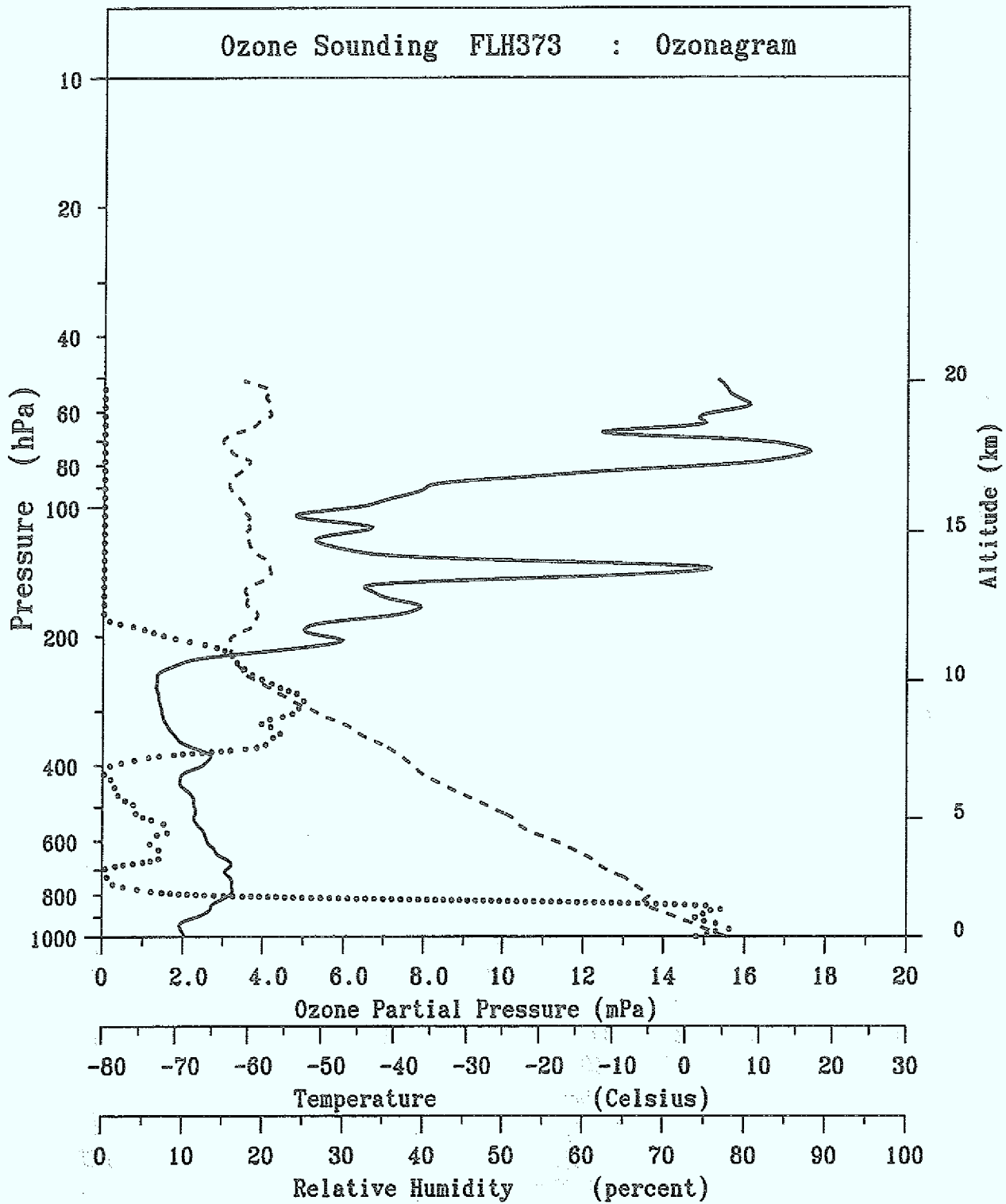
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Location : Julich, FRG			Relative Humidity





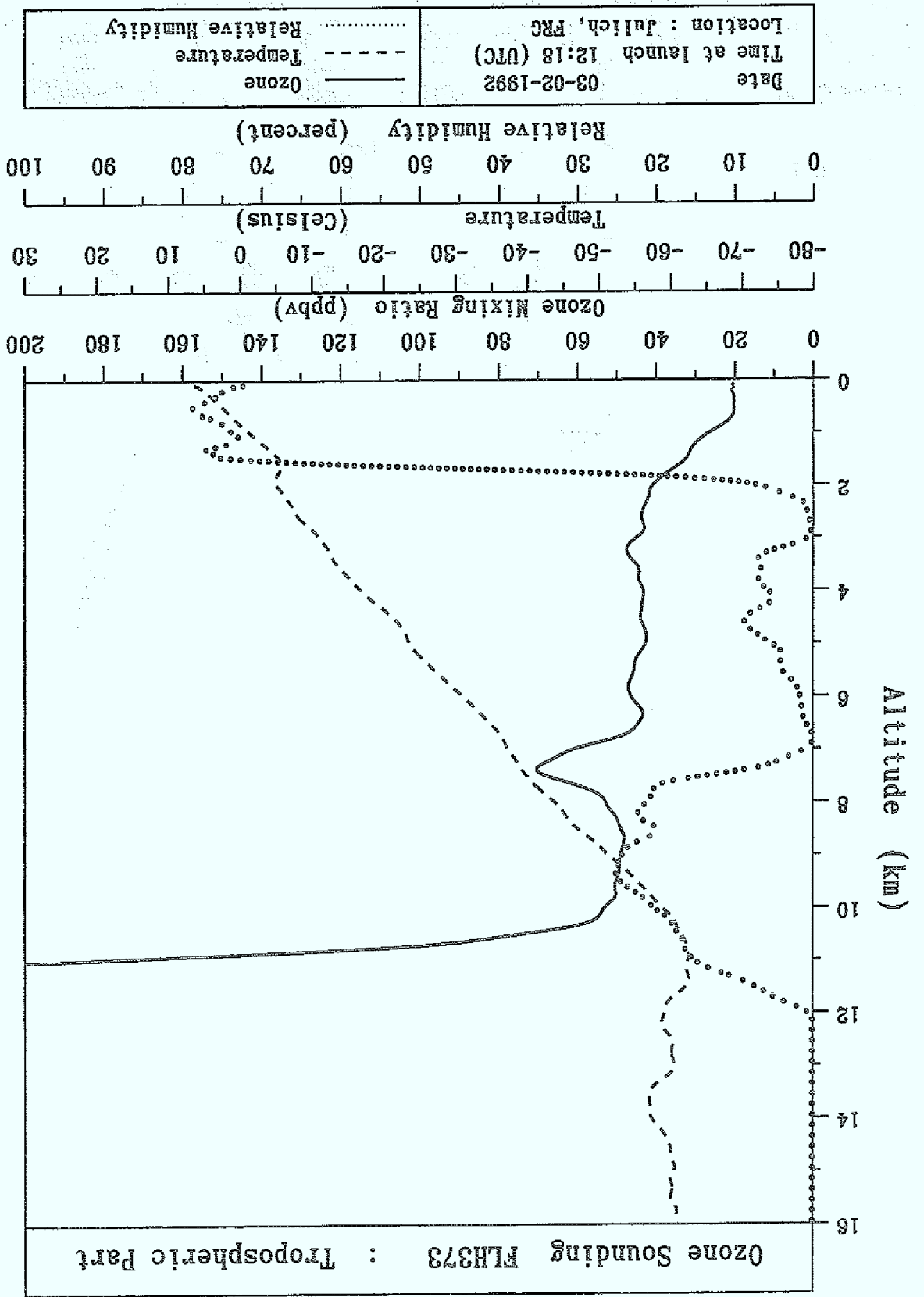
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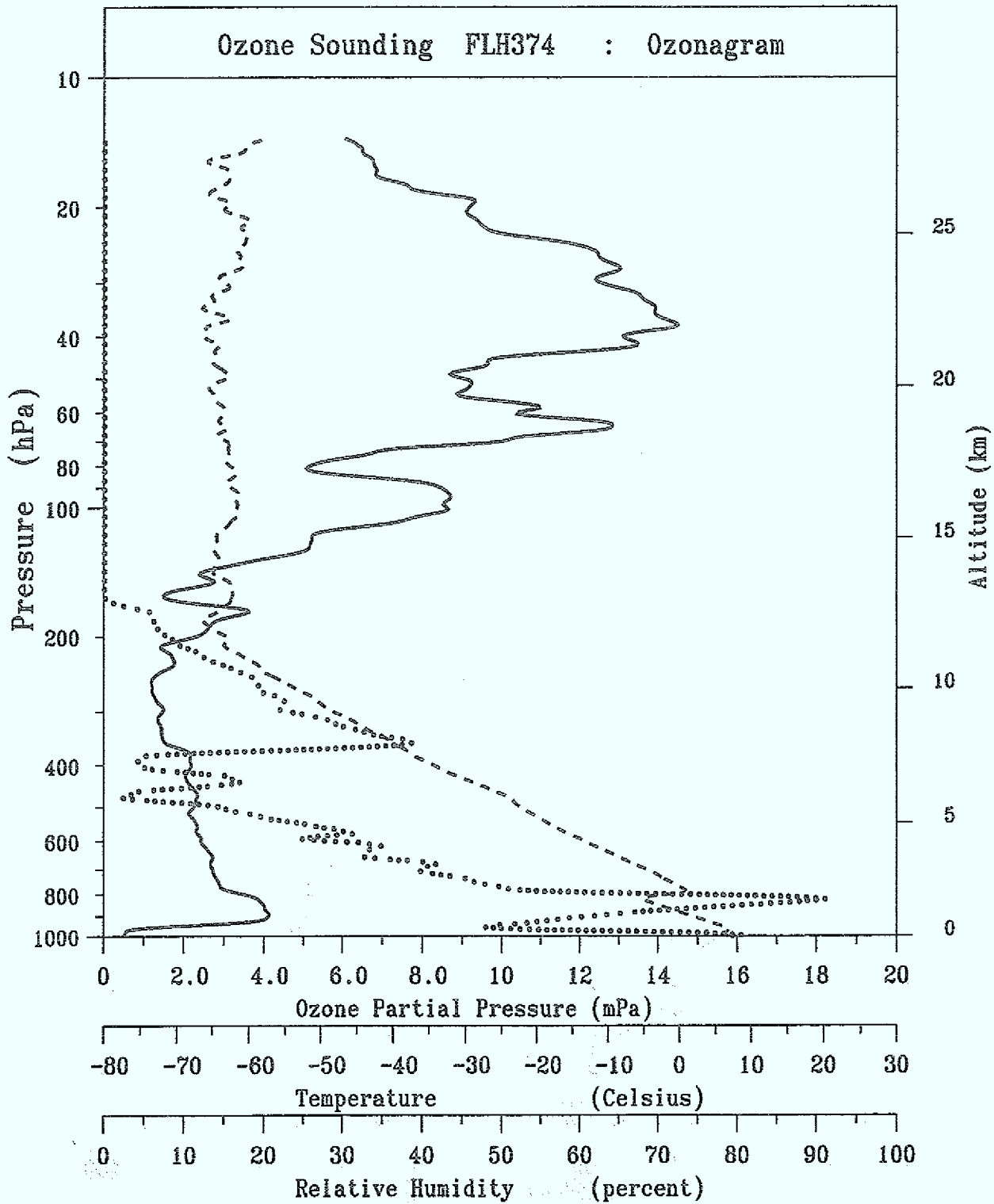




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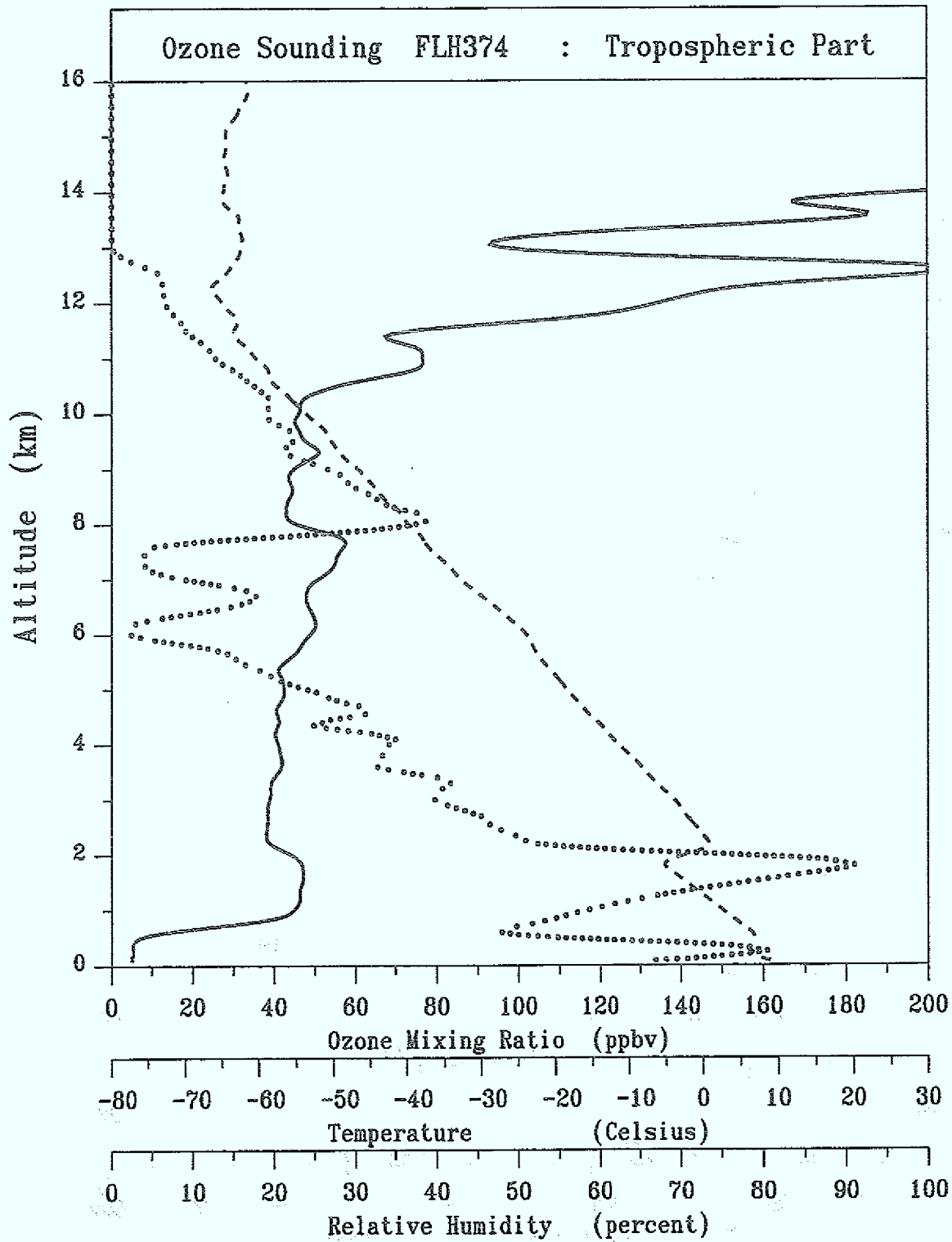
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 --- Temperature
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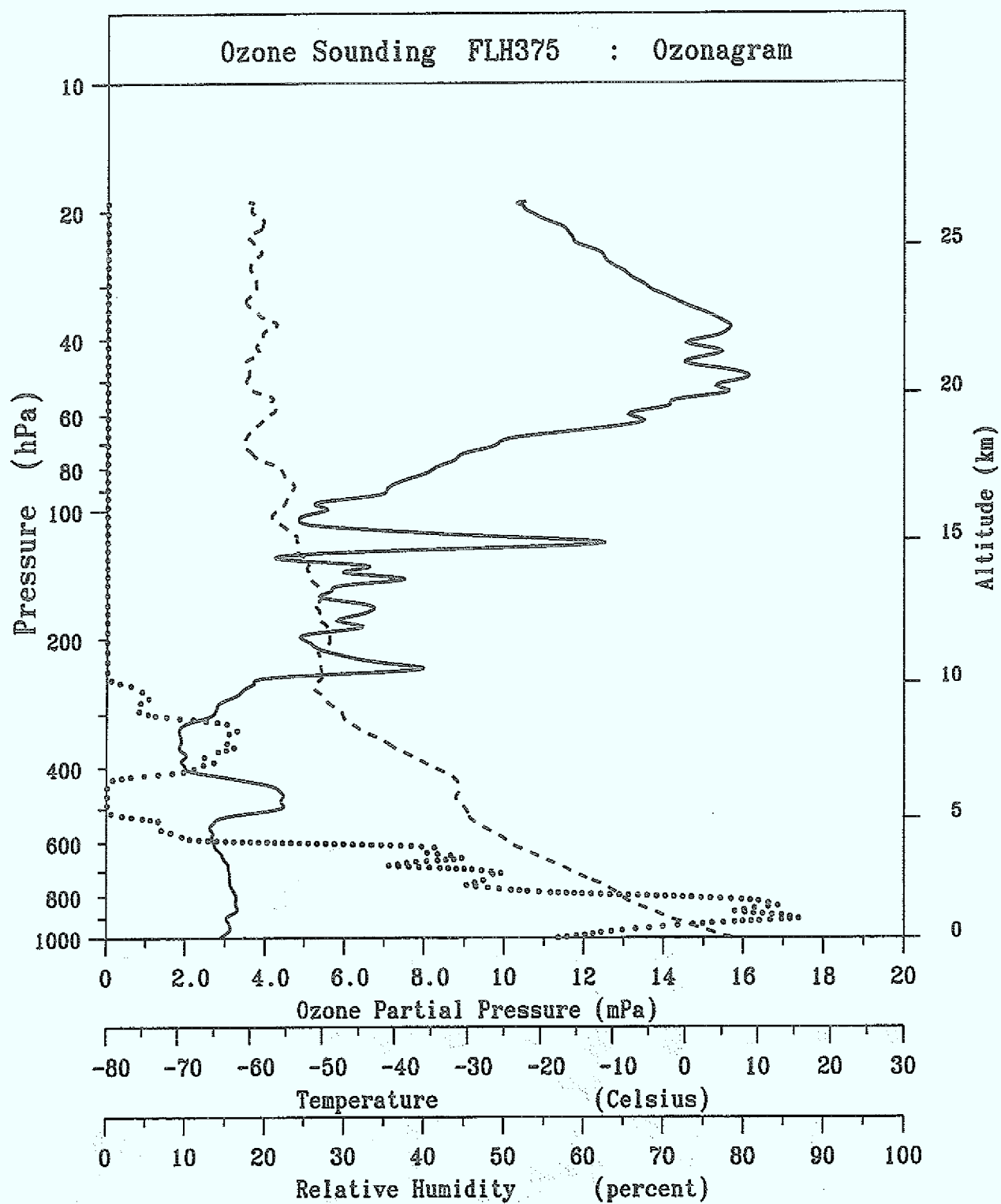


Date 06-02-1992
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 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity

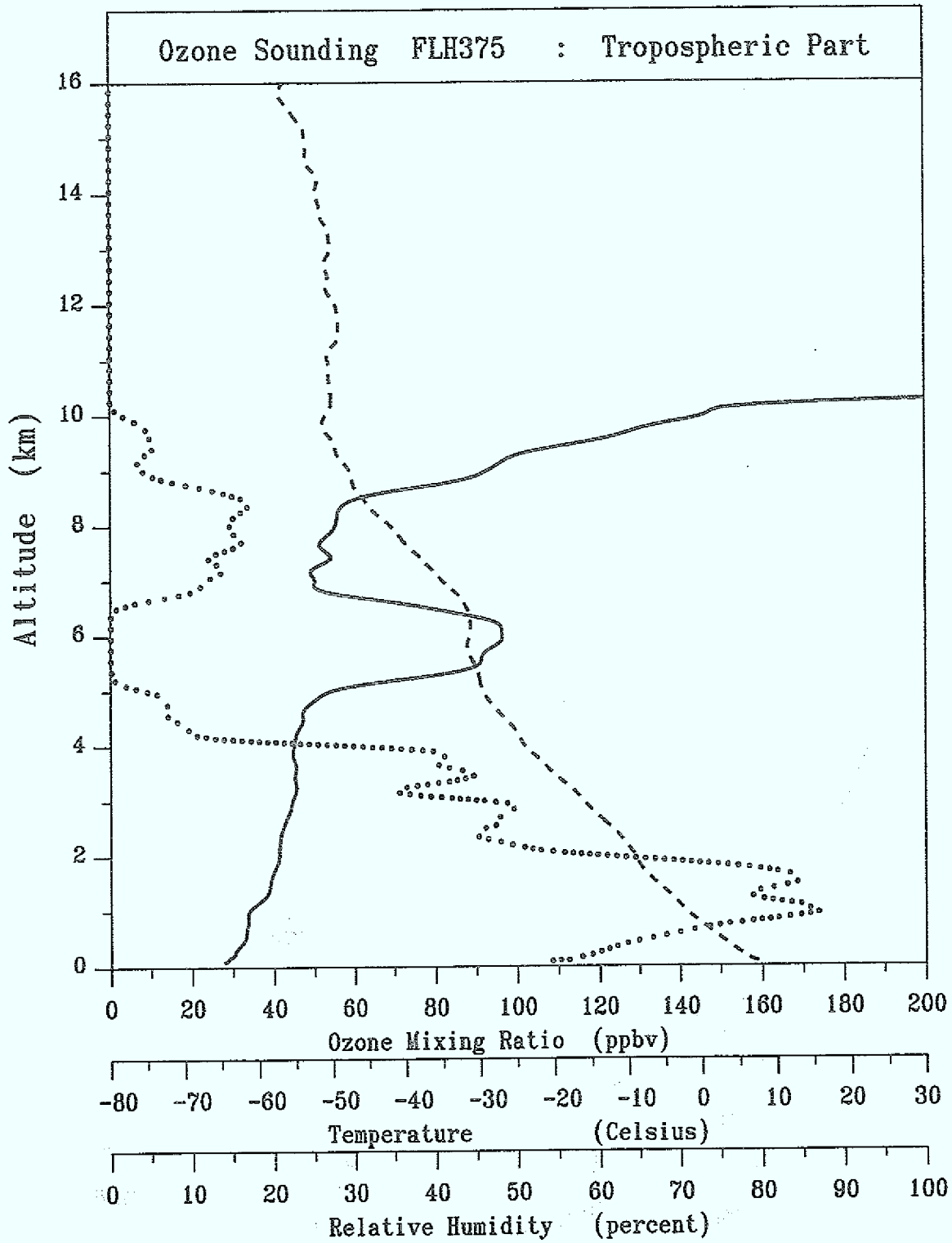


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Location : Julich, FRG			Relative Humidity



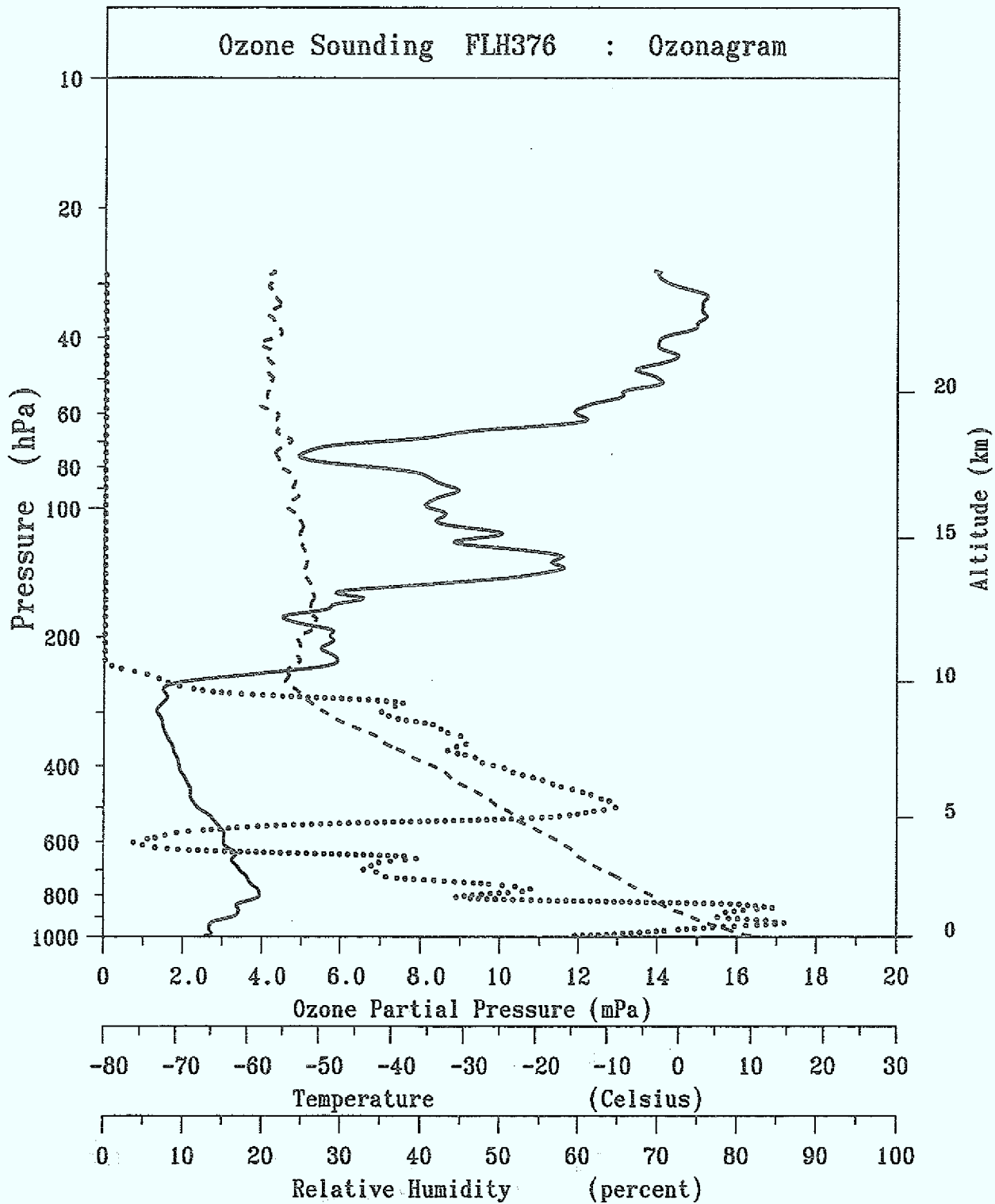
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— Ozone
 --- Temperature
 Relative Humidity



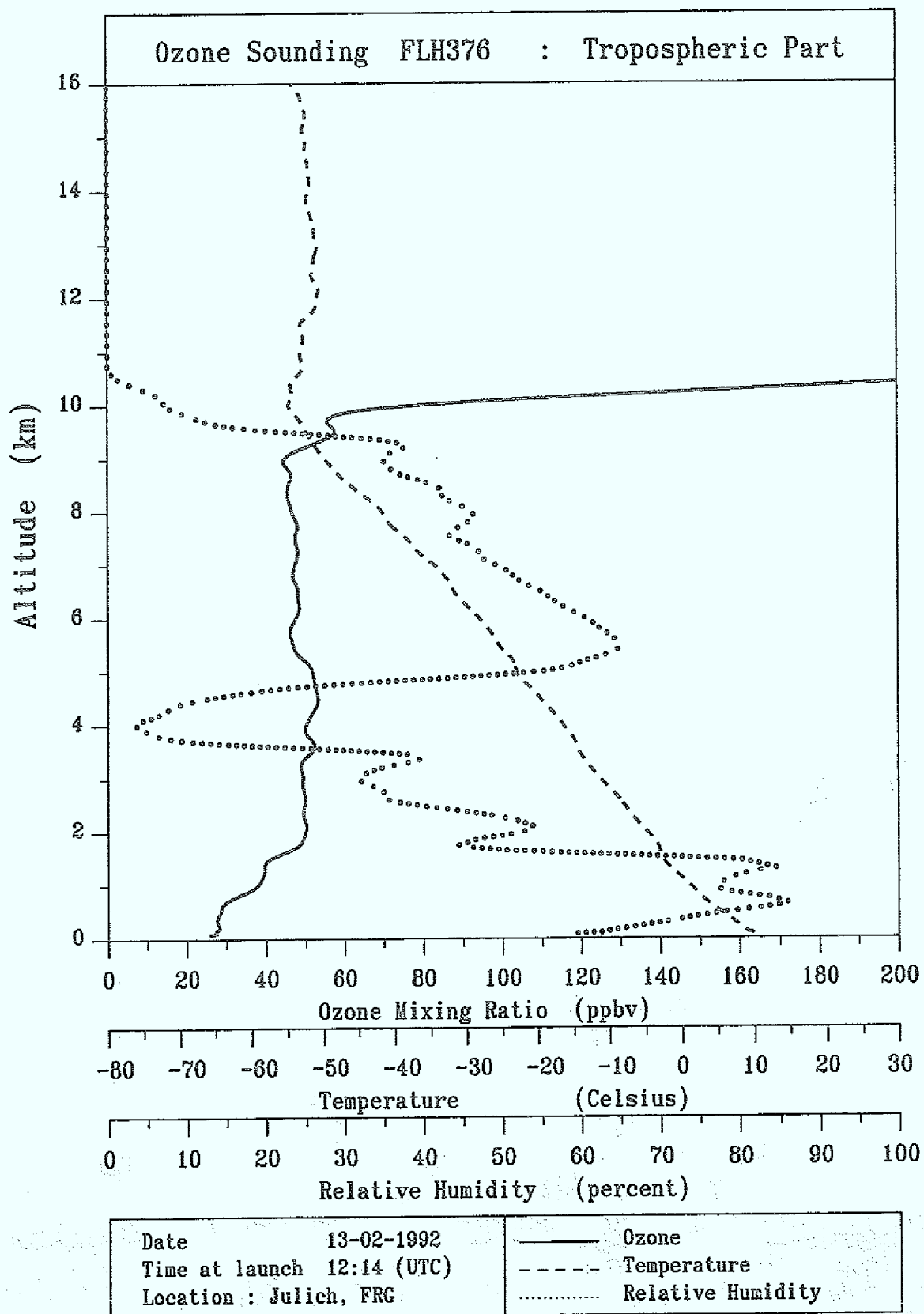
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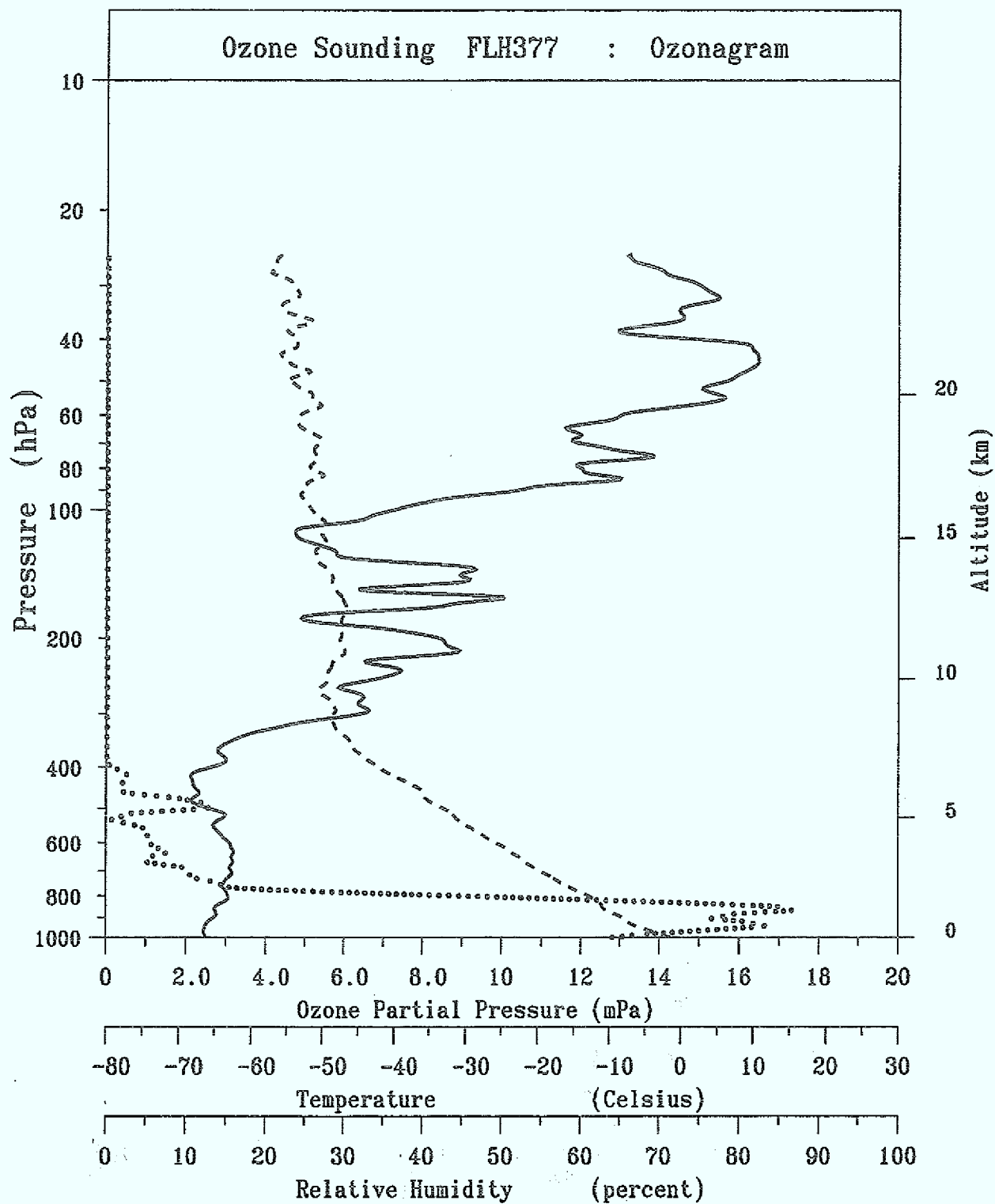
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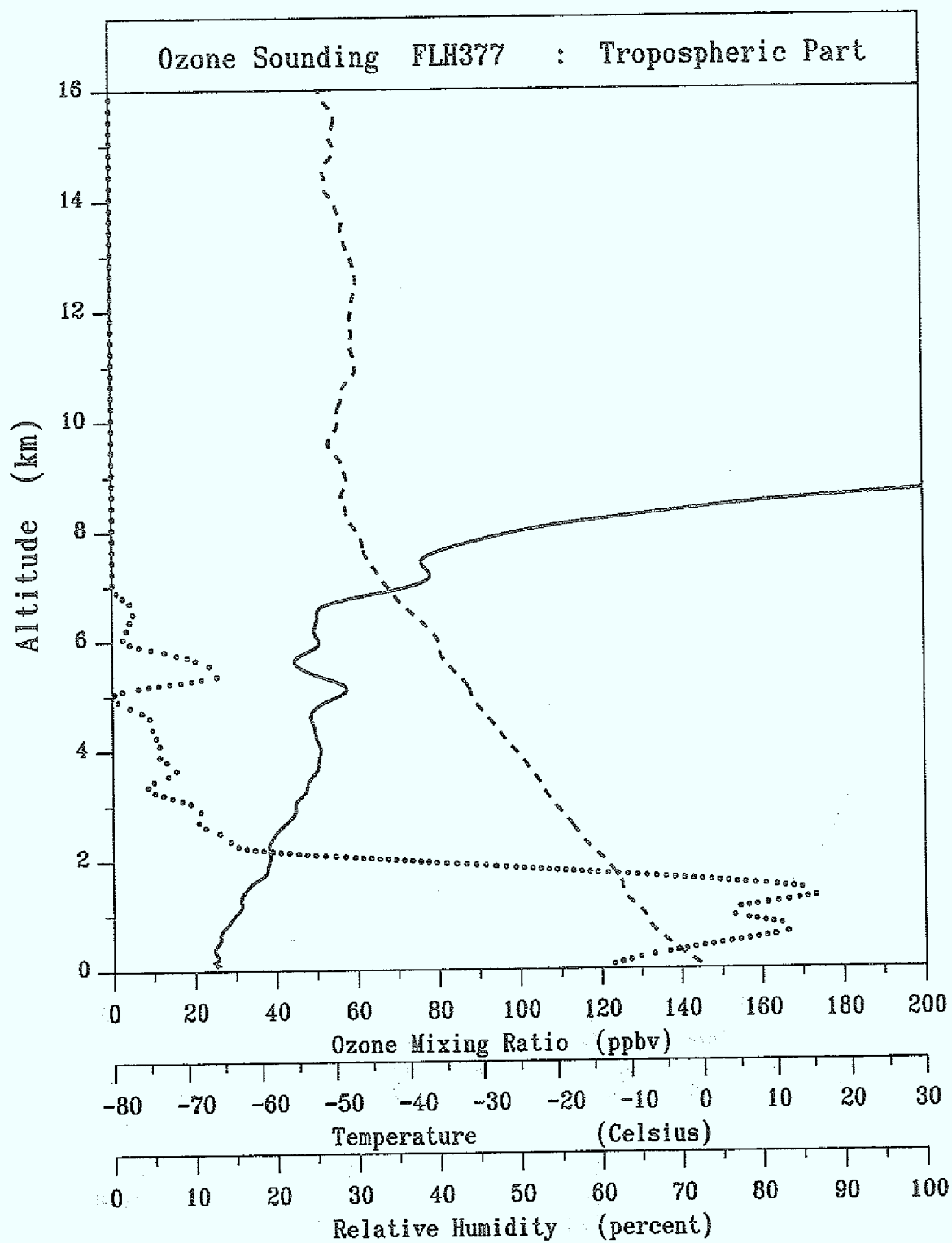
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 --- Temperature
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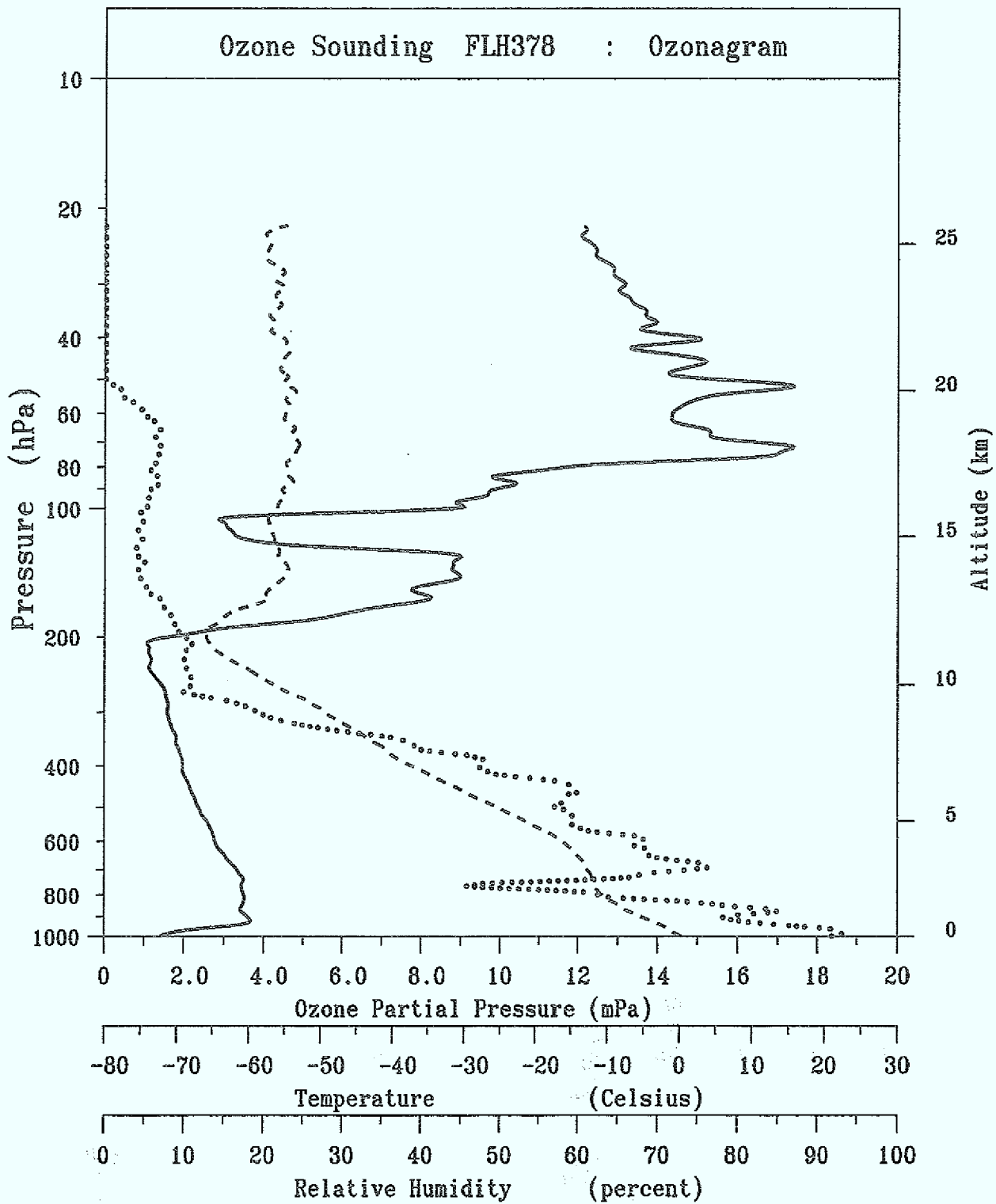


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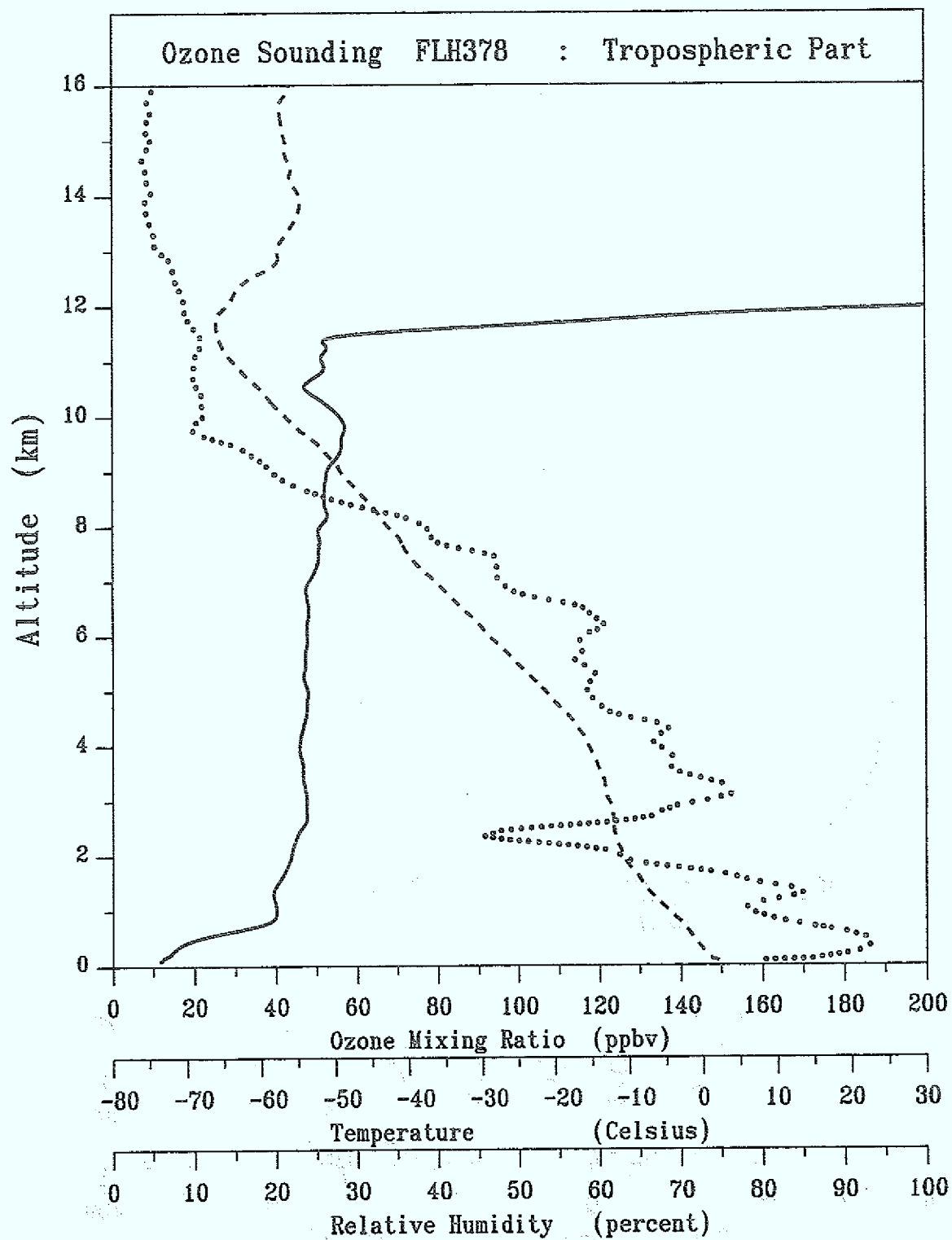
— Ozone
 --- Temperature
 Relative Humidity



Date	17-02-1992	—	Ozone
Time at launch	12:20 (UTC)	- - - -	Temperature
Location : Julich, FRG			Relative Humidity

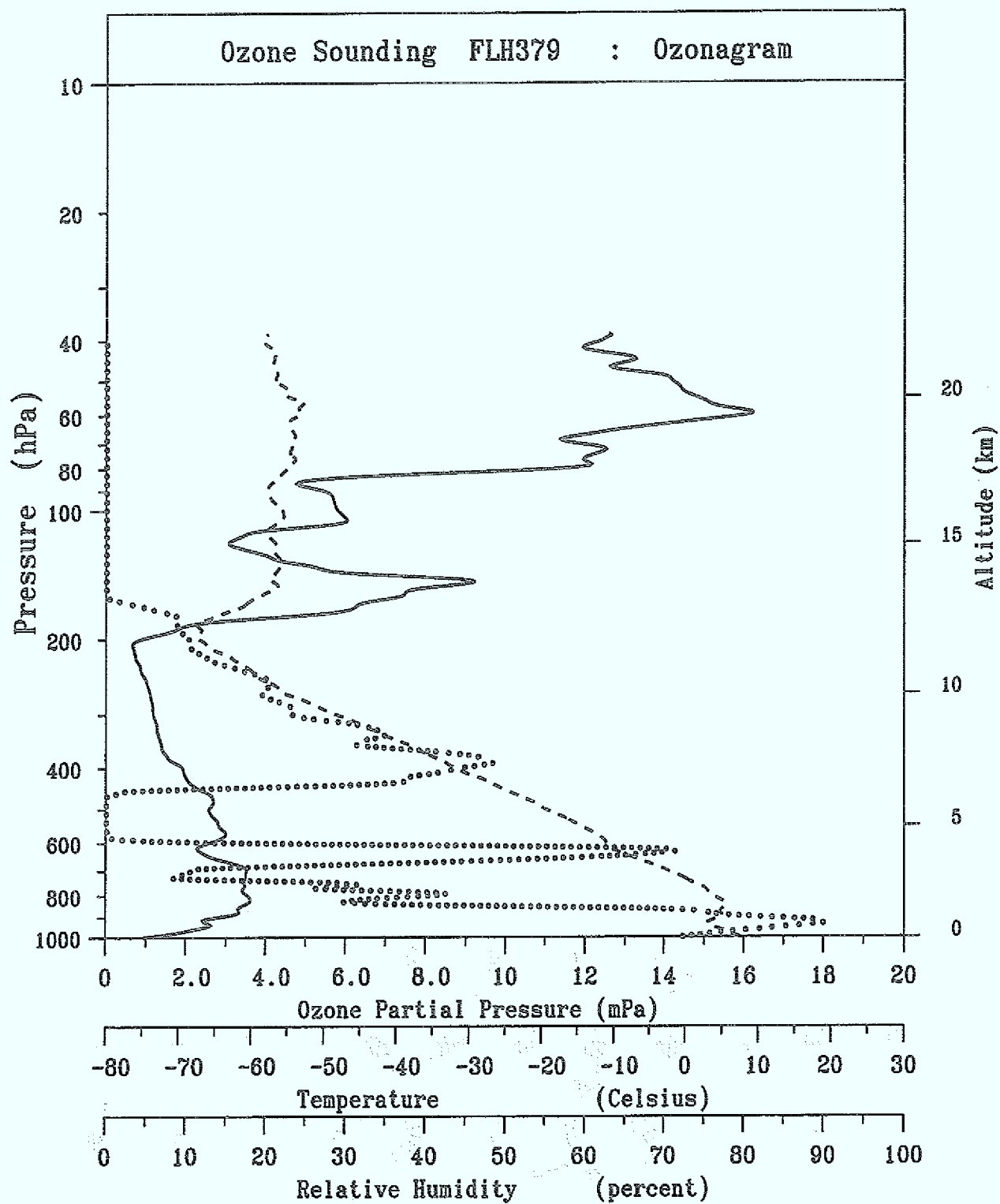


Date	20-02-1992	—	Ozone
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Location	Julich, FRG		Relative Humidity

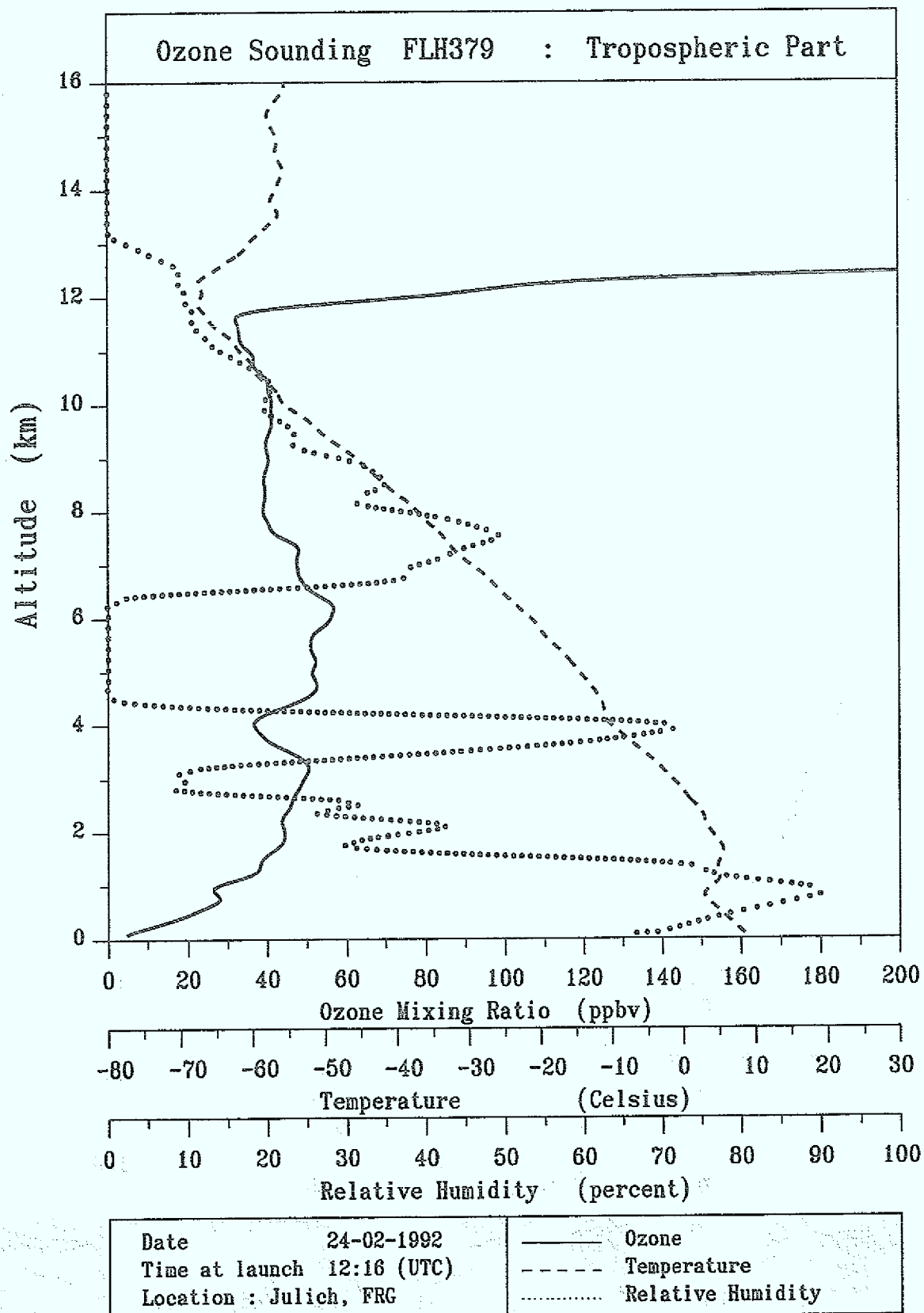


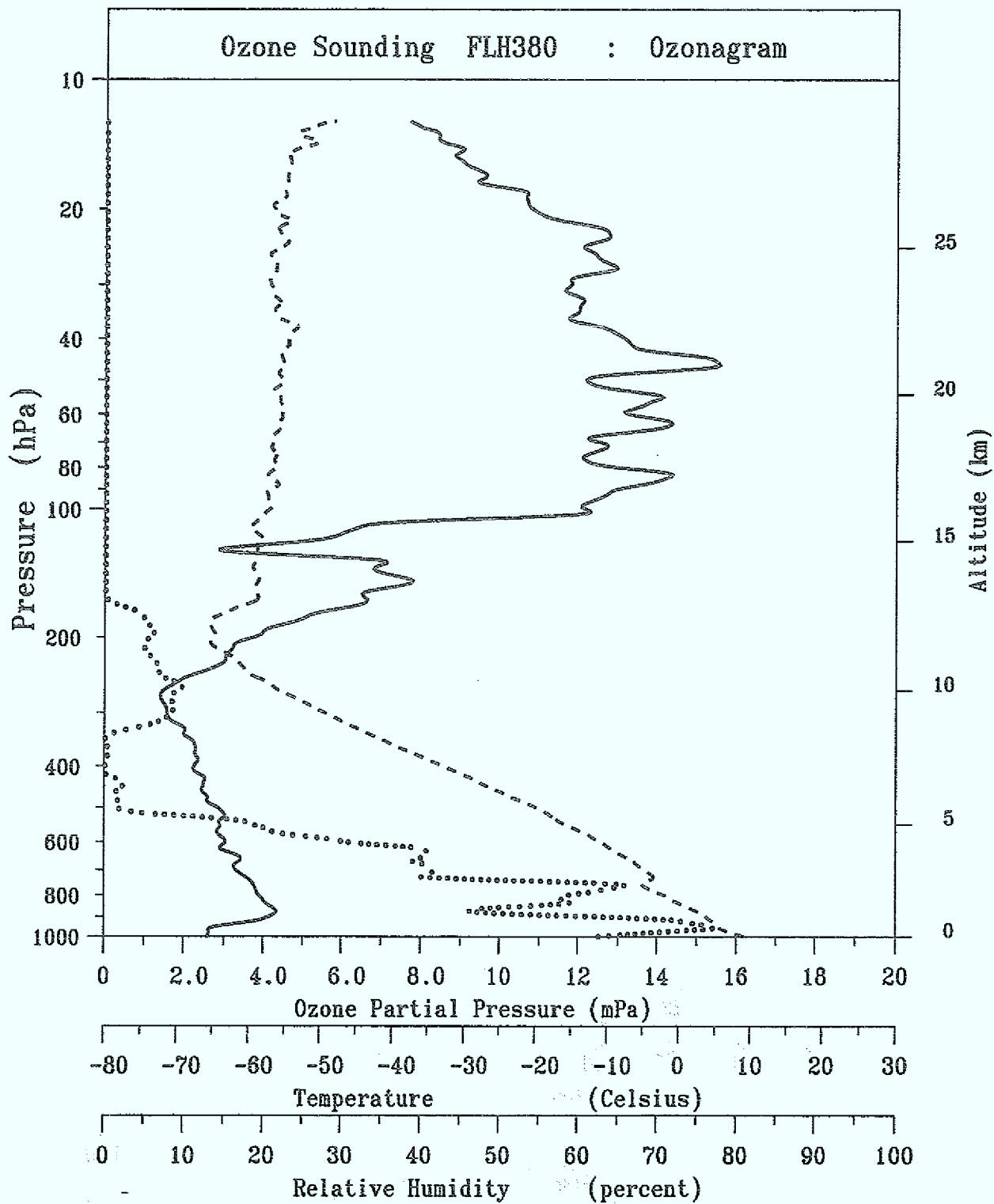
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— Ozone
 --- Temperature
 Relative Humidity



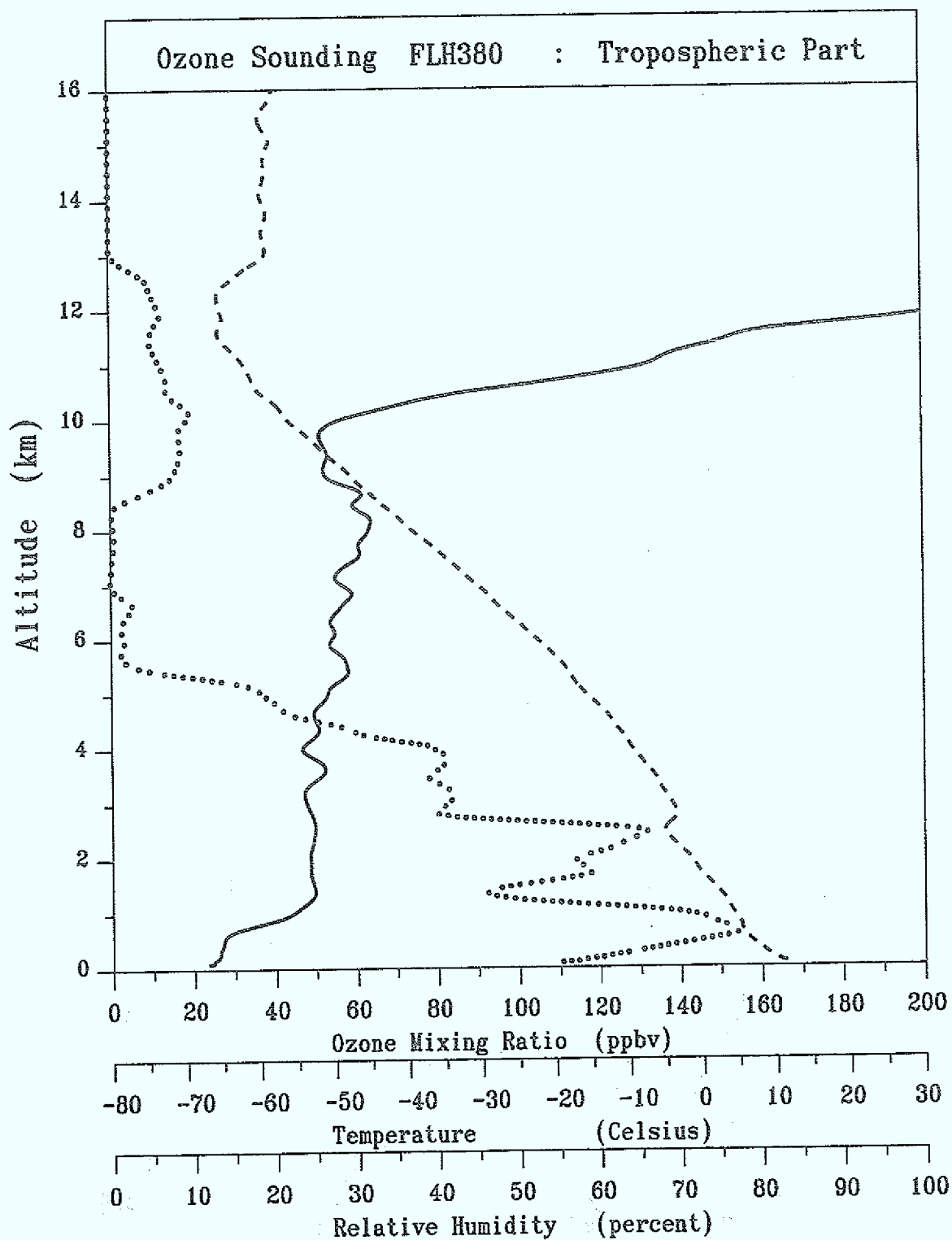
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Location : Julich, FRG			Relative Humidity





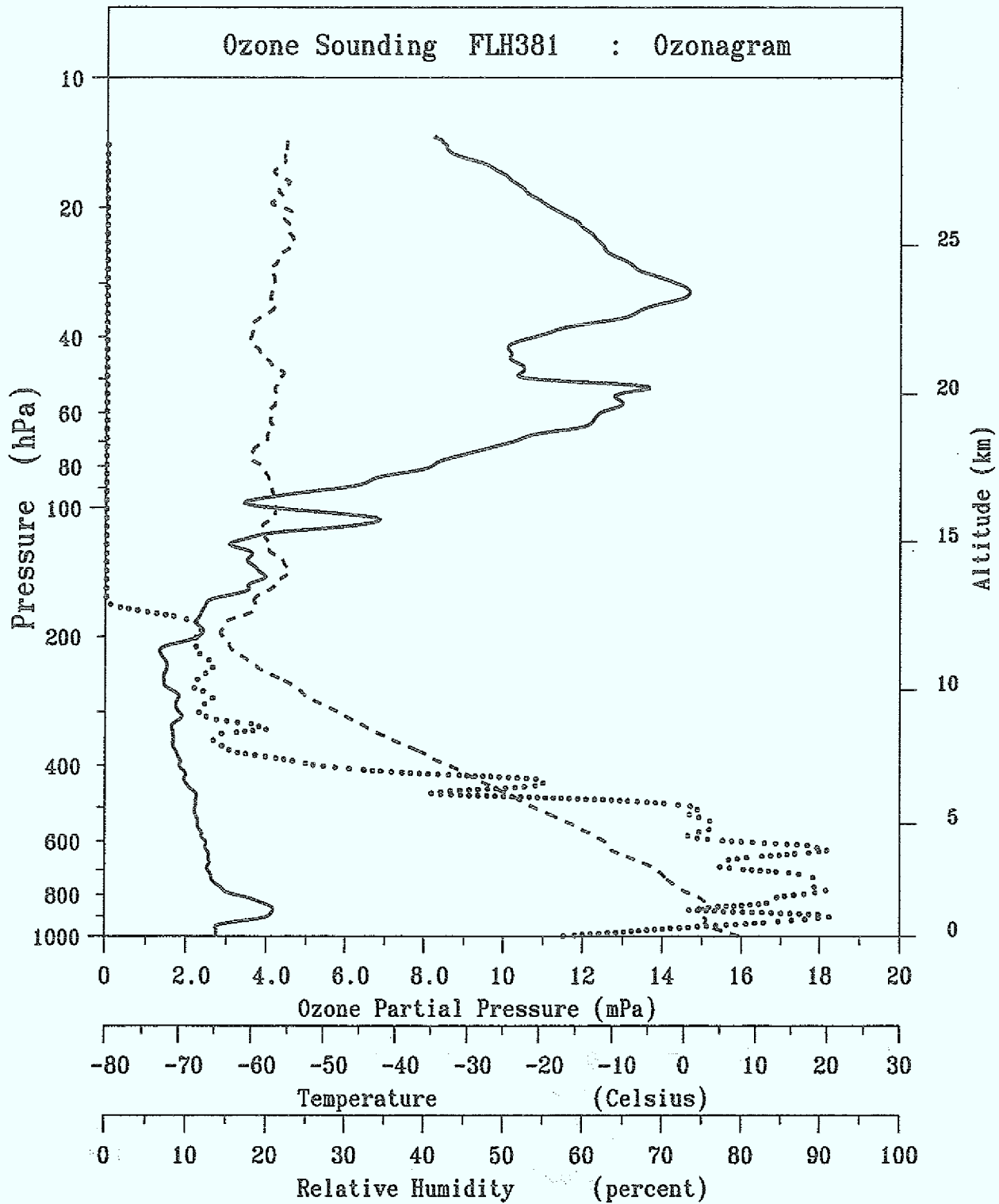
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— Ozone
 - - - Temperature
 Relative Humidity



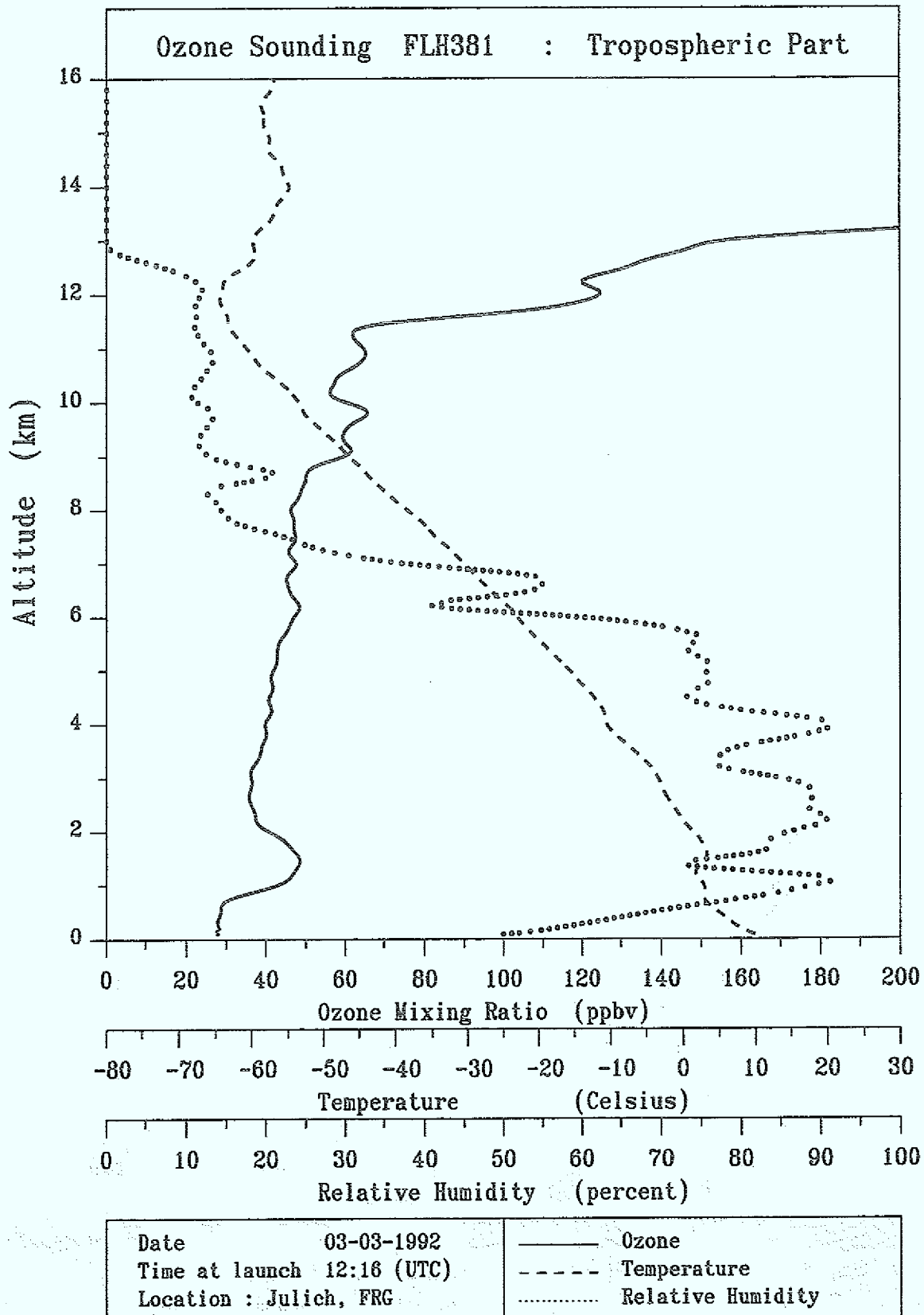
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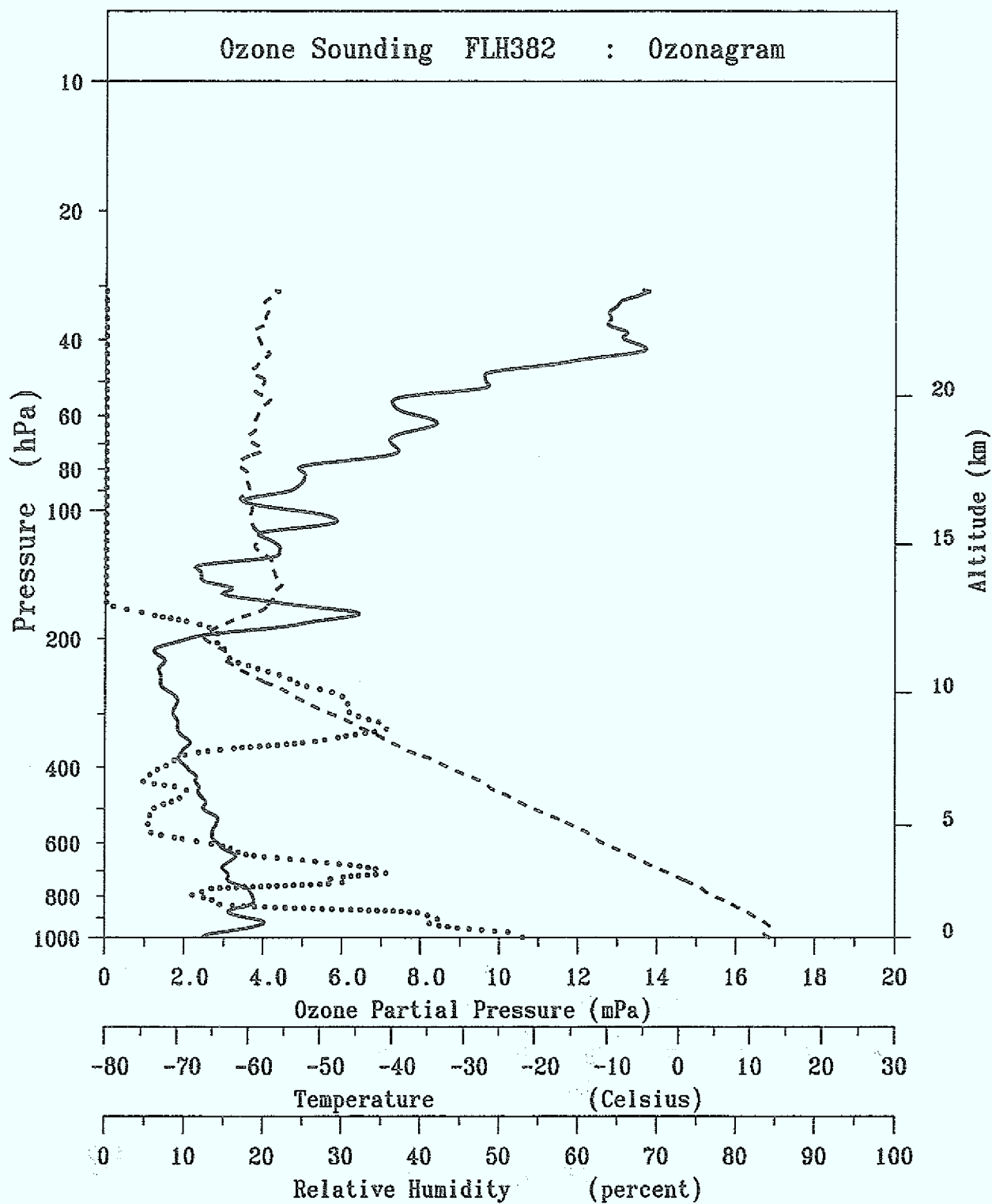
— Ozone
 - - - Temperature
 Relative Humidity



Date 03-03-1992
 Time at launch 12:16 (UTC)
 Location : Julich, FRG

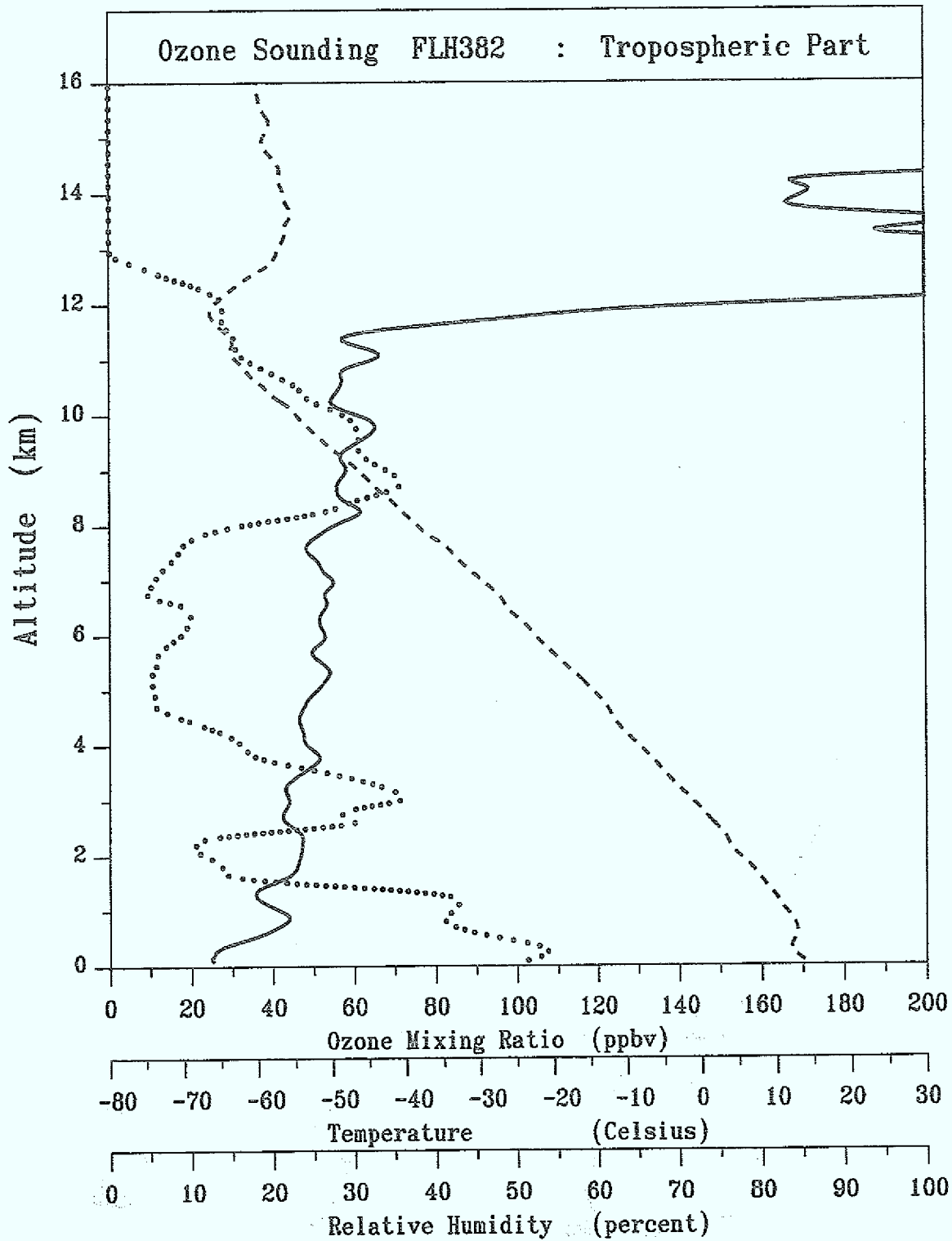
— Ozone
 --- Temperature
 Relative Humidity





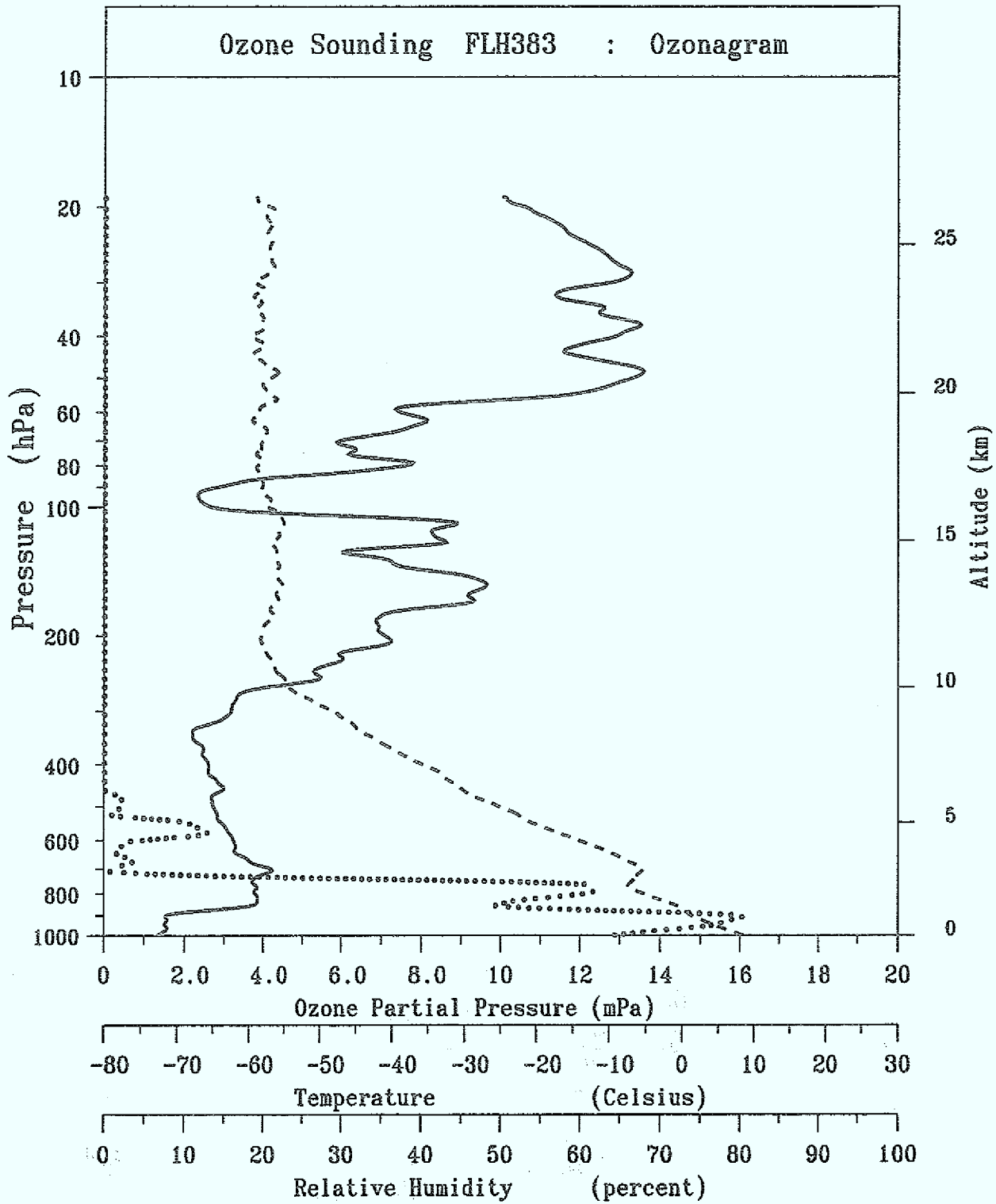
Date 05-03-1992
 Time at launch 12:20 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity



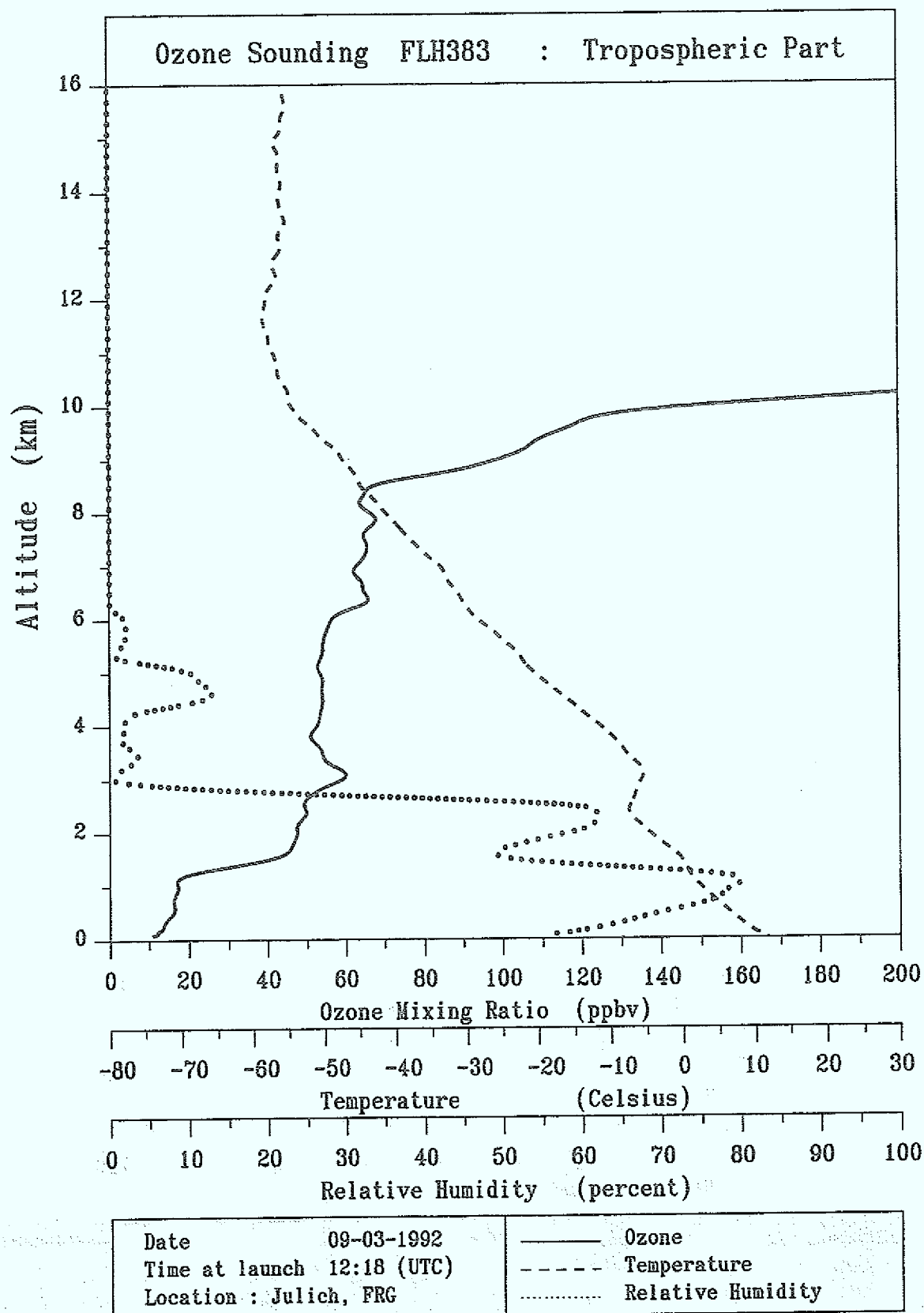
Date 05-03-1992
 Time at launch 12:20 (UTC)
 Location : Julich, FRG

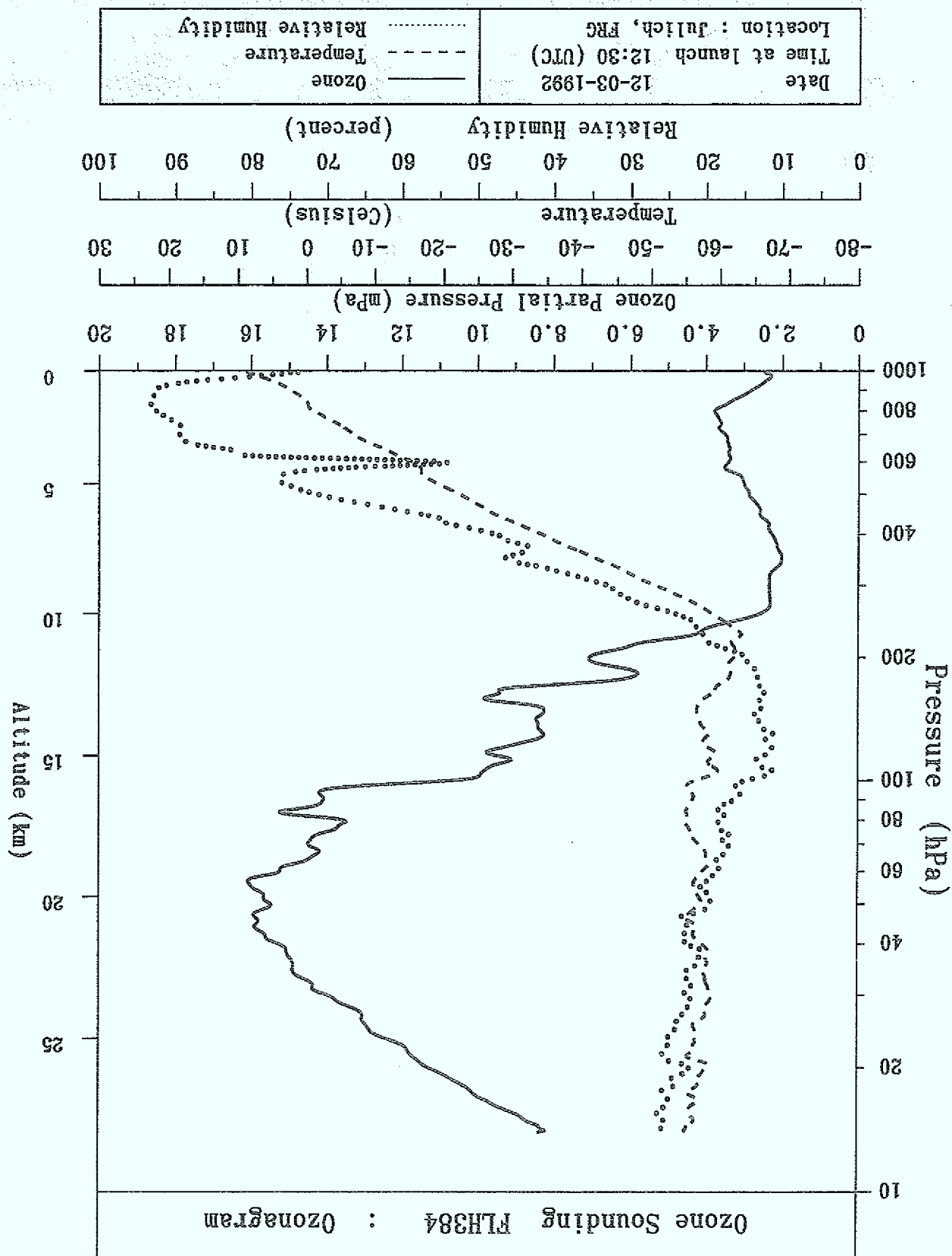
——— Ozone
 - - - - - Temperature
 Relative Humidity

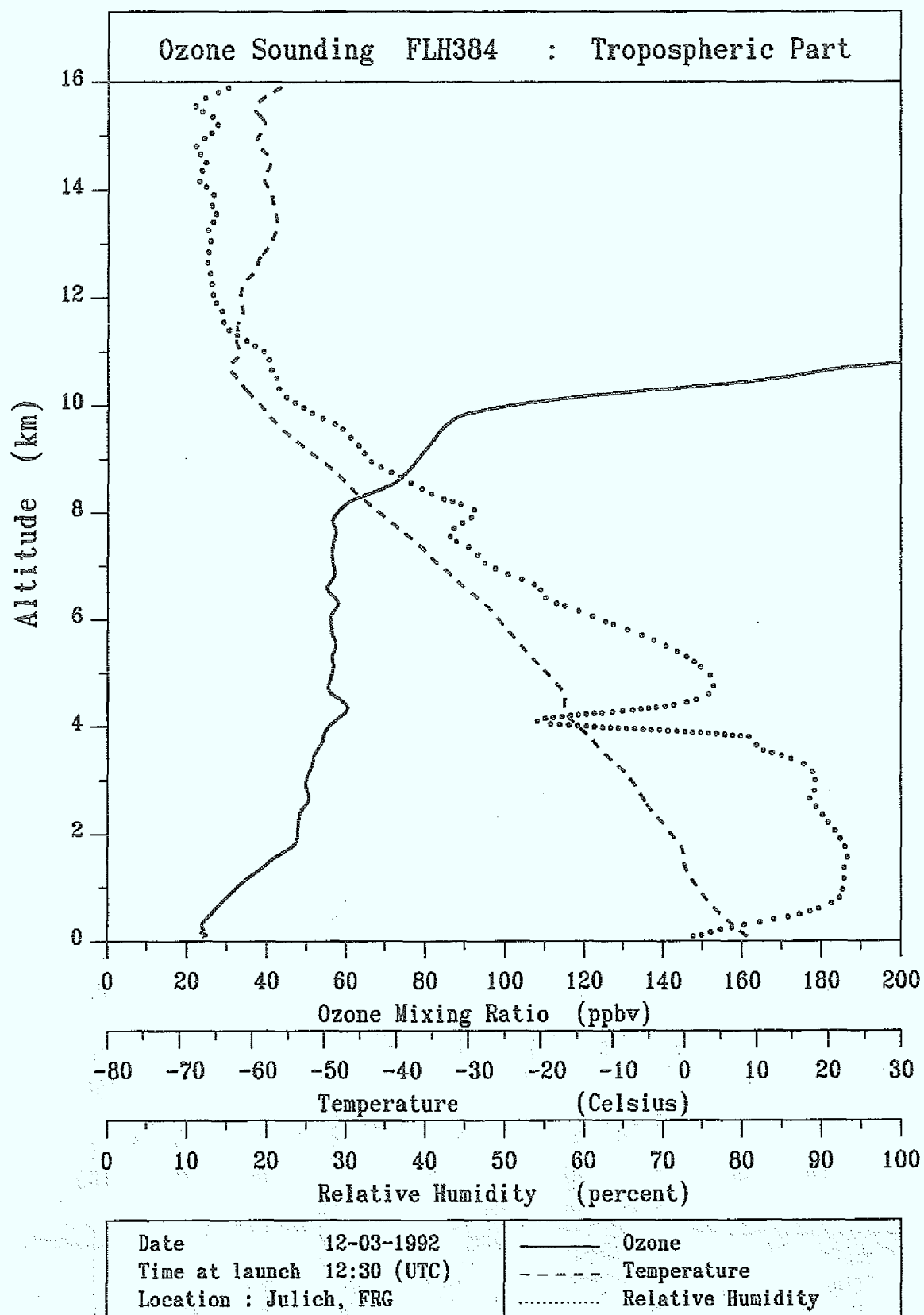


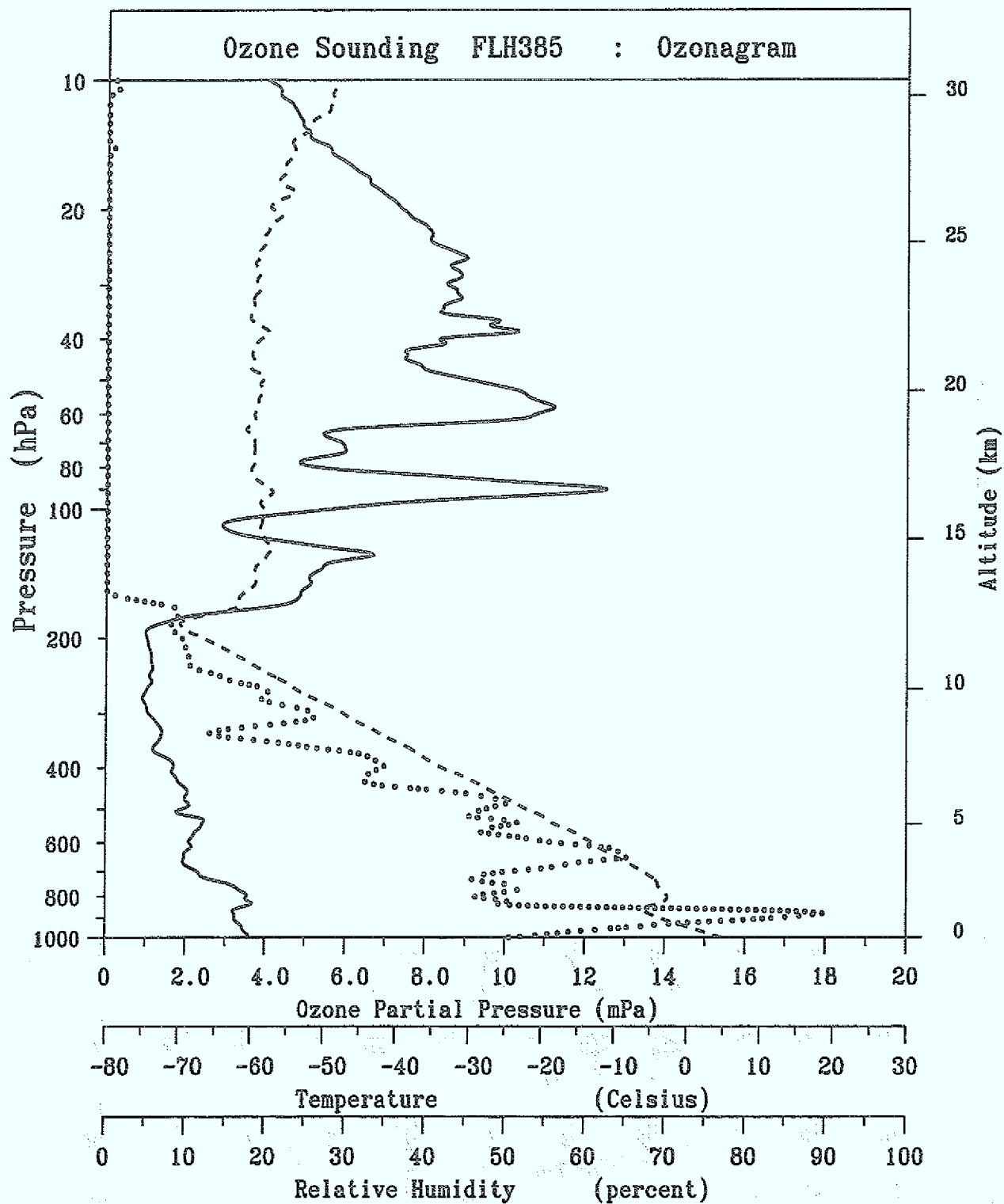
Date 09-03-1992
 Time at launch 12:18 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity





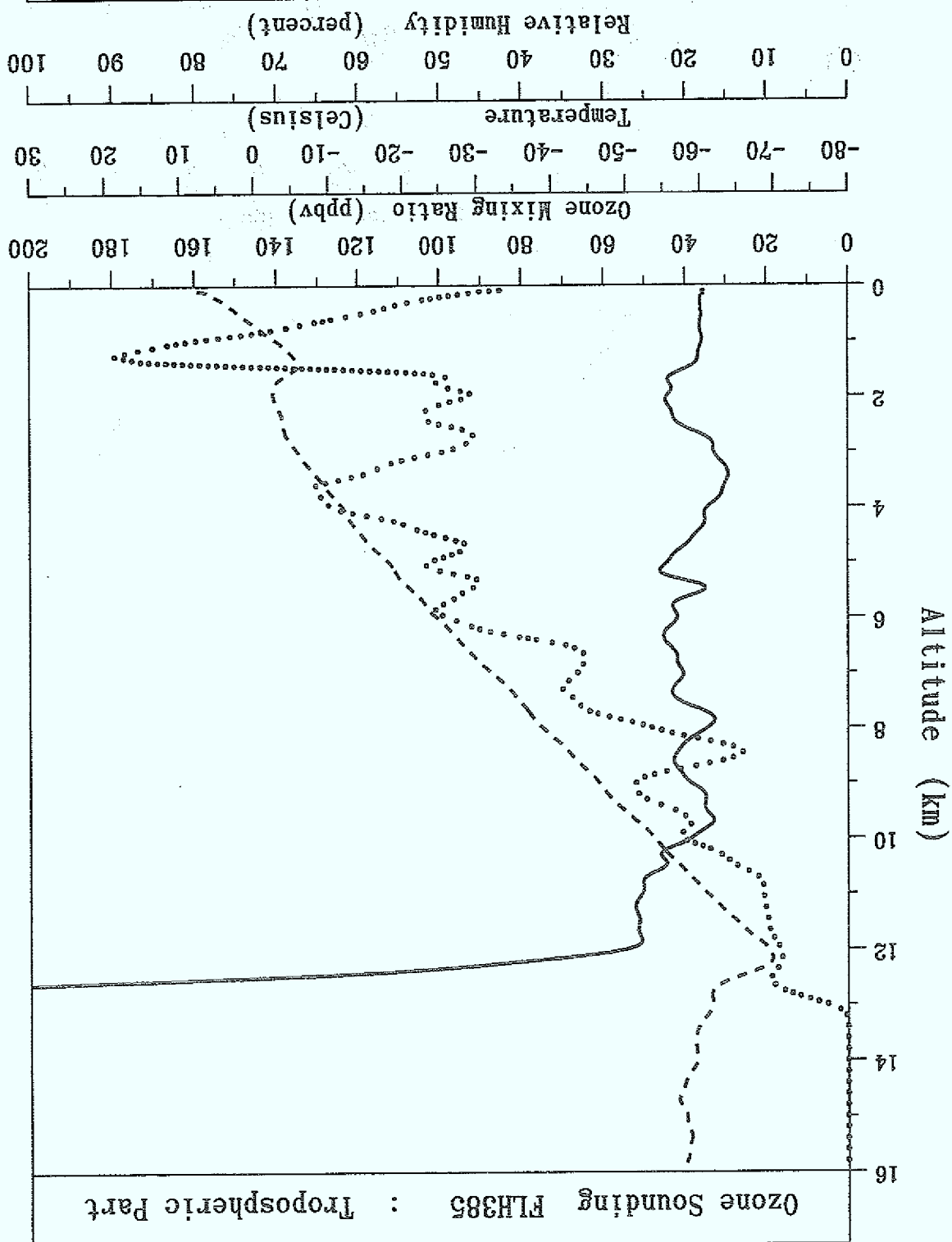


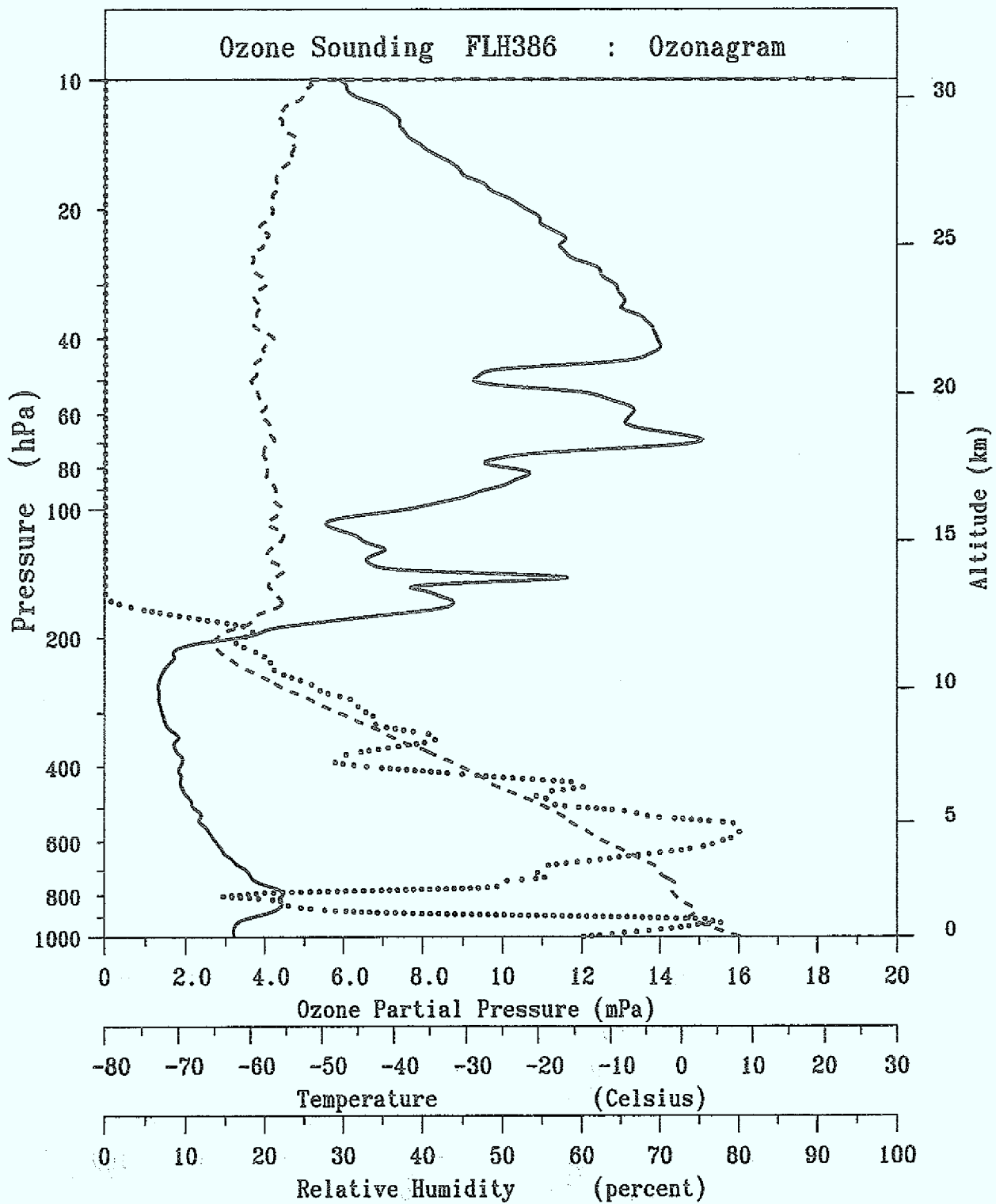


Date 16-03-1992
 Time at launch 12:25 (UTC)
 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity

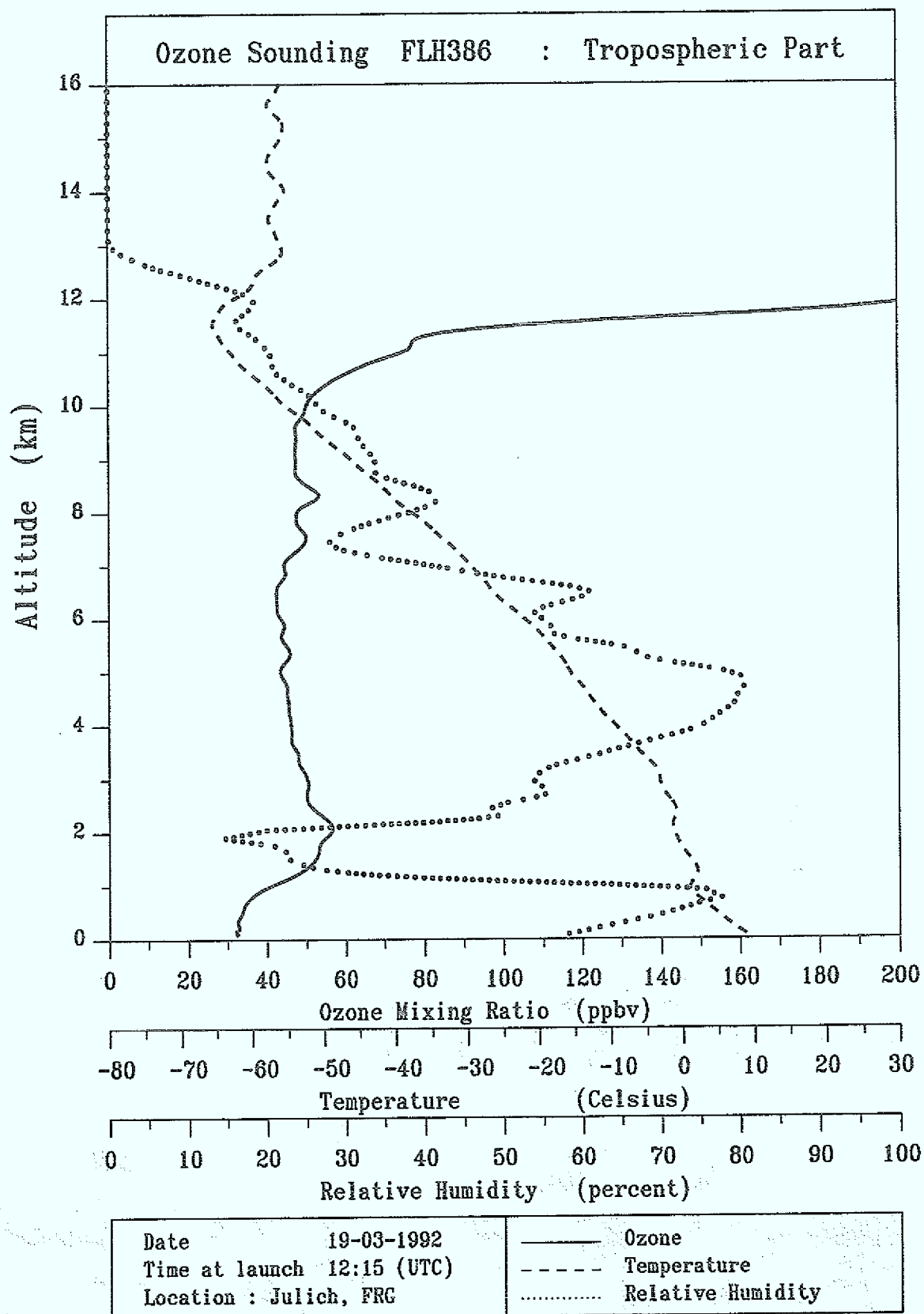
Date	16-03-1992
Time at launch	12:25 (UTC)
Location	Julich, FRG
Ozone	—
Temperature	- - -
Relative Humidity	.....

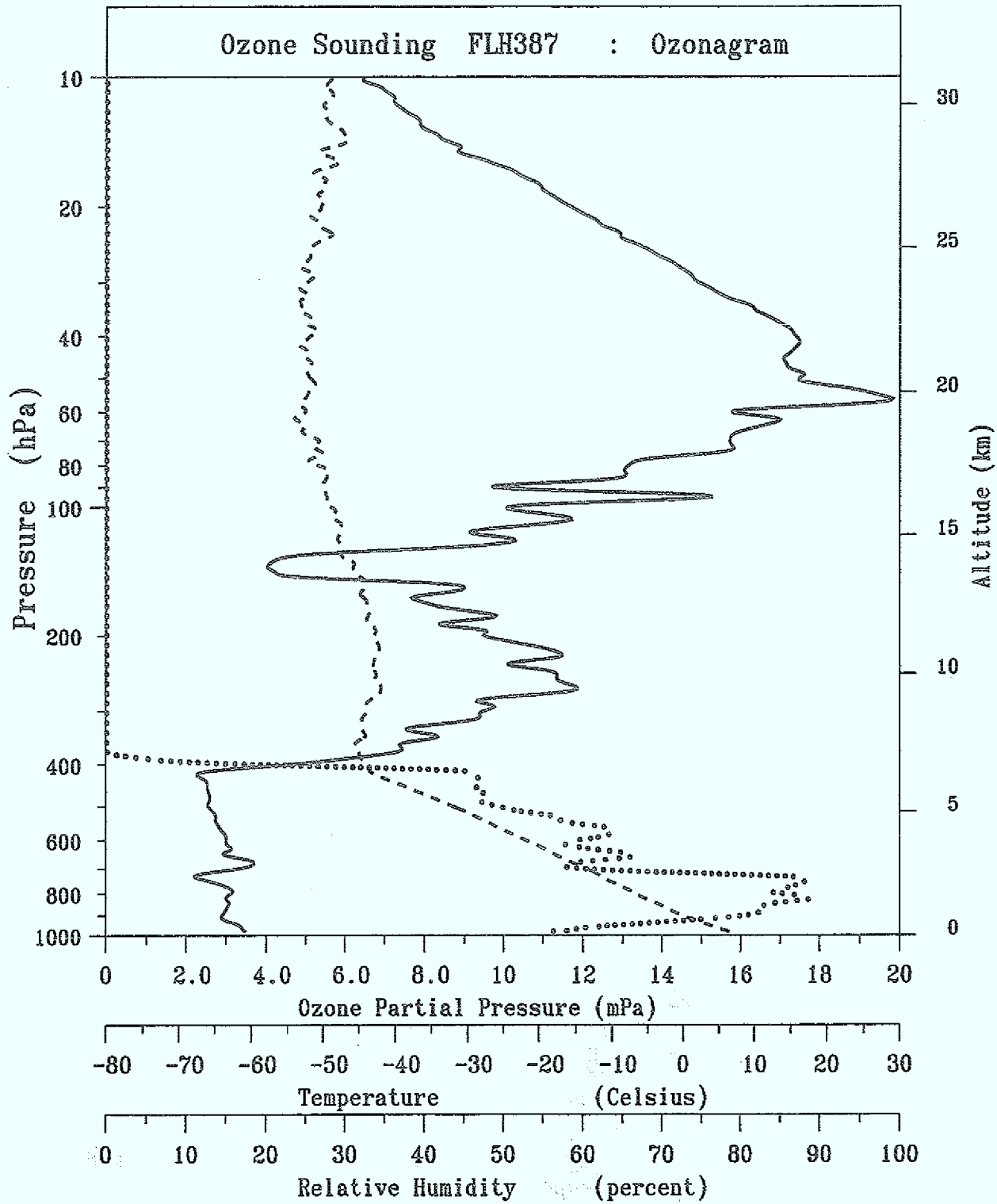




Date 19-03-1992
 Time at launch 12:15 (UTC)
 Location : Julich, FRG

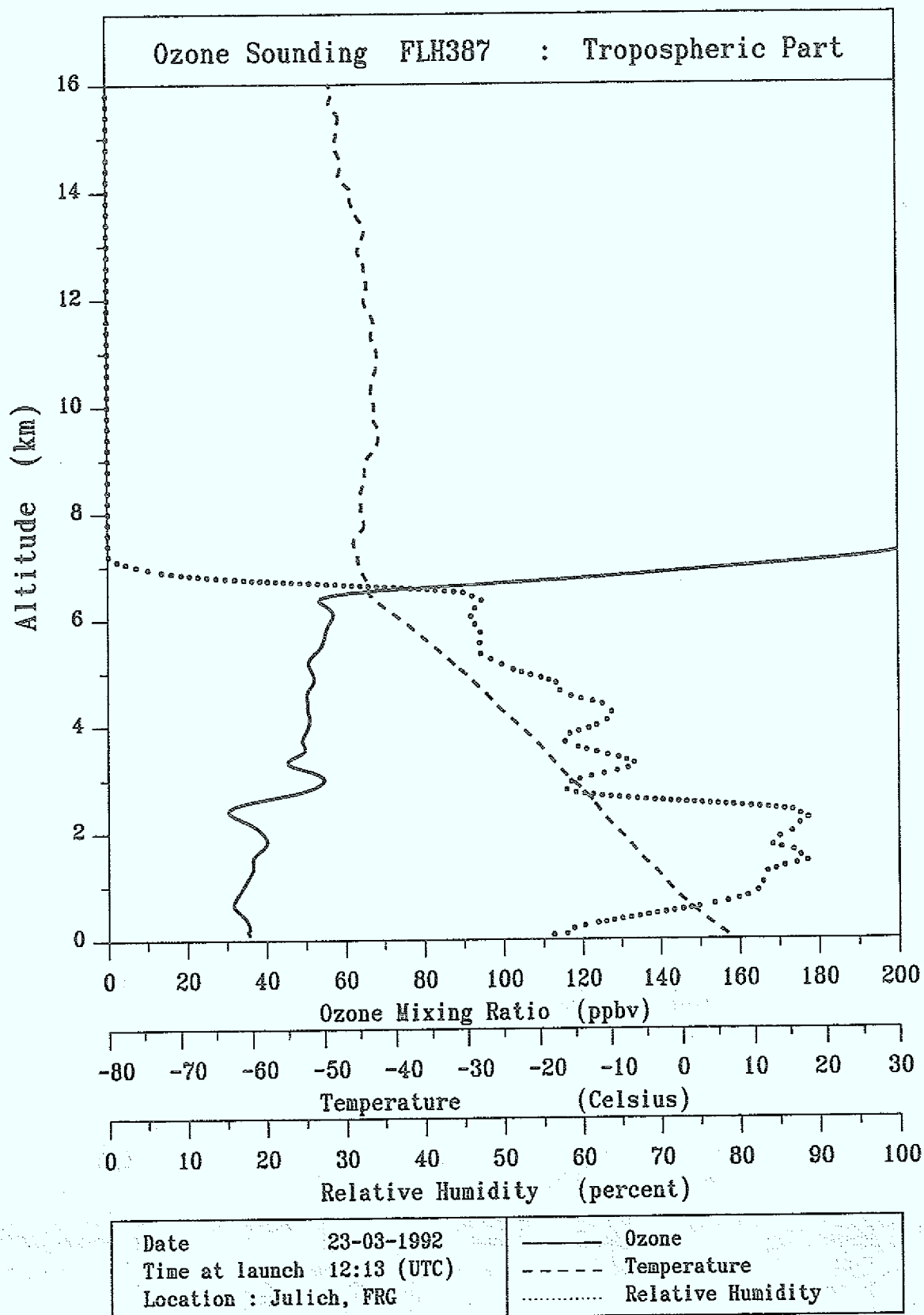
— Ozone
 - - - - Temperature
 Relative Humidity

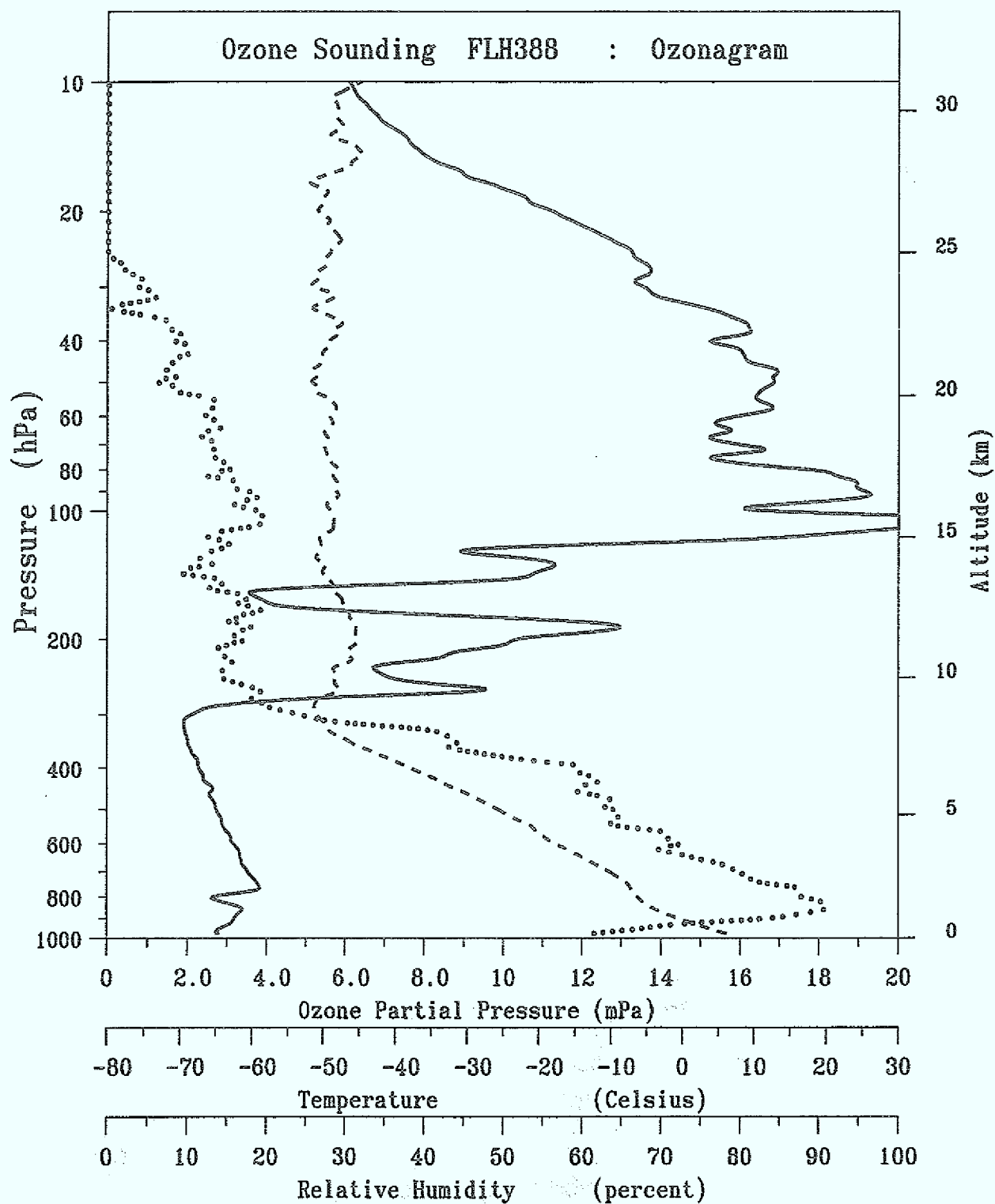




Date 23-03-1992
 Time at launch 12:13 (UTC)
 Location : Julich, FRG

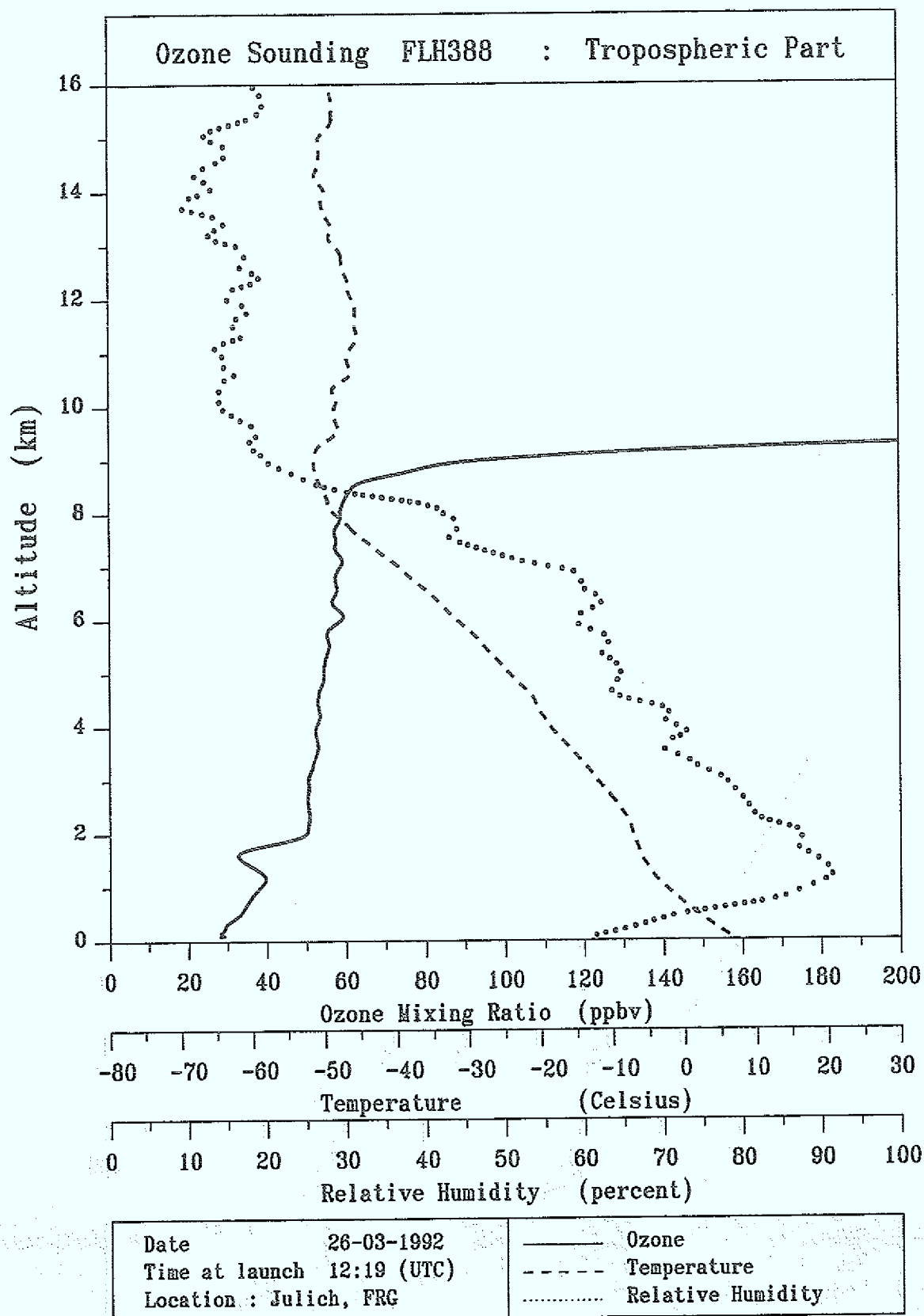
— Ozone
 - - - - Temperature
 Relative Humidity

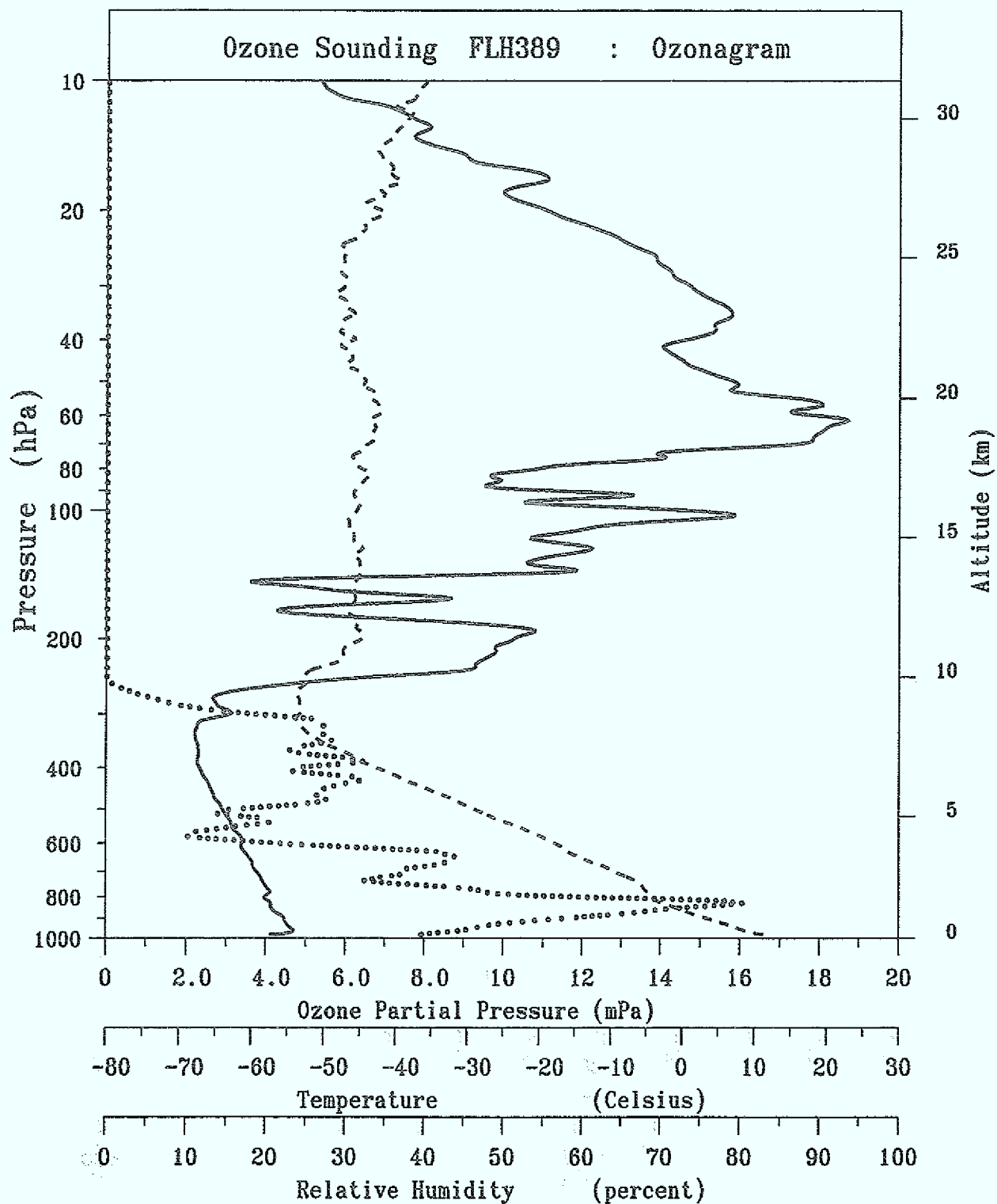




Date 26-03-1992
 Time at launch 12:19 (UTC)
 Location : Julich, FRG

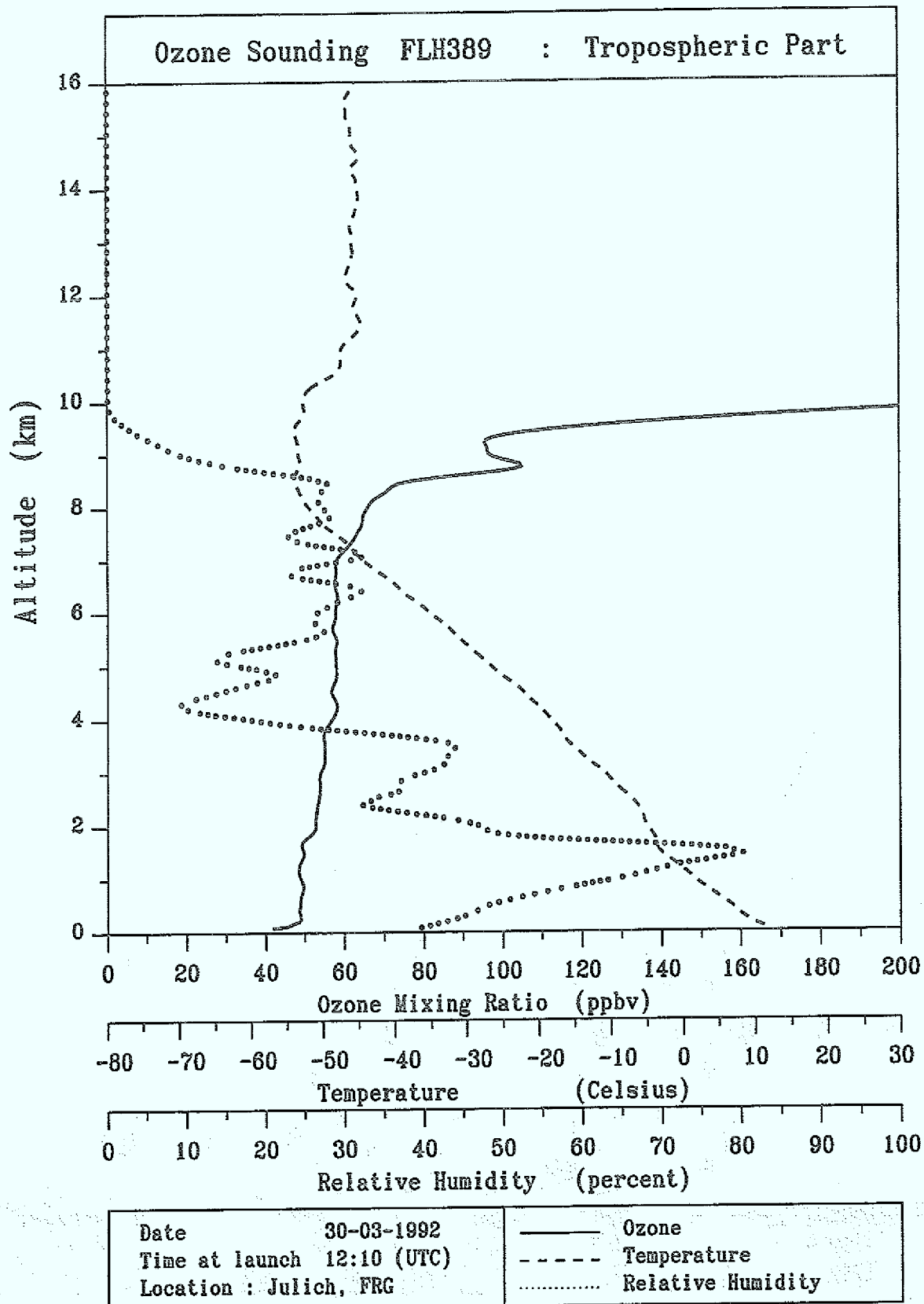
— Ozone
 - - - Temperature
 Relative Humidity

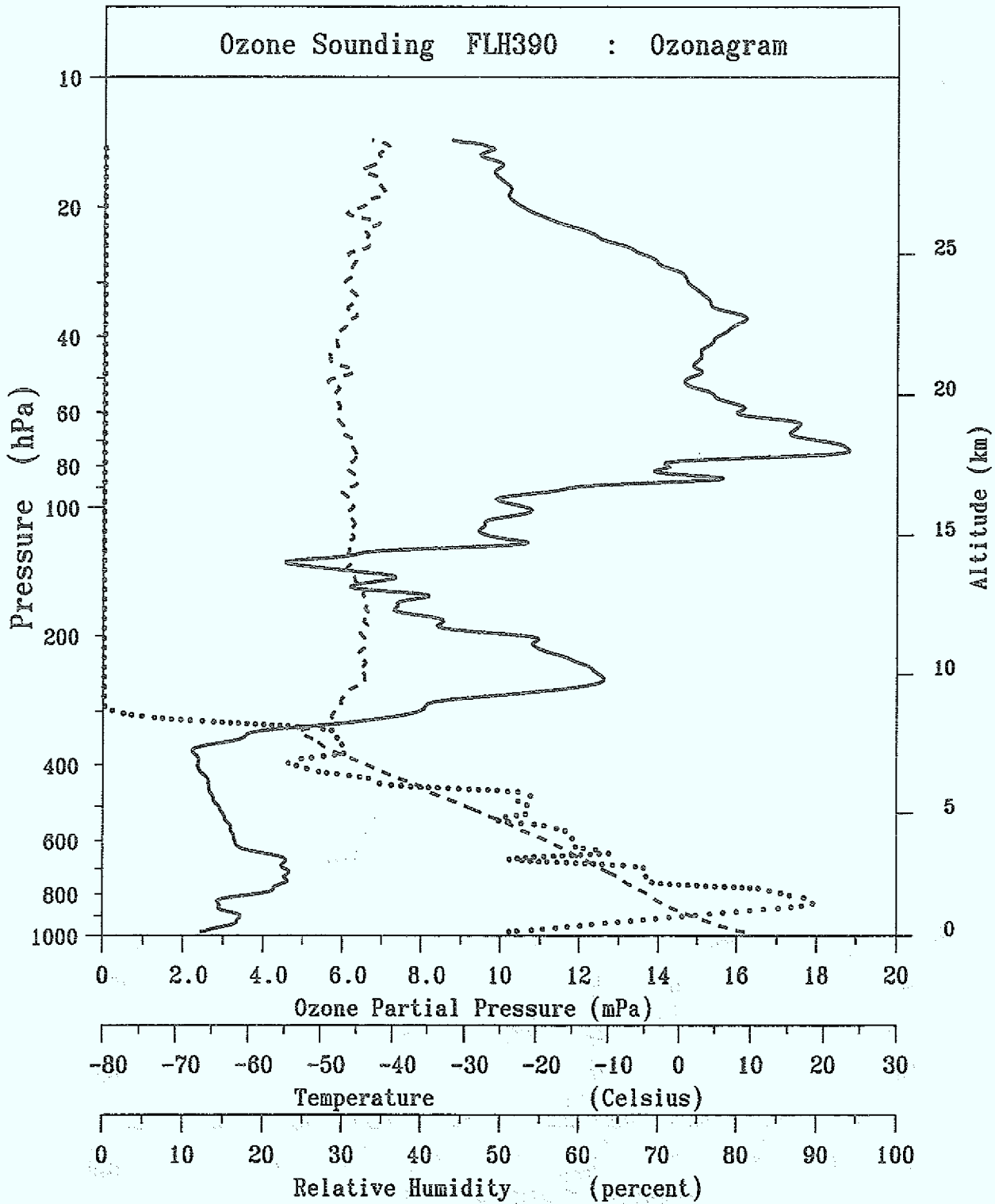




Date 30-03-1992
 Time at launch 12:10 (UTC)
 Location : Julich, FRG

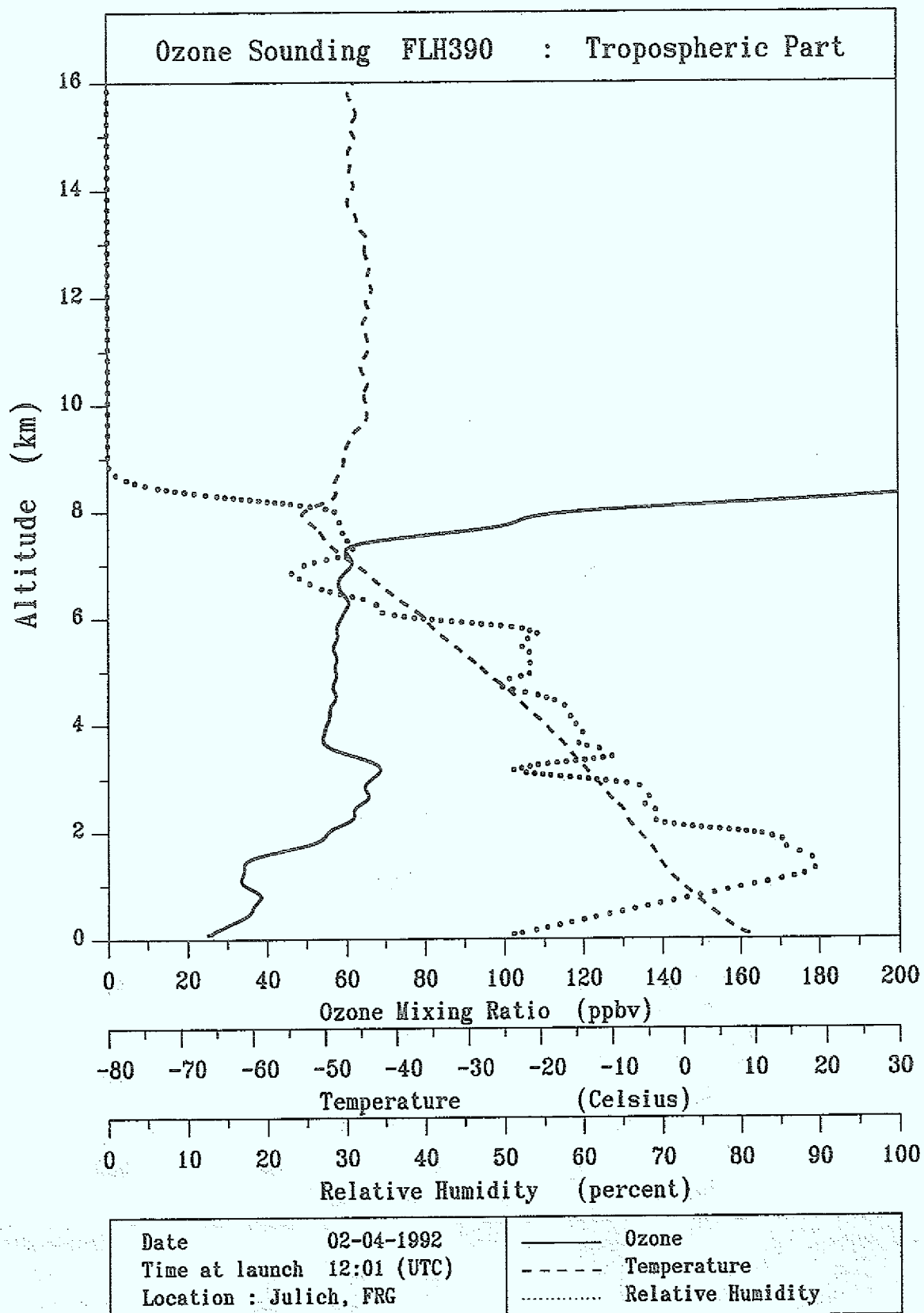
— Ozone
 --- Temperature
 Relative Humidity

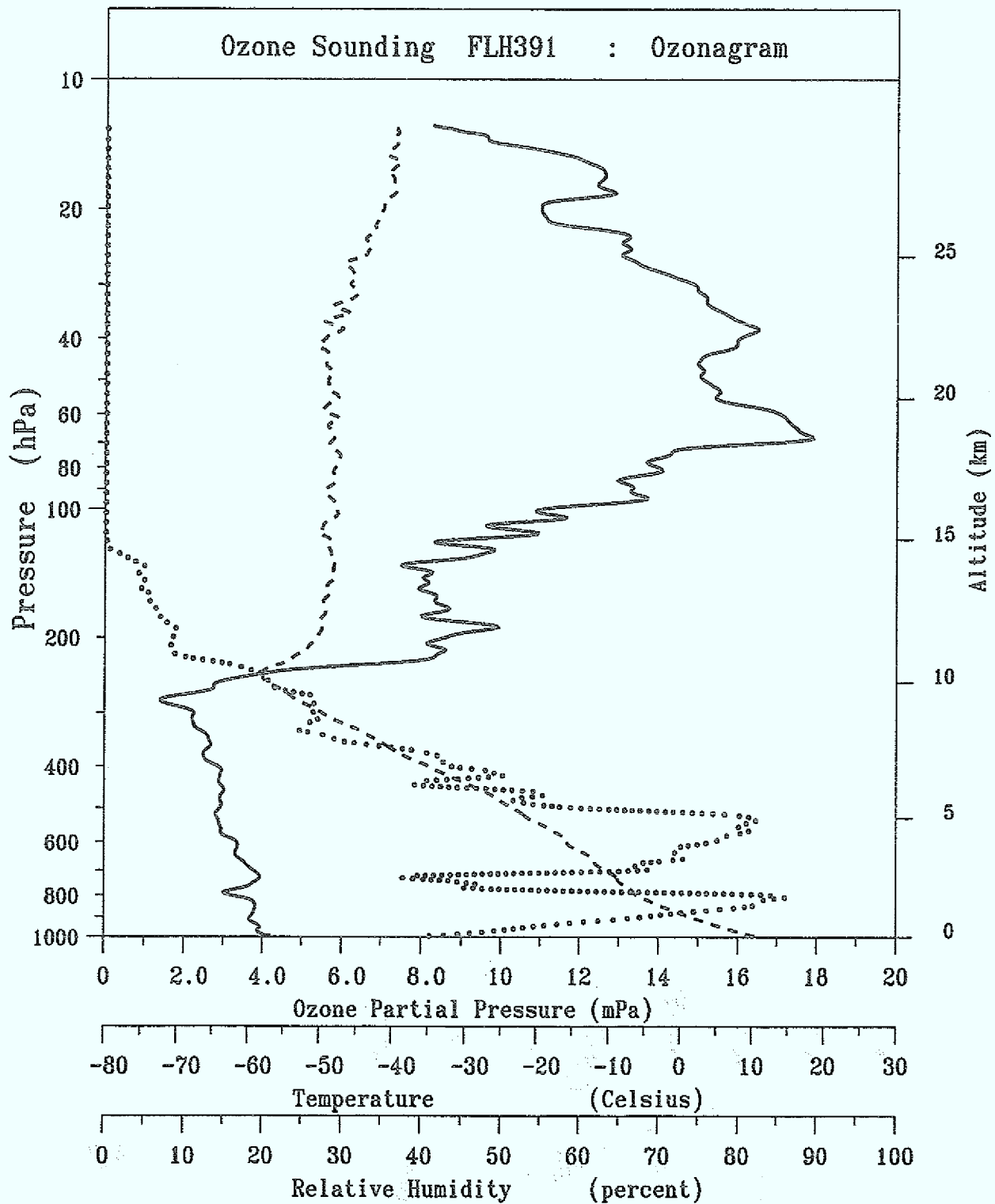




Date 02-04-1992
 Time at launch 12:01 (UTC)
 Location : Julich, FRG

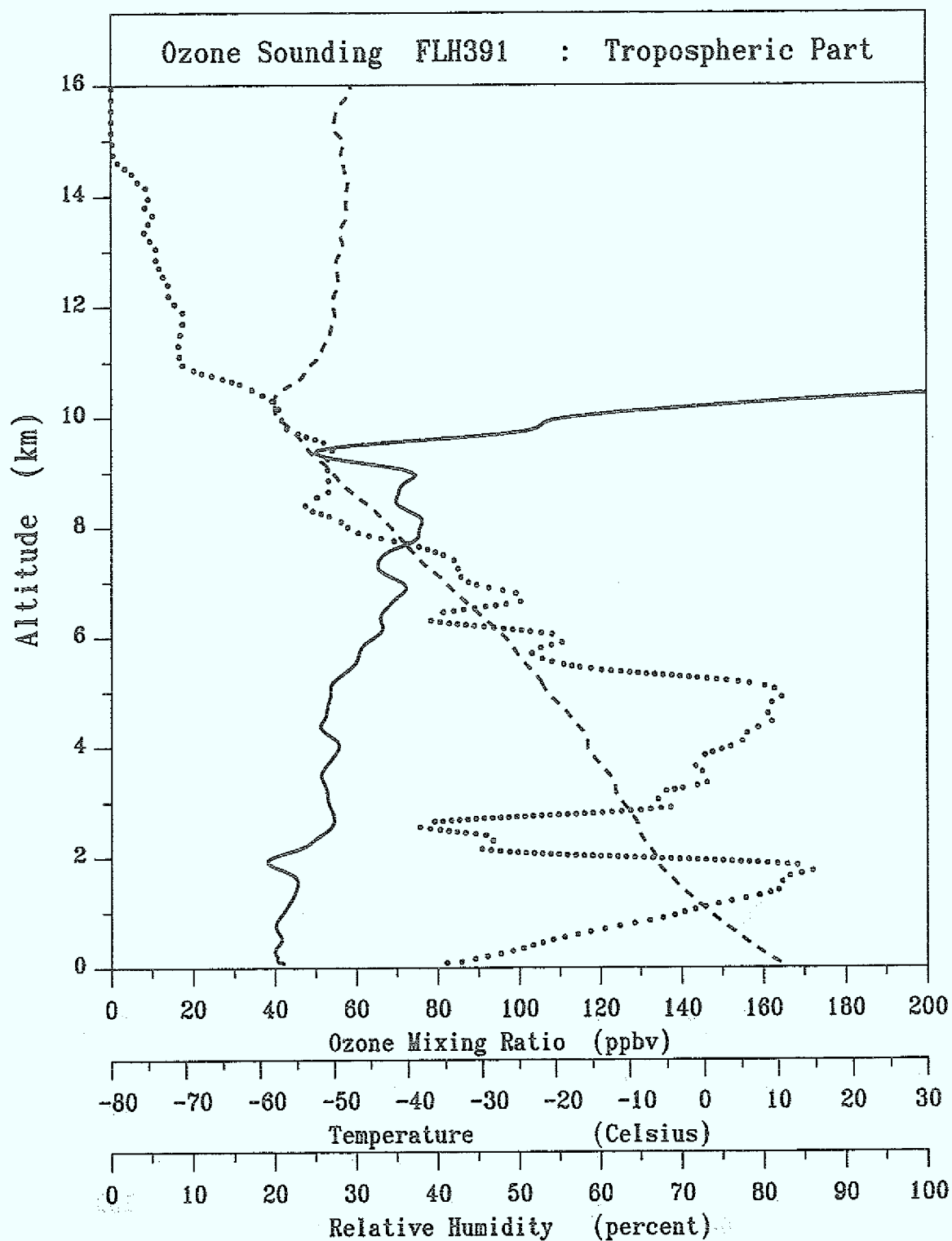
— Ozone
 --- Temperature
 Relative Humidity





Date 06-04-1992
 Time at launch 12:05 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity



Date 06-04-1992

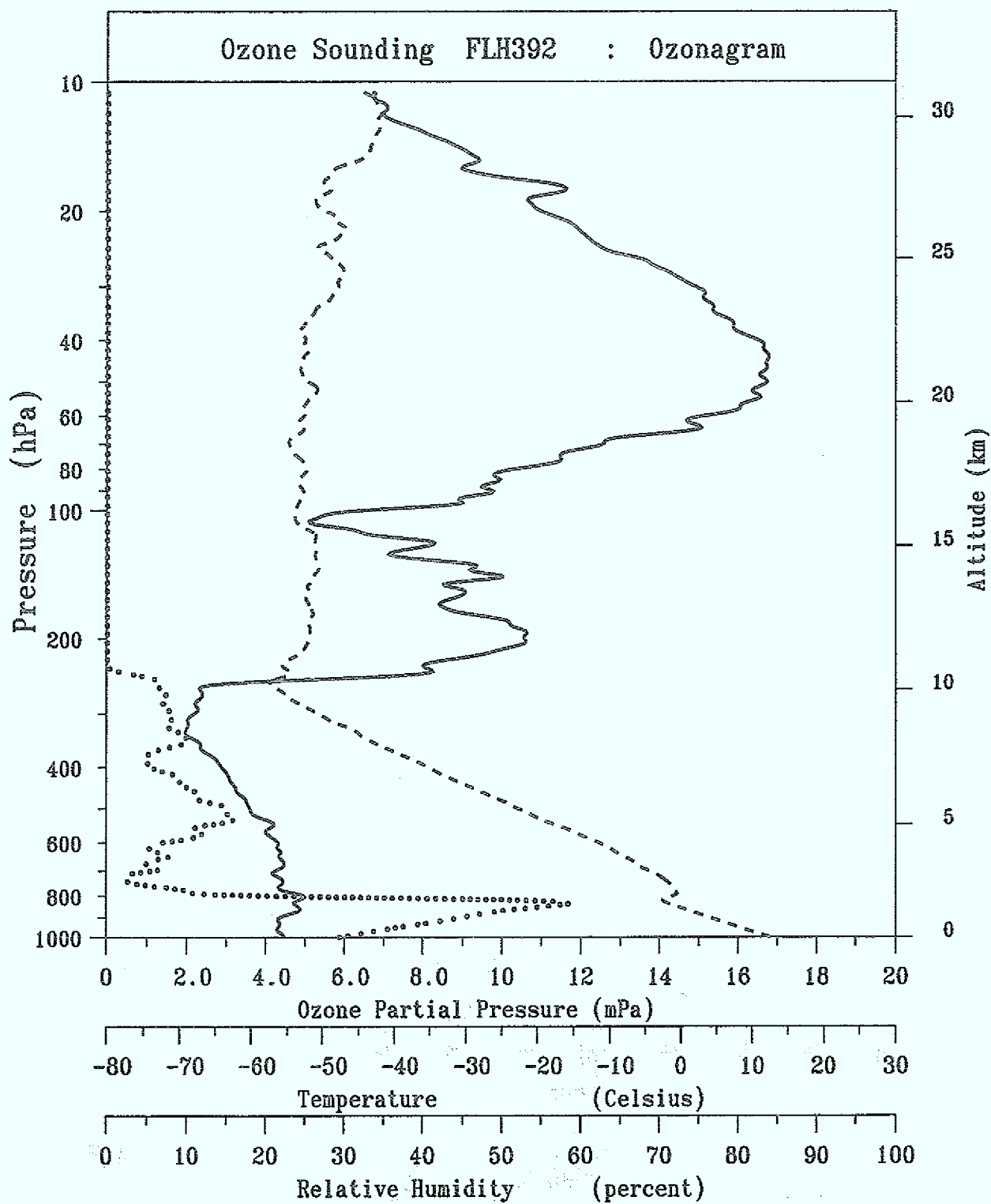
Time at launch 12:05 (UTC)

Location : Julich, FRG

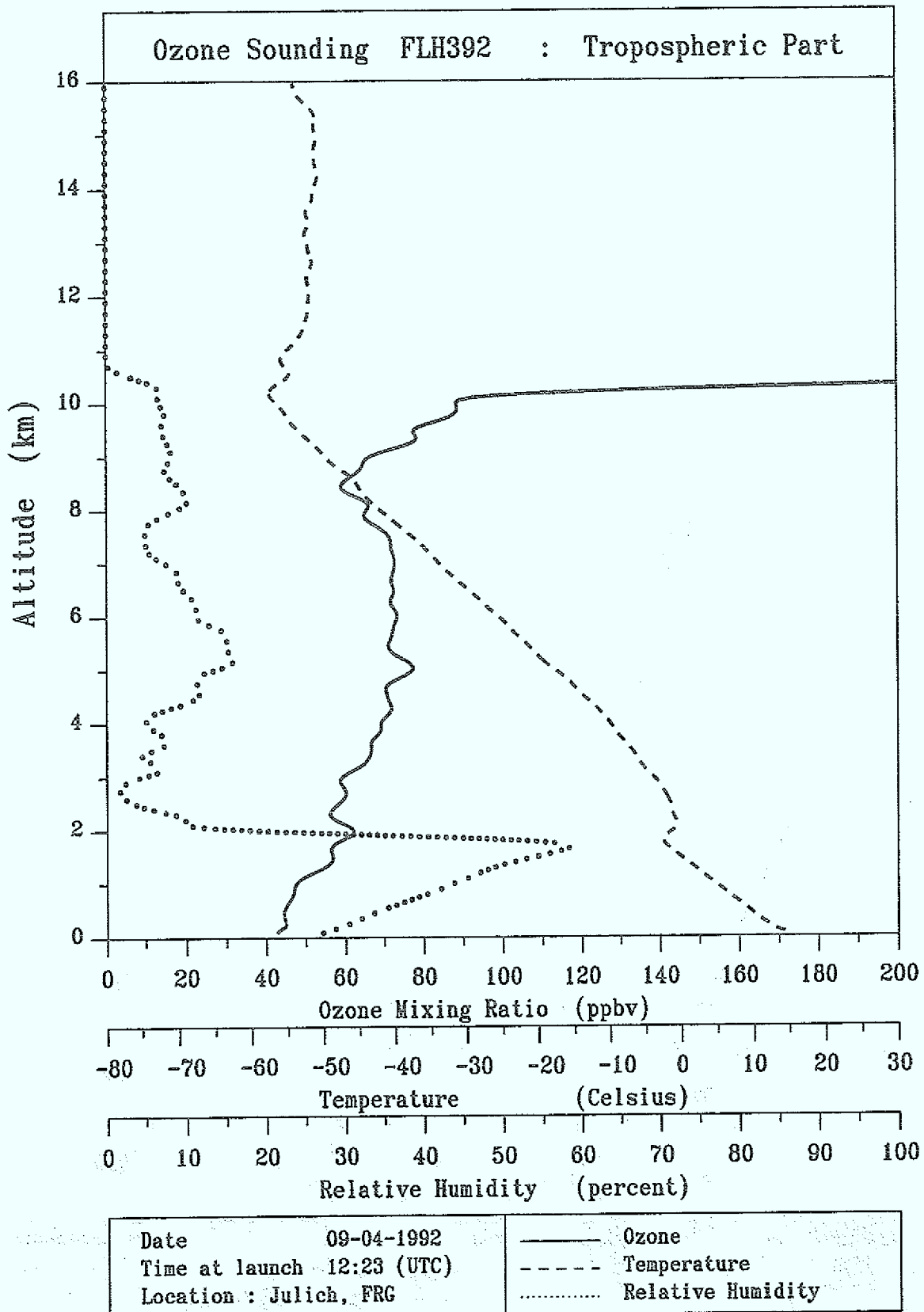
— Ozone

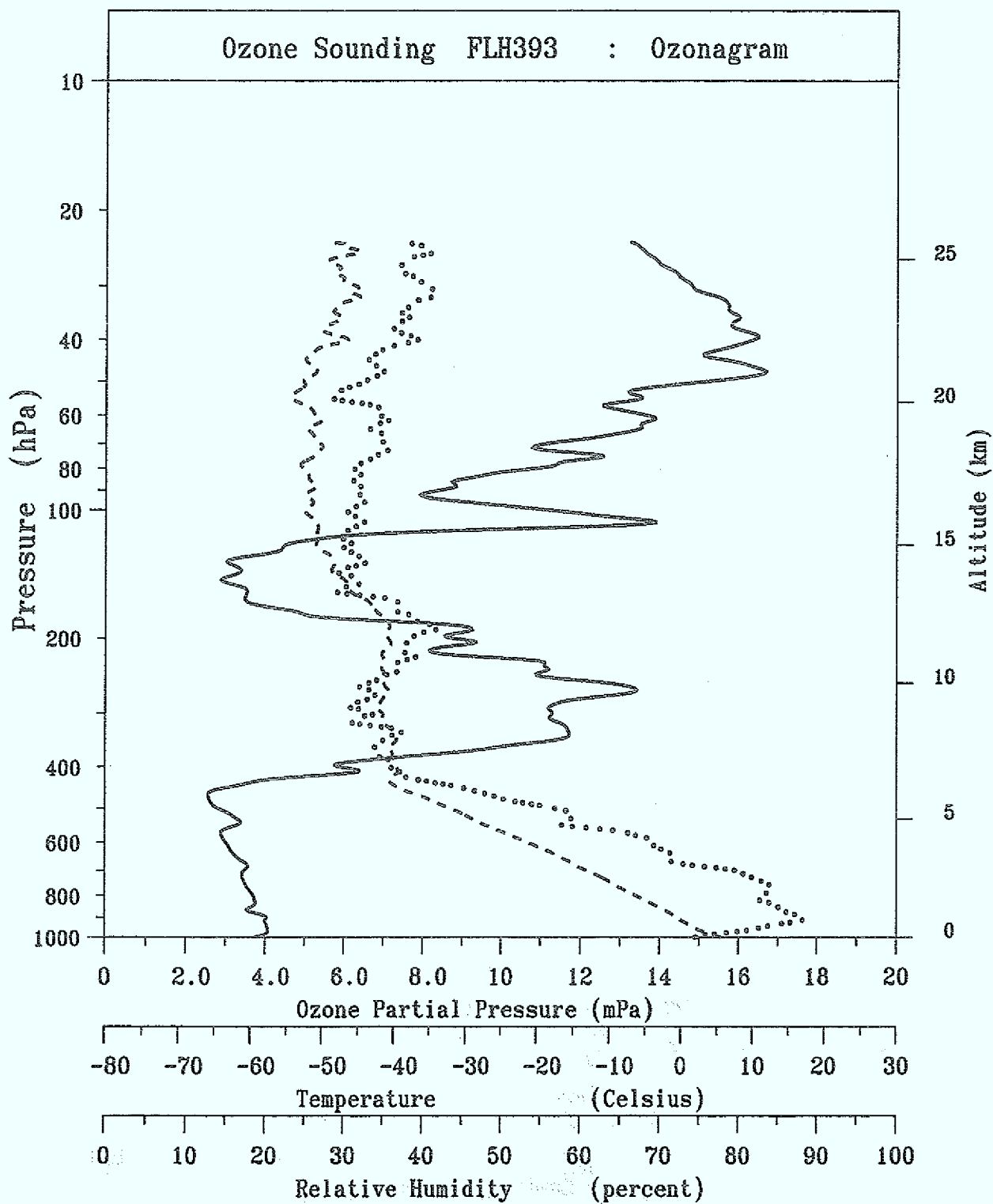
- - - Temperature

..... Relative Humidity



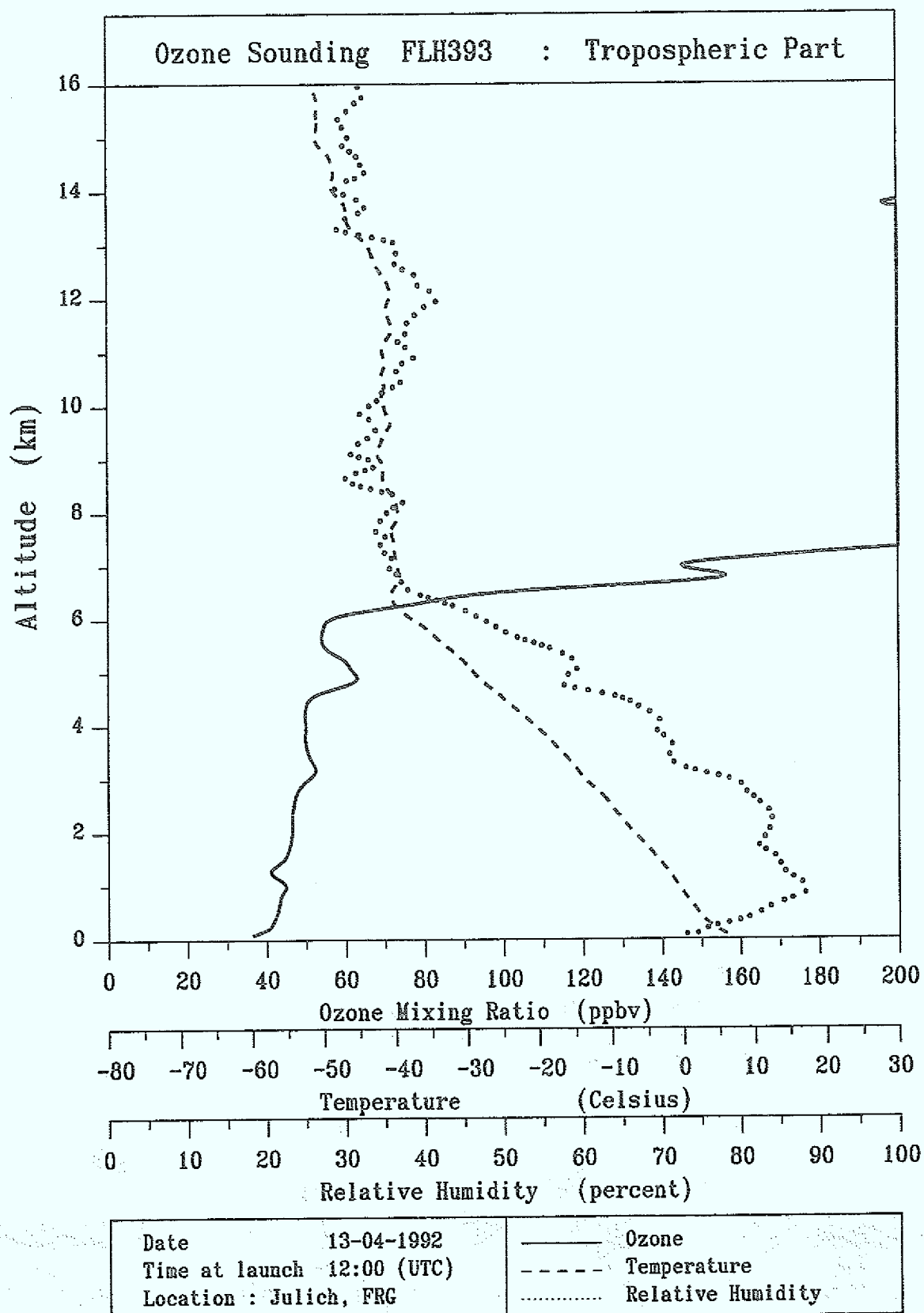
Date	09-04-1992	—	Ozone
Time at launch	12:23 (UTC)	- - - -	Temperature
Location	Julich, FRG	.....	Relative Humidity

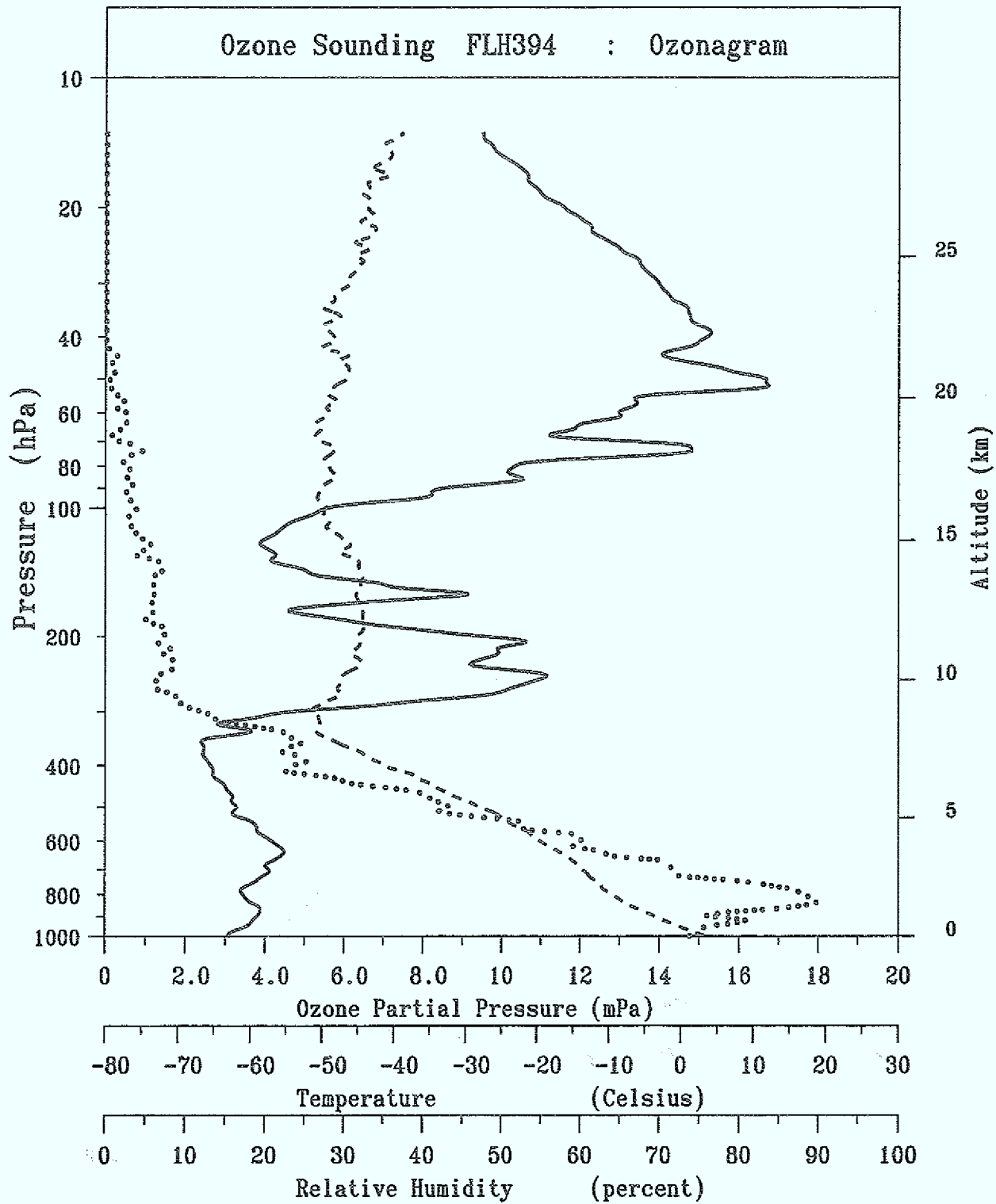




Date 13-04-1992
 Time at launch 12:00 (UTC)
 Location : Julich, FRG

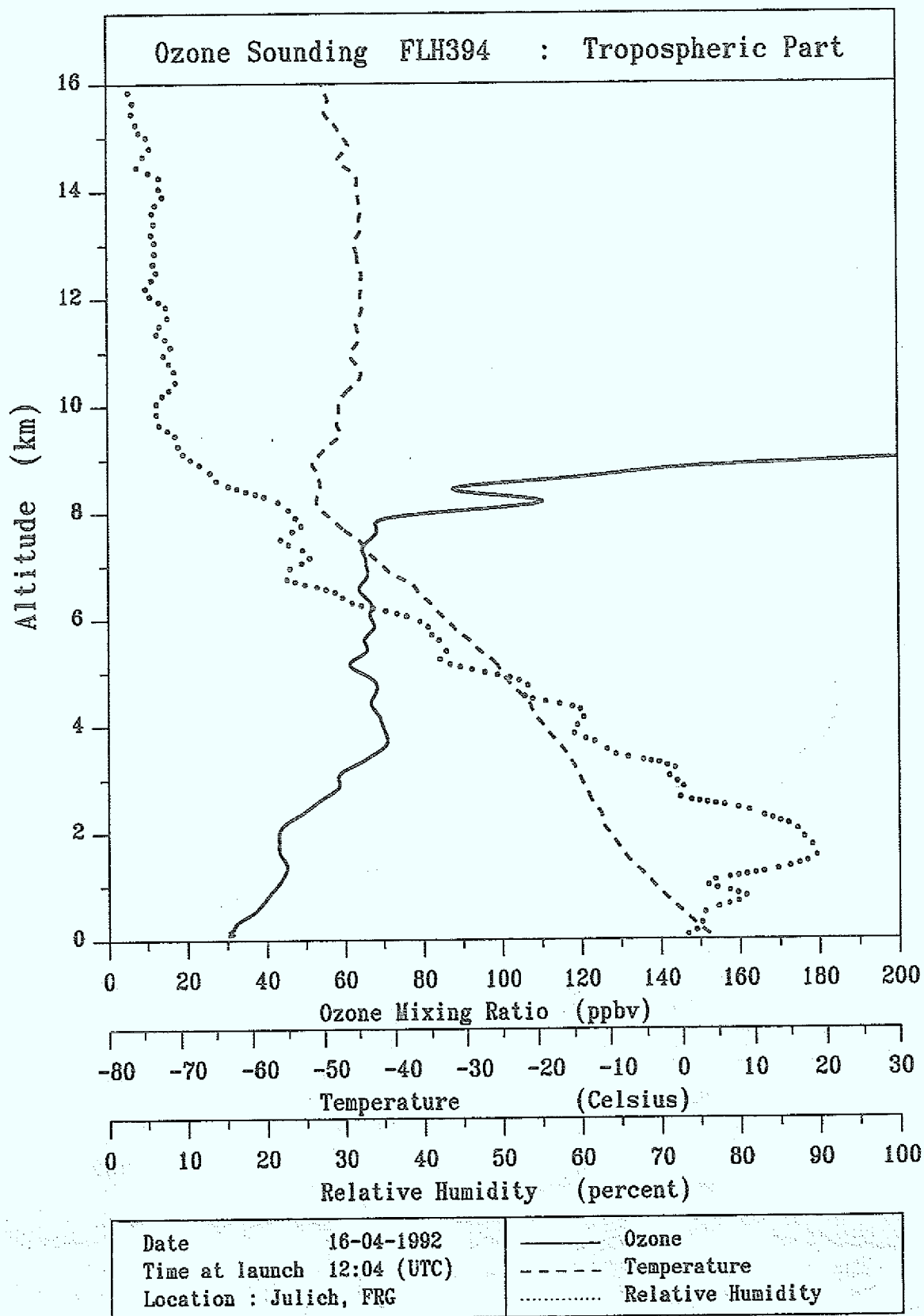
— Ozone
 --- Temperature
 Relative Humidity

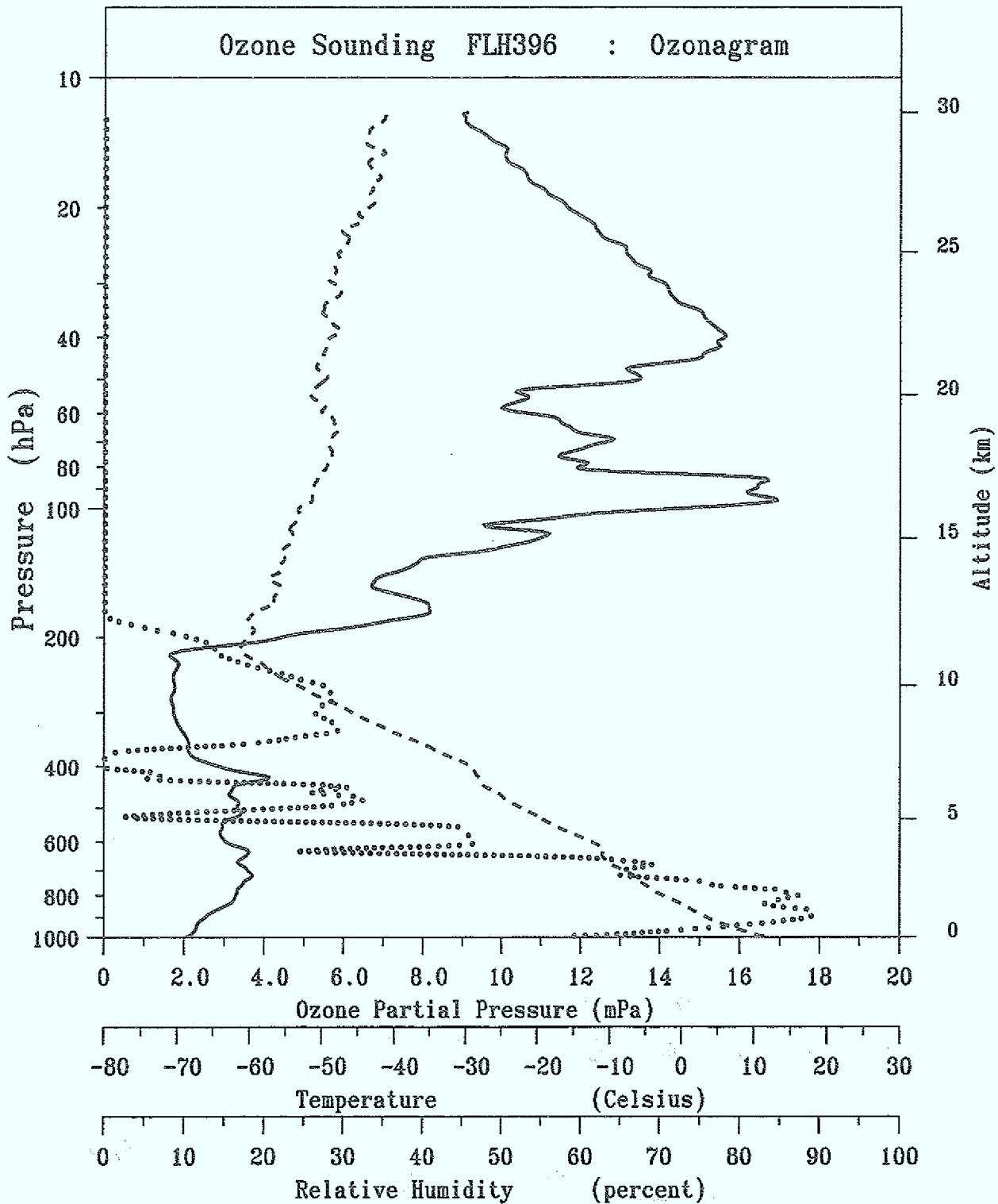




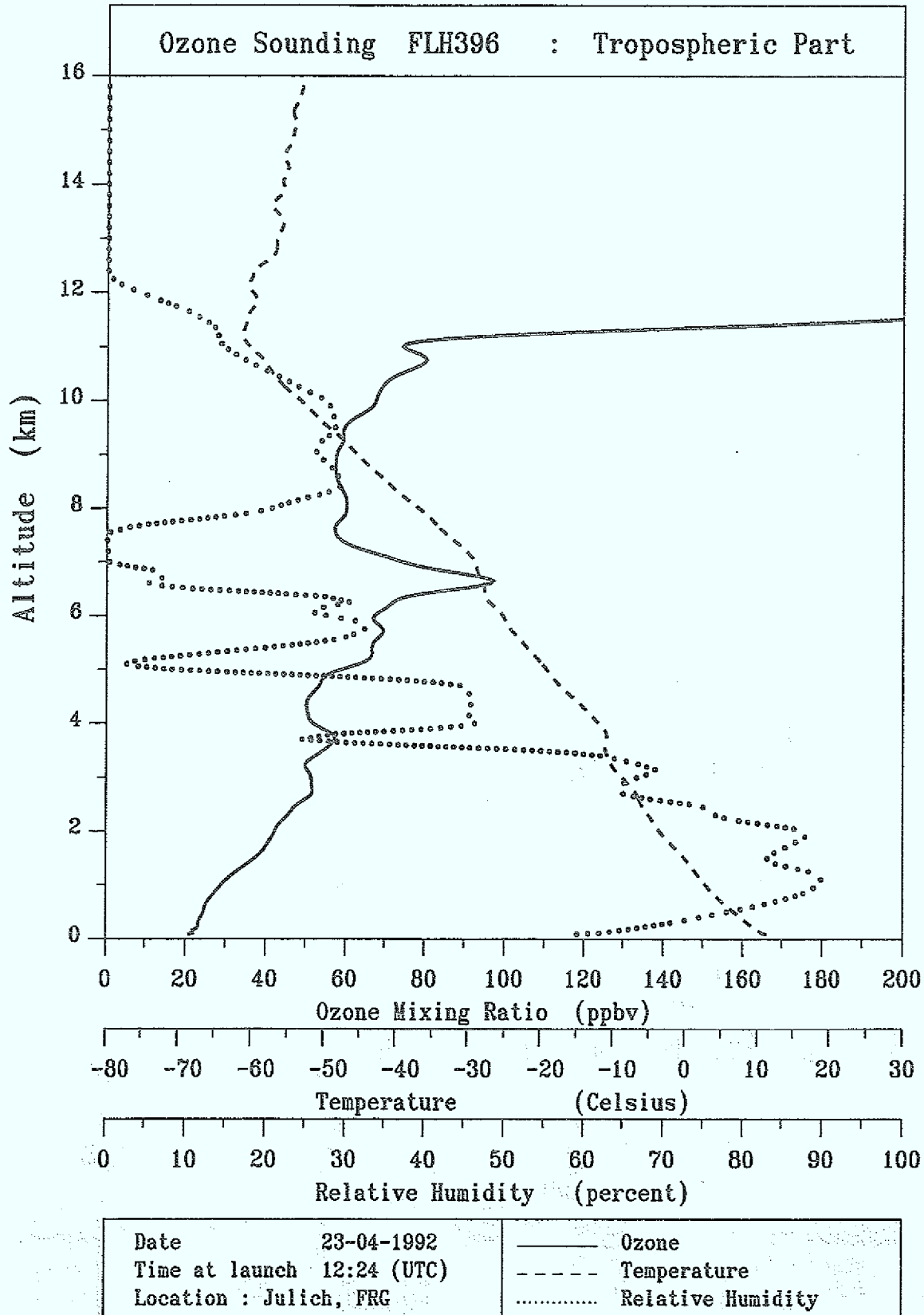
Date 16-04-1992
 Time at launch 12:04 (UTC)
 Location : Julich, FRG

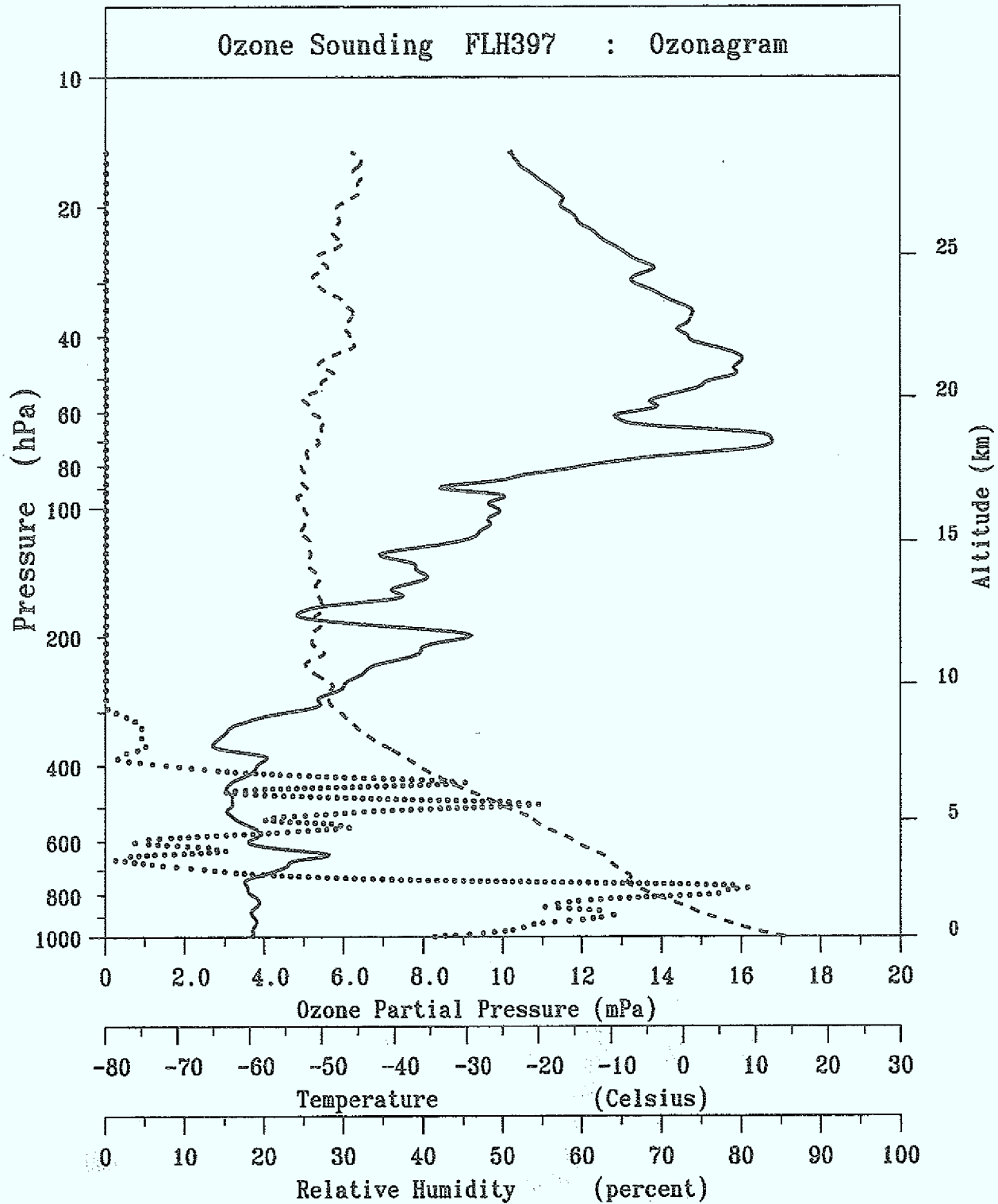
— Ozone
 --- Temperature
 Relative Humidity





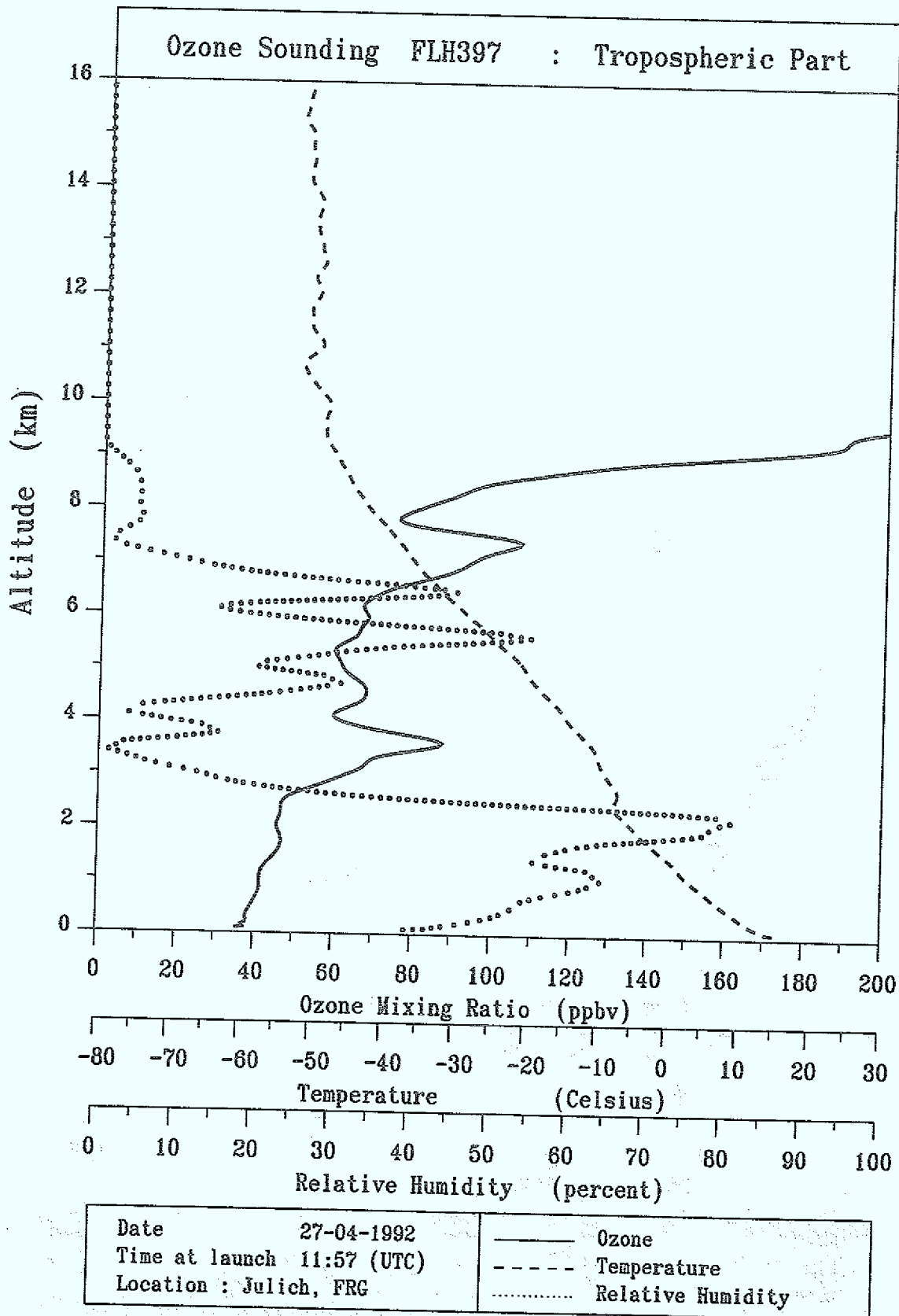
Date	23-04-1992	—	Ozone
Time at launch	12:24 (UTC)	- - -	Temperature
Location : Julich, FRG		.....	Relative Humidity

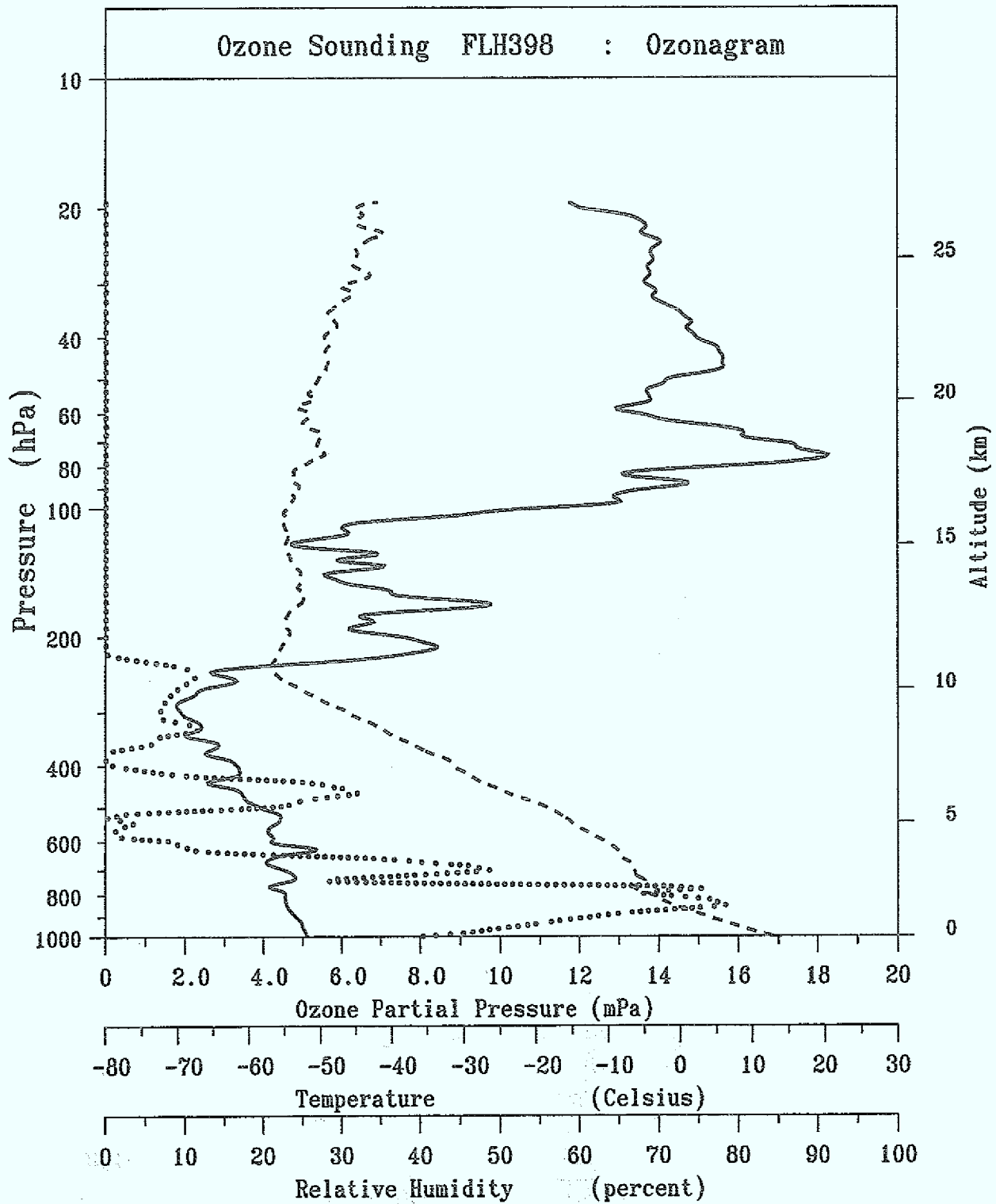




Date 27-04-1992
 Time at launch 11:57 (UTC)
 Location : Julich, FRG

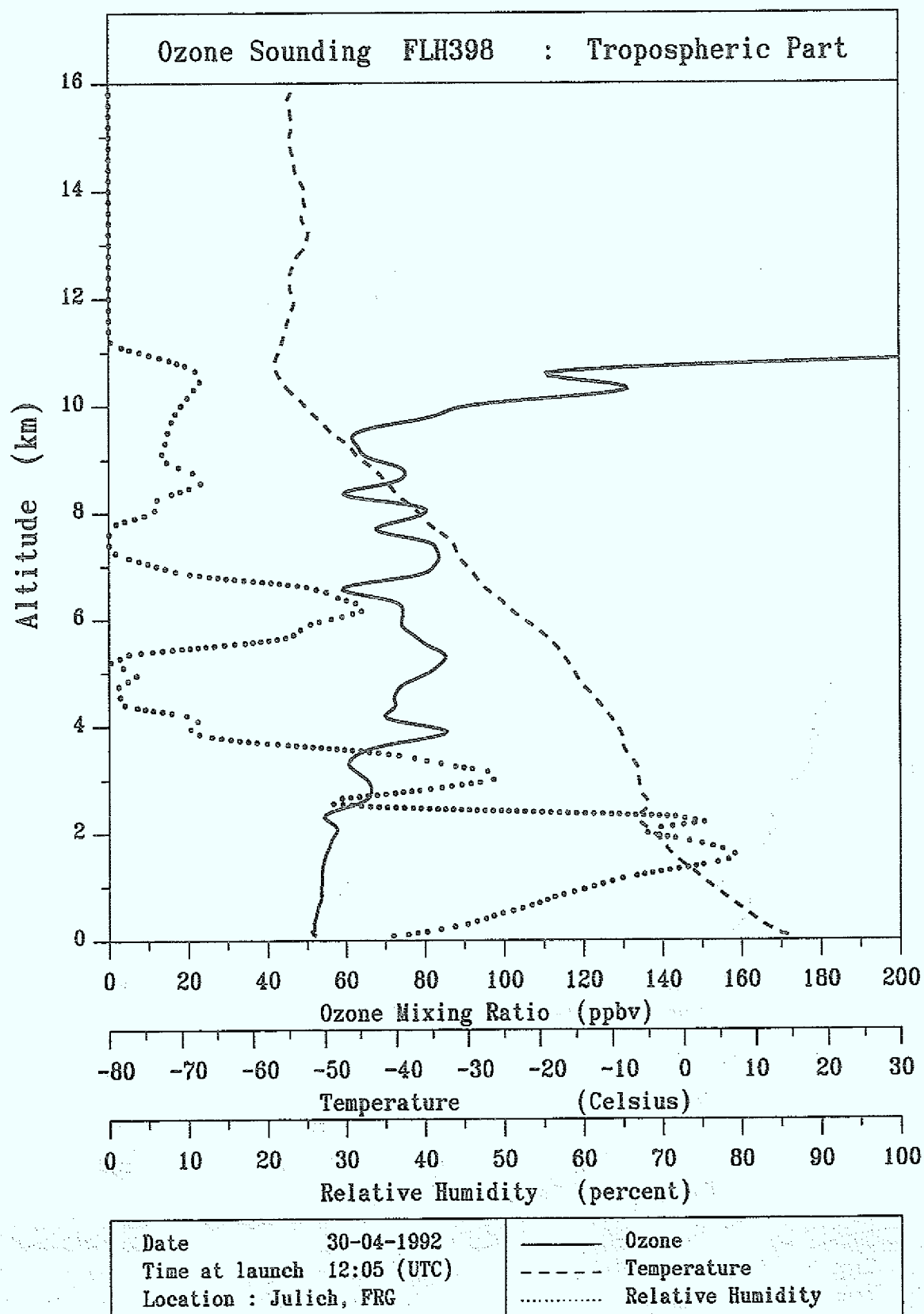
—— Ozone
 - - - - Temperature
 Relative Humidity

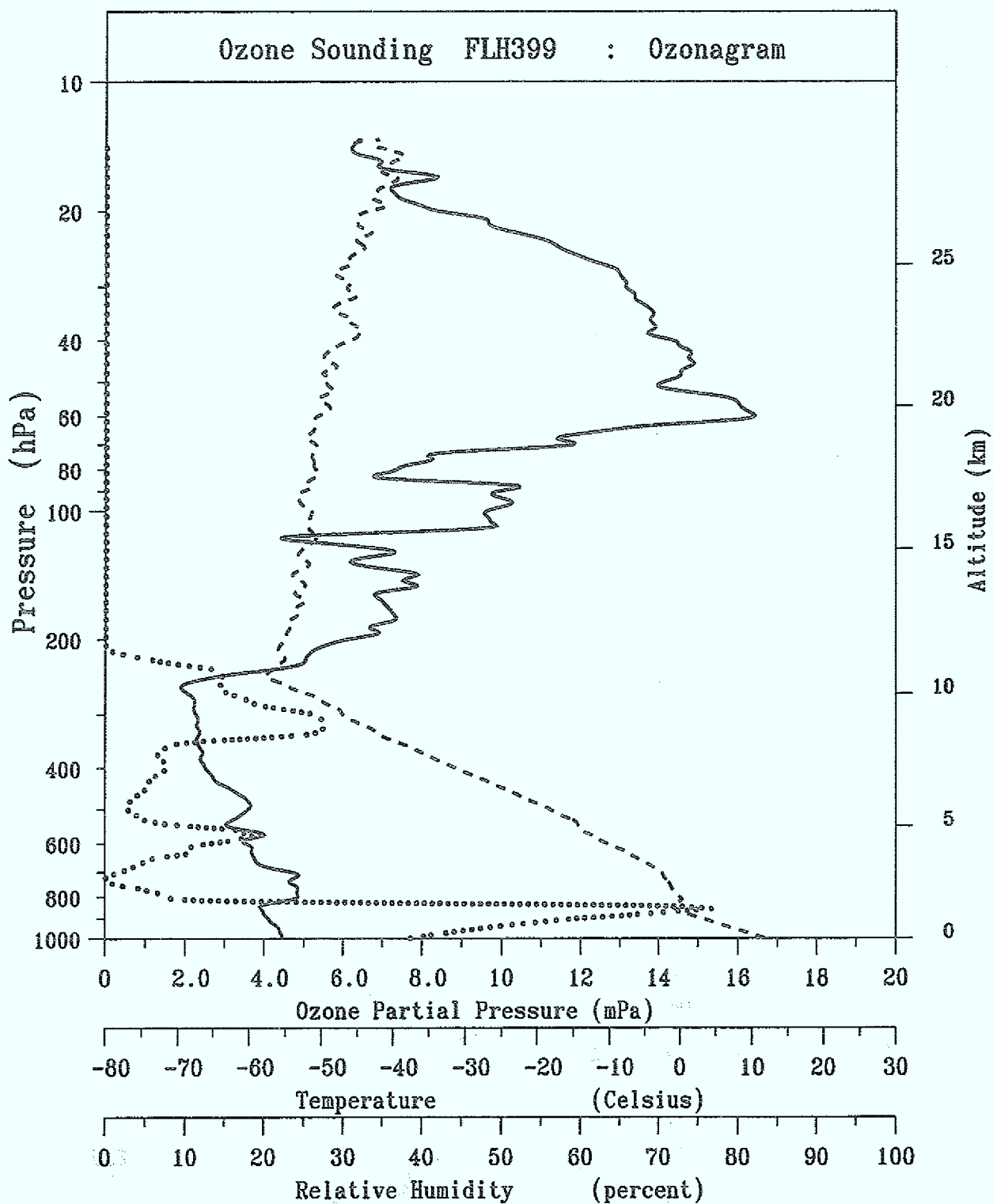




Date 30-04-1992
 Time at launch 12:05 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity

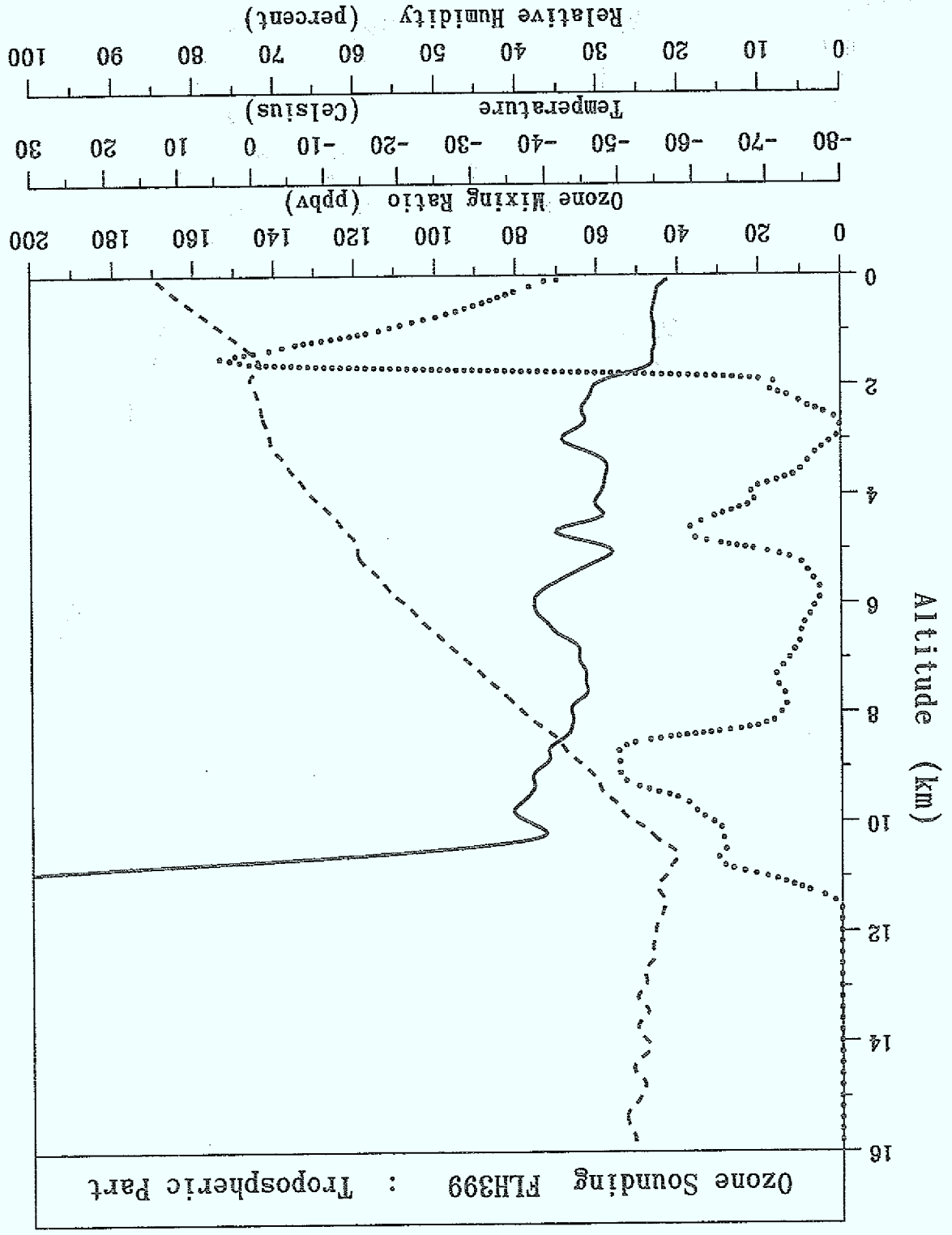




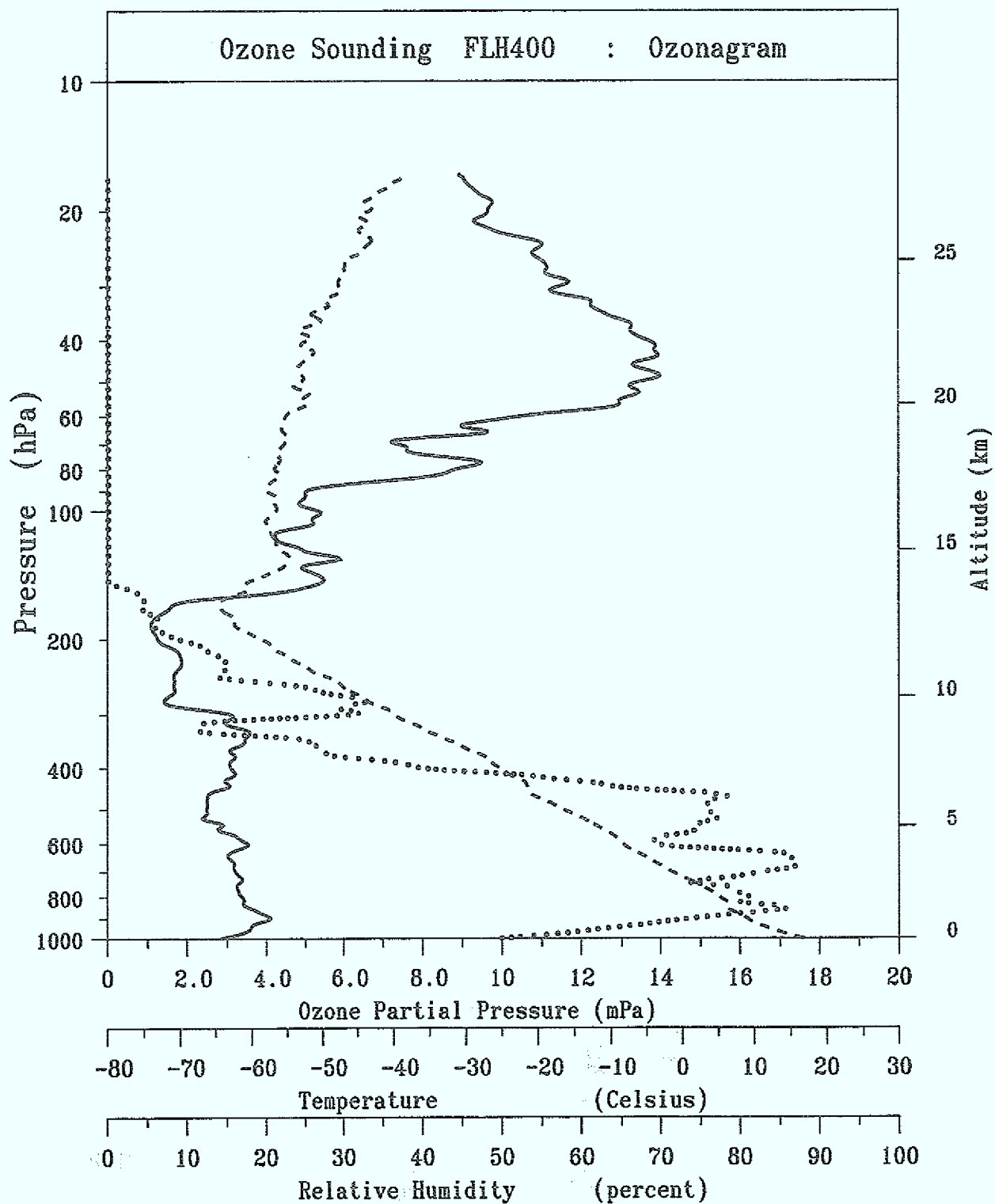
Date 04-05-1992
 Time at launch 11:56 (UTC)
 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity

Date 04-05-1992	
Time at launch 11:56 (UTC)	
Location : Jülich, FRG	
-----	Ozone
-----	Temperature
.....	Relative Humidity

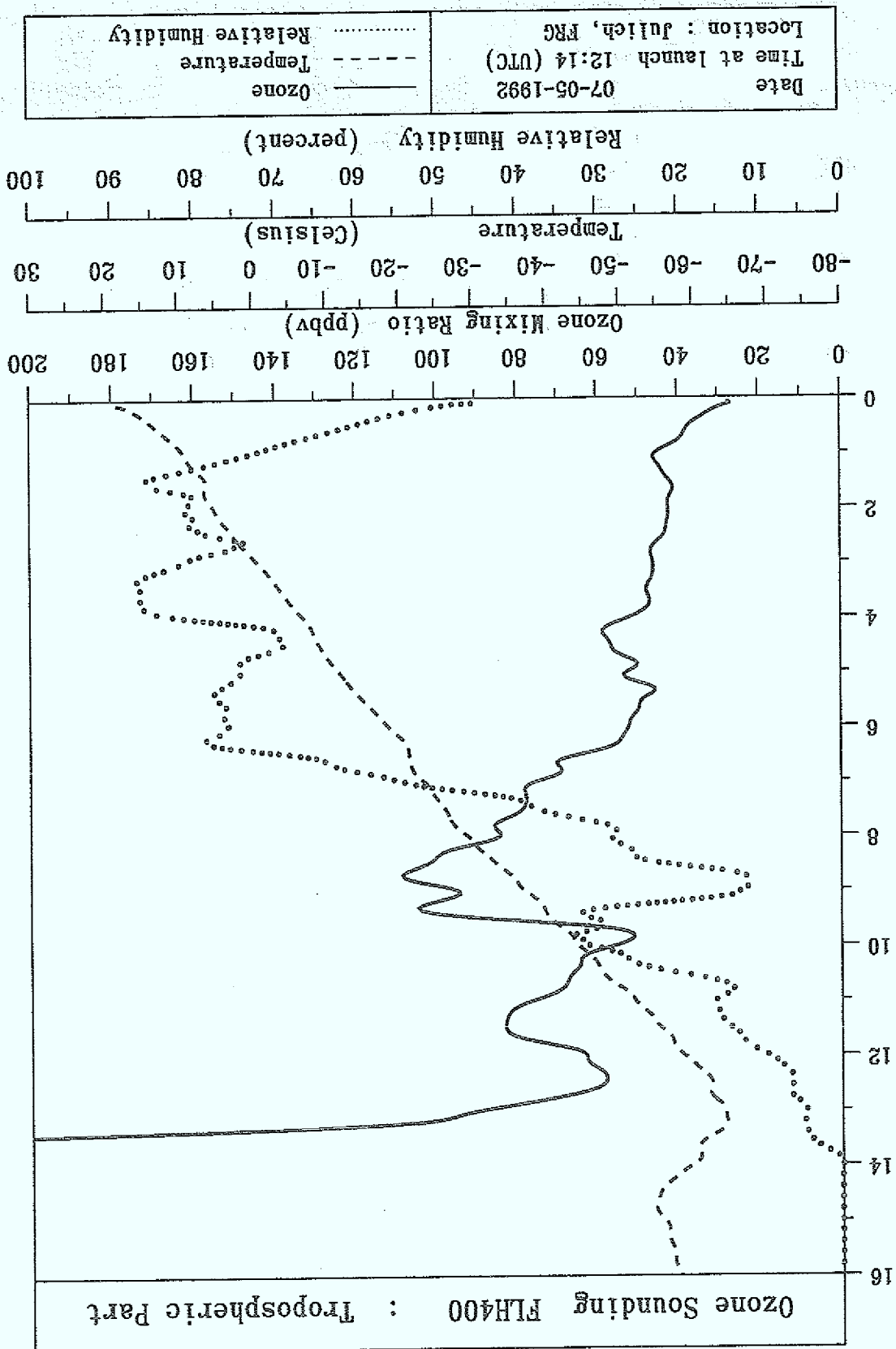


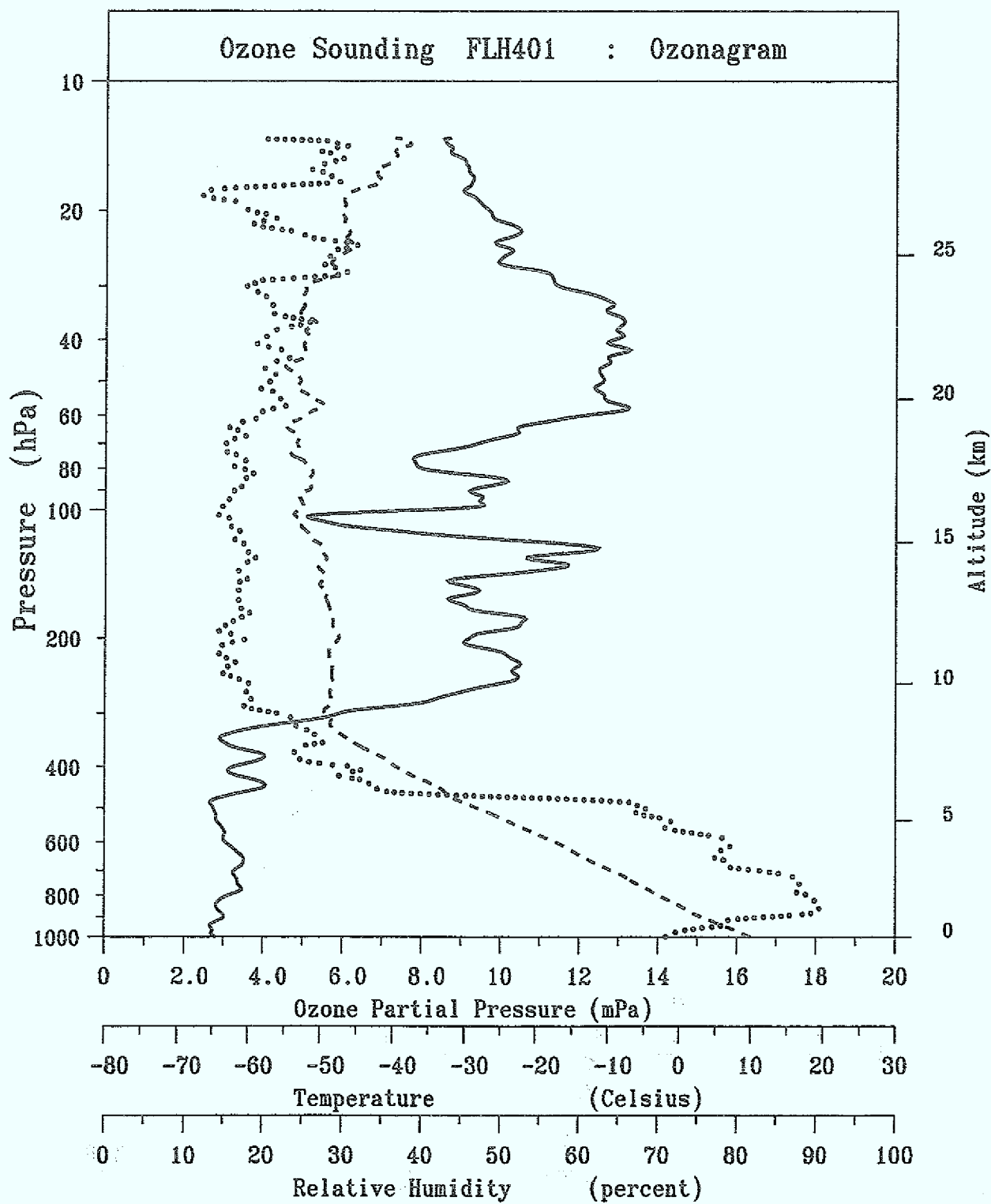
Ozone Sounding FLH399 : Tropospheric Part



Date 07-05-1992
 Time at launch 12:14 (UTC)
 Location : Julich, FRG

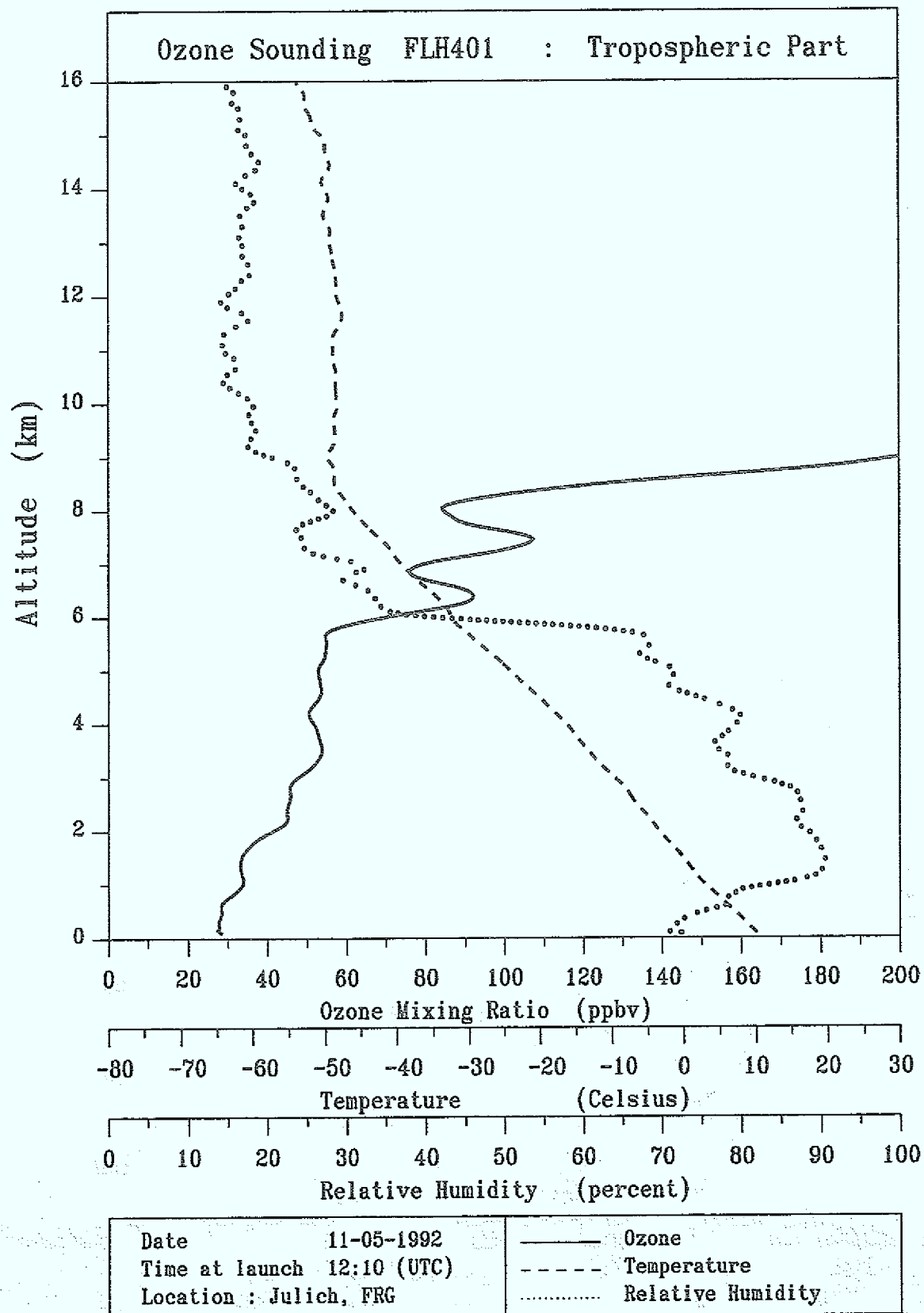
— Ozone
 - - - Temperature
 Relative Humidity

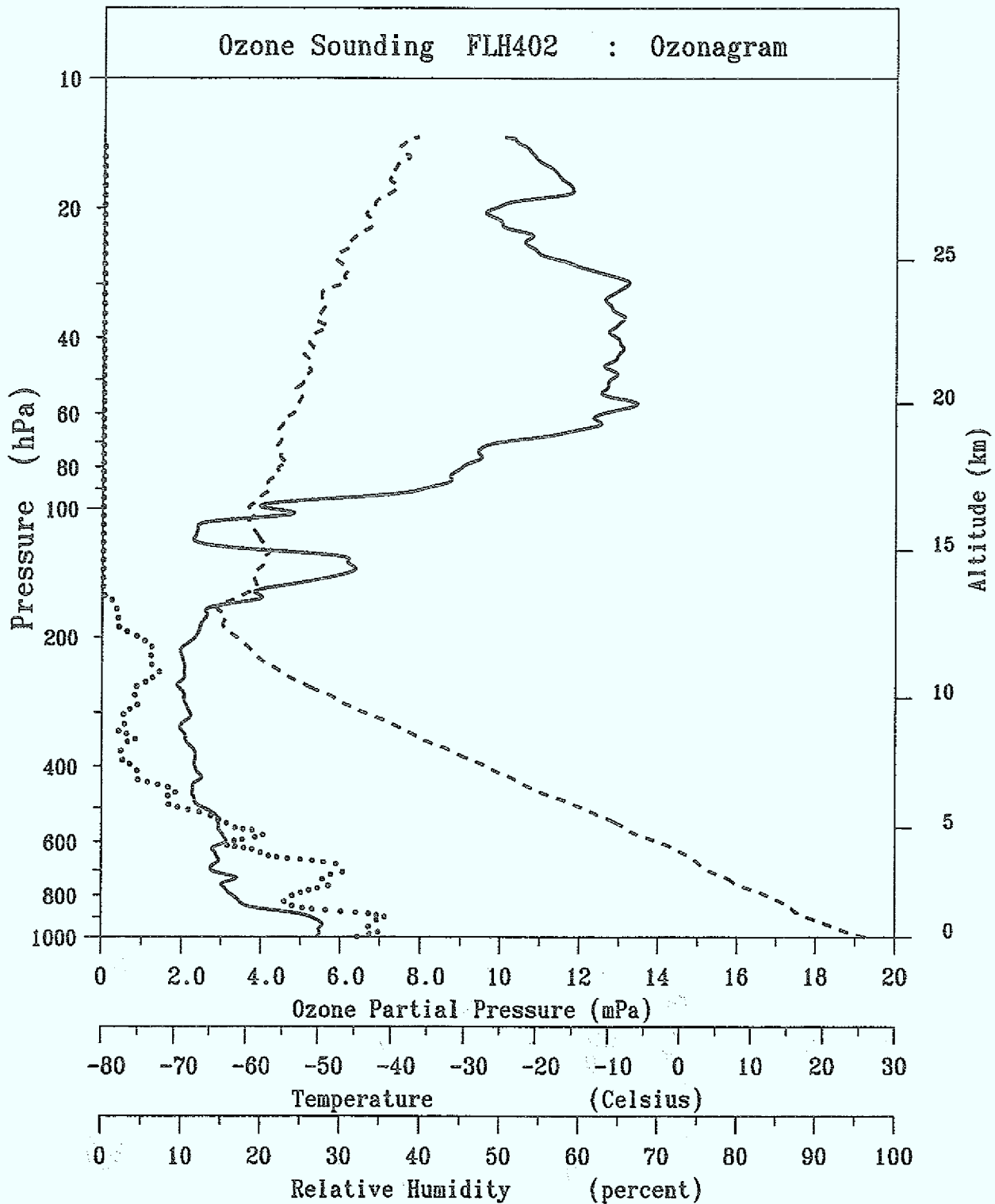




Date 11-05-1992
 Time at launch 12:10 (UTC)
 Location : Julich, FRG

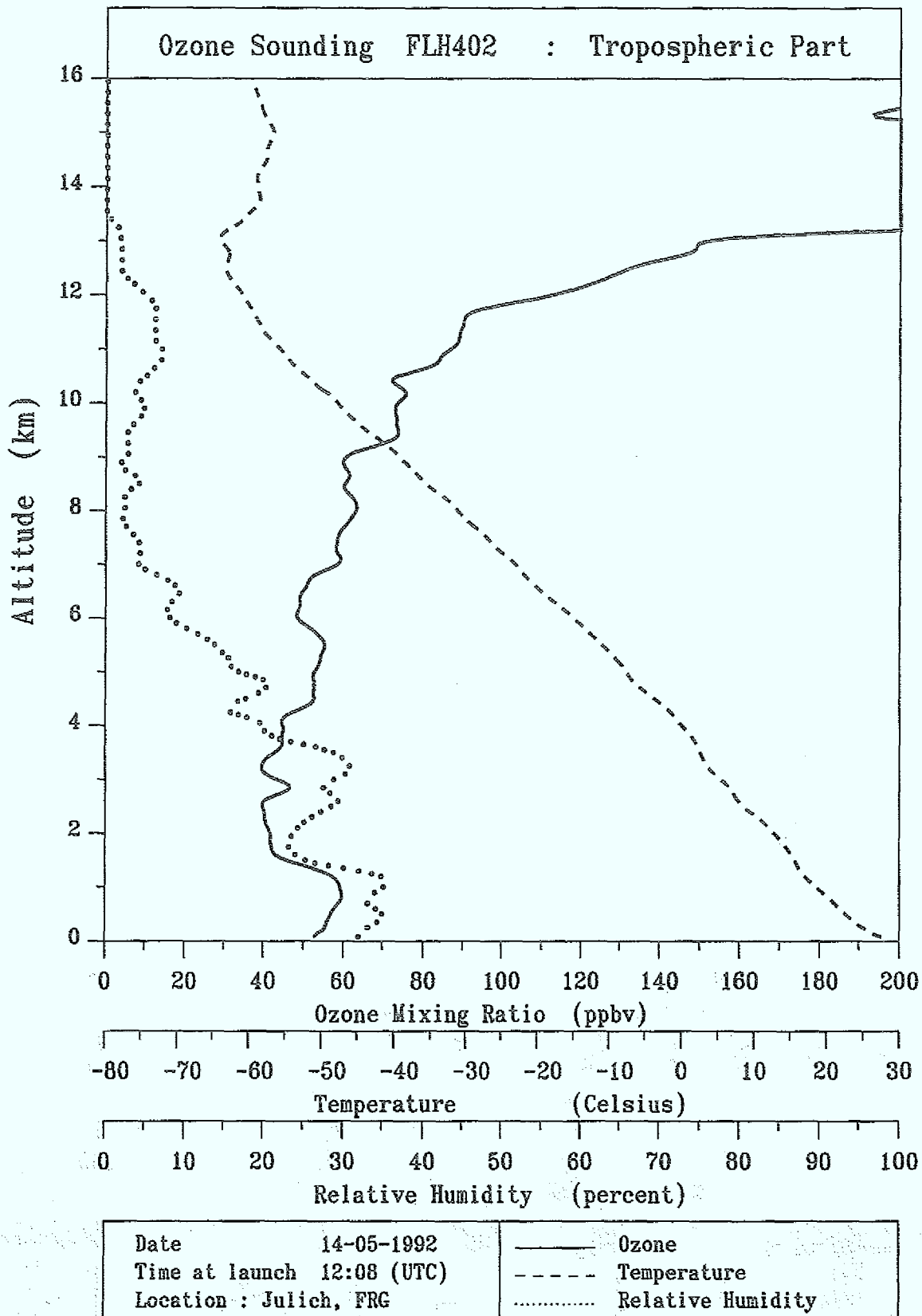
— Ozone
 - - - Temperature
 Relative Humidity

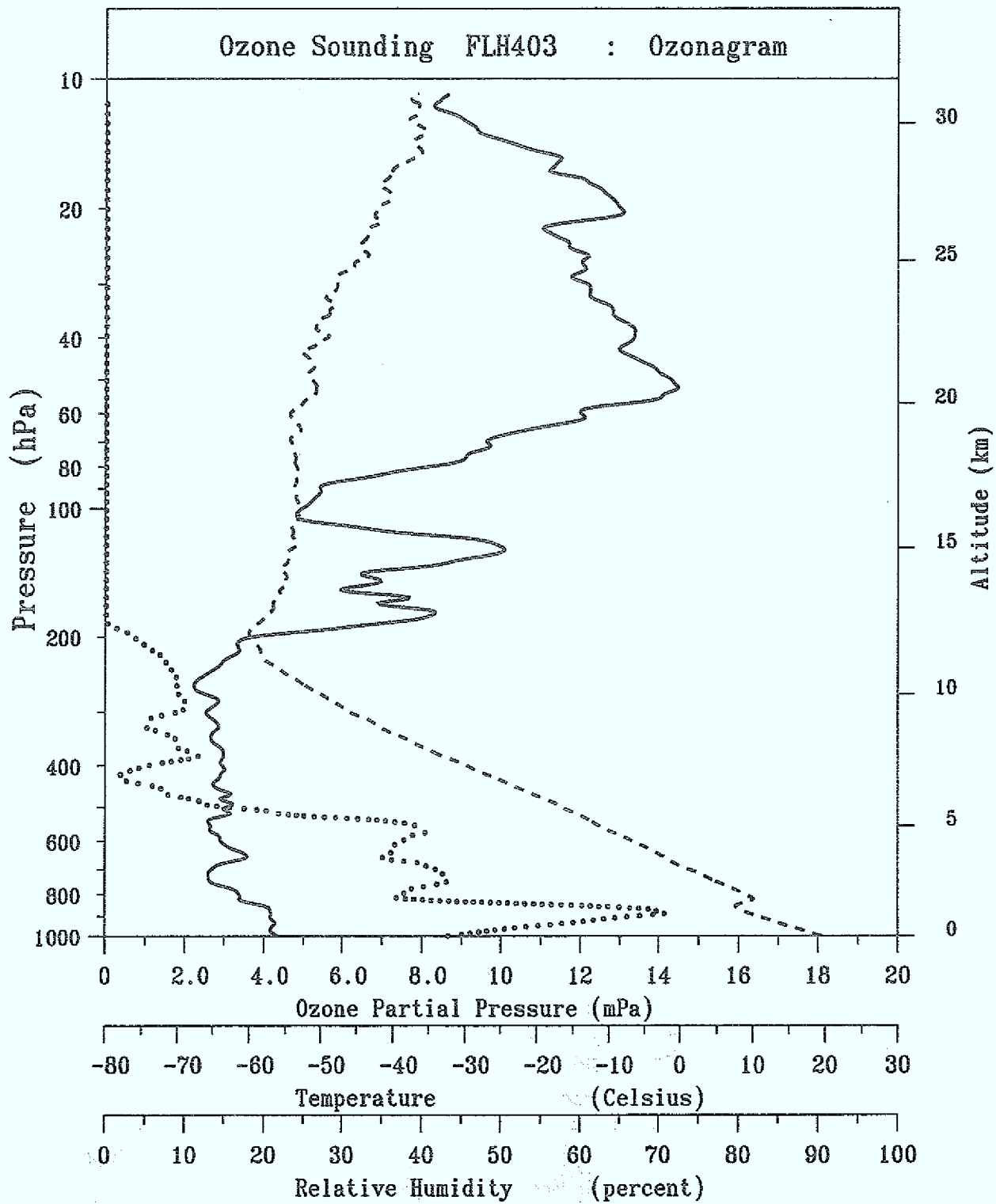




Date 14-05-1992
 Time at launch 12:08 (UTC)
 Location : Julich, FRG

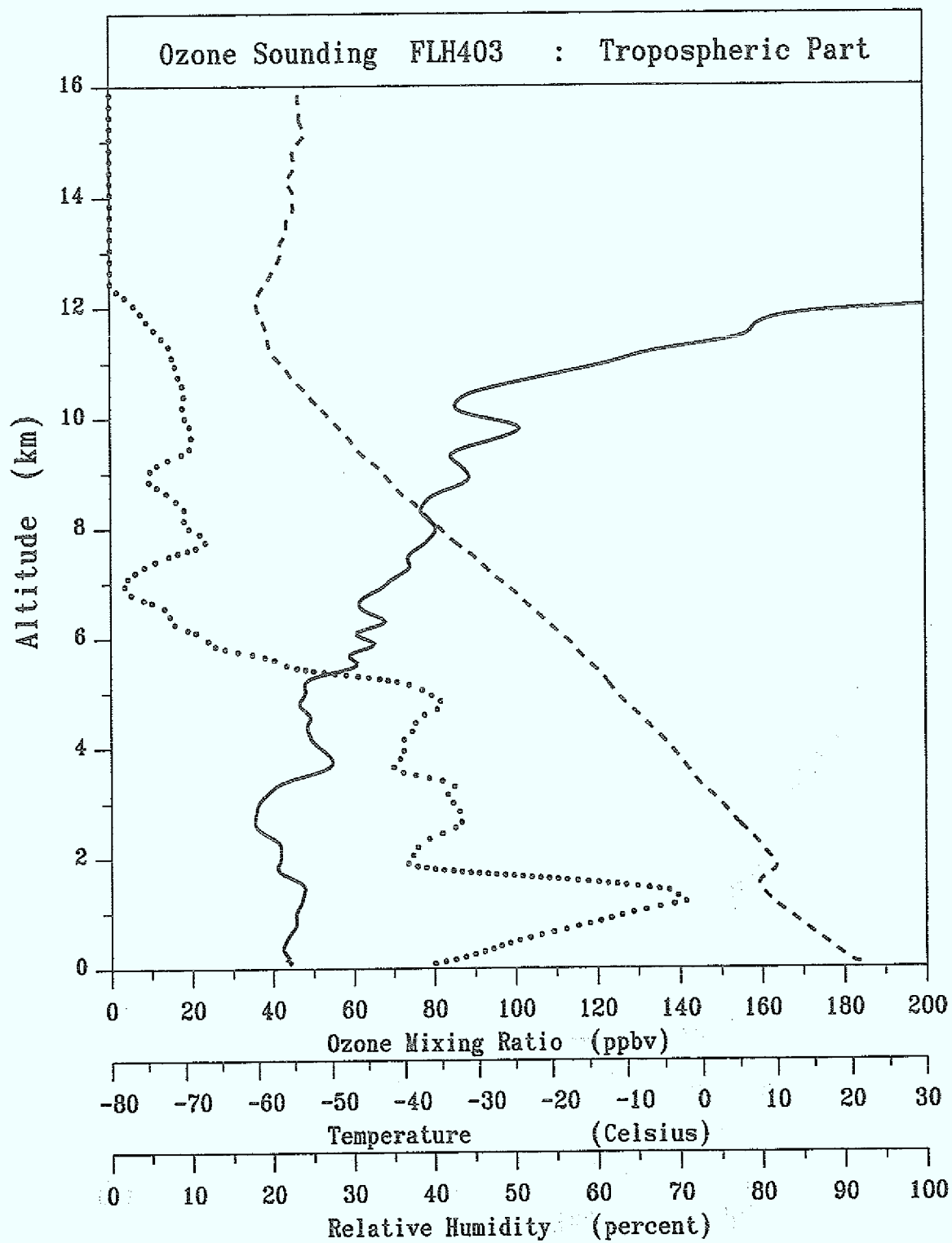
—— Ozone
 ---- Temperature
 Relative Humidity





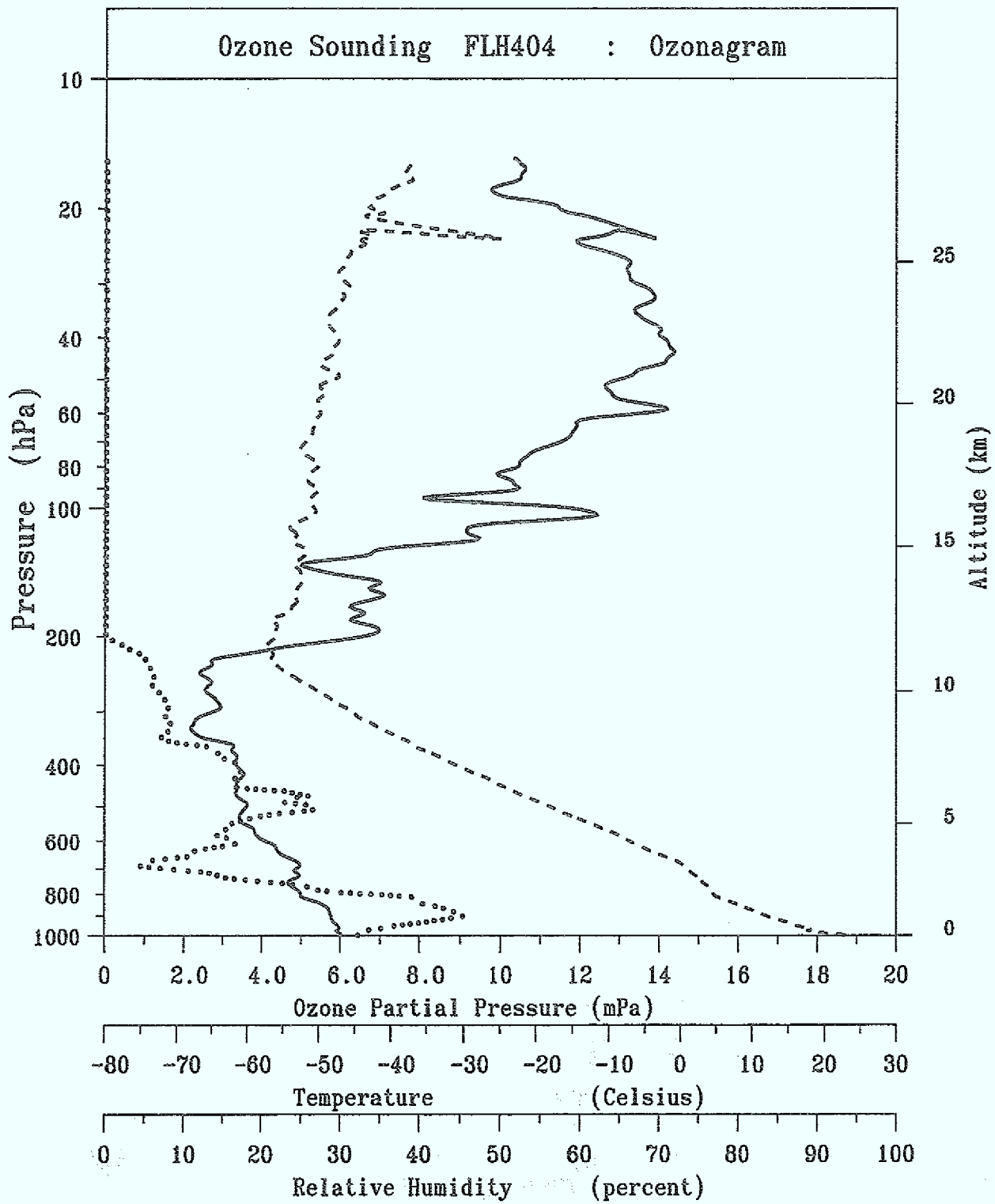
Date 18-05-1992
 Time at launch 12:03 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity



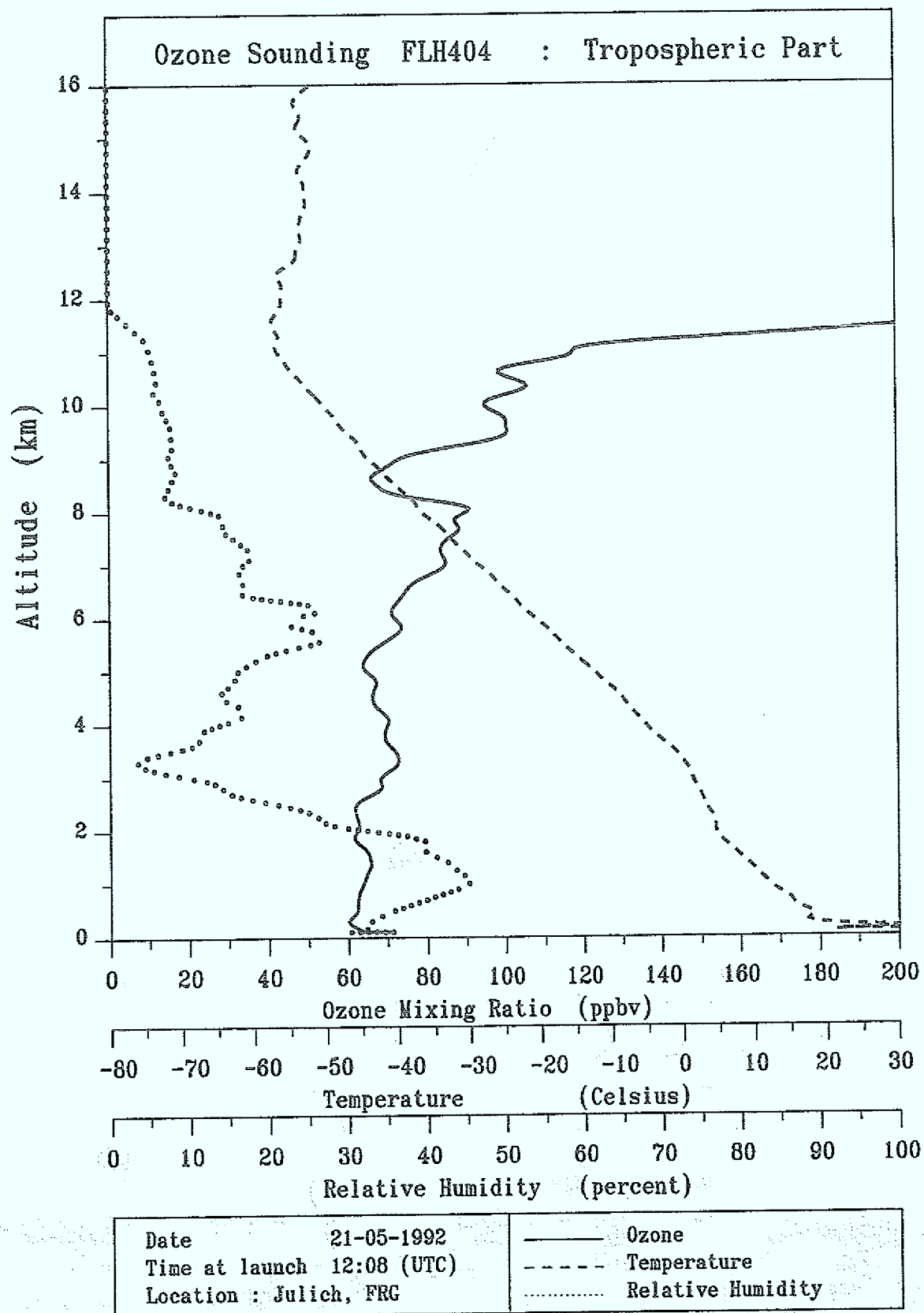
Date 18-05-1992
 Time at launch 12:03 (UTC)
 Location : Julich, FRG

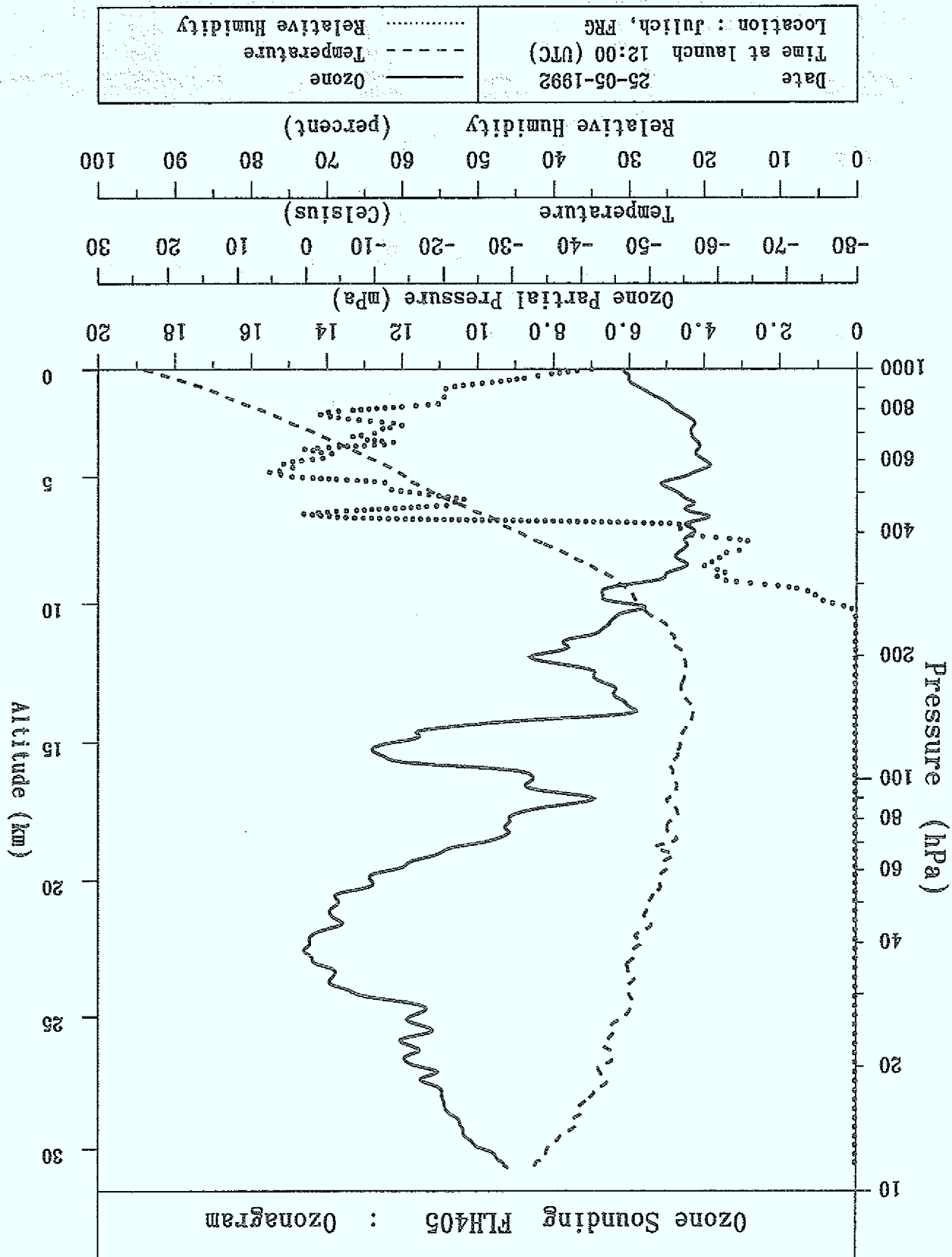
— Ozone
 - - - - - Temperature
 Relative Humidity

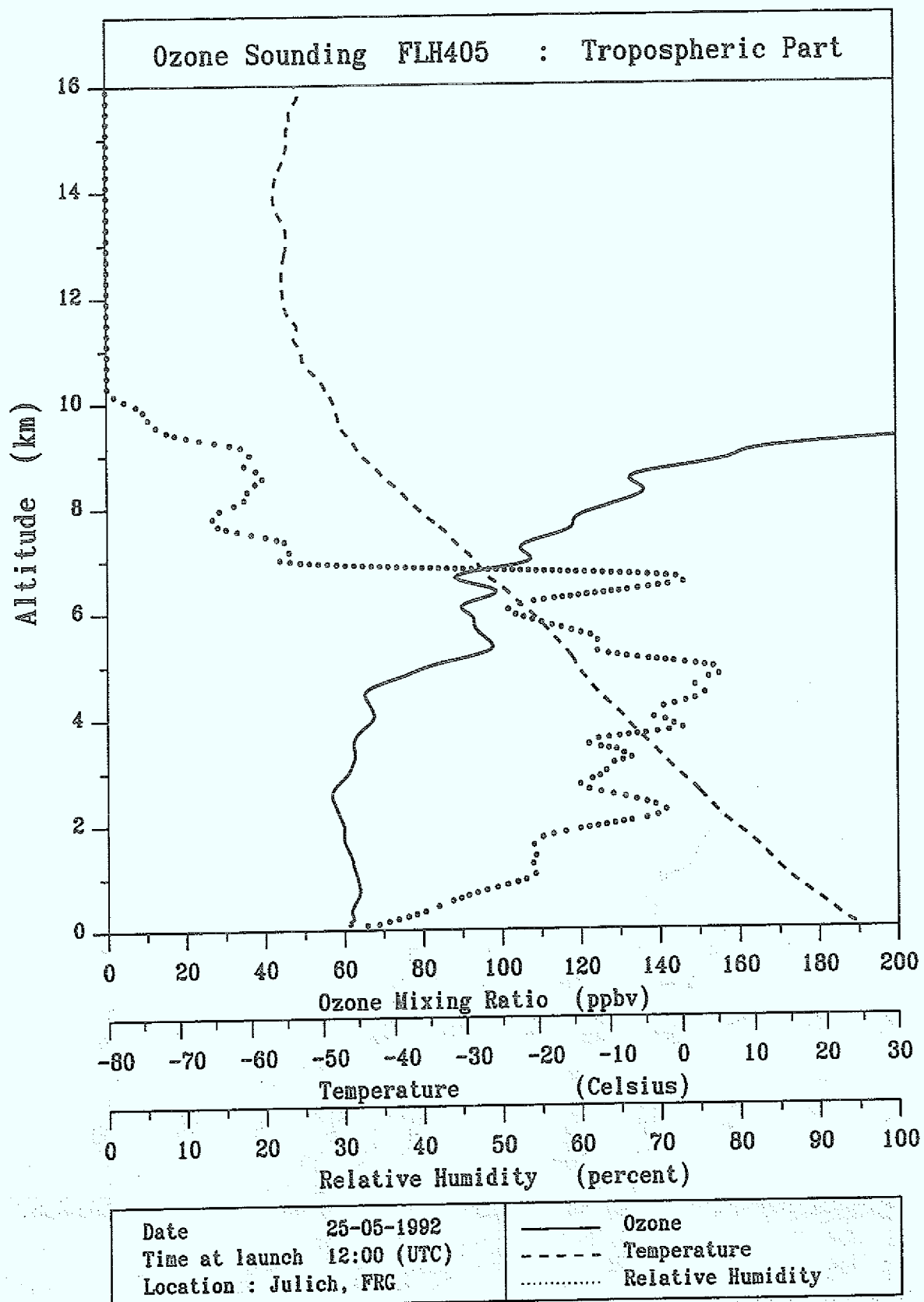


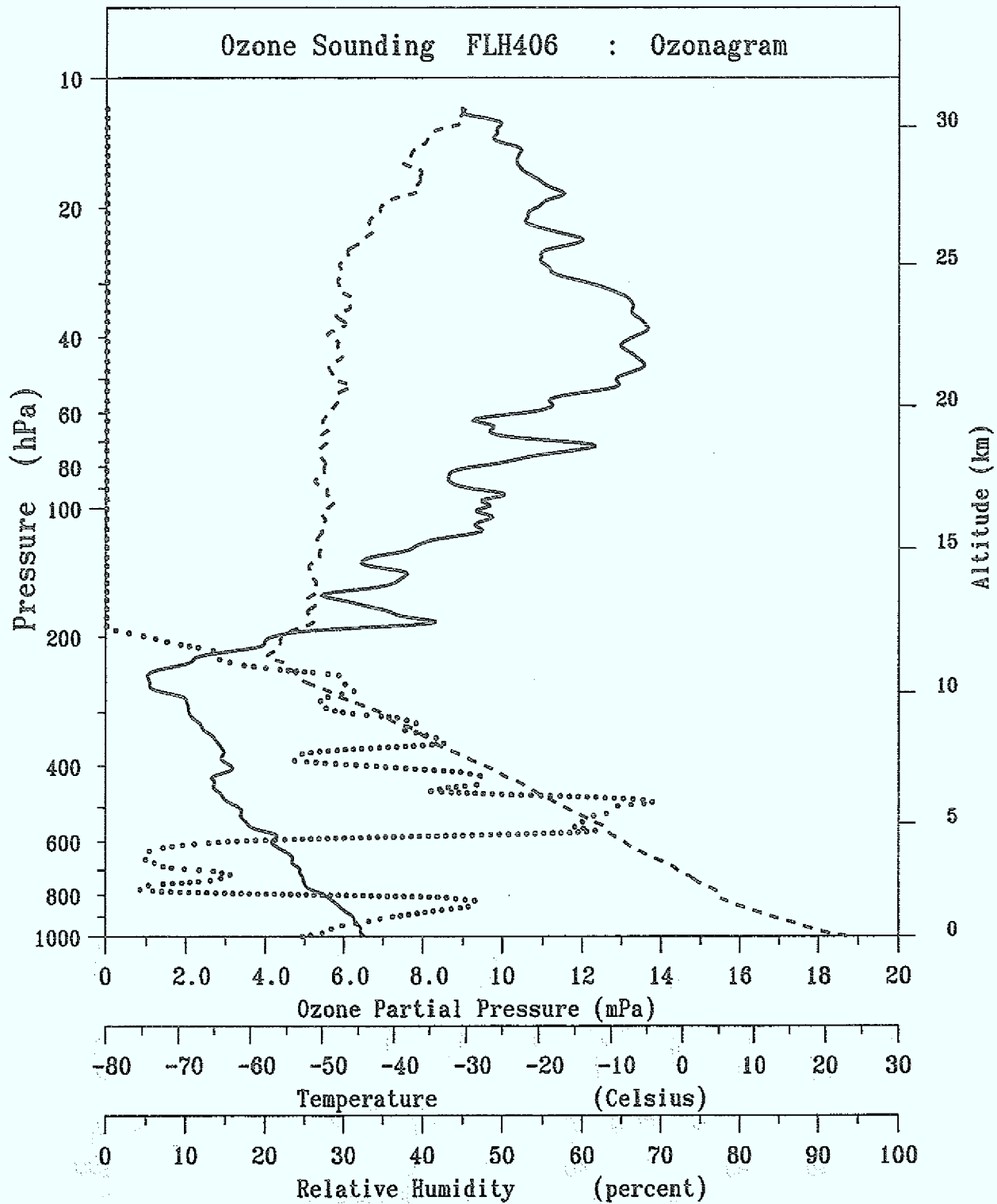
Date 21-05-1992
 Time at launch 12:08 (UTC)
 Location : Julich, FRG

— Ozone
 - - - - Temperature
 Relative Humidity



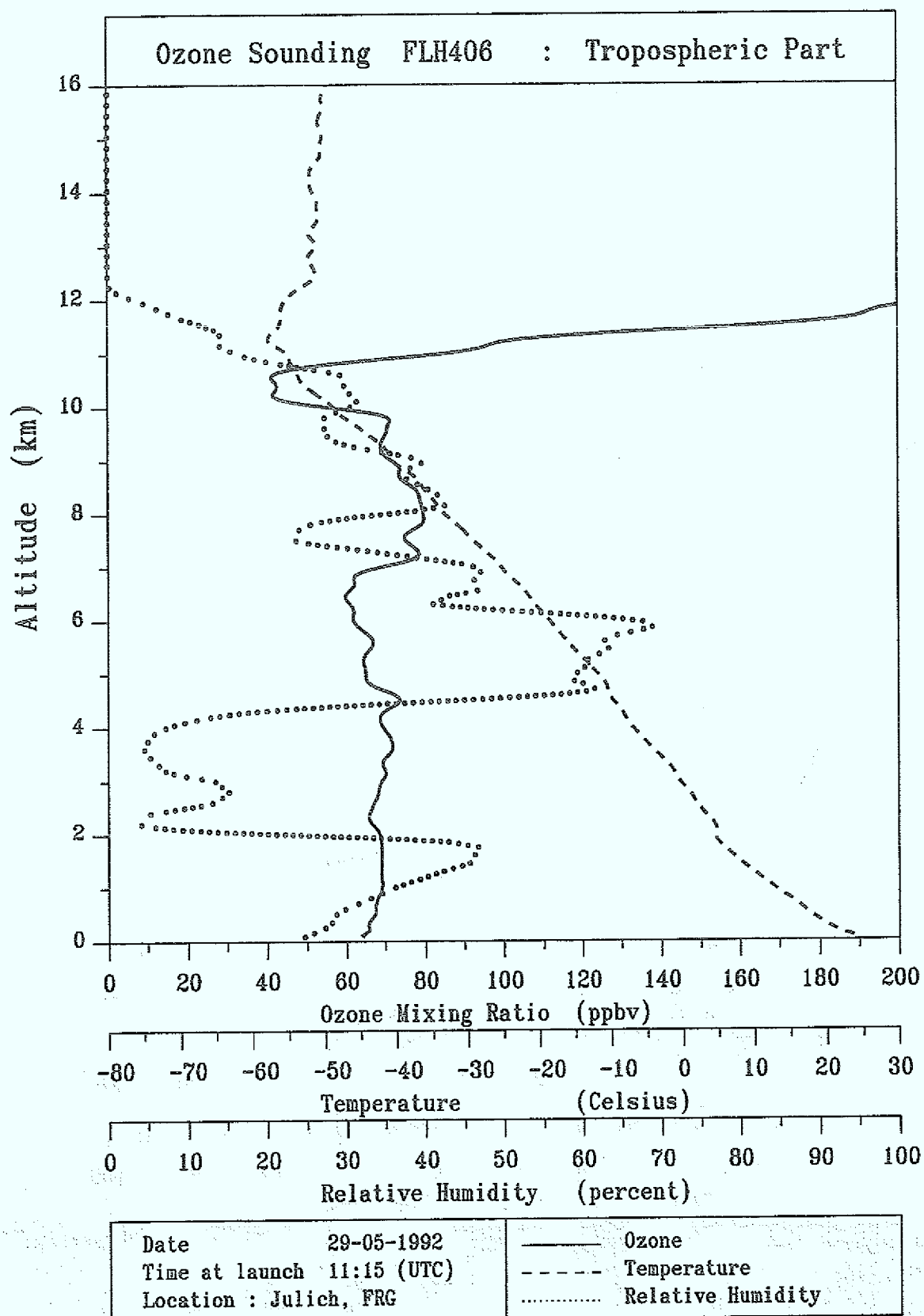


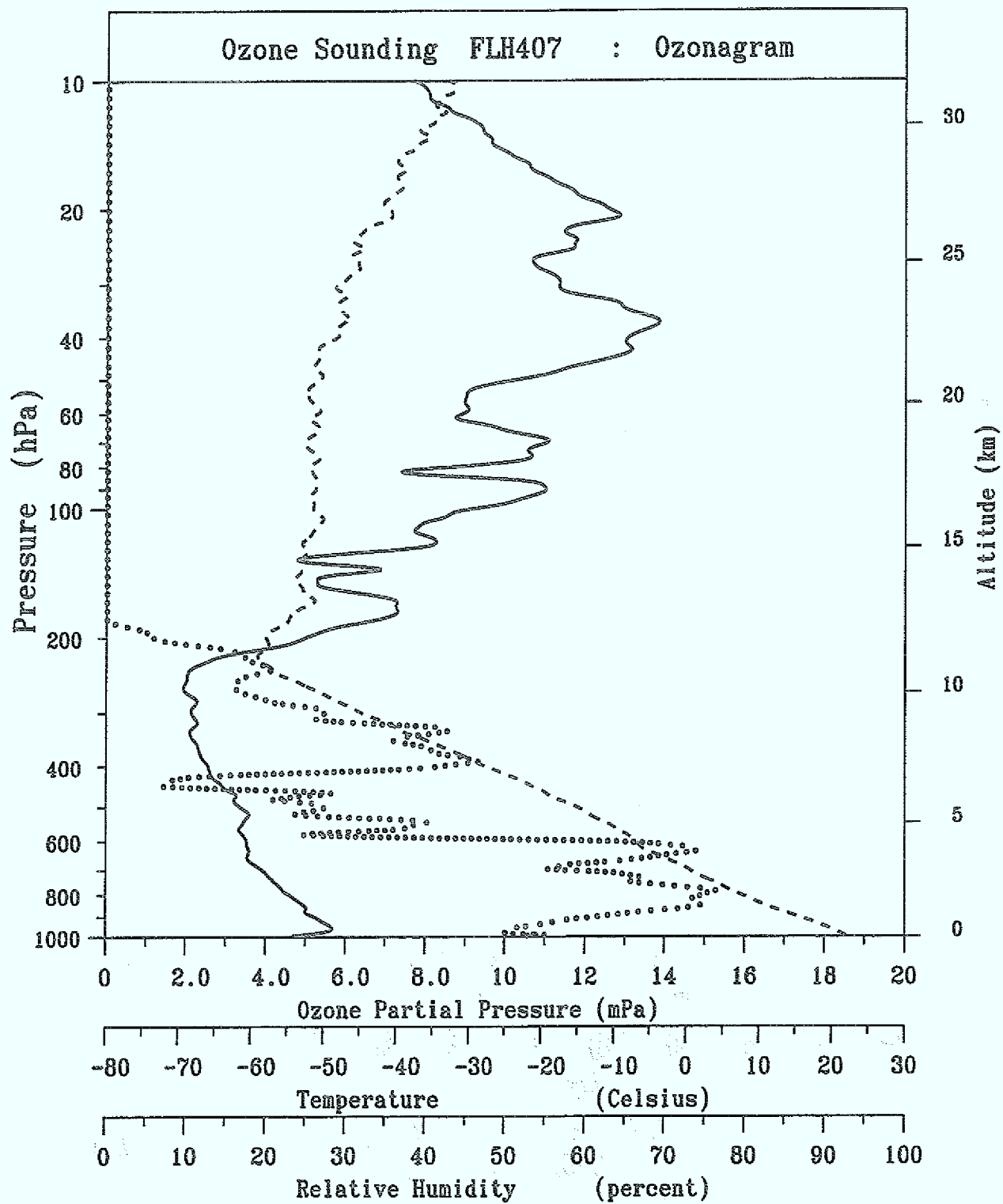




Date 29-05-1992
 Time at launch 11:15 (UTC)
 Location : Julich, FRG

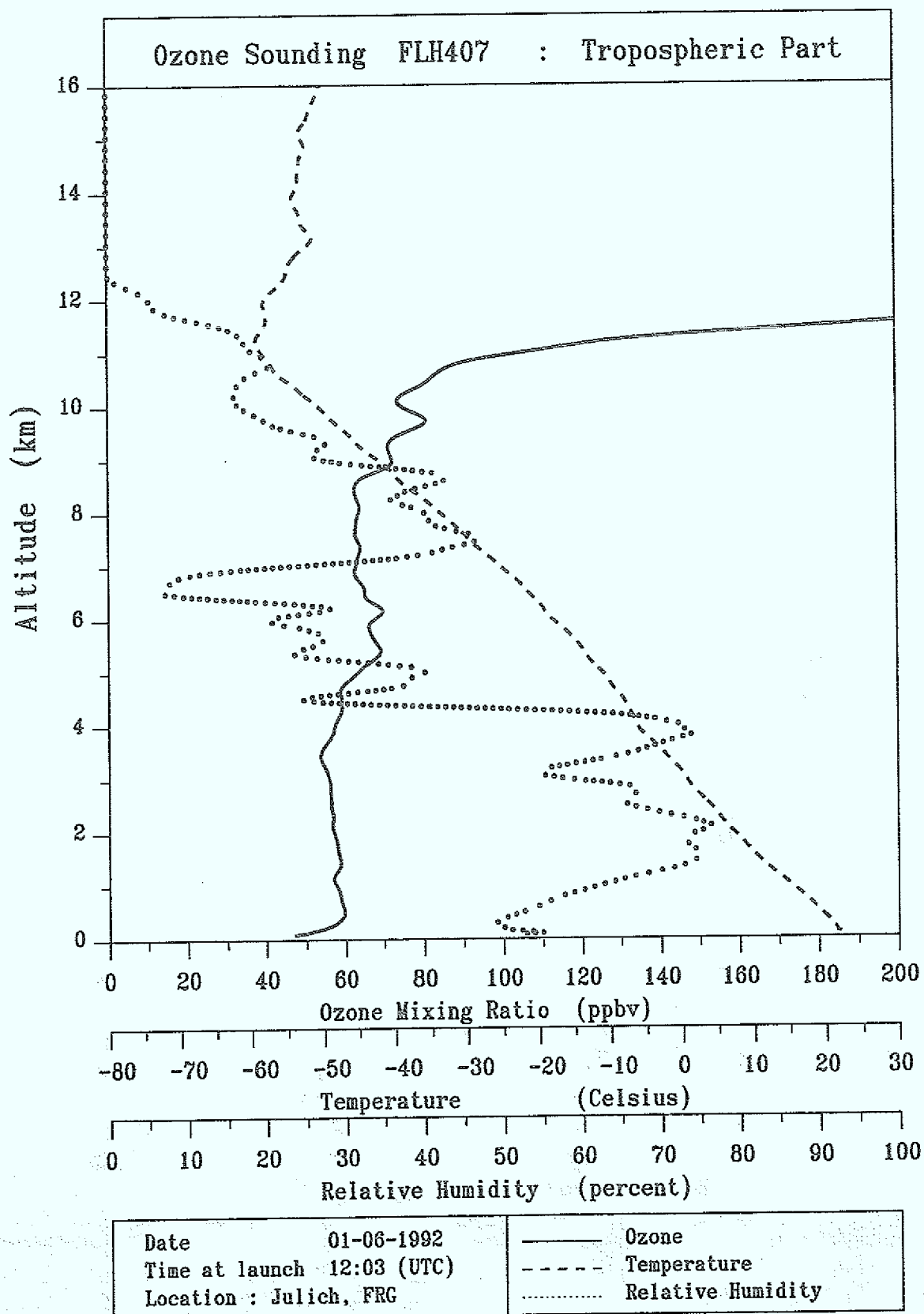
— Ozone
 --- Temperature
 Relative Humidity

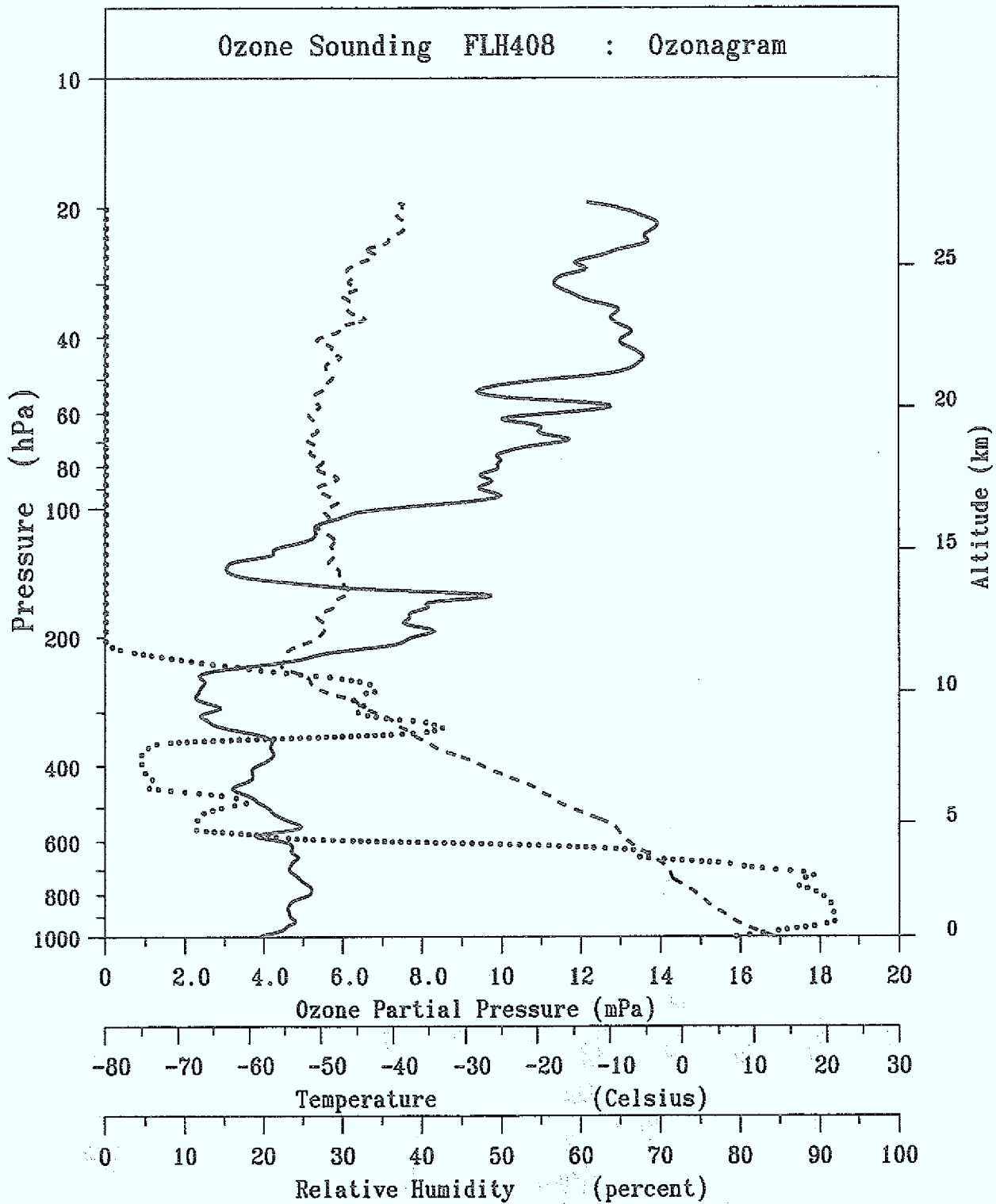




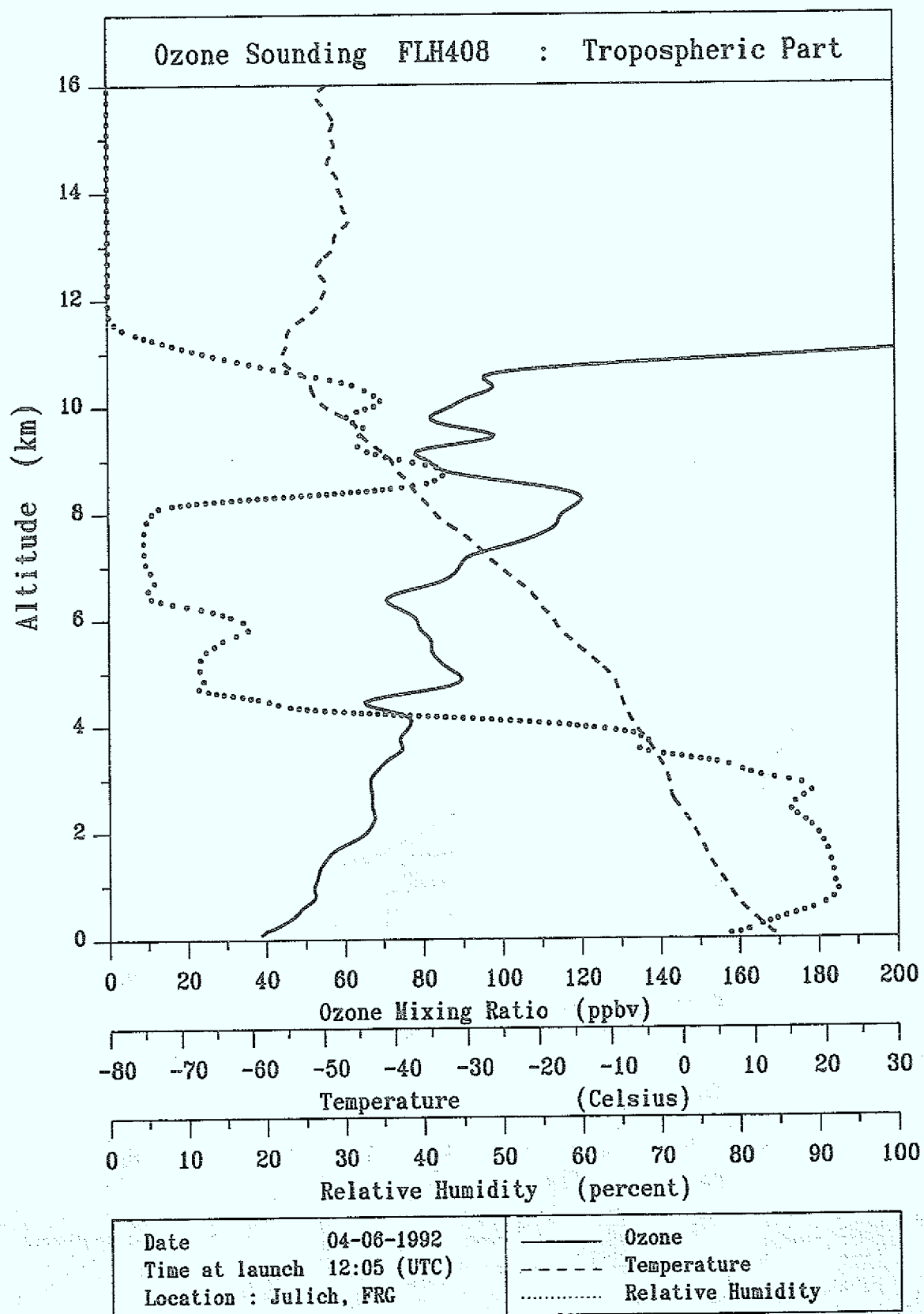
Date 01-06-1992
 Time at launch 12:03 (UTC)
 Location : Julich, FRG

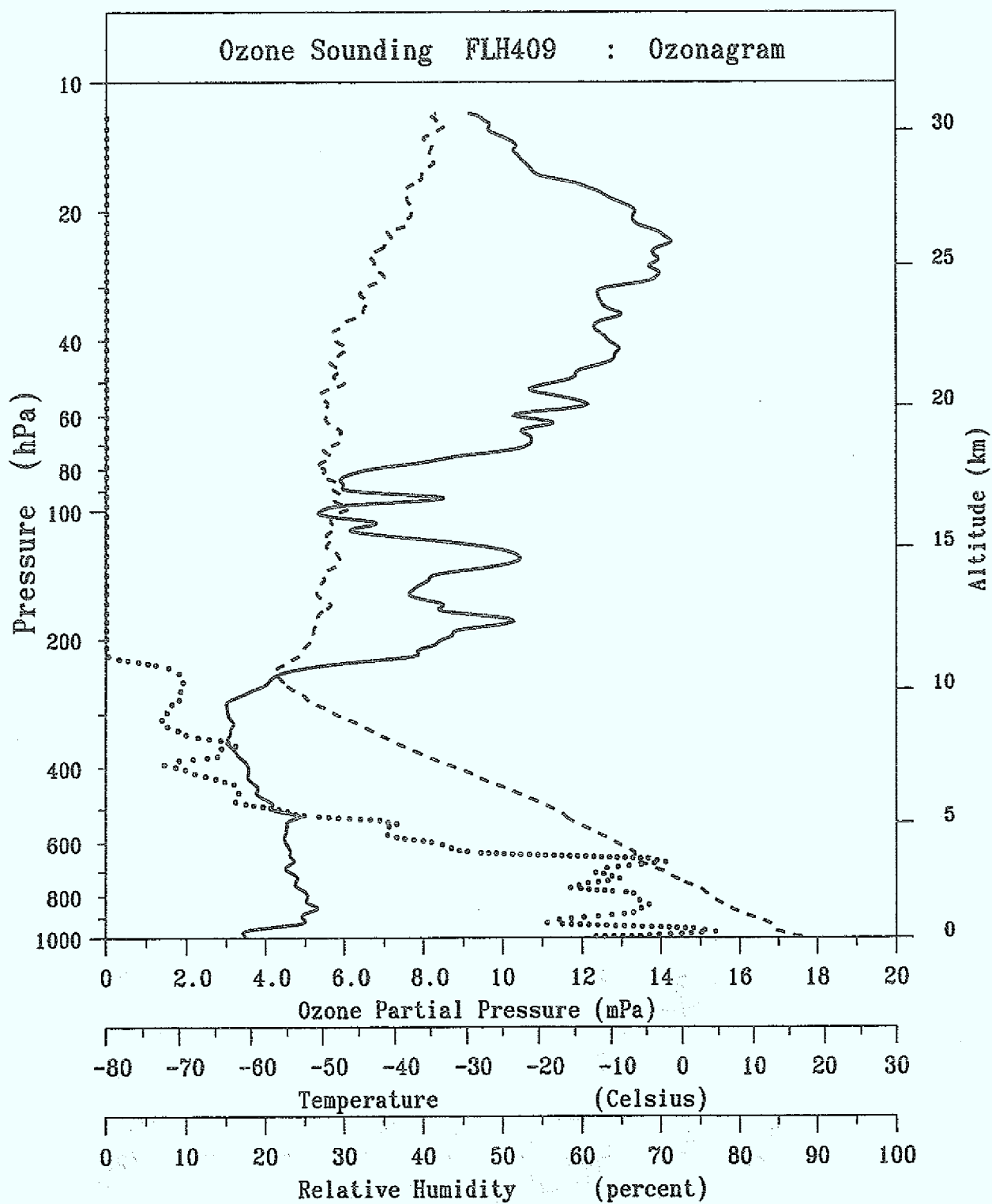
— Ozone
 --- Temperature
 Relative Humidity





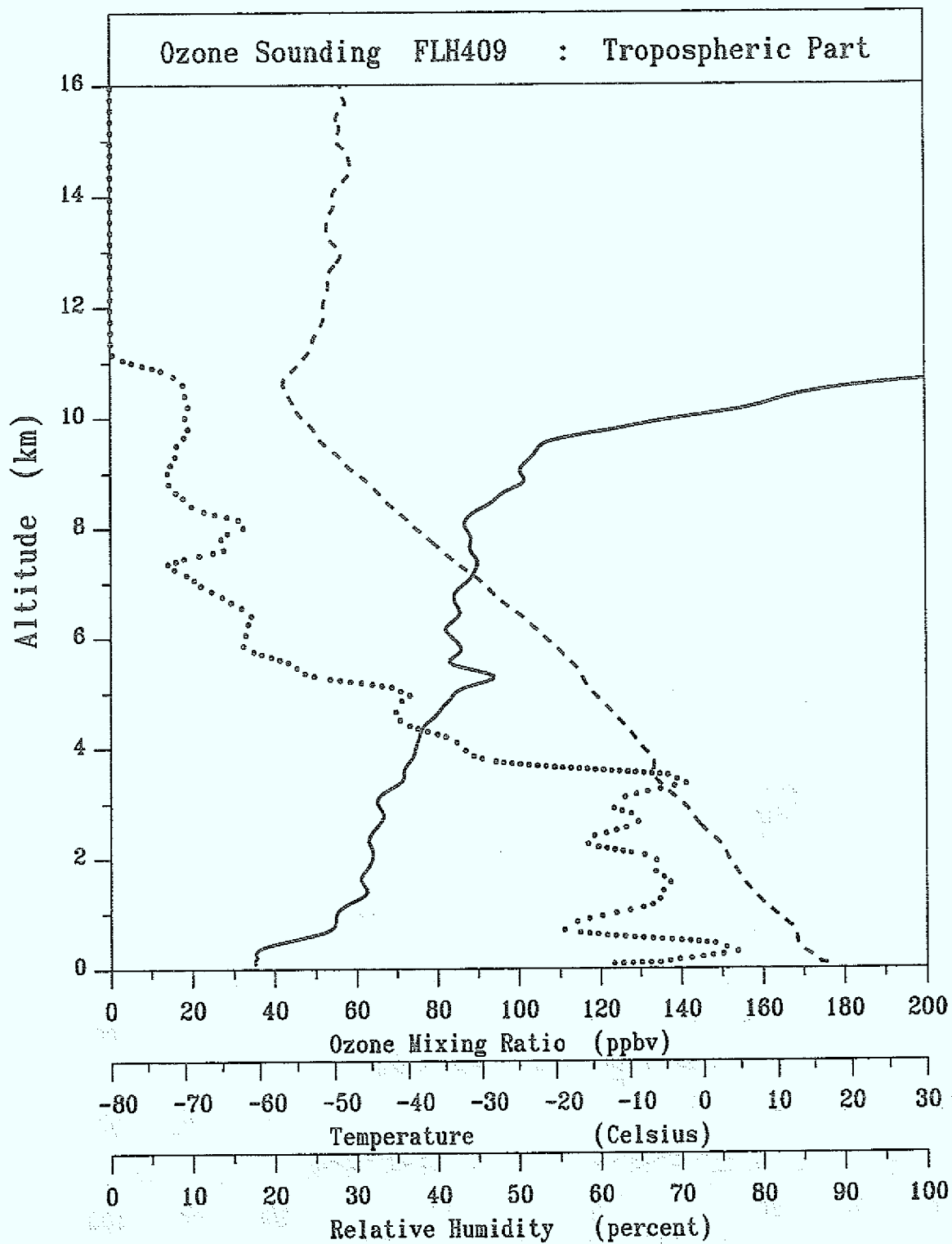
Date	04-06-1992	—	Ozone
Time at launch	12:05 (UTC)	- - -	Temperature
Location : Julich, FRG		.....	Relative Humidity





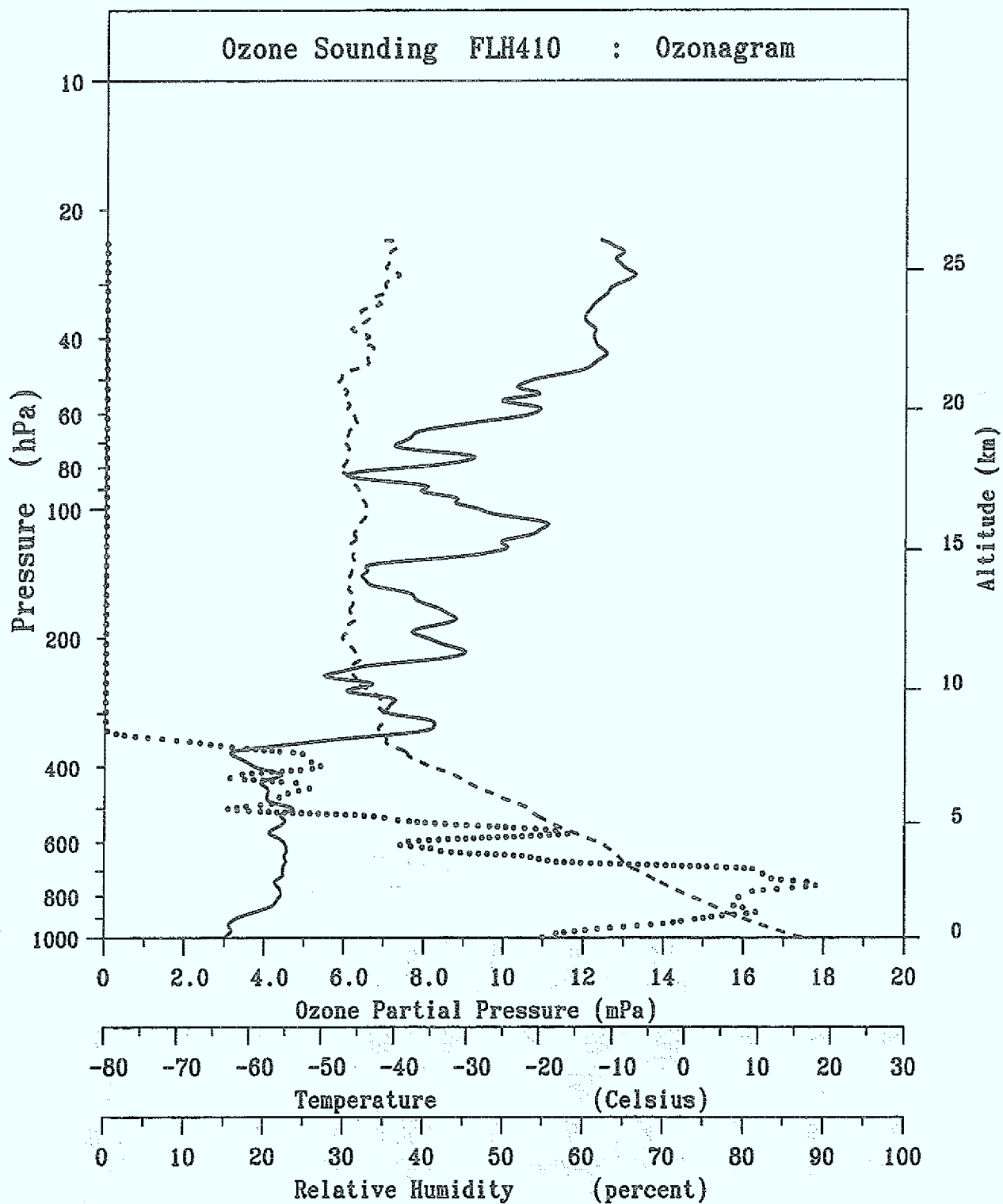
Date 09-06-1992
 Time at launch 12:07 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity



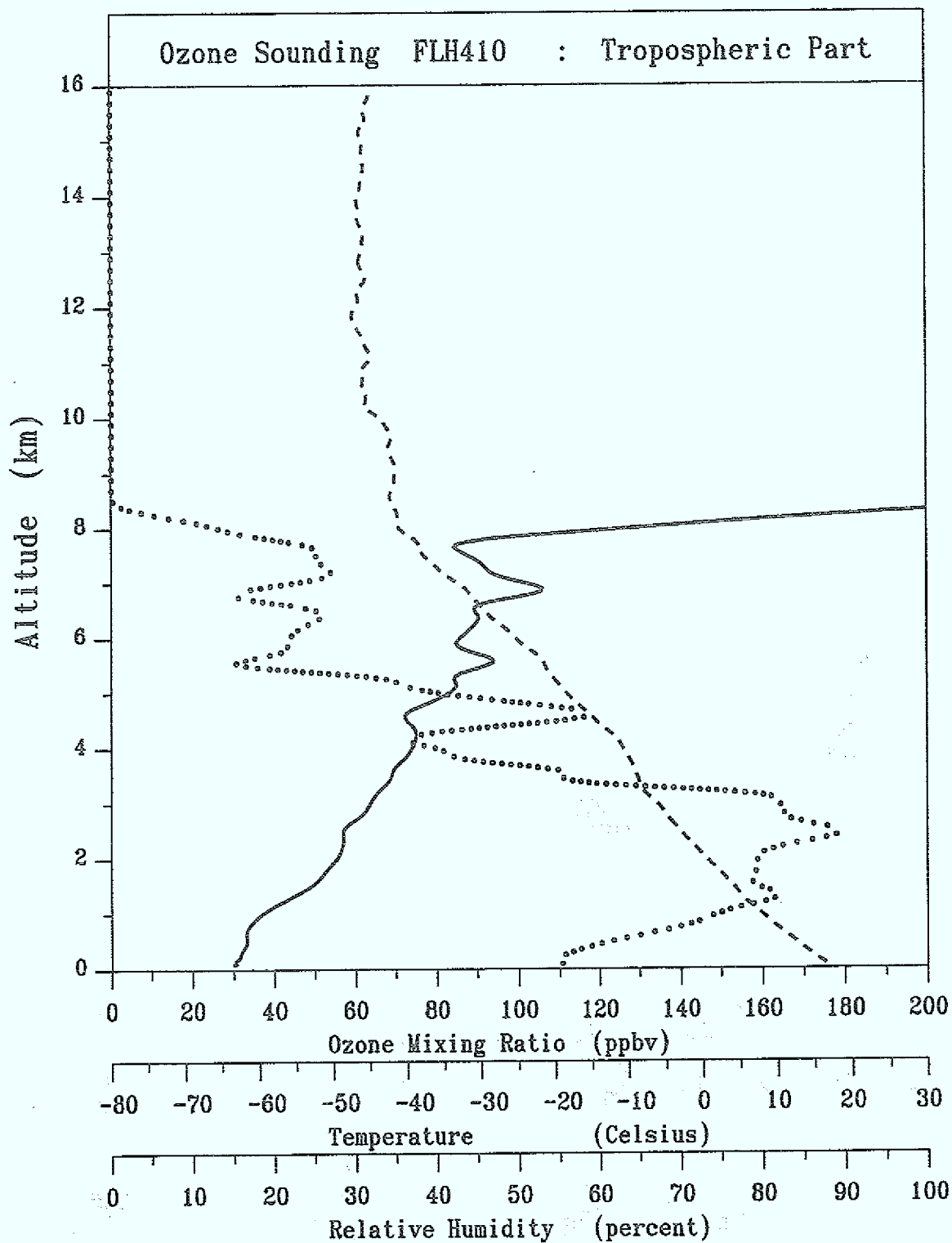
Date 09-06-1992
 Time at launch 12:07 (UTC)
 Location : Julich, FRG

——— Ozone
 - - - - - Temperature
 Relative Humidity



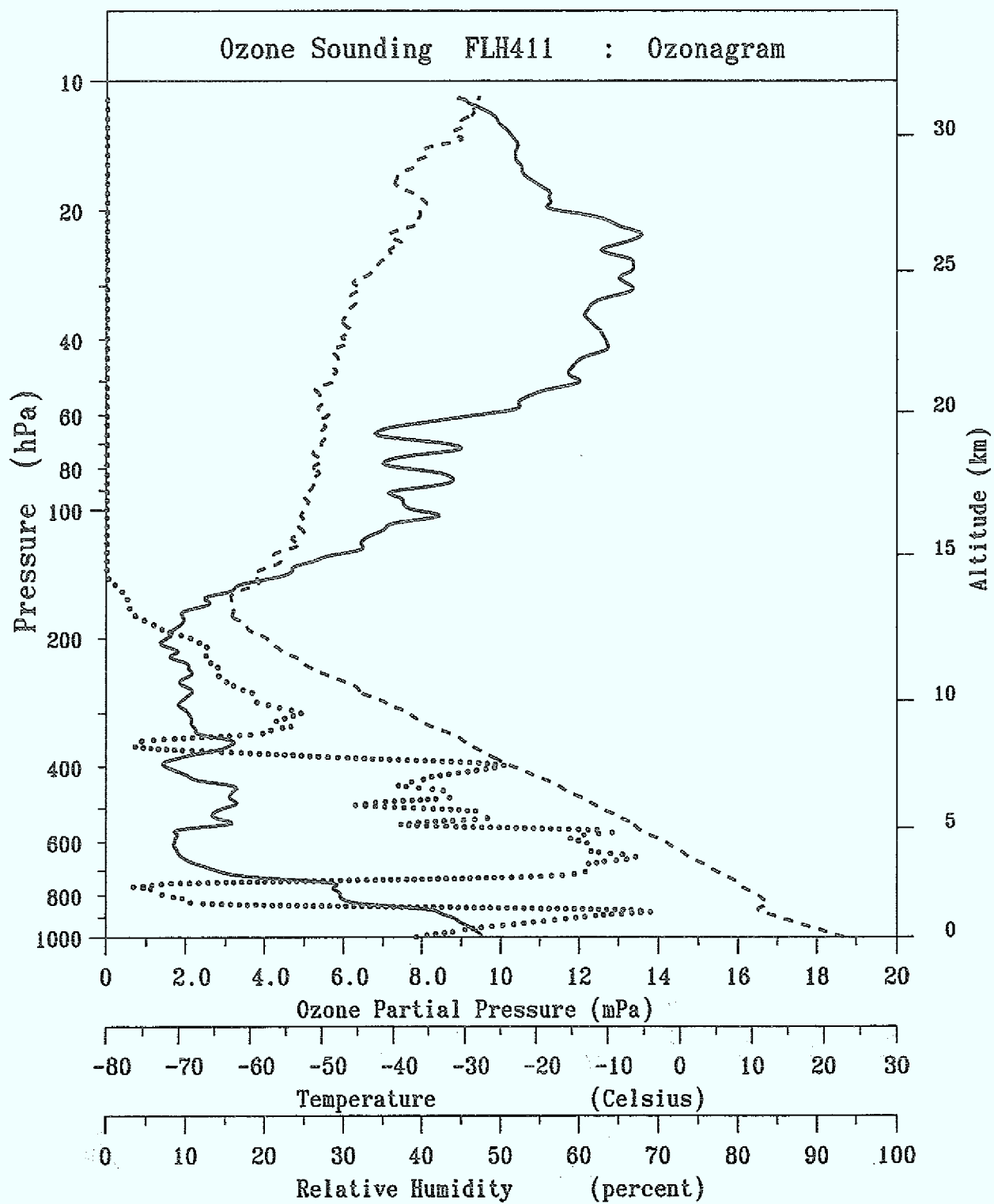
Date 12-06-1992
 Time at launch 11:30 (UTC)
 Location : Julich, FRG

— Ozone
 - - - - Temperature
 Relative Humidity



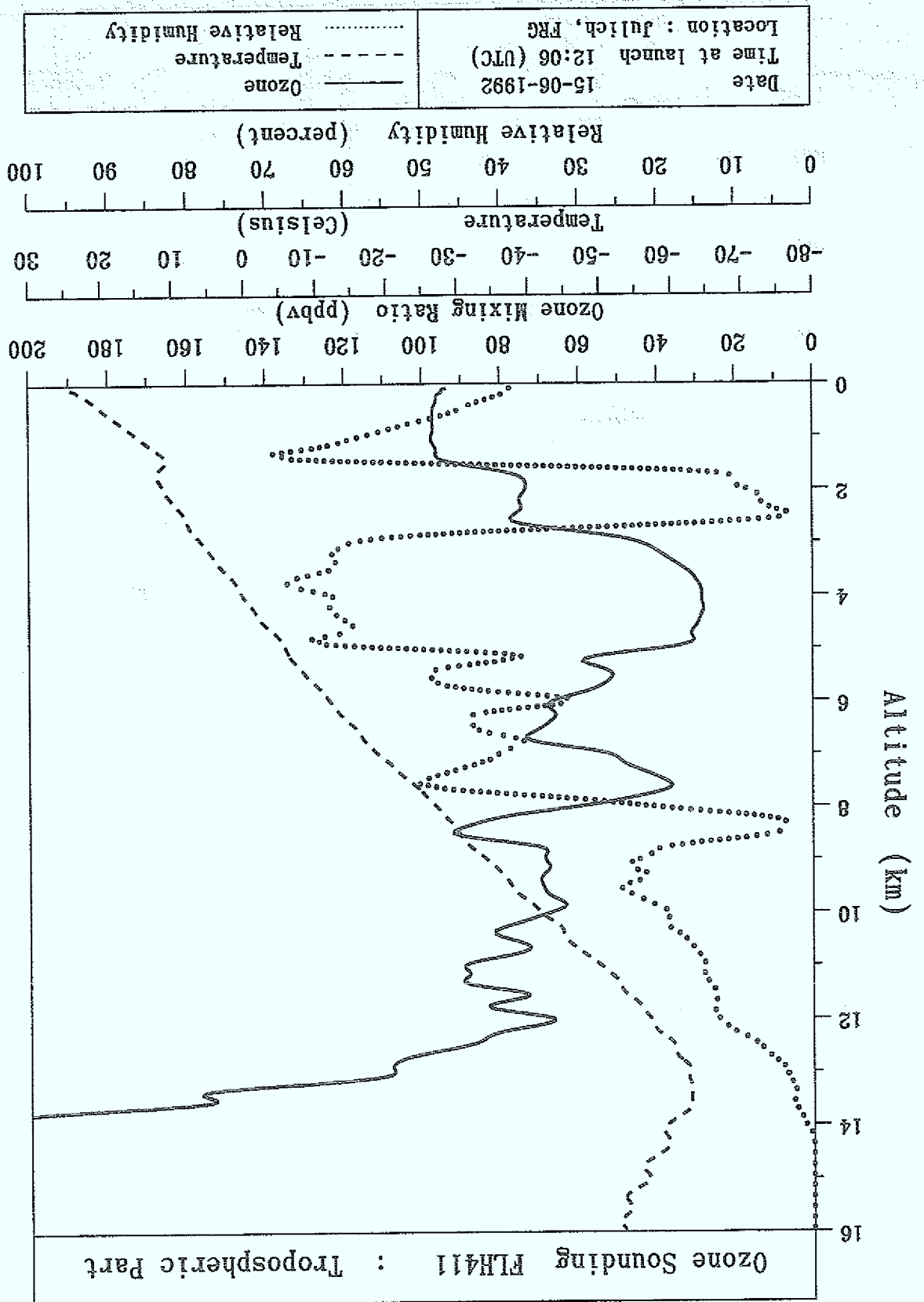
Date 12-06-1992
 Time at launch 11:30 (UTC)
 Location : Julich, FRG

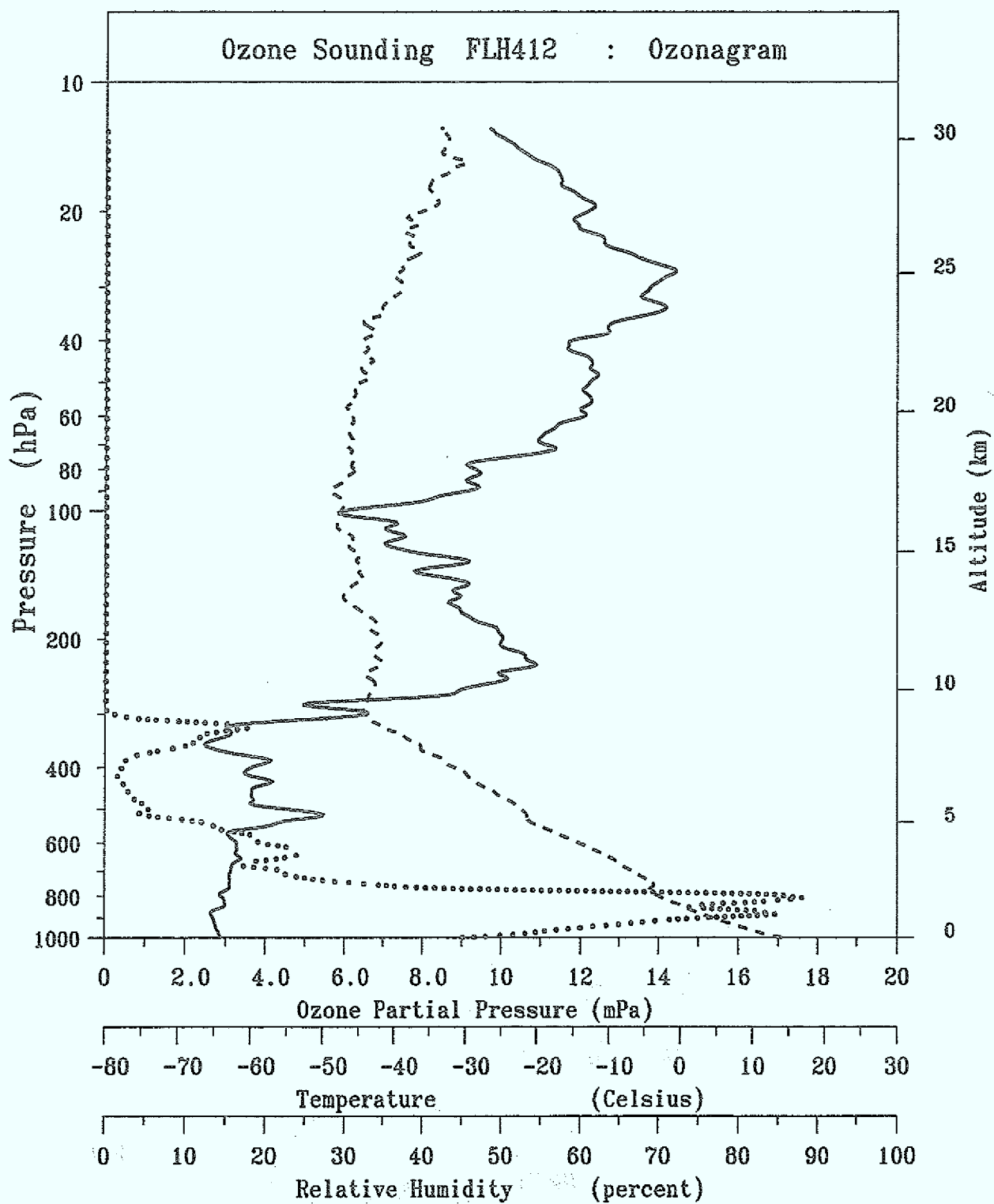
— Ozone
 - - - - Temperature
 Relative Humidity



Date 15-06-1992
 Time at launch 12:06 (UTC)
 Location : Julich, FRG

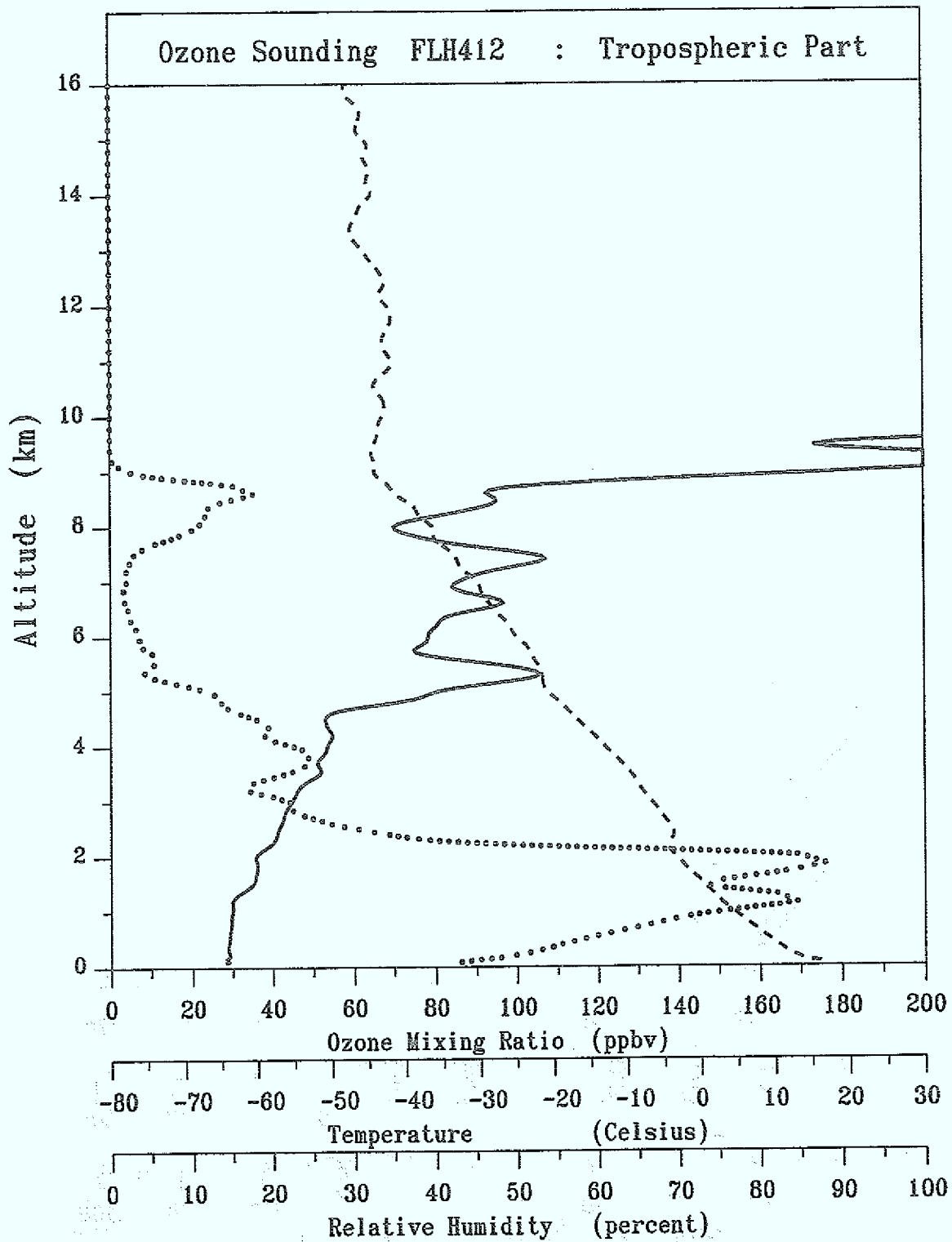
— Ozone
 - - - Temperature
 Relative Humidity





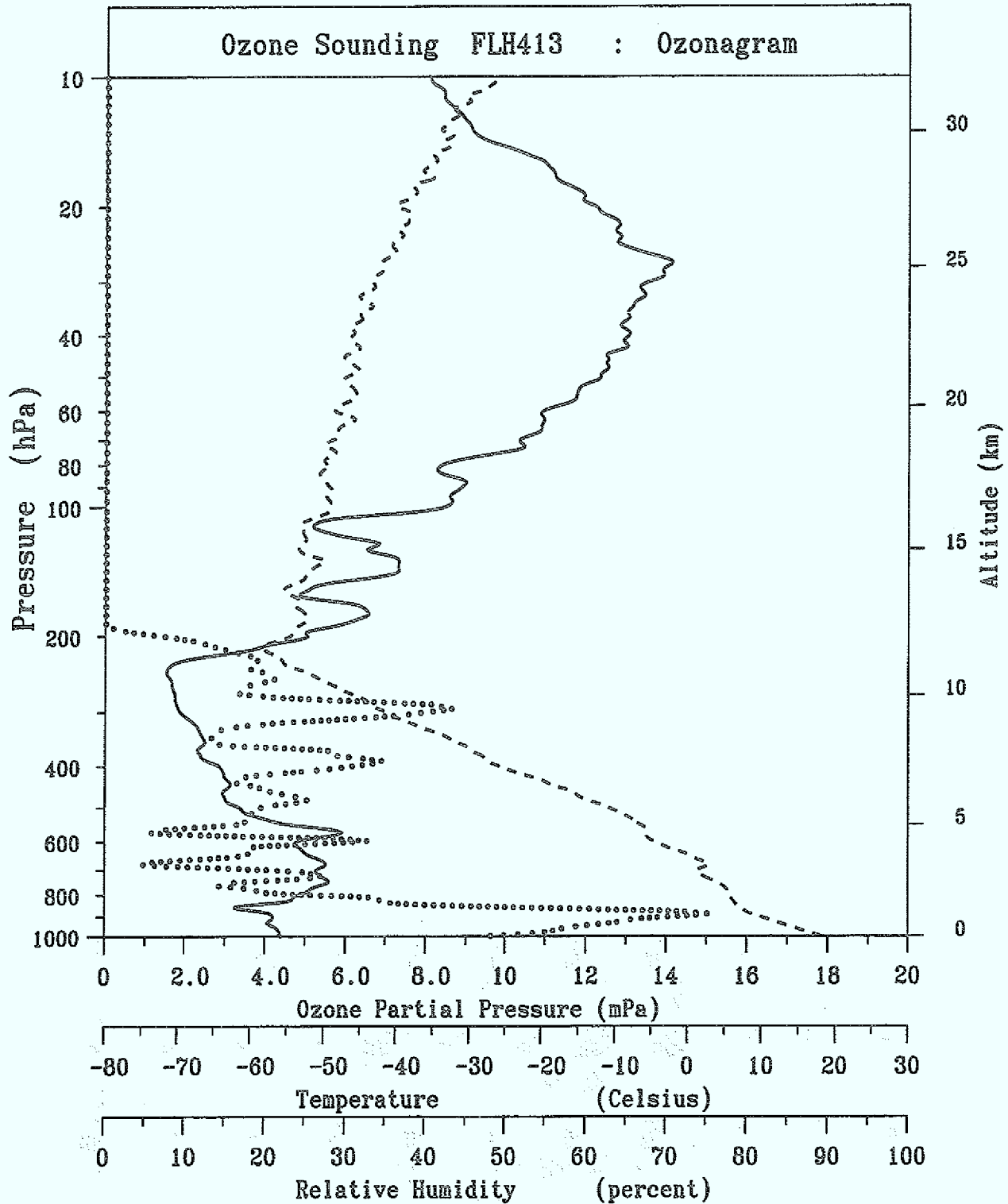
Date 19-06-1992
 Time at launch 11:16 (UTC)
 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity



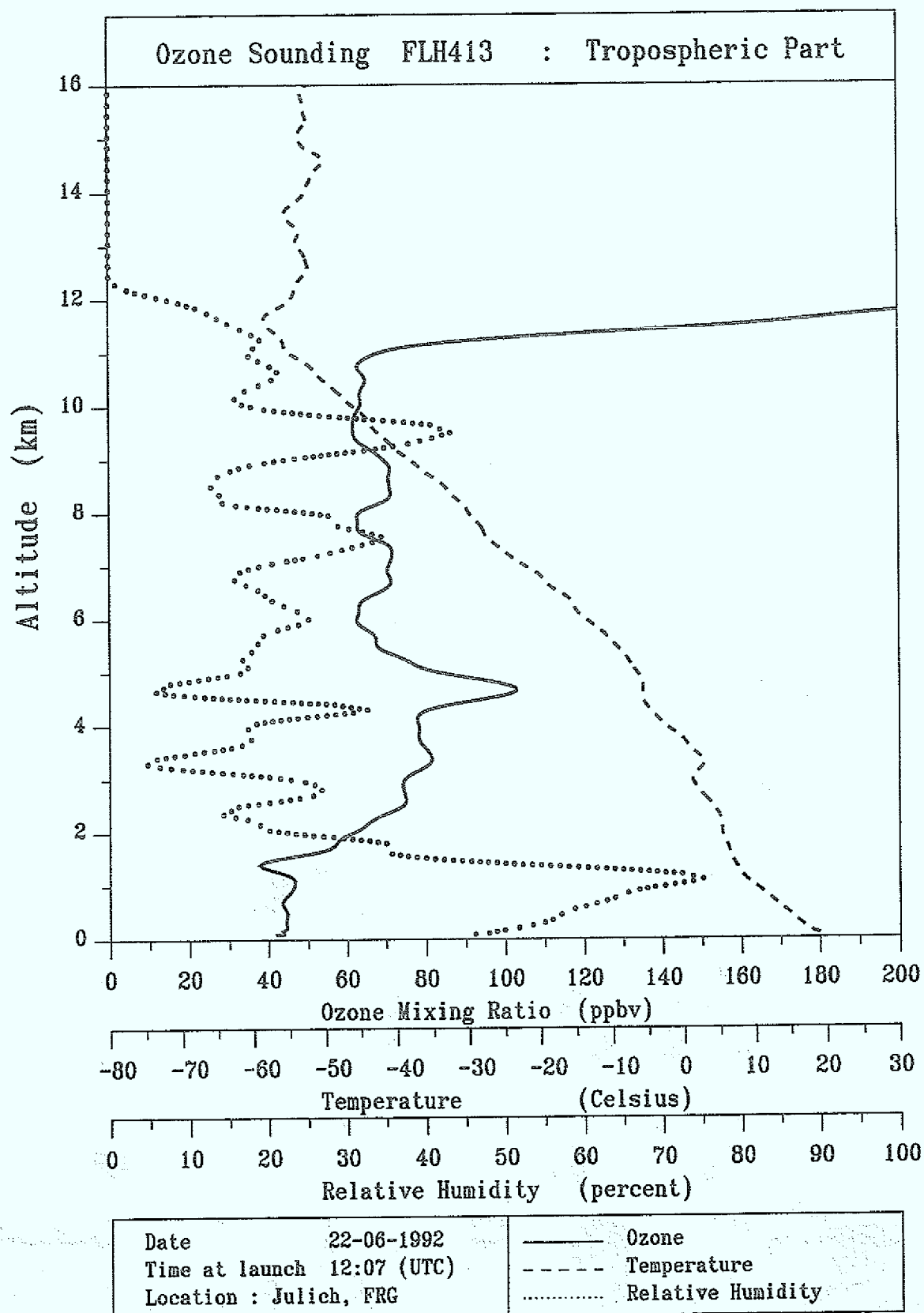
Date 19-06-1992
 Time at launch 11:16 (UTC)
 Location : Julich, FRG

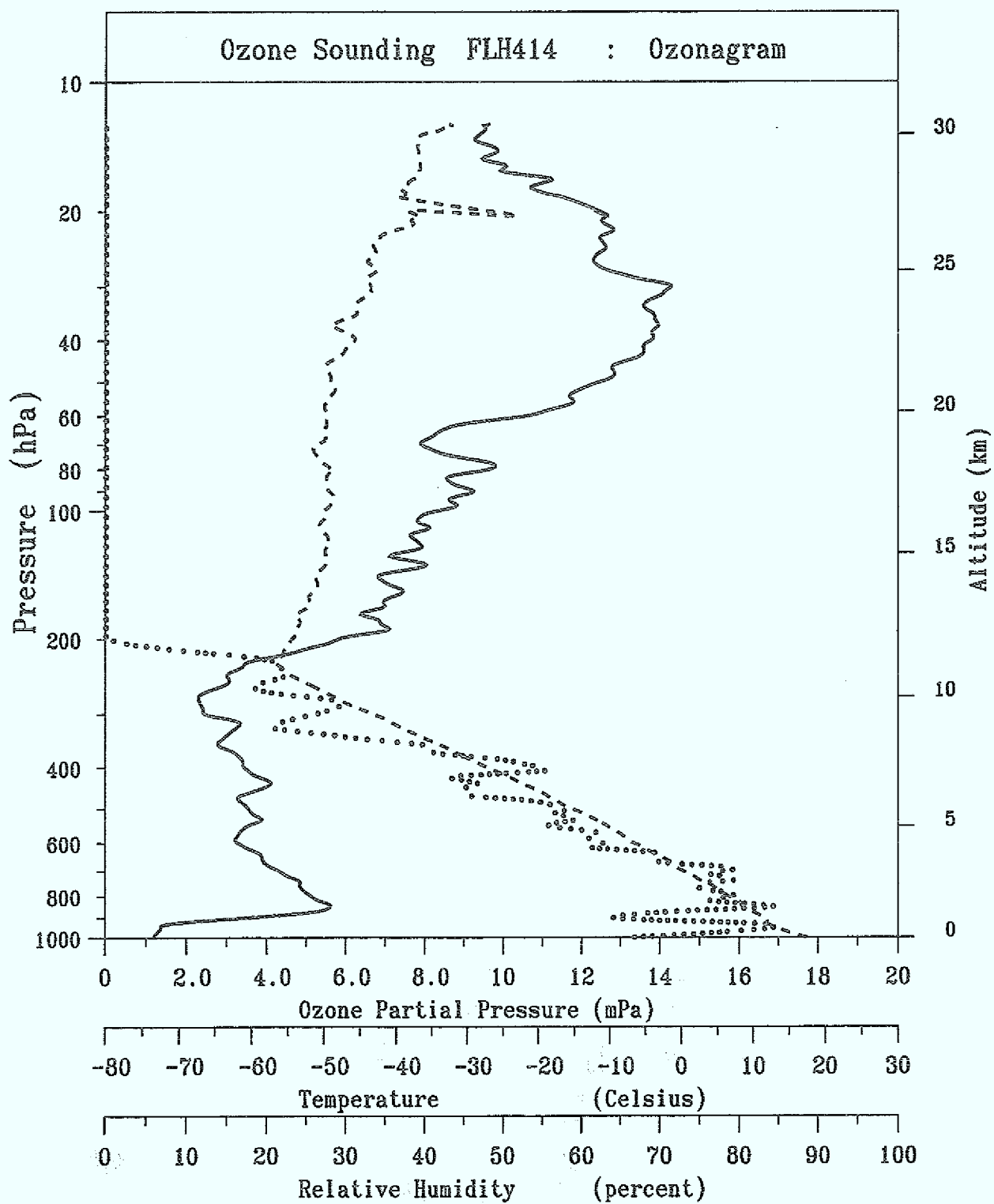
— Ozone
 - - - - - Temperature
 Relative Humidity



Date 22-06-1992
 Time at launch 12:07 (UTC)
 Location : Julich, FRG

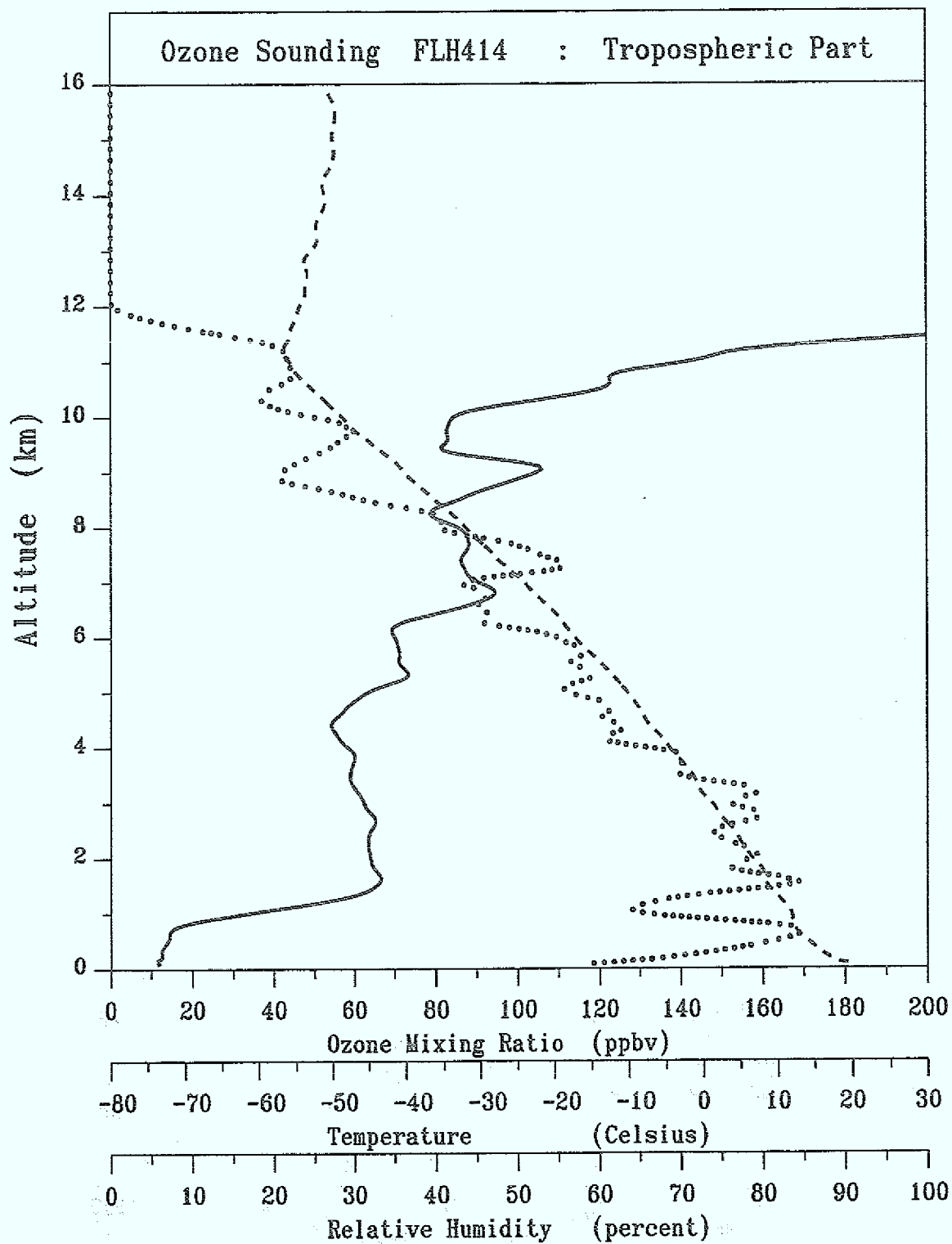
— Ozone
 --- Temperature
 Relative Humidity



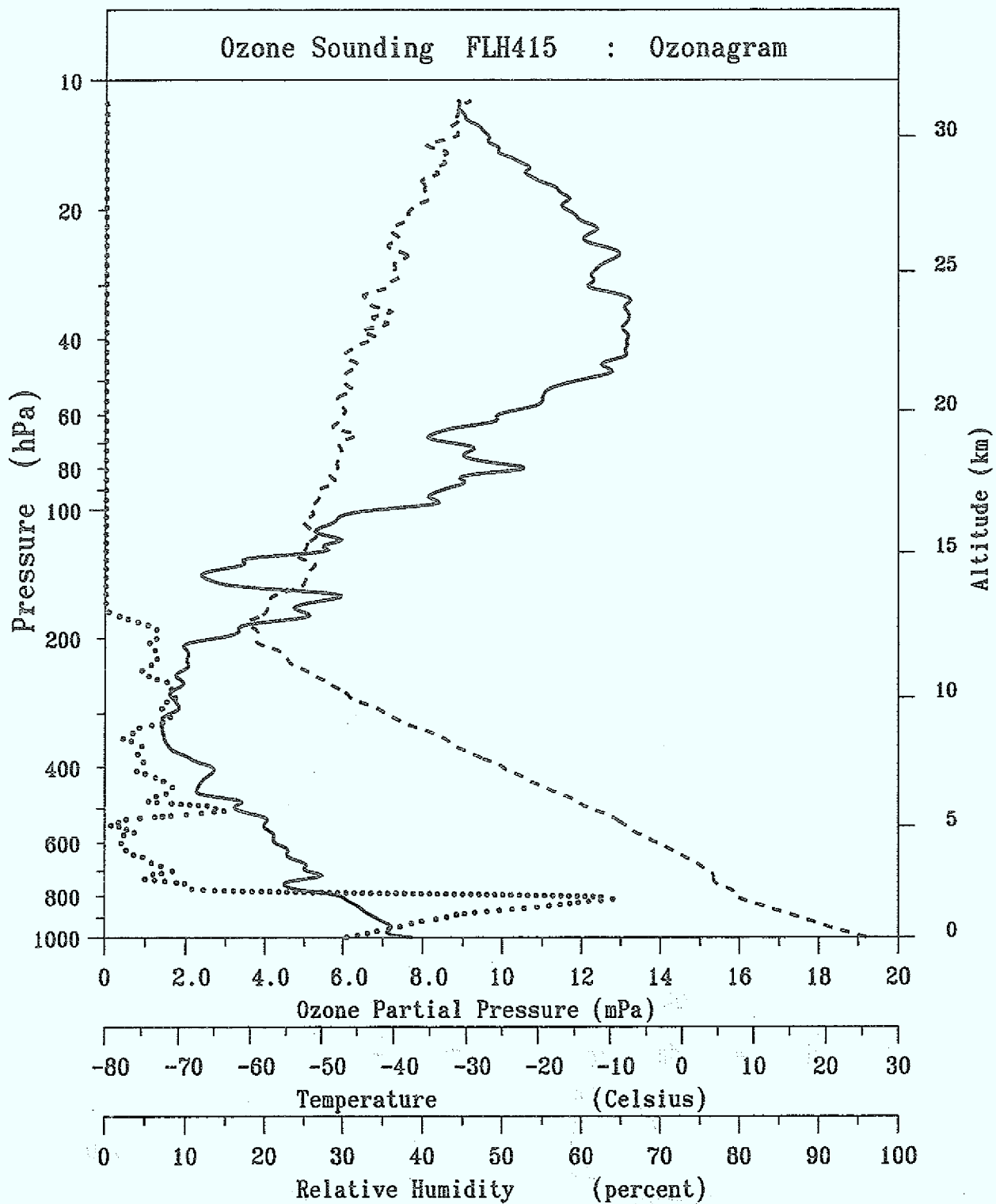


Date 25-06-1992
 Time at launch 11:41 (UTC)
 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity



Date	25-06-1992	—	Ozone
Time at launch	11:41 (UTC)	- - - -	Temperature
Location	Julich, FRG	.....	Relative Humidity



Date 29-06-1992

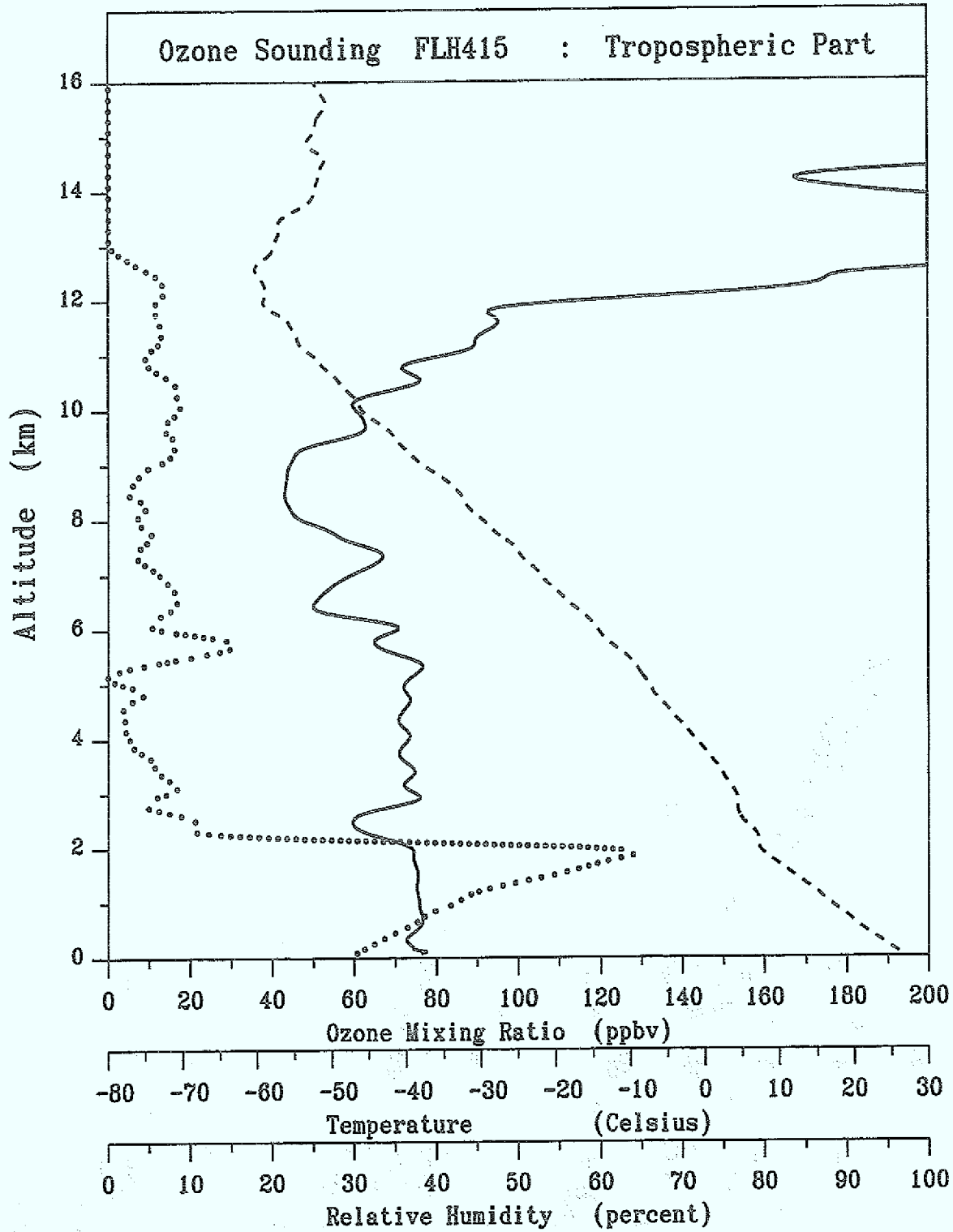
Time at launch 11:58 (UTC)

Location : Julich, FRG

— Ozone

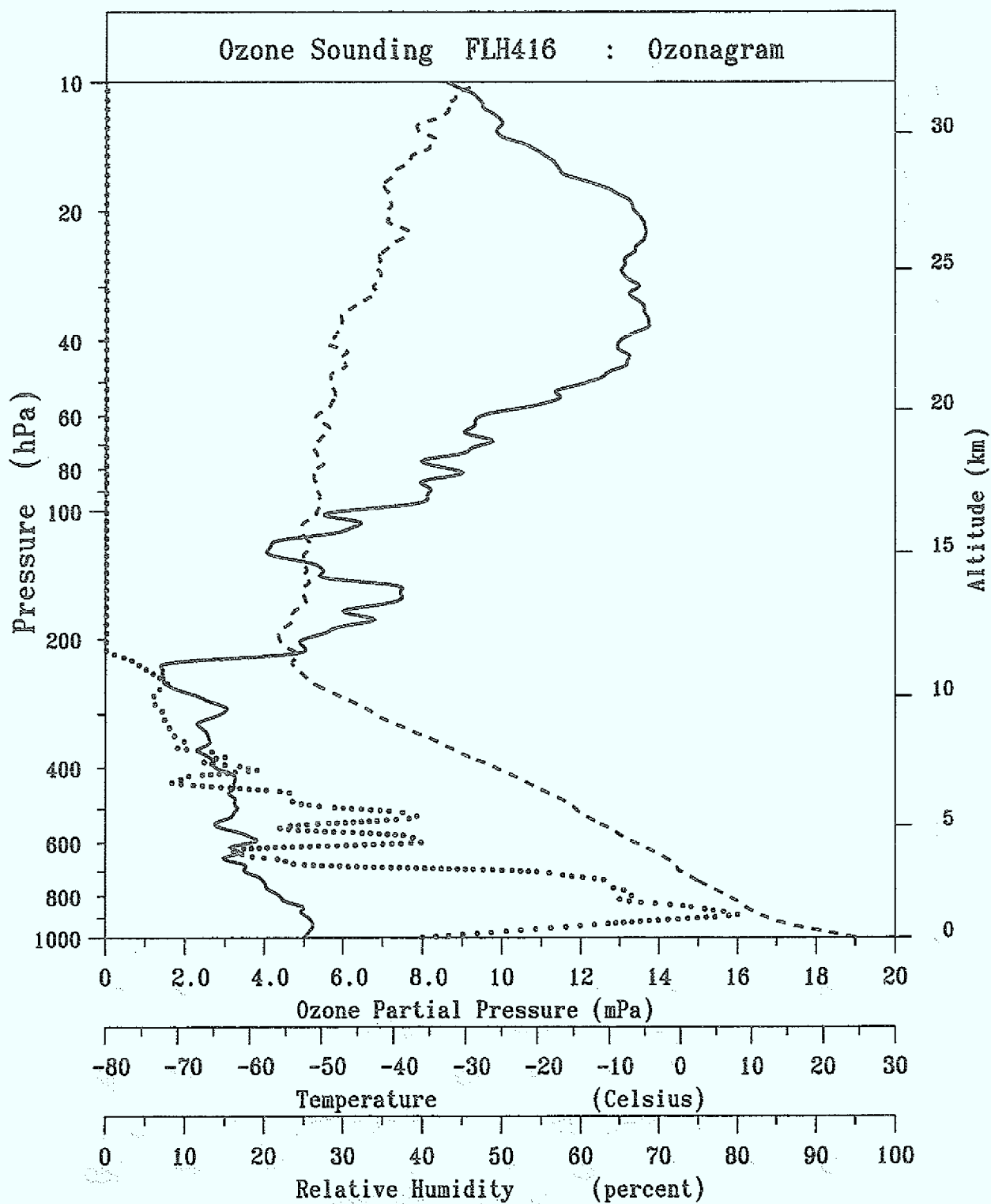
--- Temperature

..... Relative Humidity



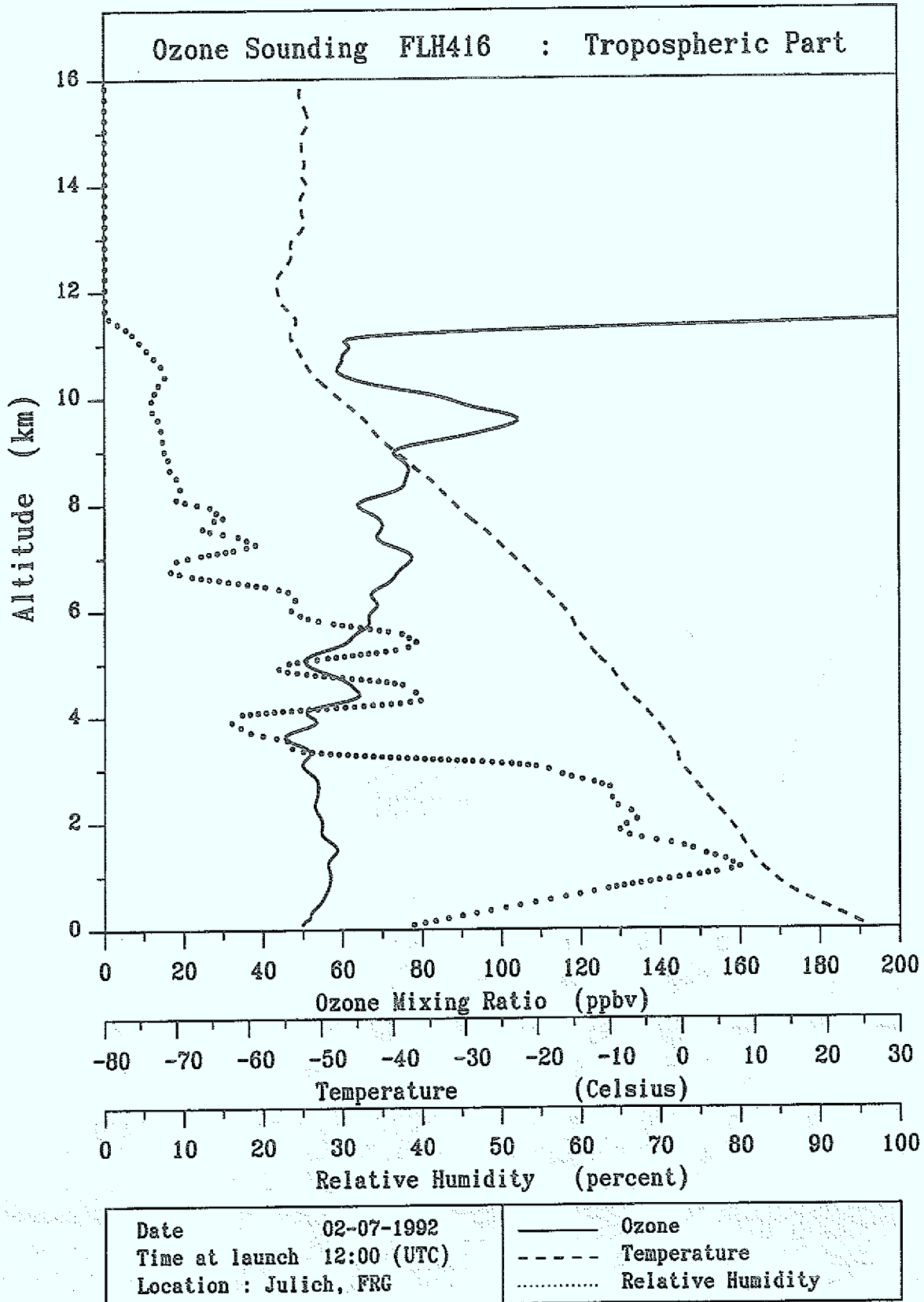
Date 29-06-1992
 Time at launch 11:58 (UTC)
 Location : Julich, FRG

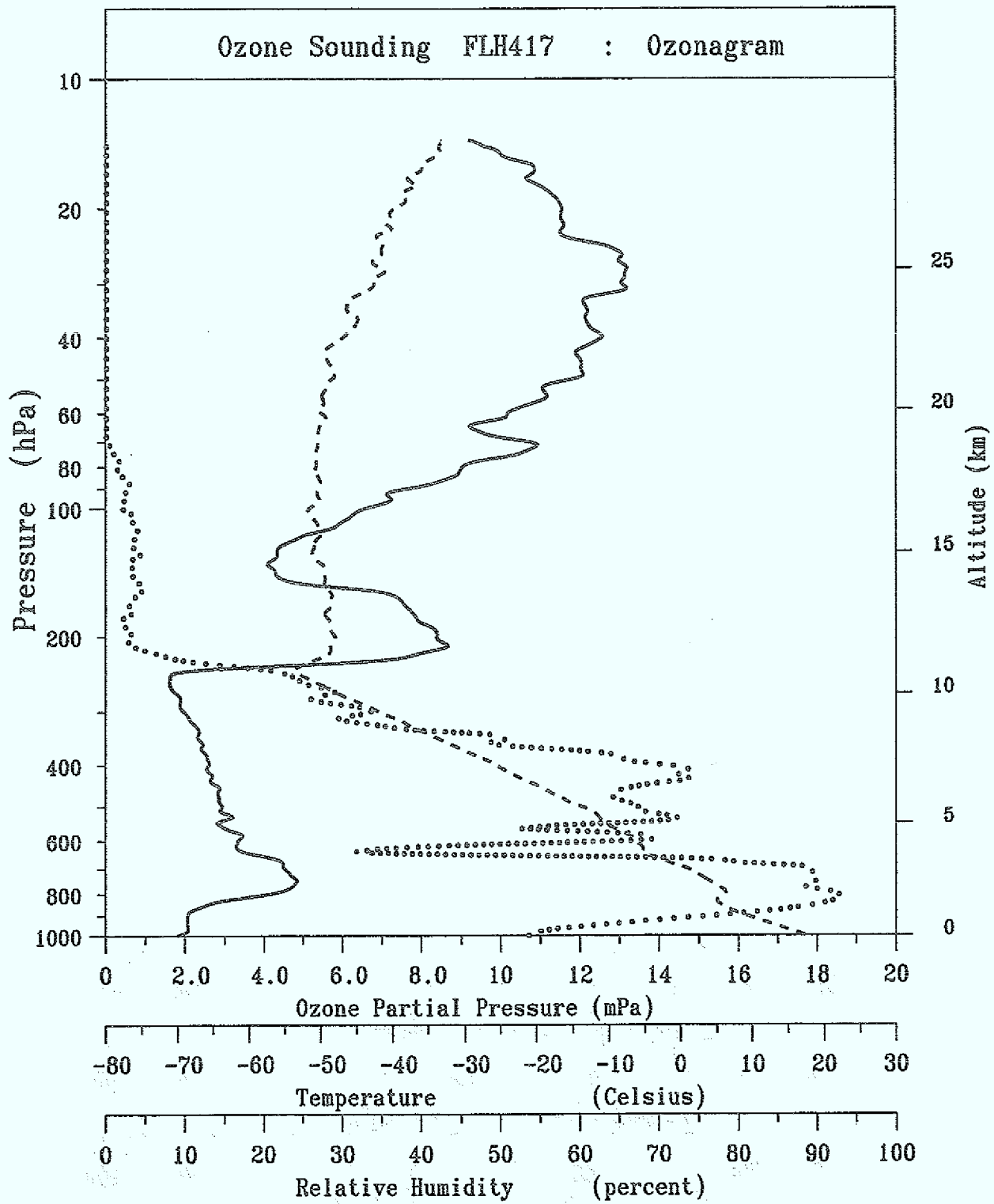
—— Ozone
 - - - - Temperature
 Relative Humidity



Date 02-07-1992
 Time at launch 12:00 (UTC)
 Location : Julich, FRG

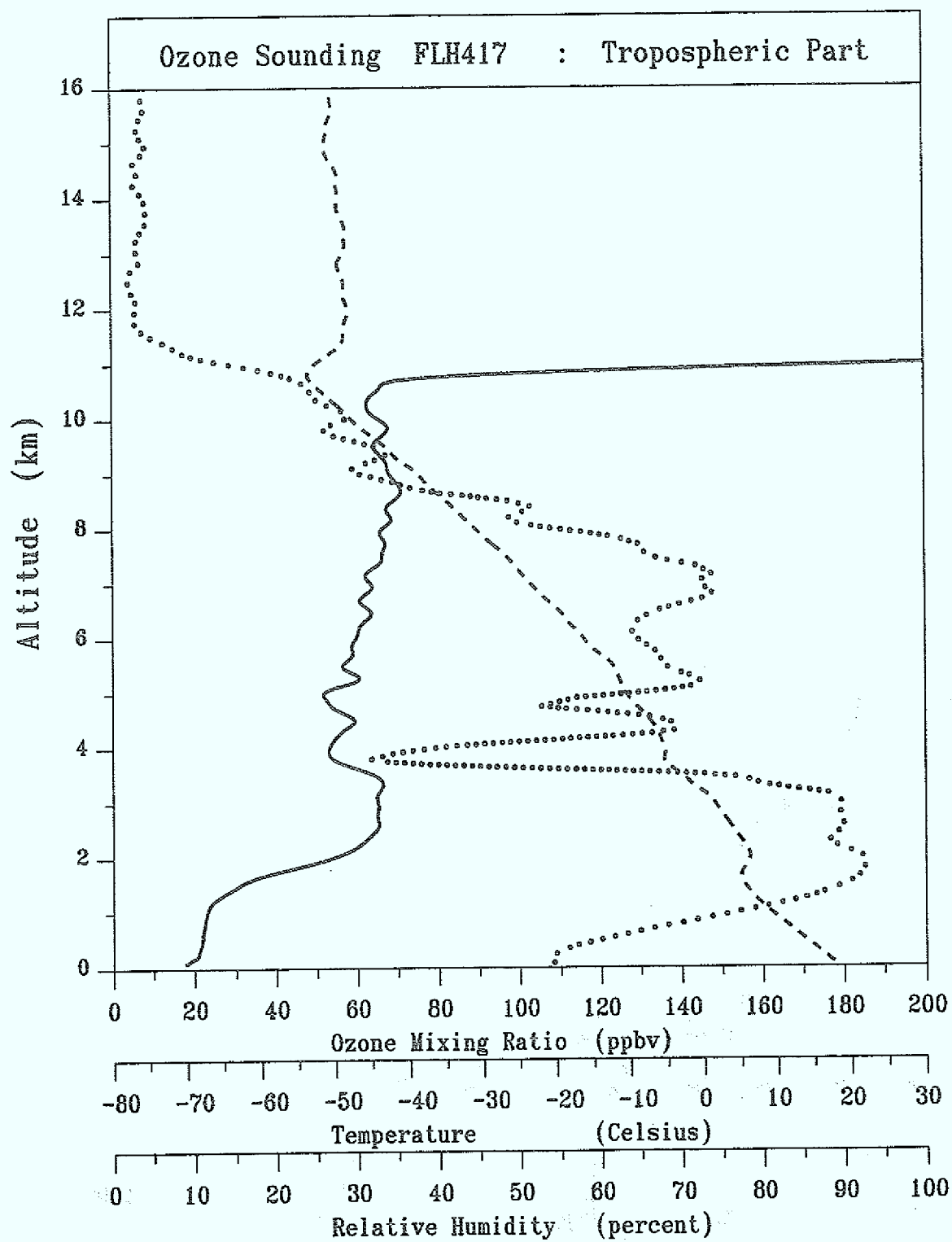
— Ozone
 - - - Temperature
 Relative Humidity





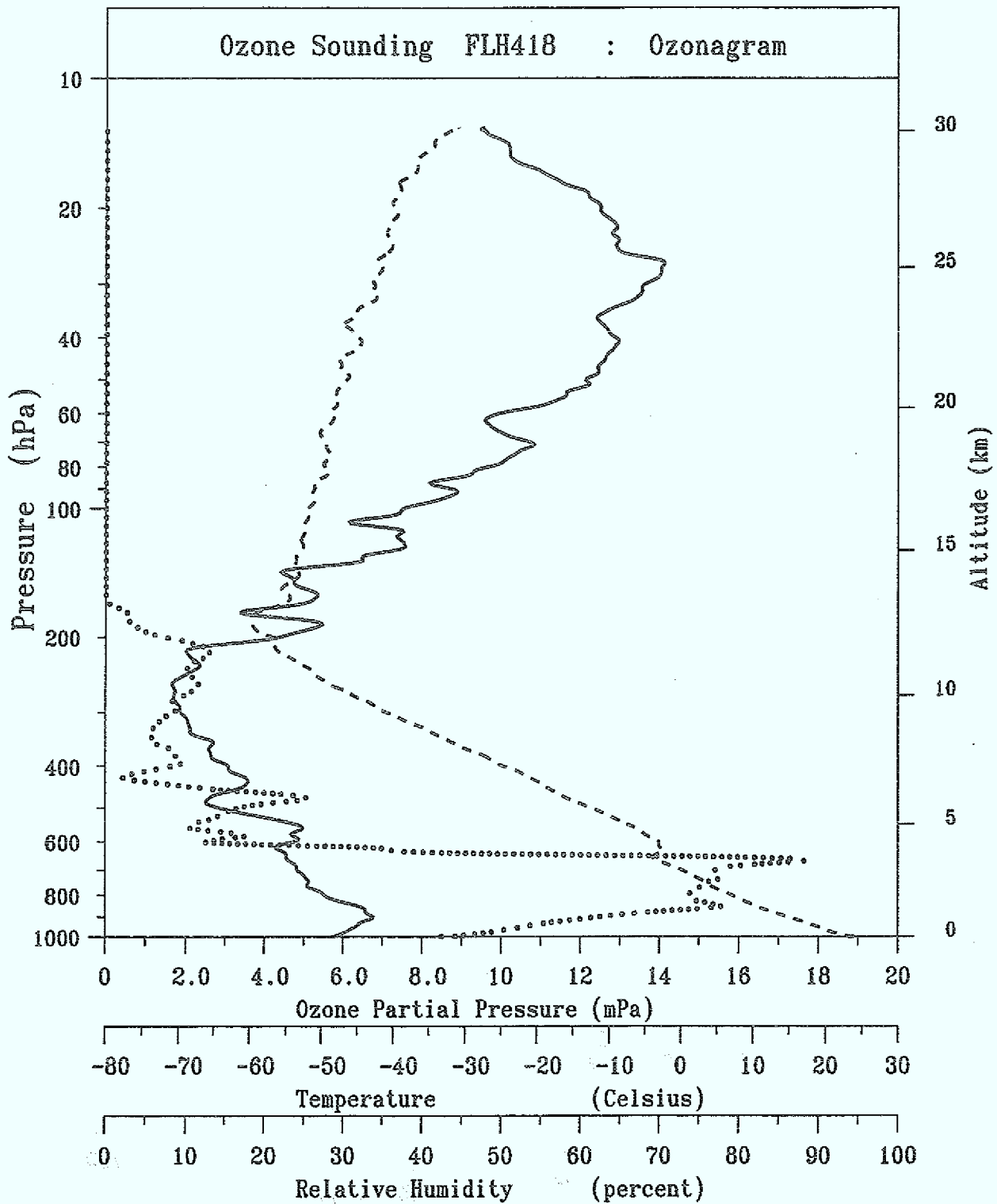
Date 06-07-1992
 Time at launch 12:09 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity



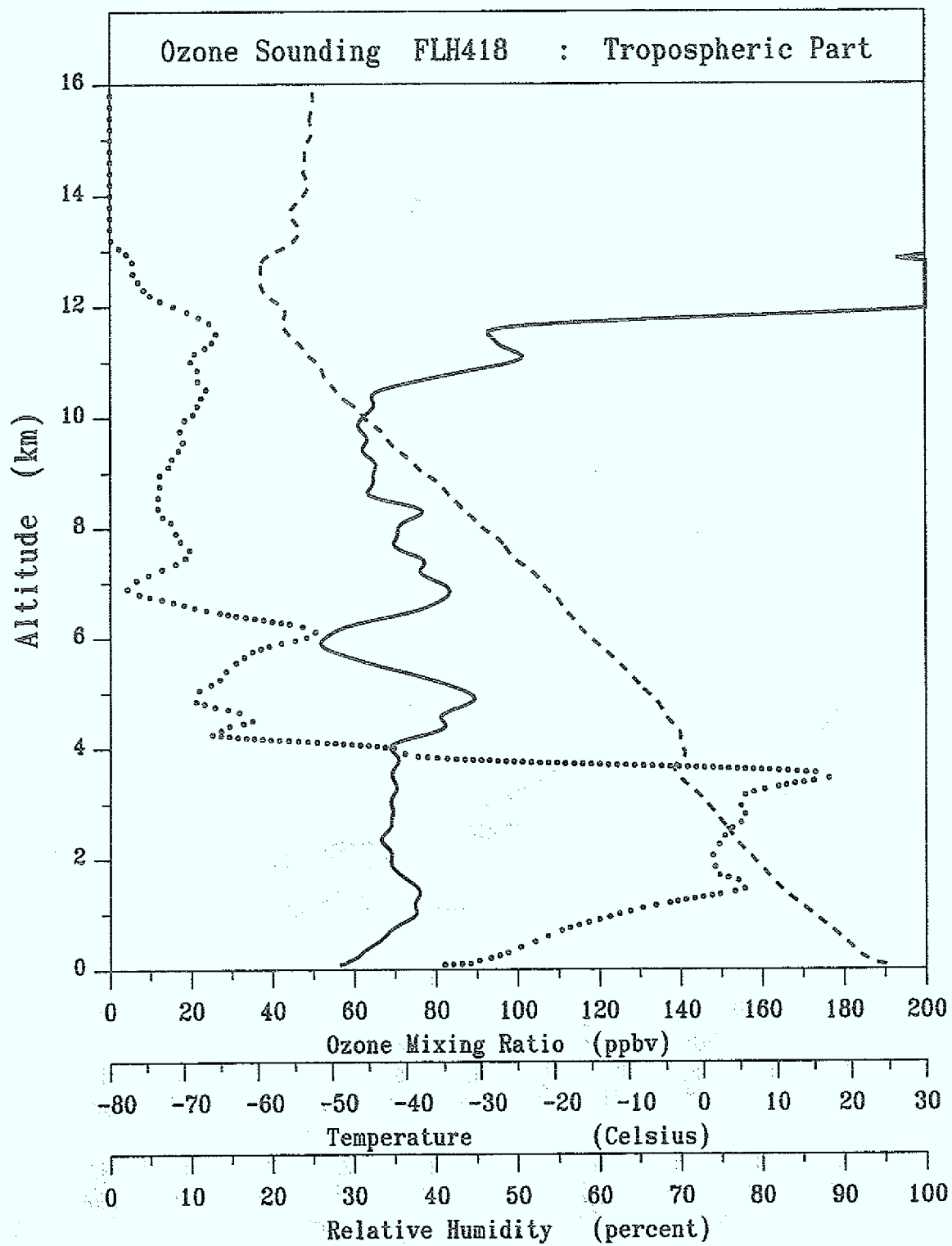
Date 06-07-1992
 Time at launch 12:09 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity



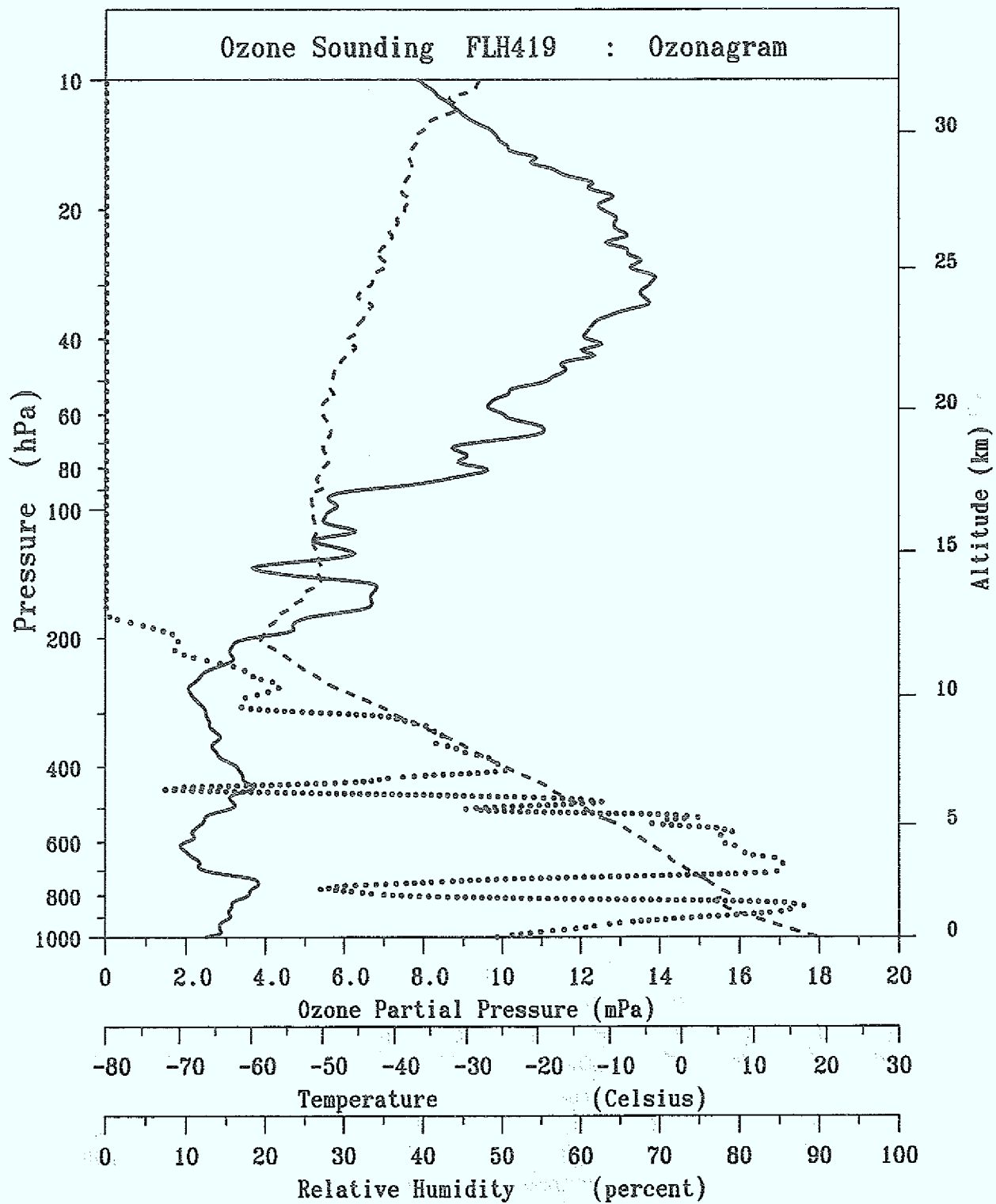
Date 09-07-1992
 Time at launch 12:00 (UTC)
 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity



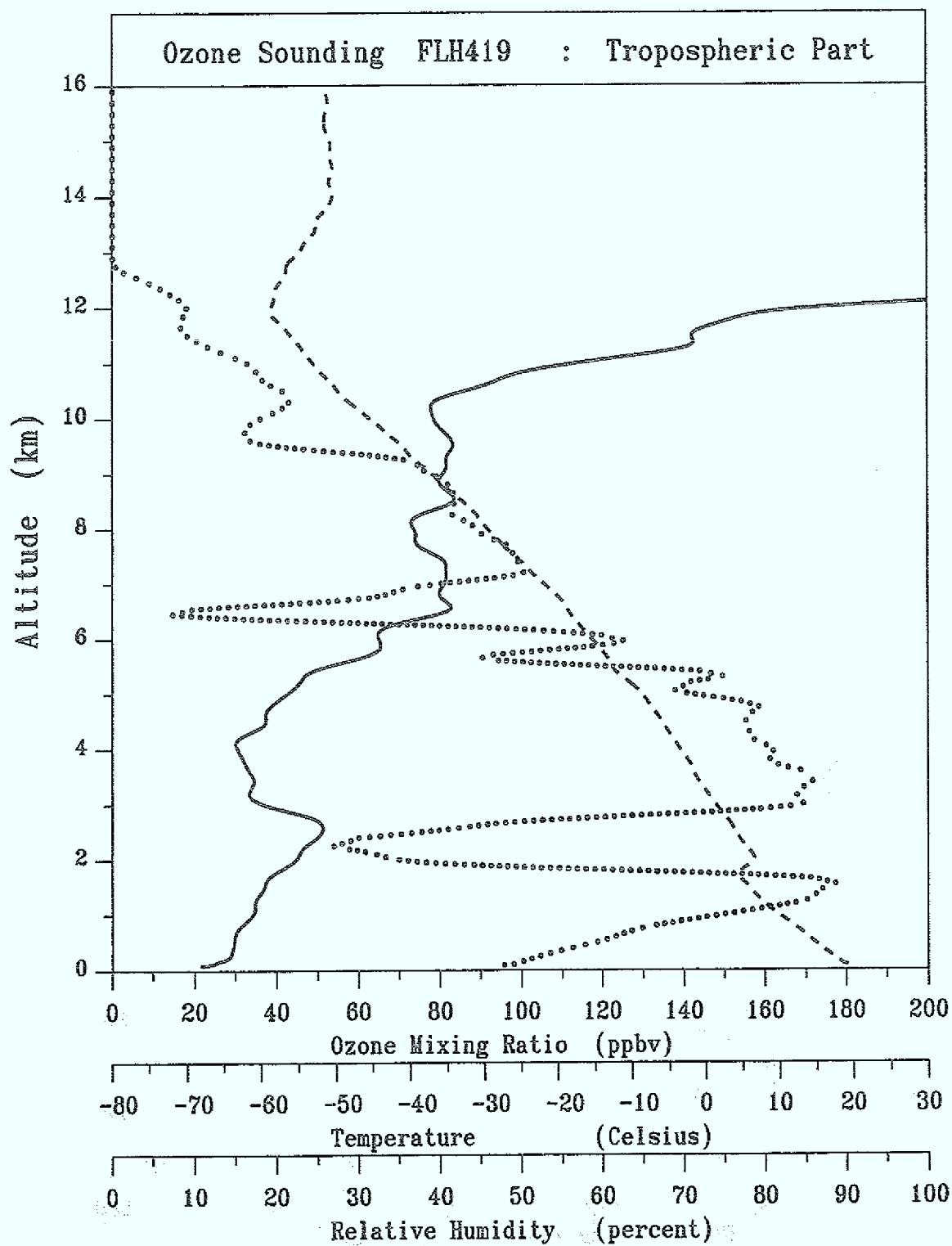
Date 09-07-1992
 Time at launch 12:00 (UTC)
 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity

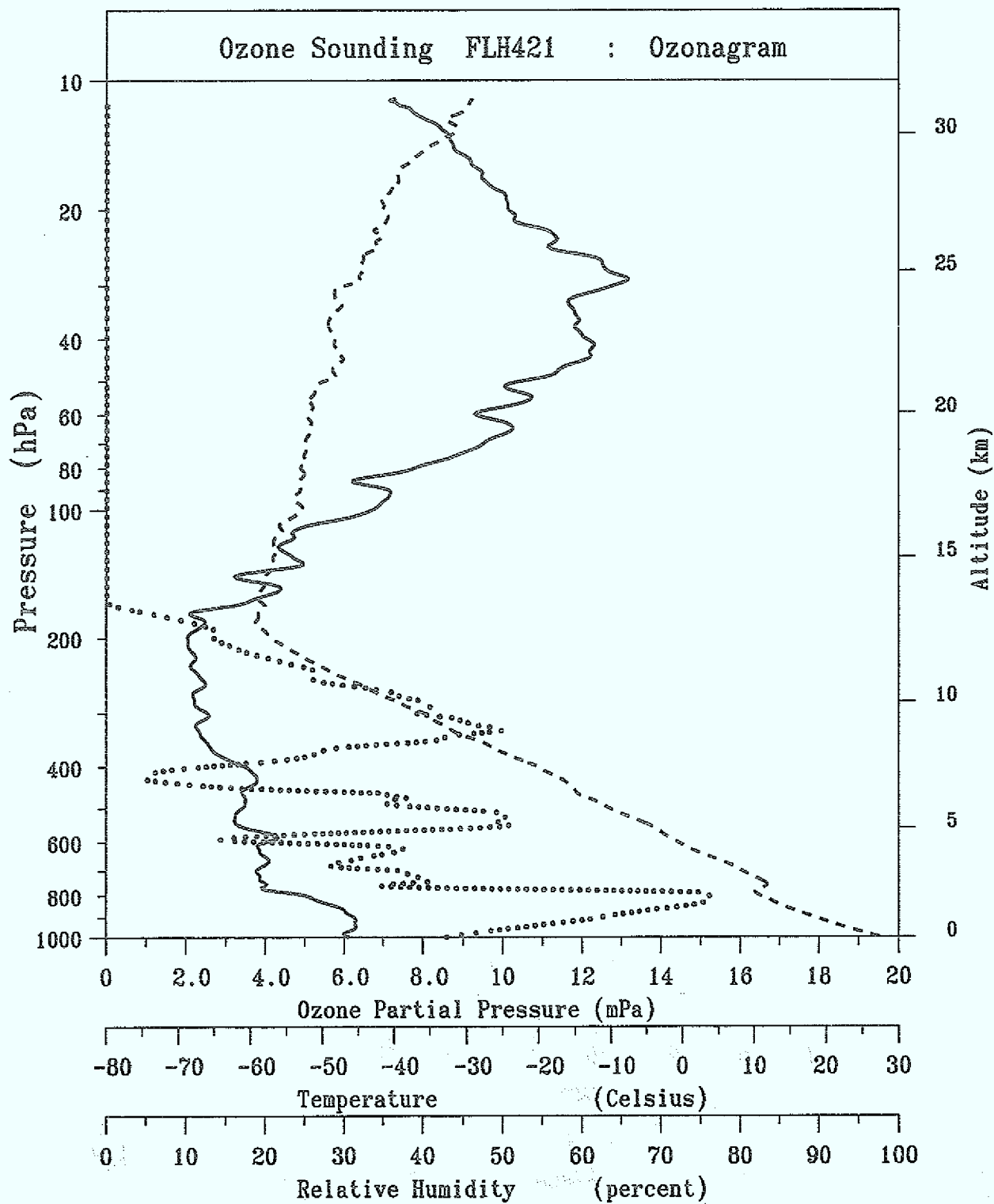


Date 13-07-1992
 Time at launch 11:59 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity

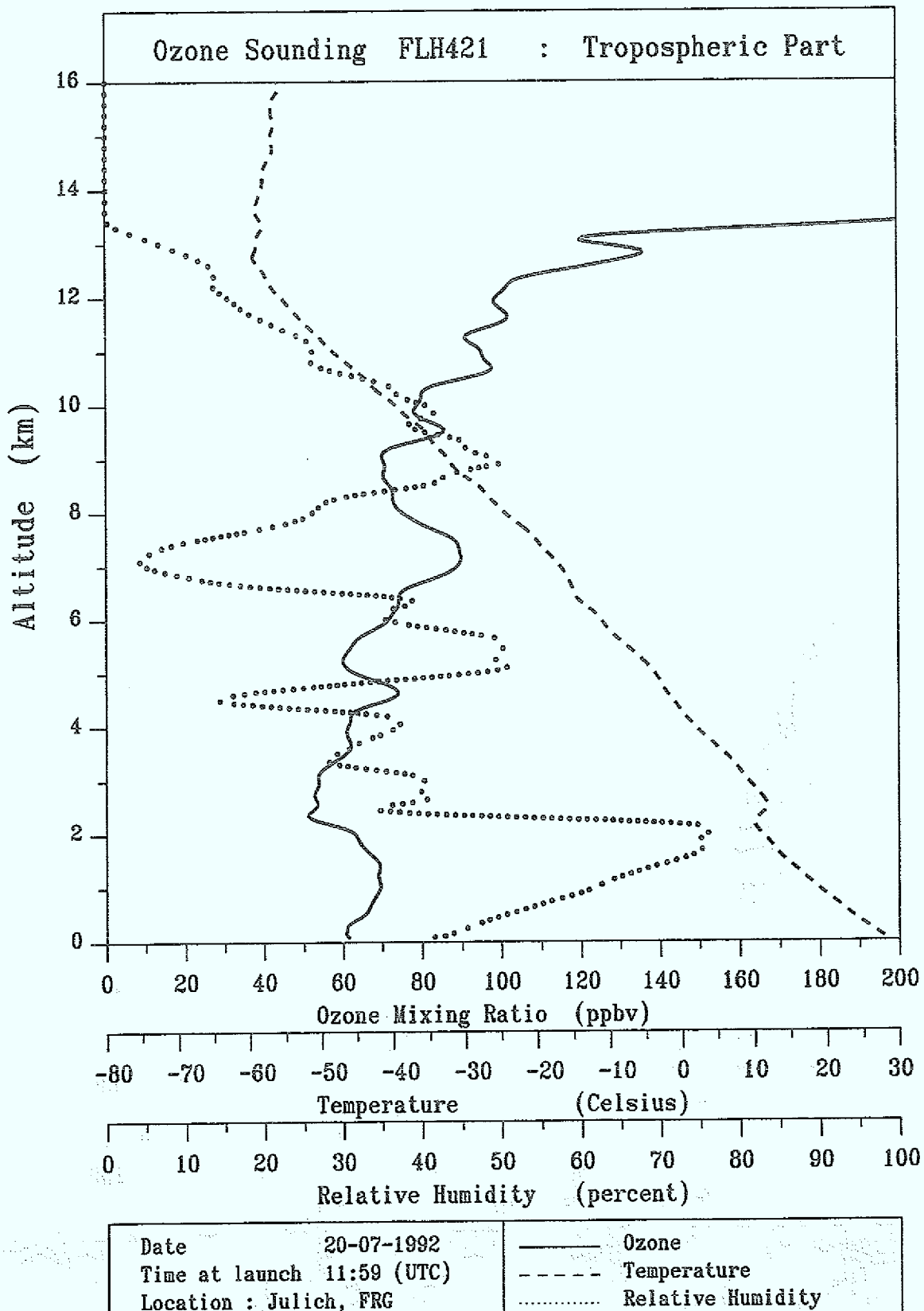


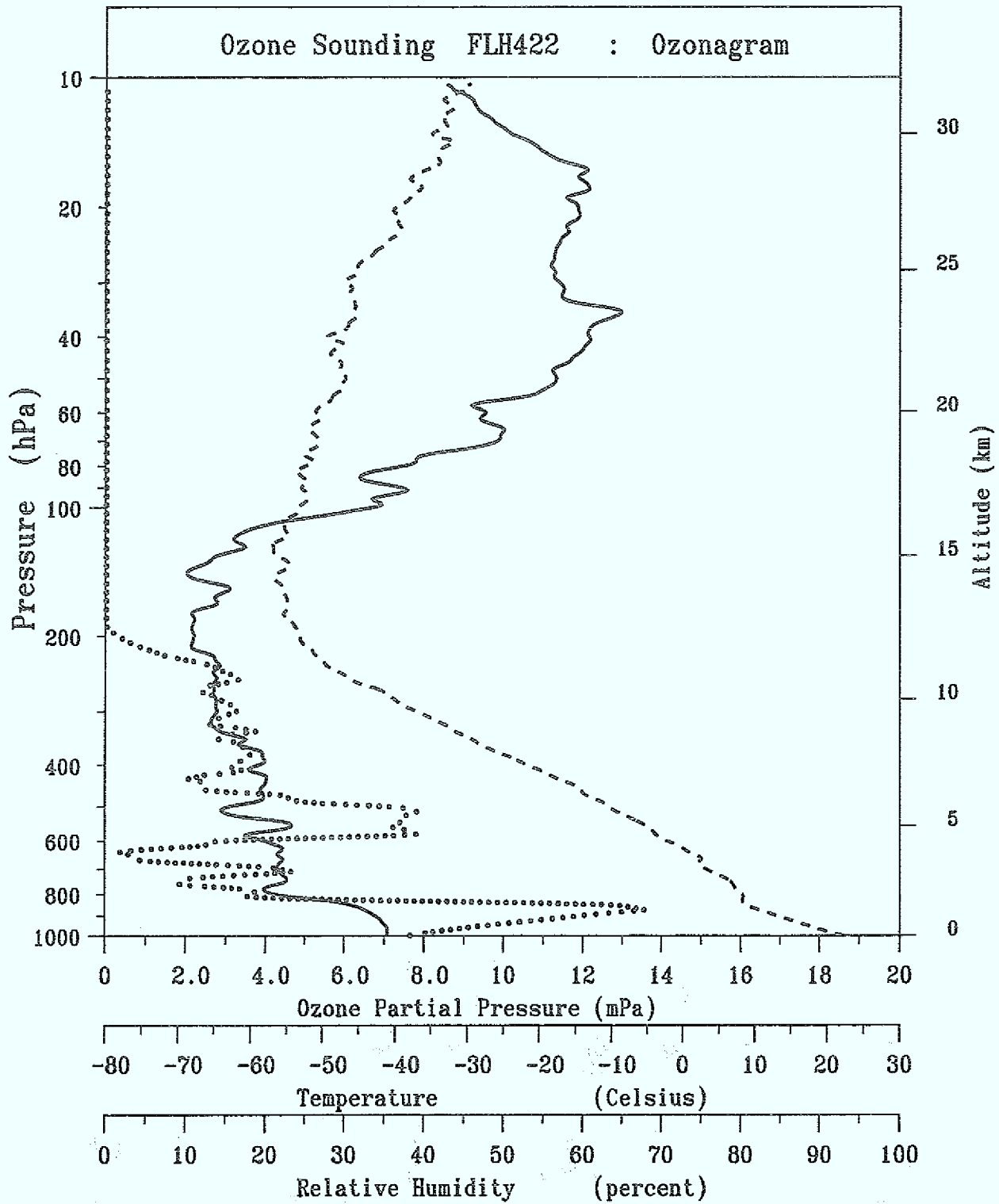
Date	13-07-1992	—	Ozone
Time at launch	11:59 (UTC)	- - - -	Temperature
Location : Julich, FRG		.....	Relative Humidity



Date 20-07-1992
 Time at launch 11:59 (UTC)
 Location : Julich, FRG

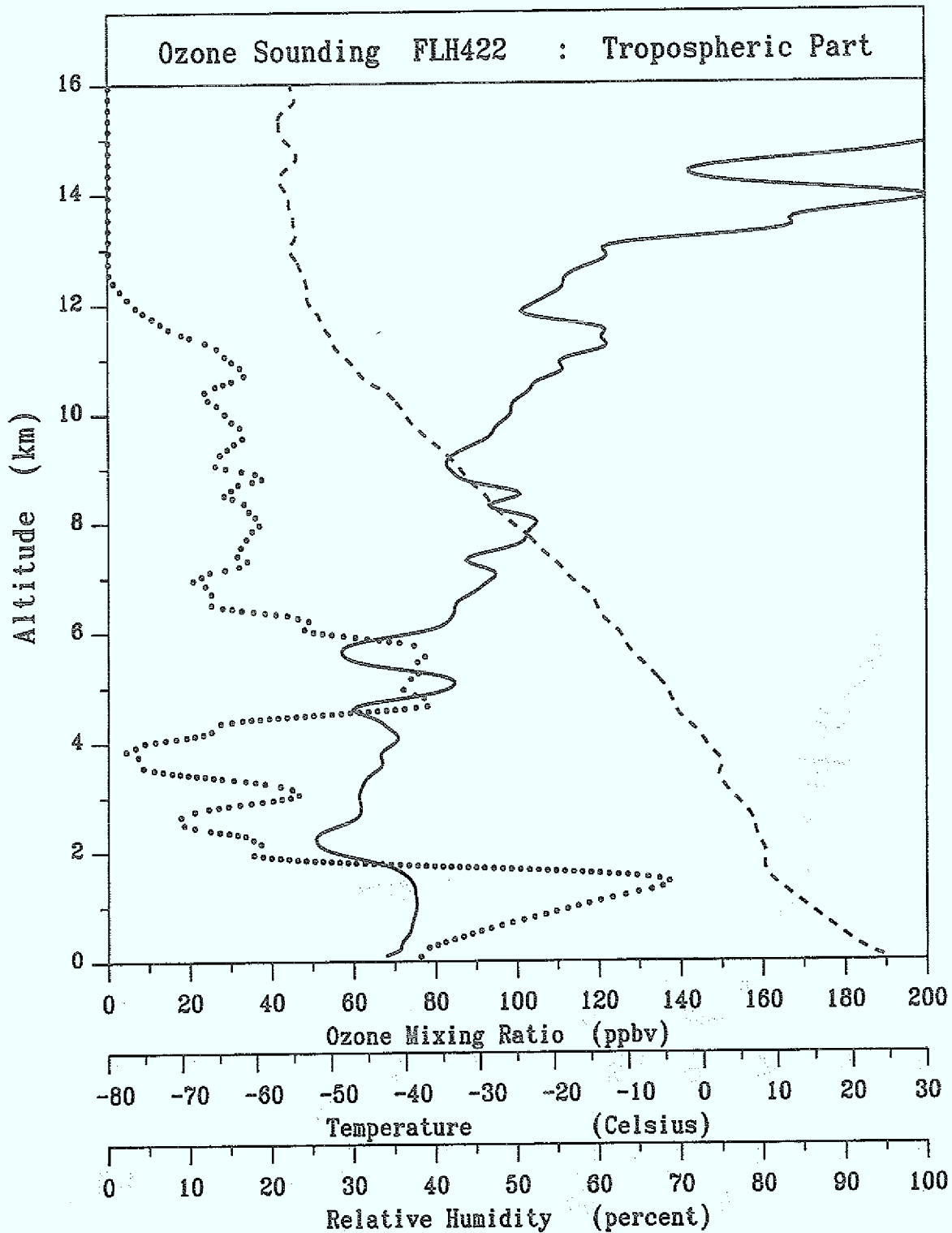
— Ozone
 - - - - Temperature
 Relative Humidity





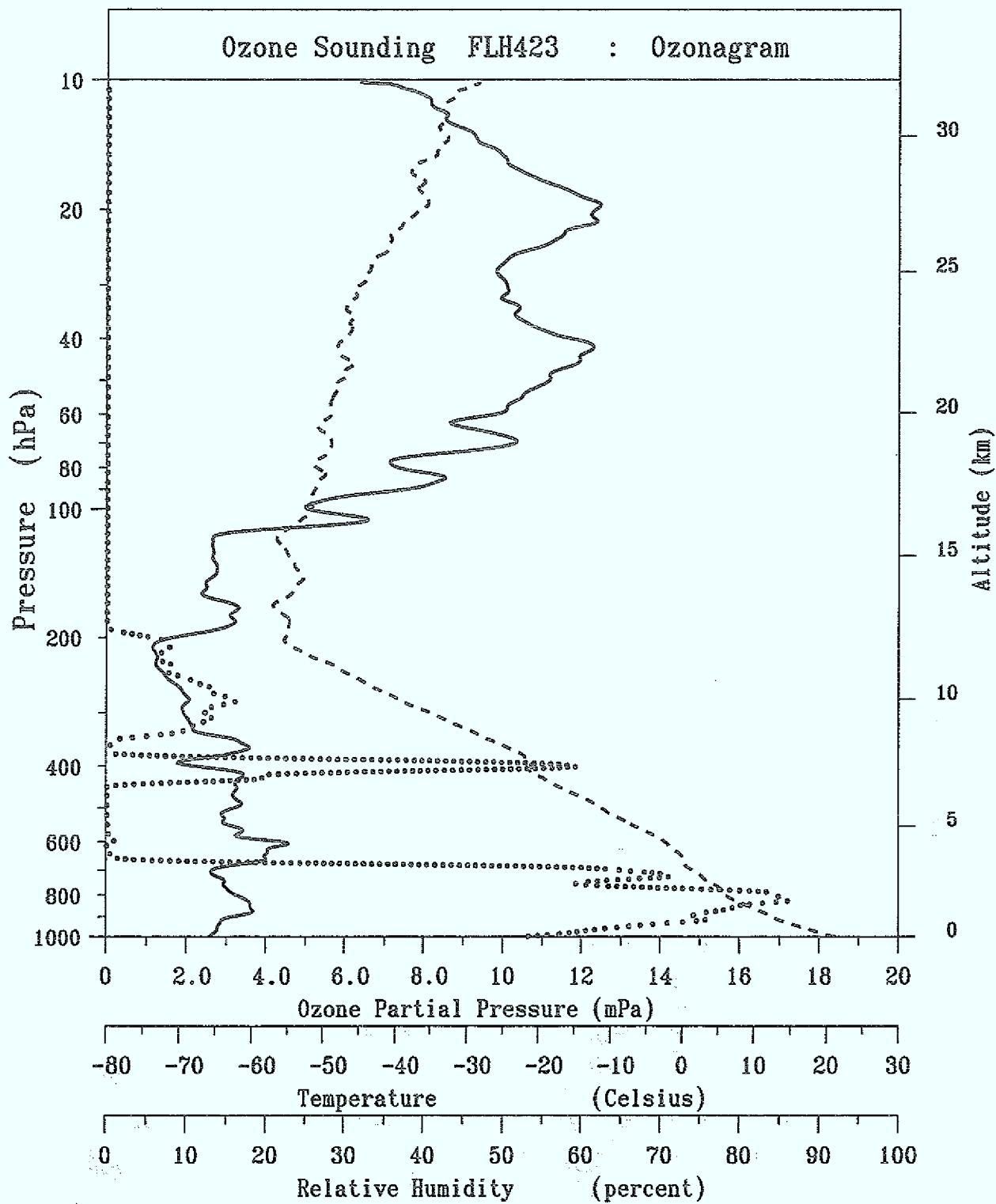
Date 23-07-1992
 Time at launch 11:59 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity



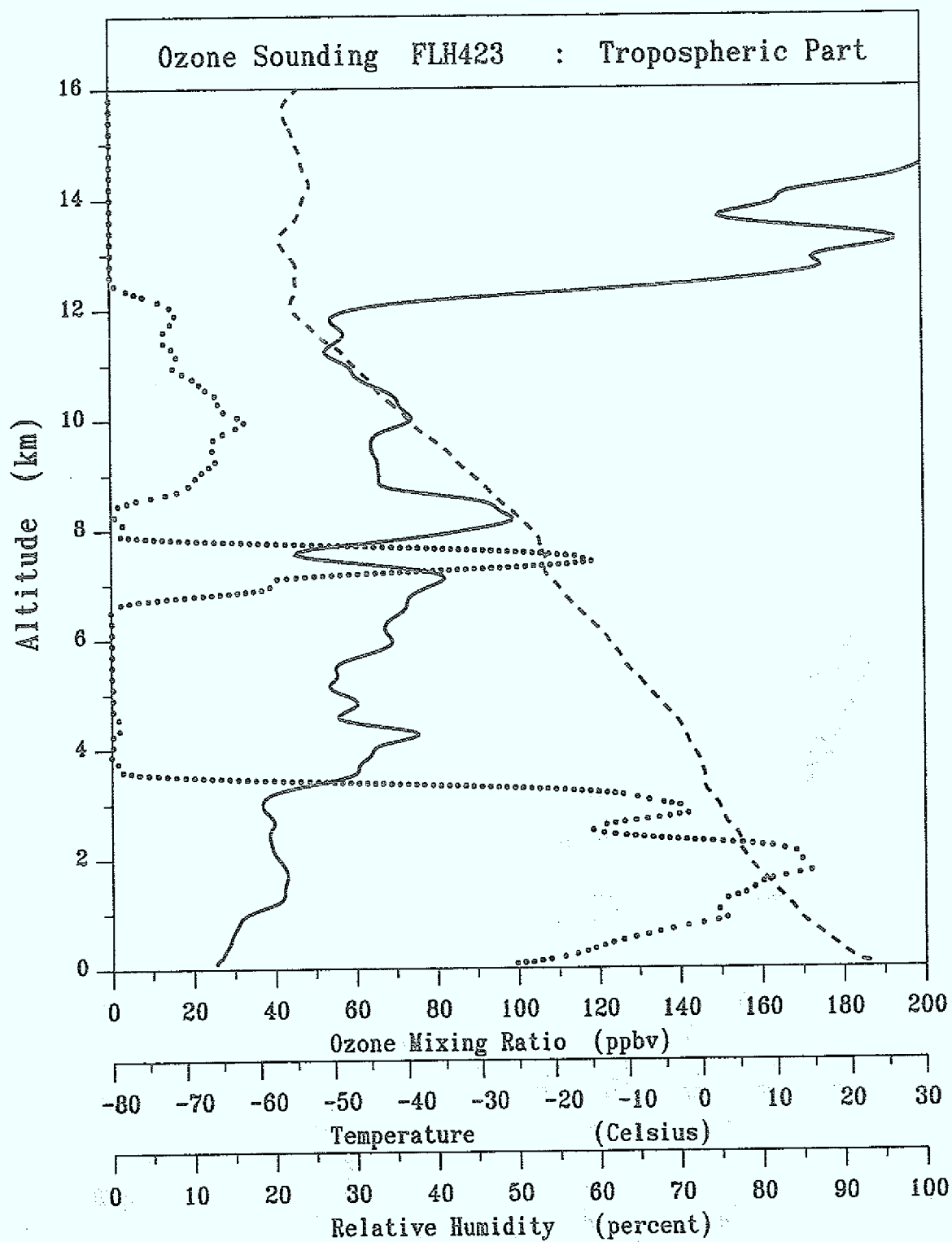
Date 23-07-1992
 Time at launch 11:59 (UTC)
 Location : Julich, FRG

——— Ozone
 - - - - - Temperature
 Relative Humidity



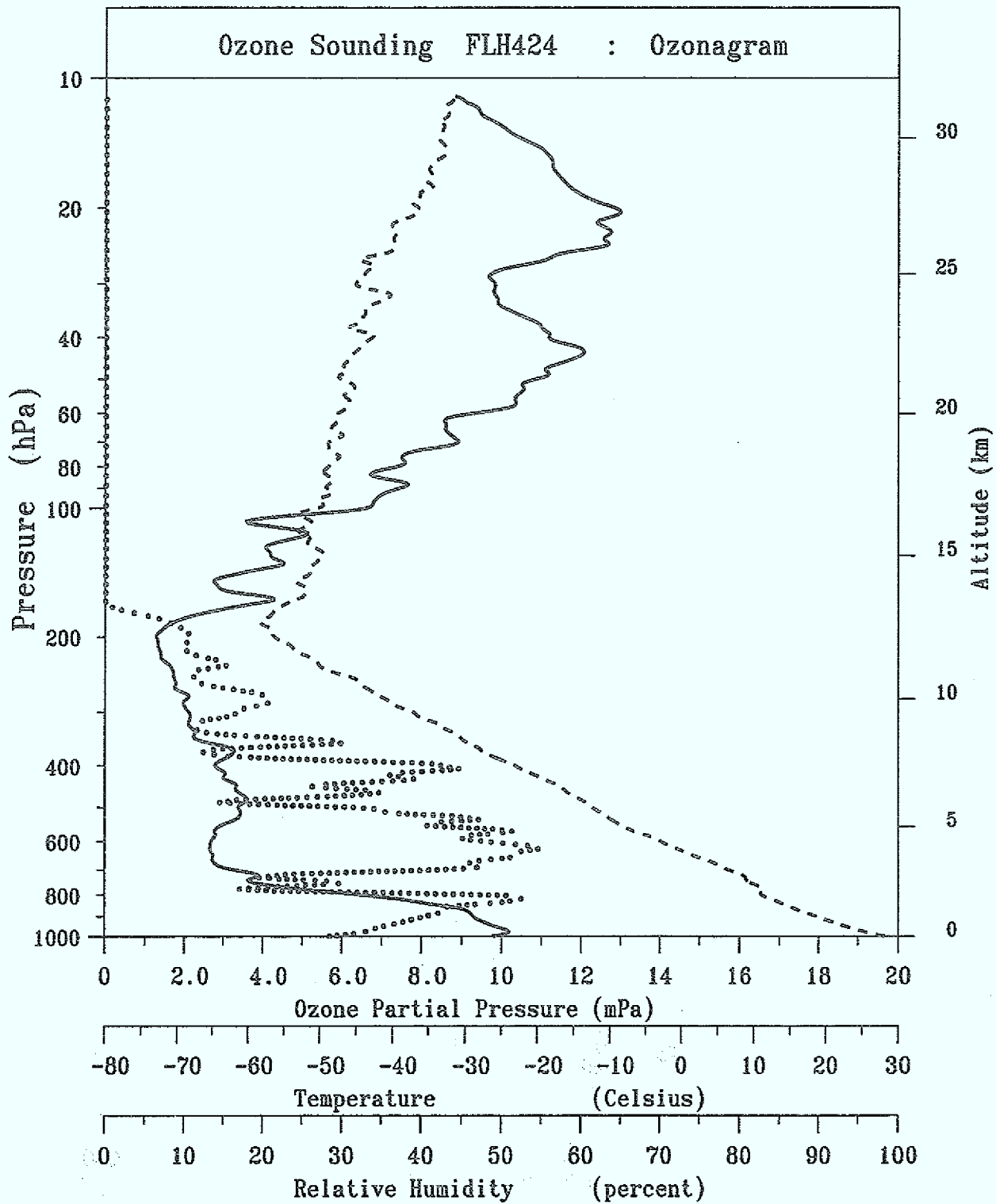
Date 27-07-1992
 Time at launch 12:09 (UTC)
 Location : Julich, FRG

— Ozone
 - - - - Temperature
 Relative Humidity



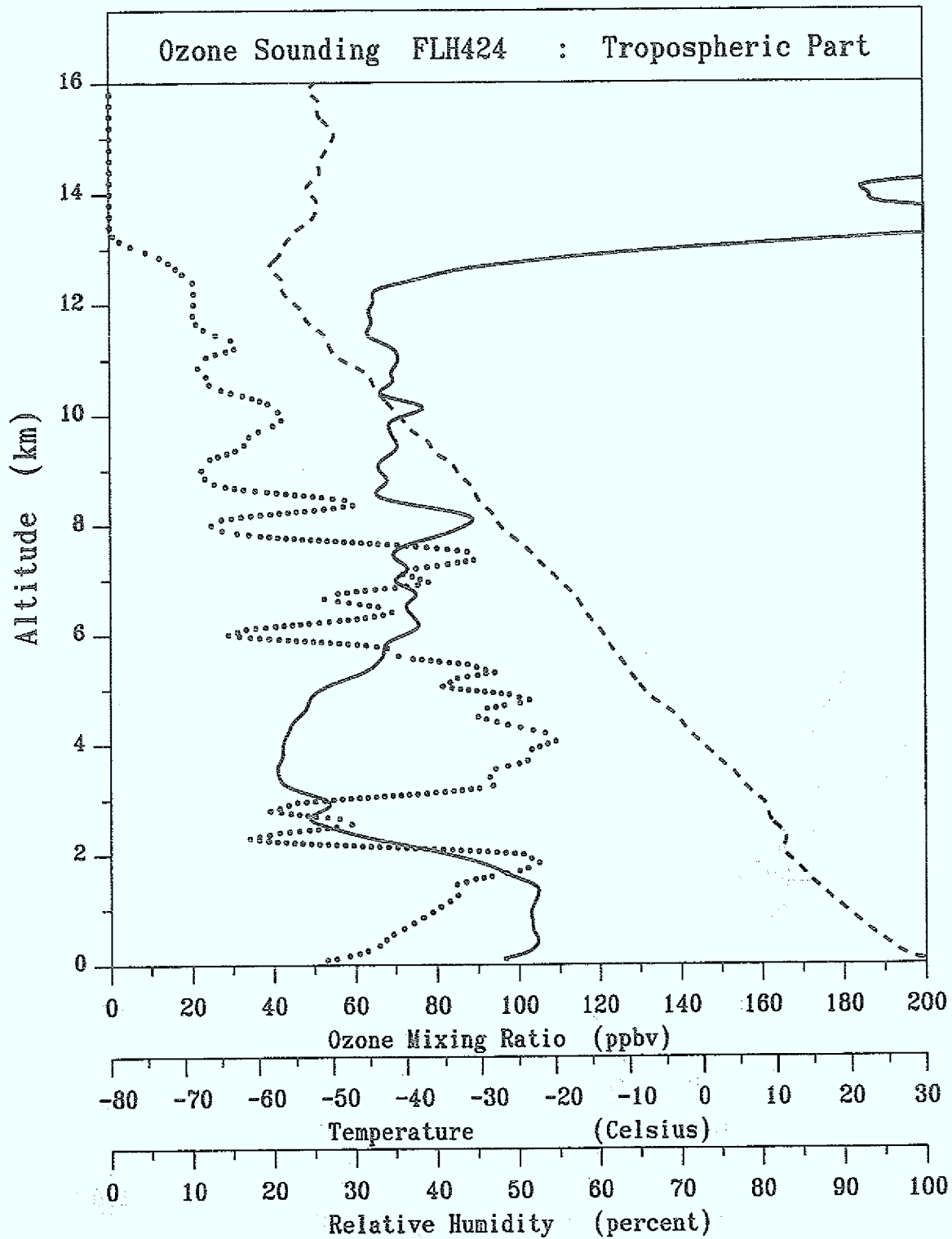
Date 27-07-1992
 Time at launch 12:09 (UTC)
 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity



Date 30-07-1992
 Time at launch 12:15 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity



Date 30-07-1992

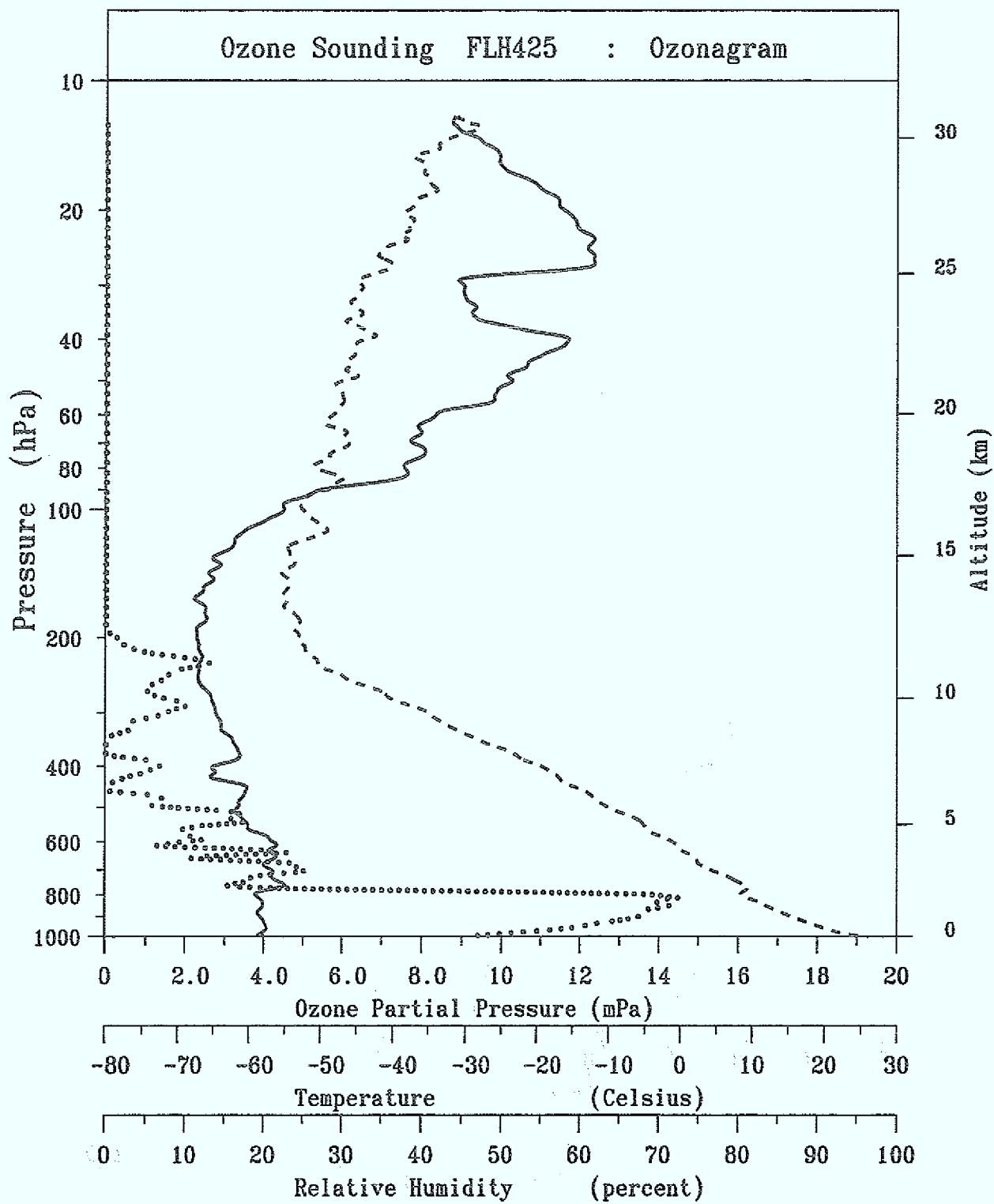
Time at launch 12:15 (UTC)

Location : Julich, FRG

——— Ozone

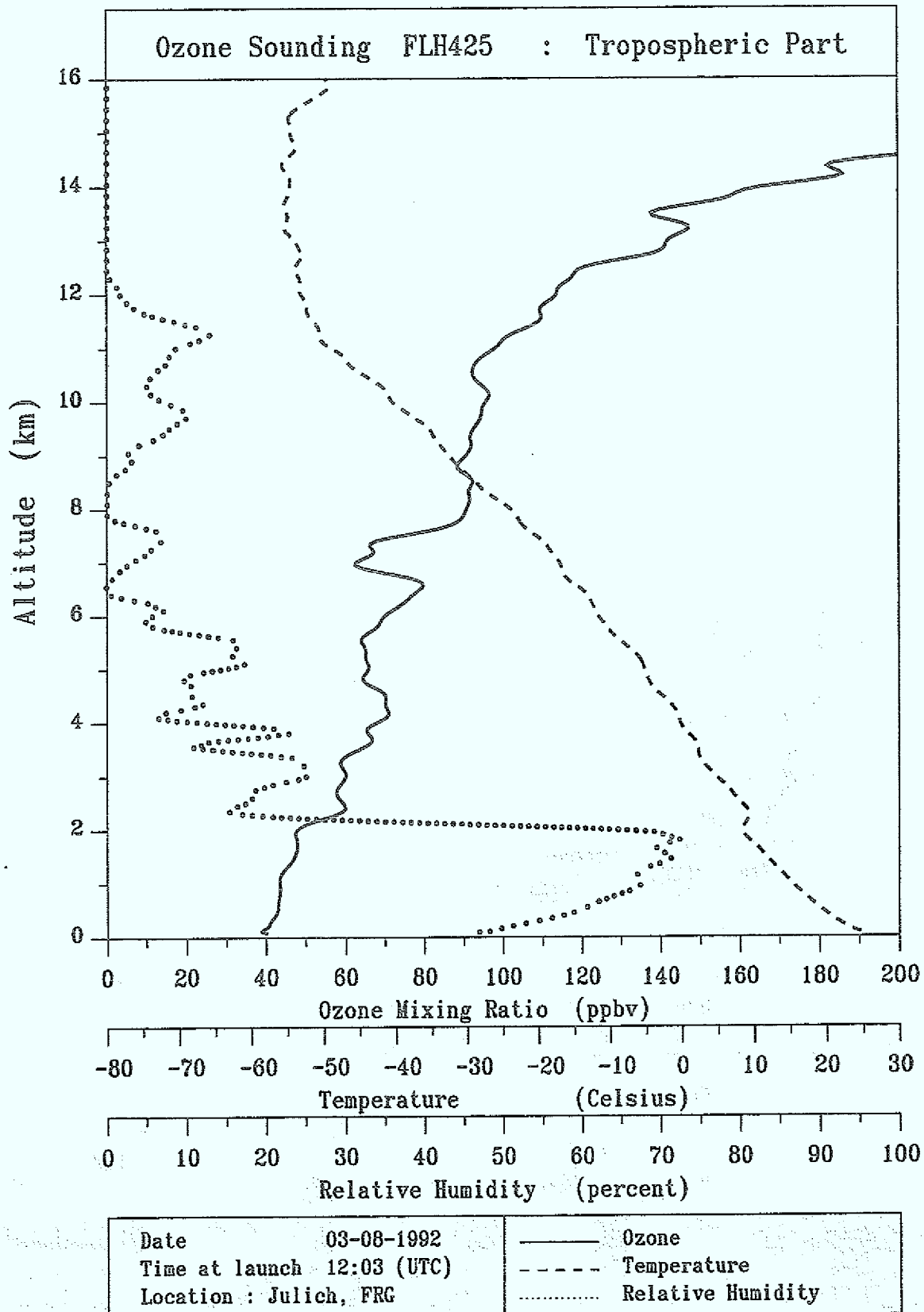
----- Temperature

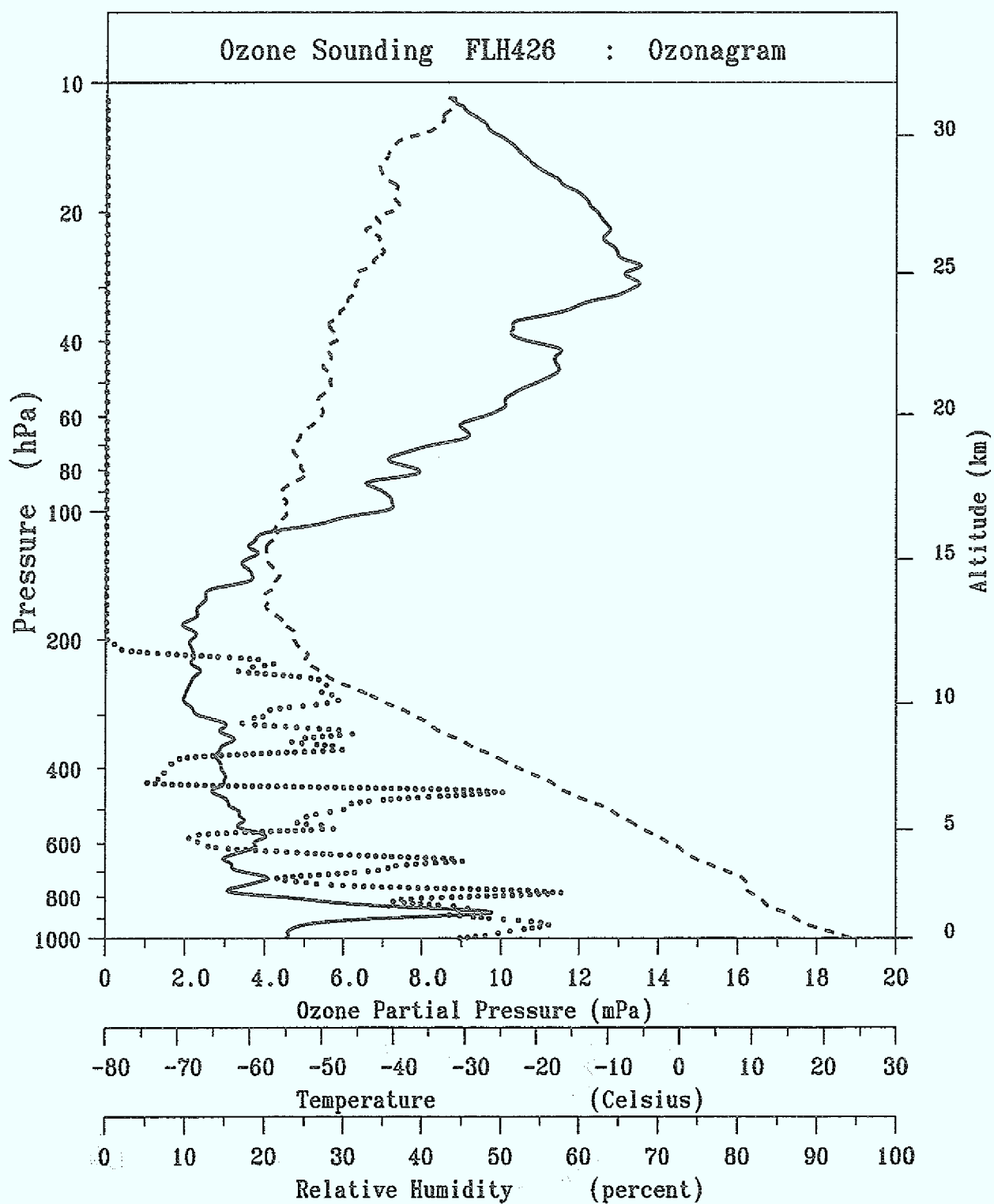
..... Relative Humidity



Date 03-08-1992
 Time at launch 12:03 (UTC)
 Location : Julich, FRG

— Ozone
 - - - - - Temperature
 Relative Humidity

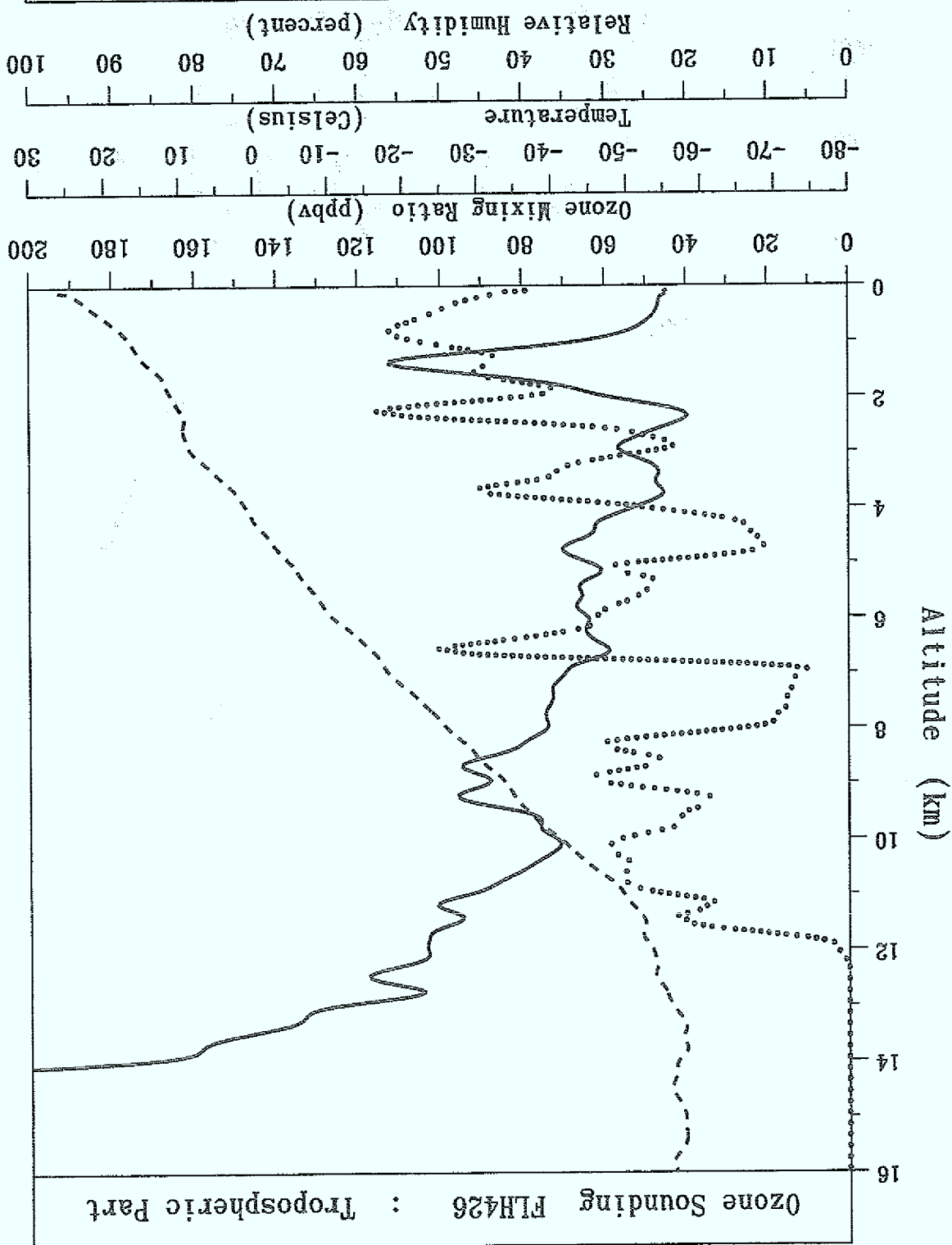


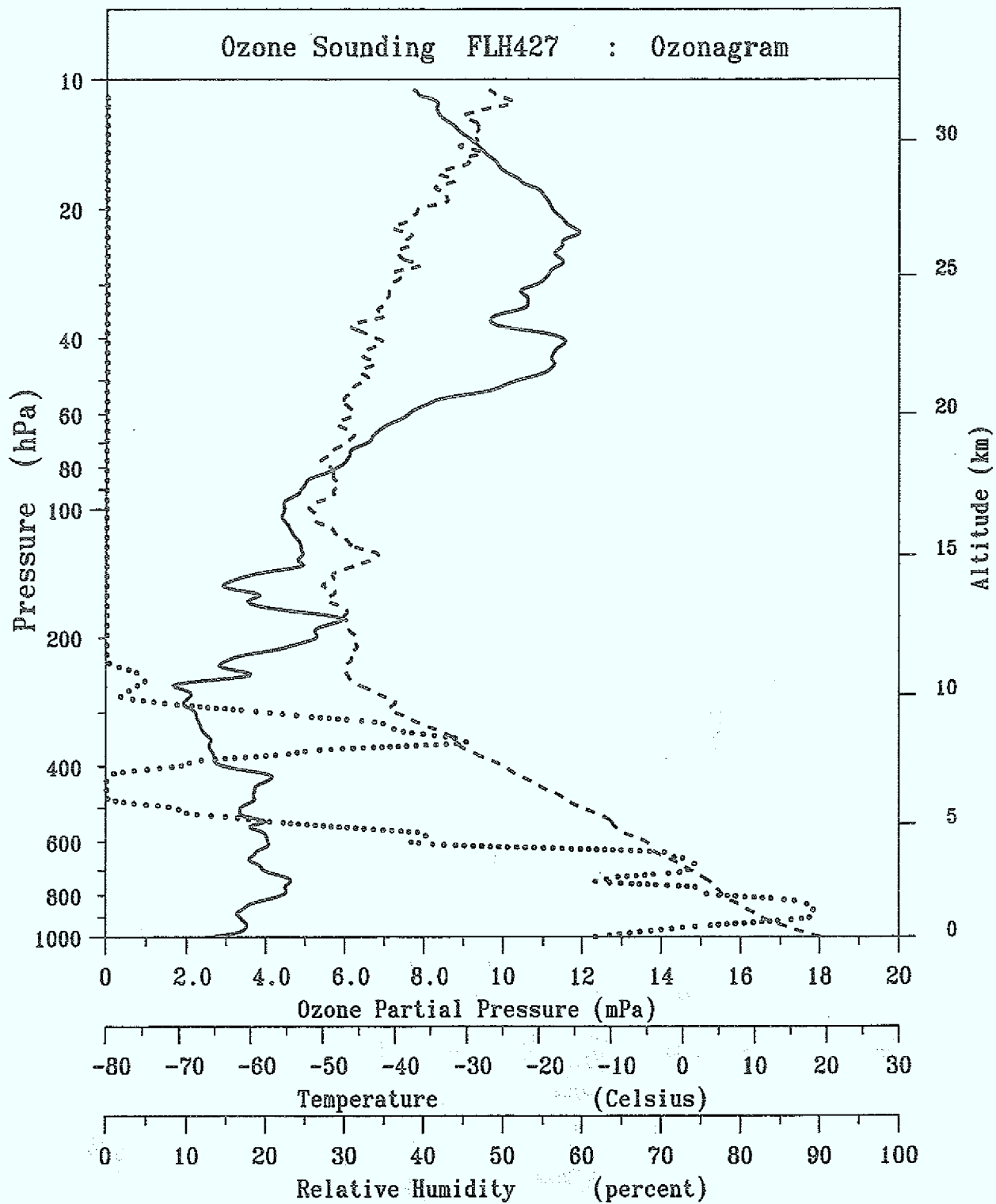


Date 06-08-1992
 Time at launch 12:00 (UTC)
 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity

Date	06-08-1992
Time at launch	12:00 (UTC)
Location	Julich, FRG
Ozone	—
Temperature	- - -
Relative Humidity	.....





Date 10-08-1992

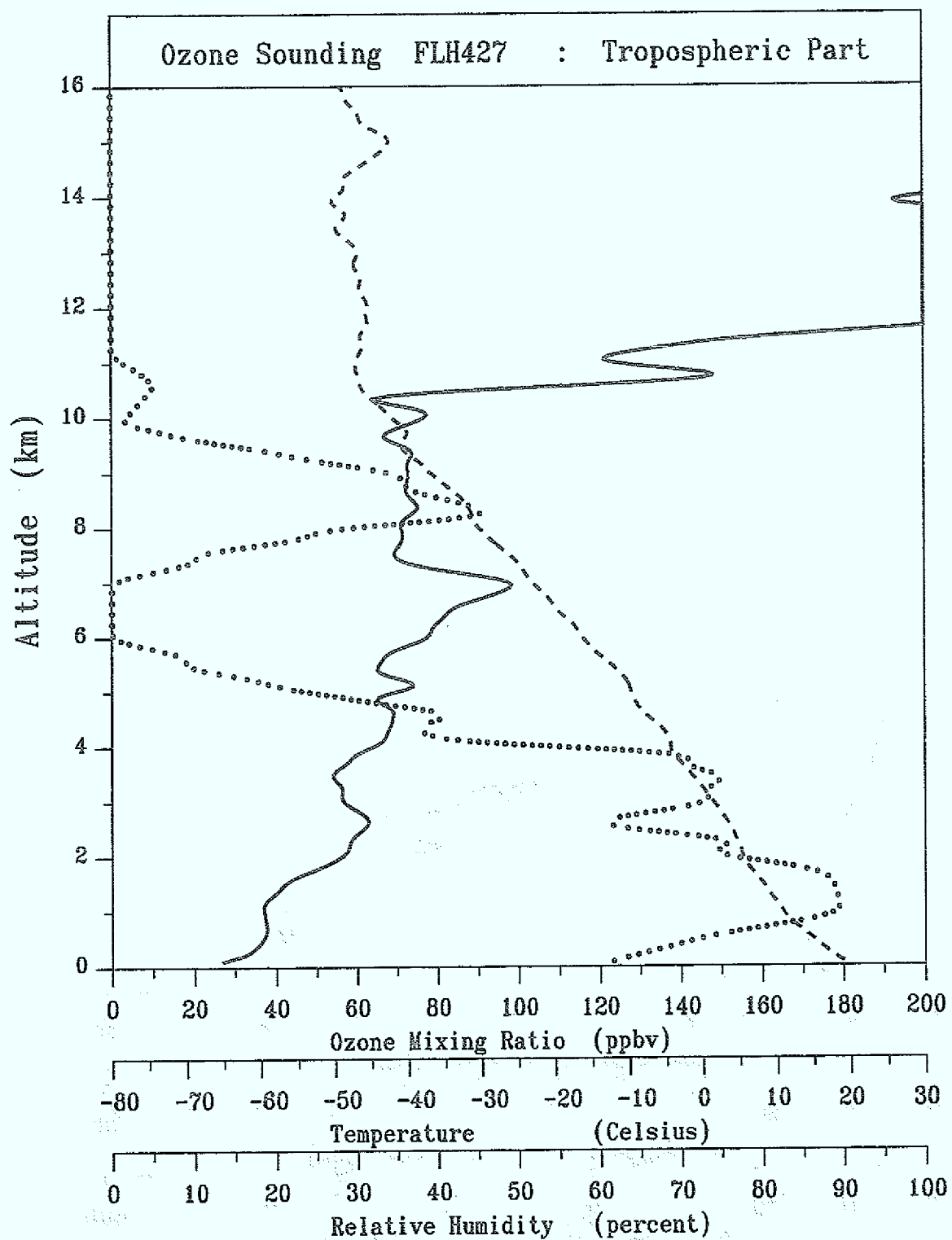
Time at launch 11:59 (UTC)

Location : Julich, FRG

— Ozone

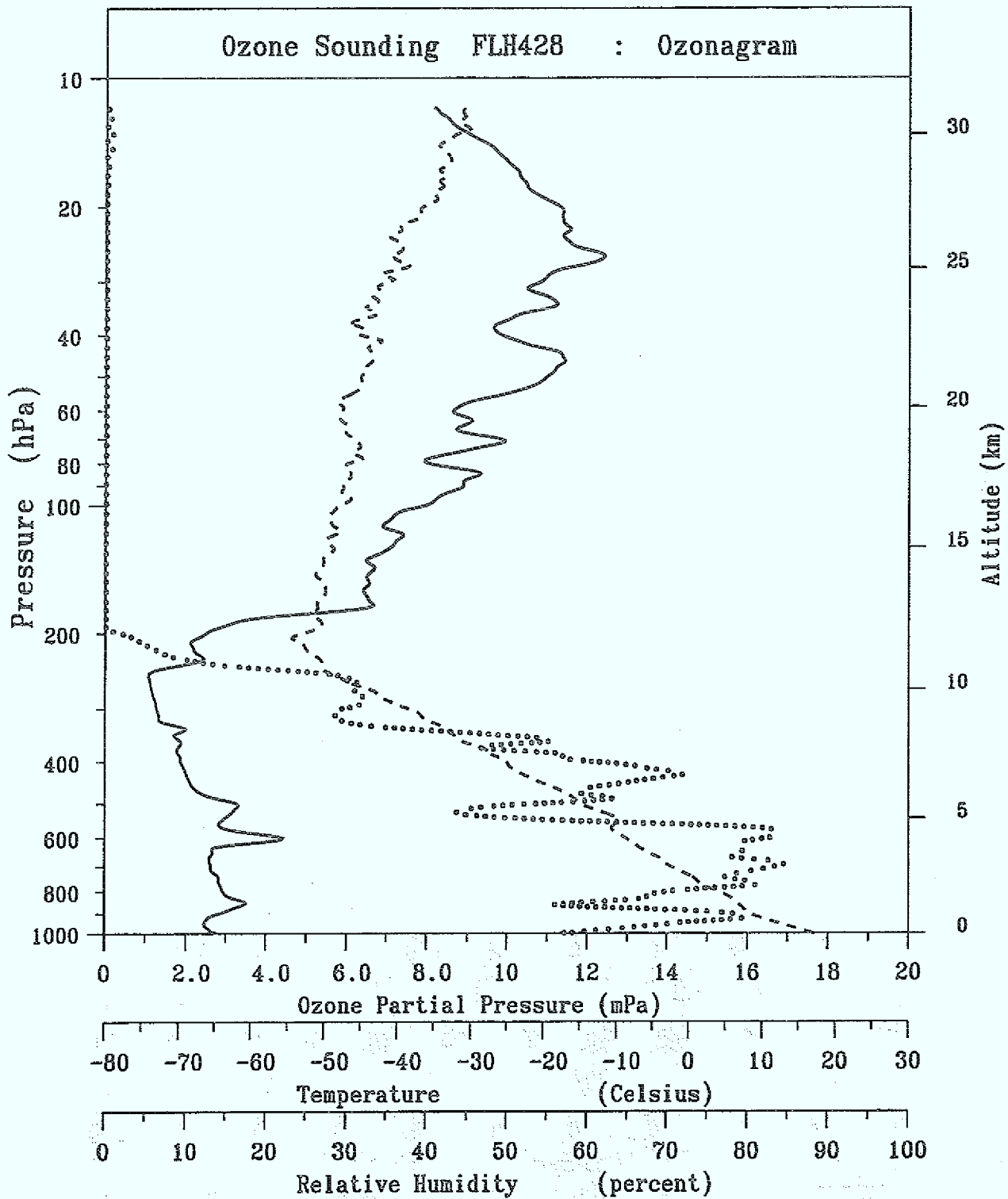
--- Temperature

..... Relative Humidity

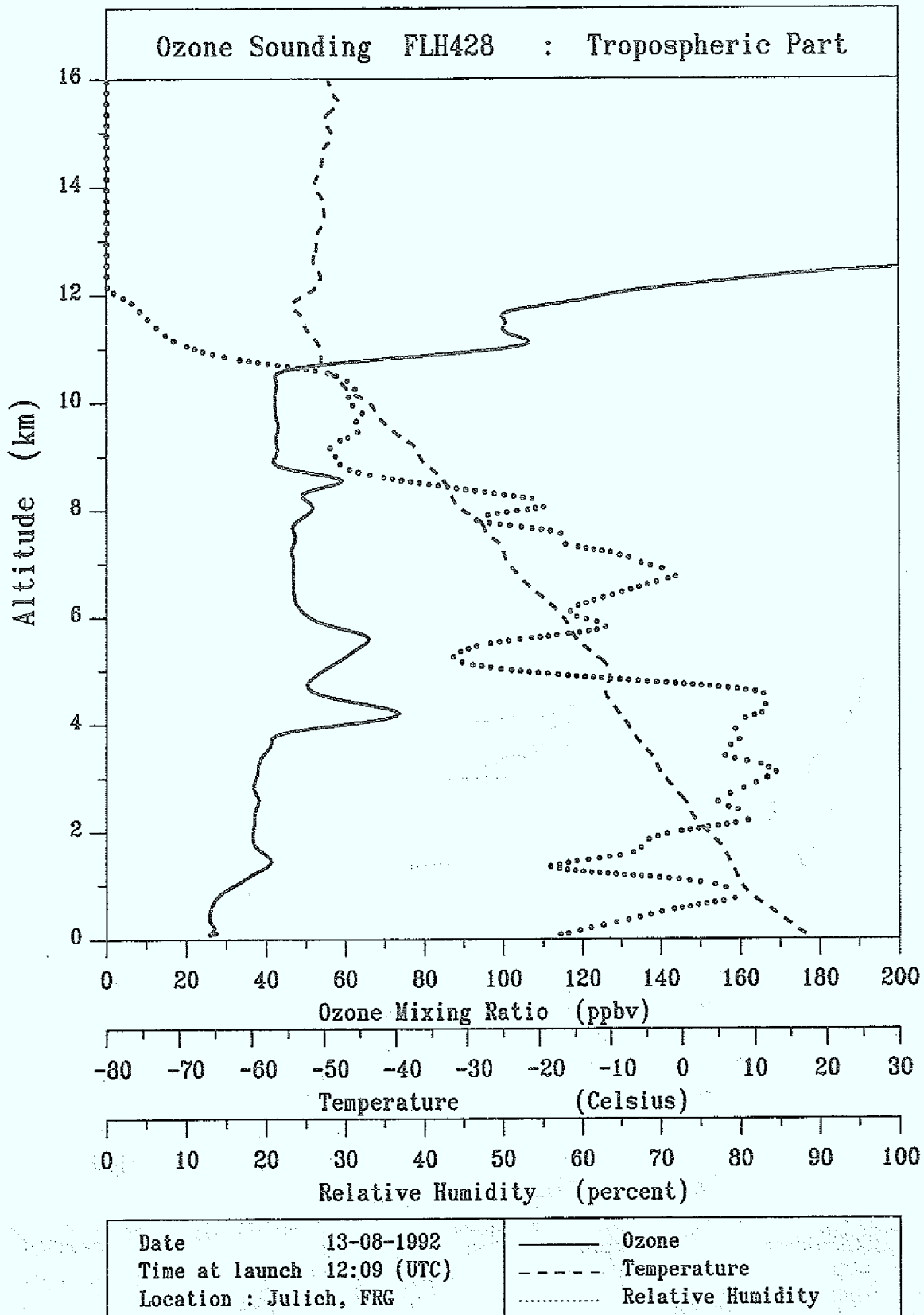


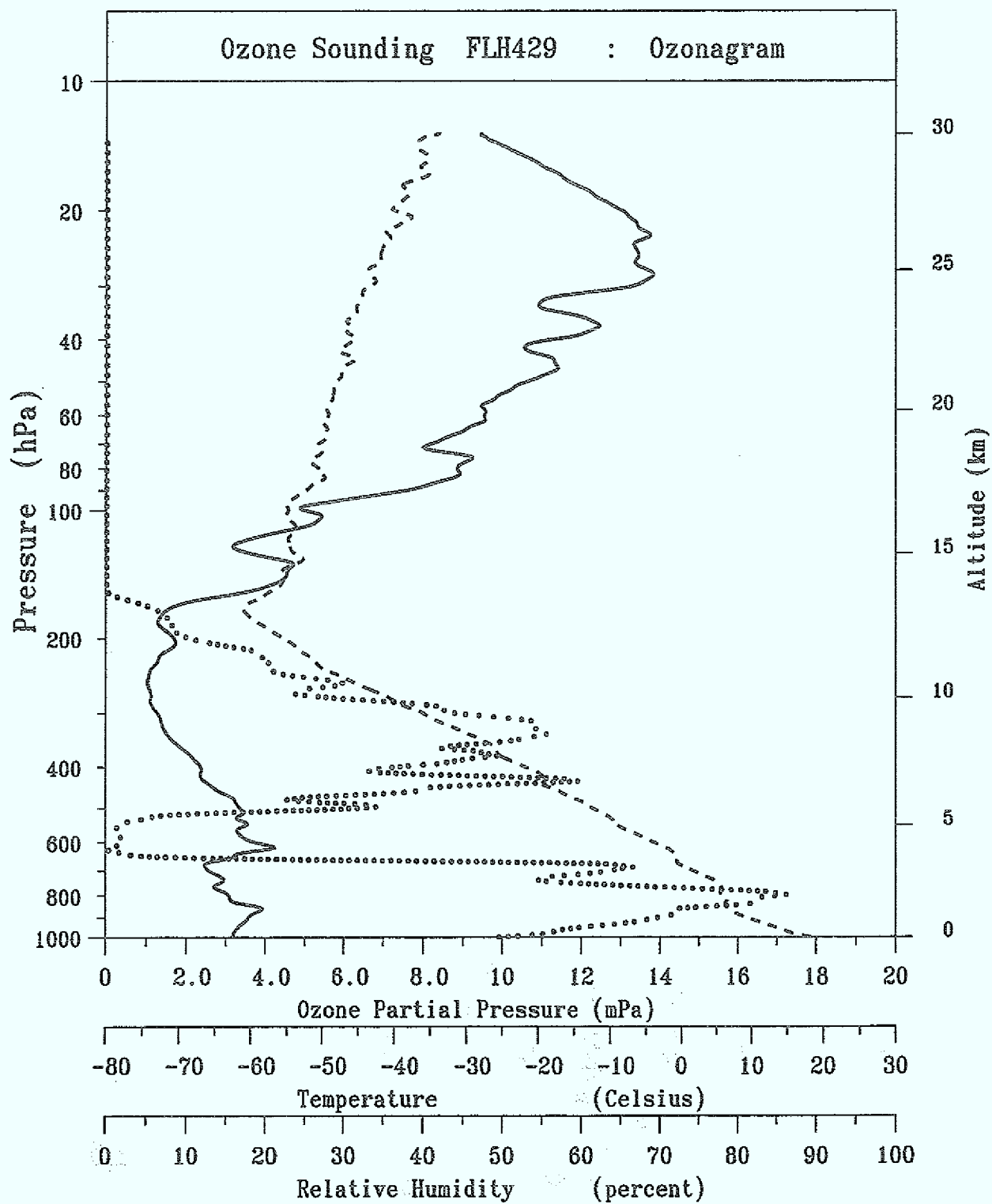
Date 10-08-1992
 Time at launch 11:59 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity



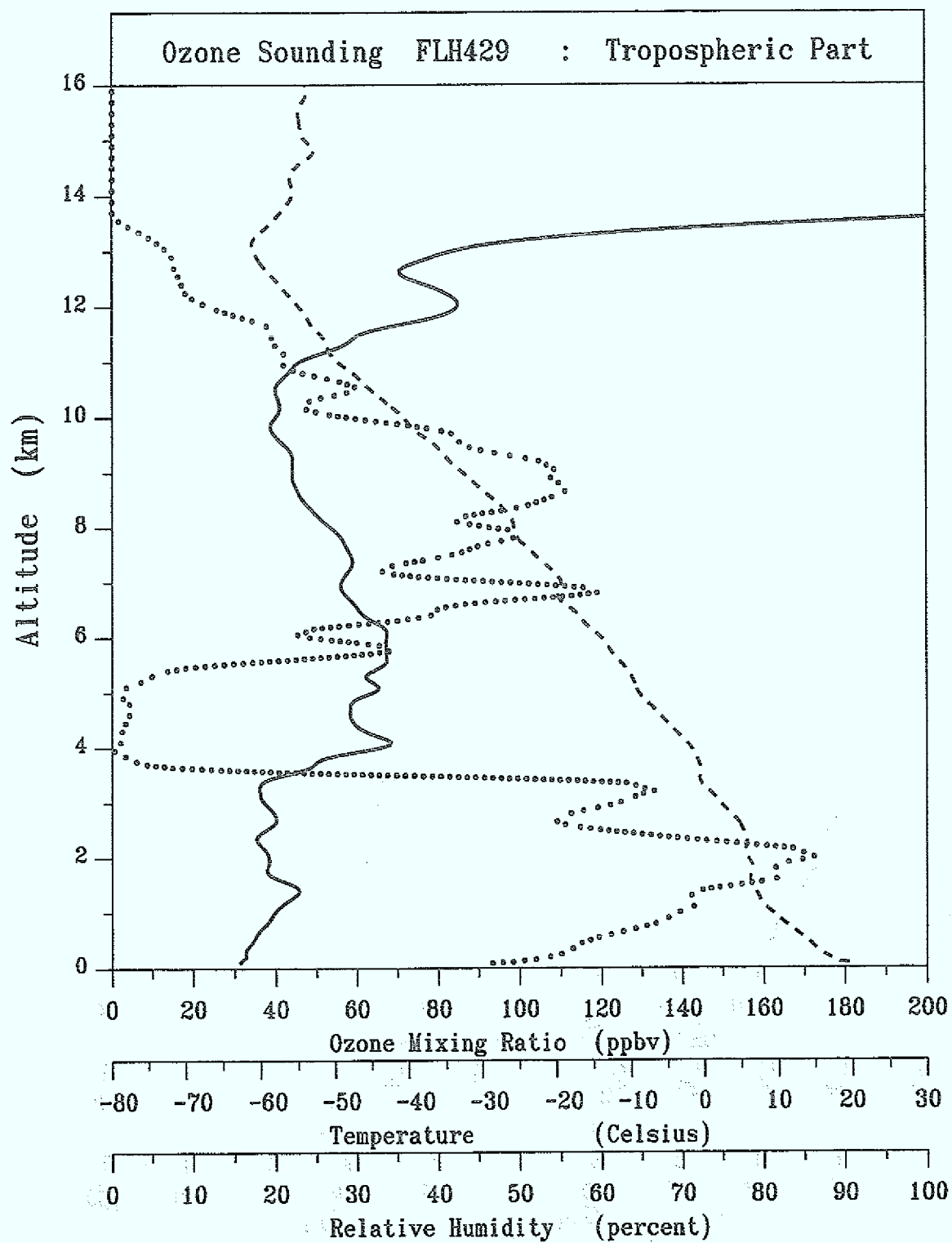
Date	13-08-1992	—	Ozone
Time at launch	12:09 (UTC)	- - -	Temperature
Location	Julich, FRG	.....	Relative Humidity





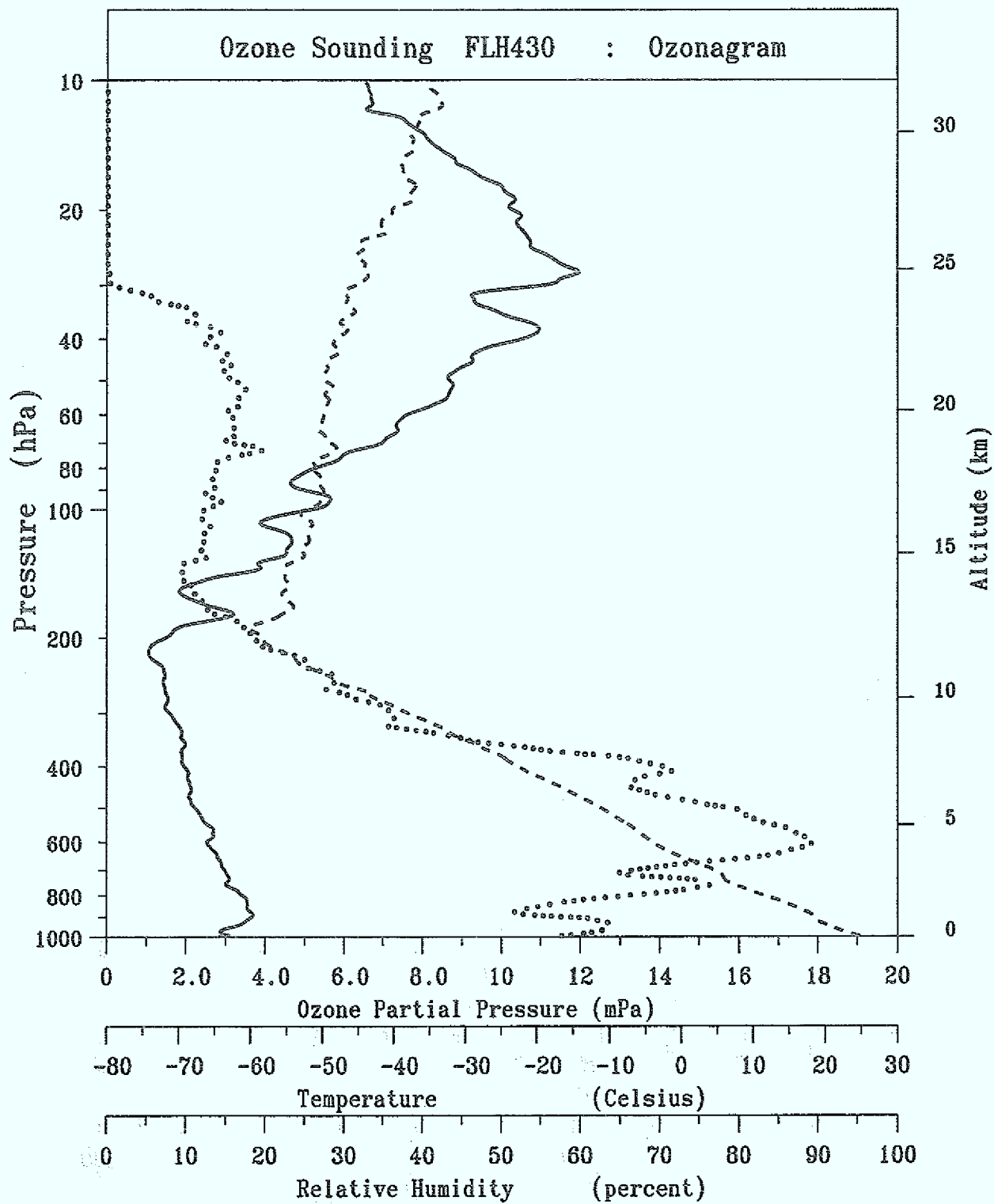
Date 17-08-1992
 Time at launch 12:06 (UTC)
 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity



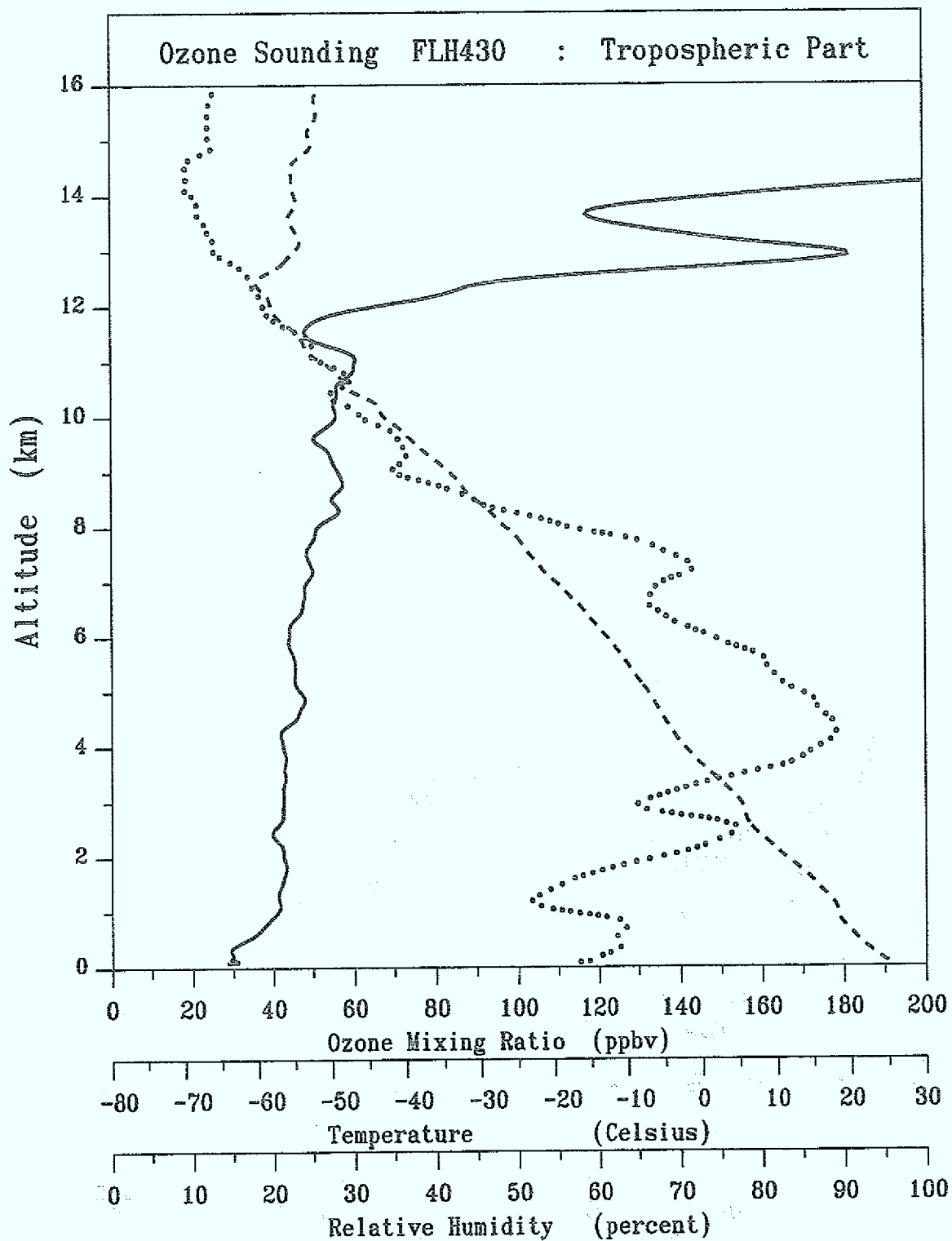
Date 17-08-1992
 Time at launch 12:06 (UTC)
 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity



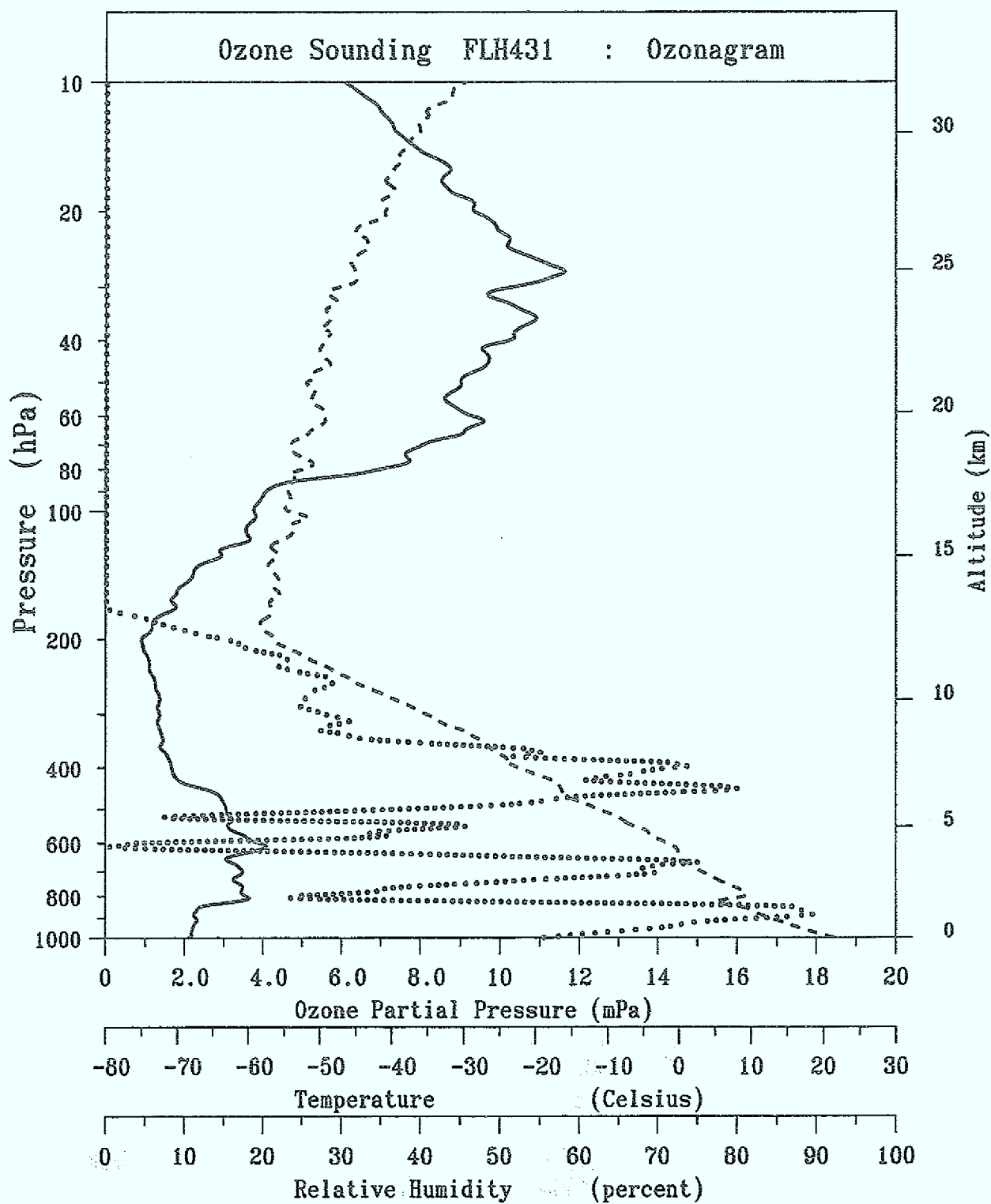
Date 20-08-1992
 Time at launch 12:02 (UTC)
 Location : Julich, FRG

— Ozone
 - - - - - Temperature
 Relative Humidity

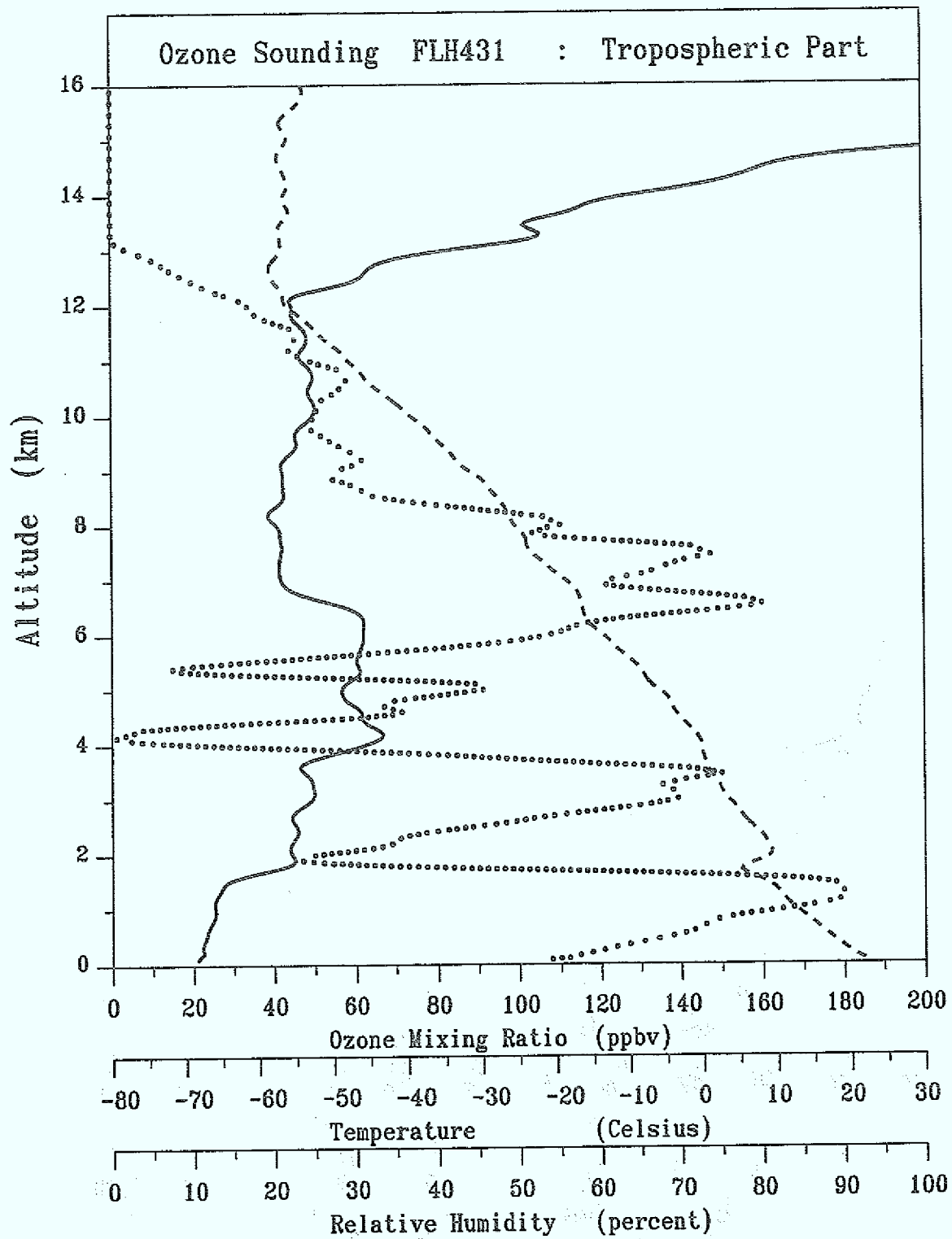


Date 20-08-1992
 Time at launch 12:02 (UTC)
 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity



Date	24-08-1992	—	Ozone
Time at launch	12:00 (UTC)	- - - -	Temperature
Location : Julich, FRG		.....	Relative Humidity



Date 24-08-1992

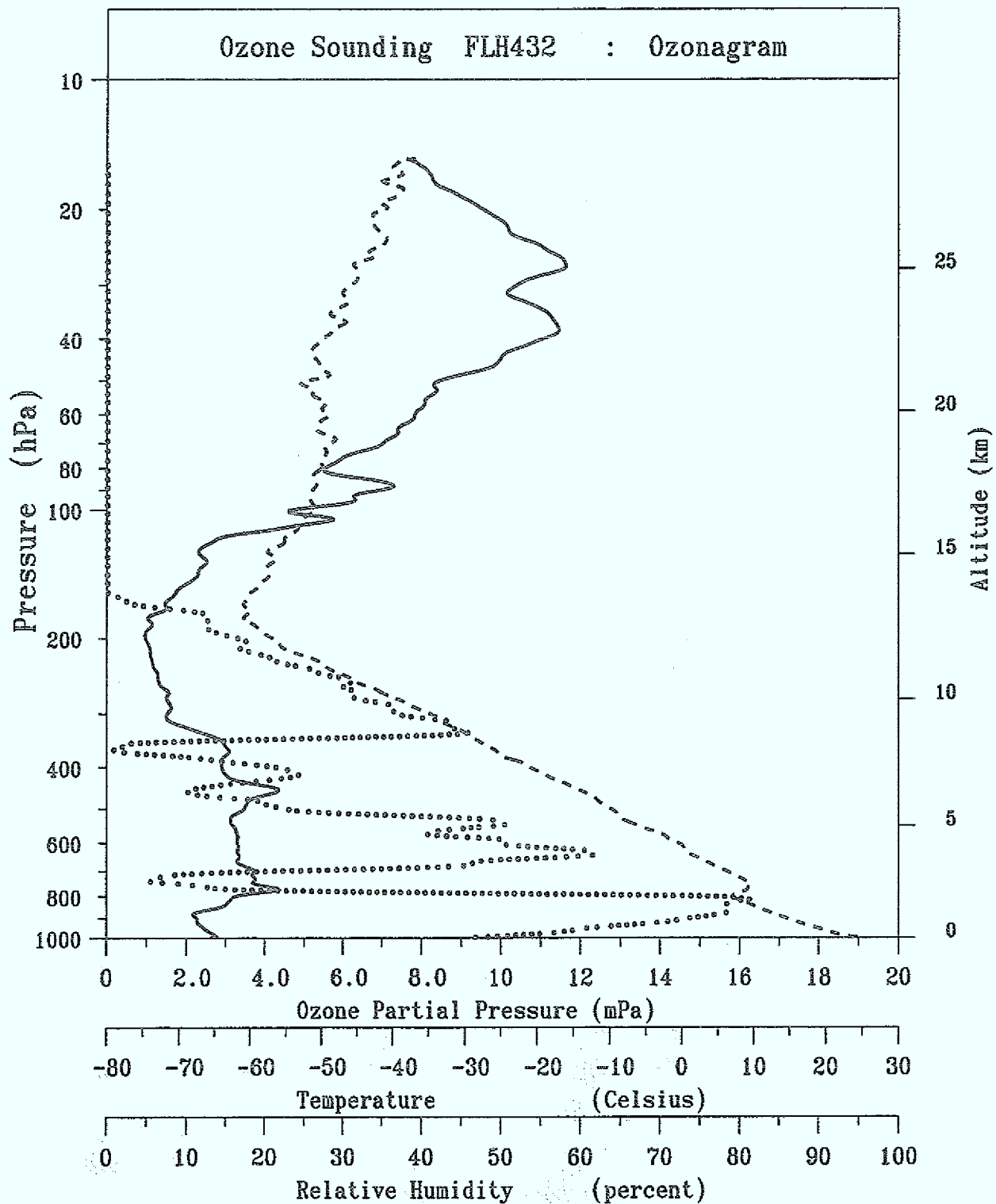
Time at launch 12:00 (UTC)

Location : Julich, FRG

— Ozone

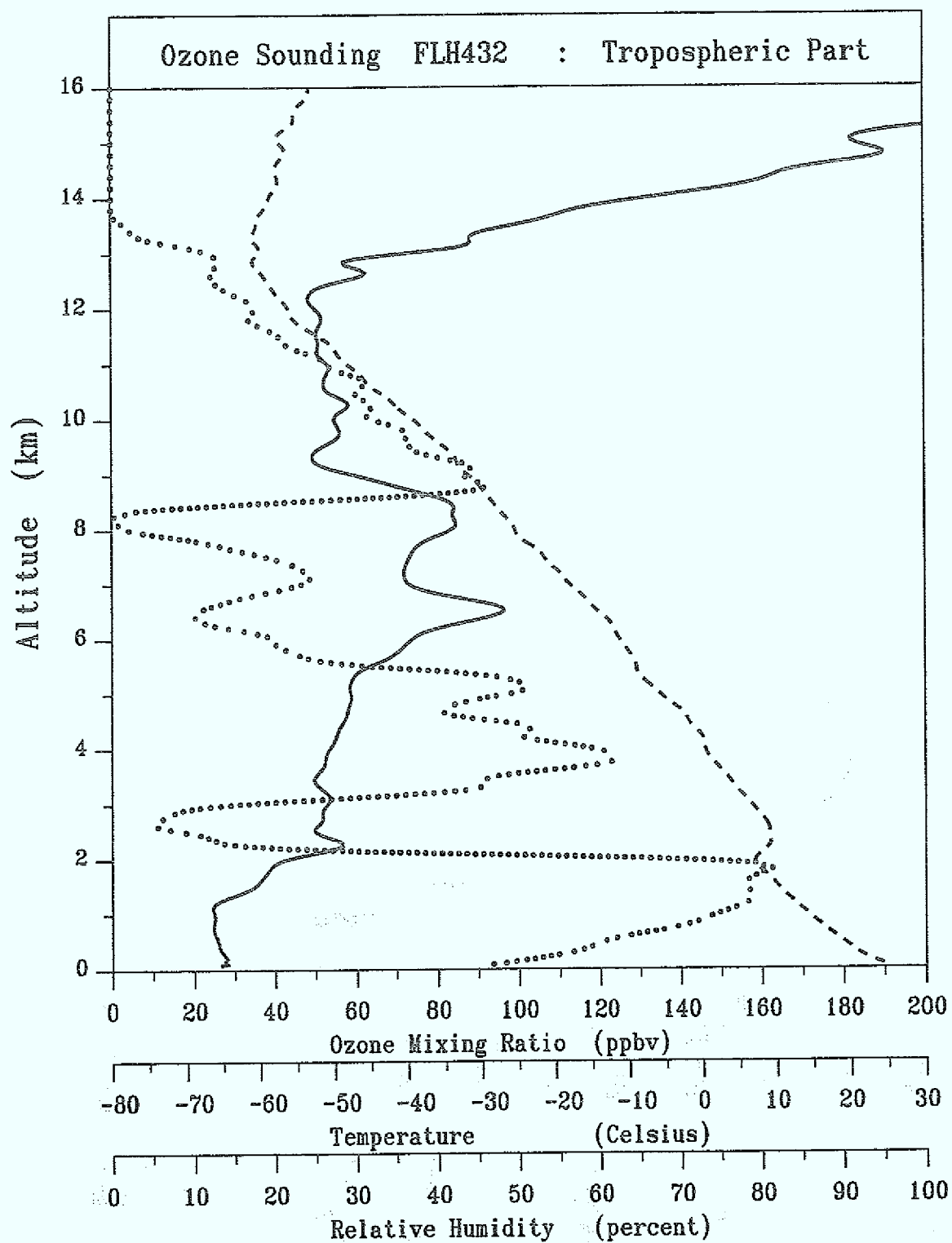
- - - Temperature

..... Relative Humidity



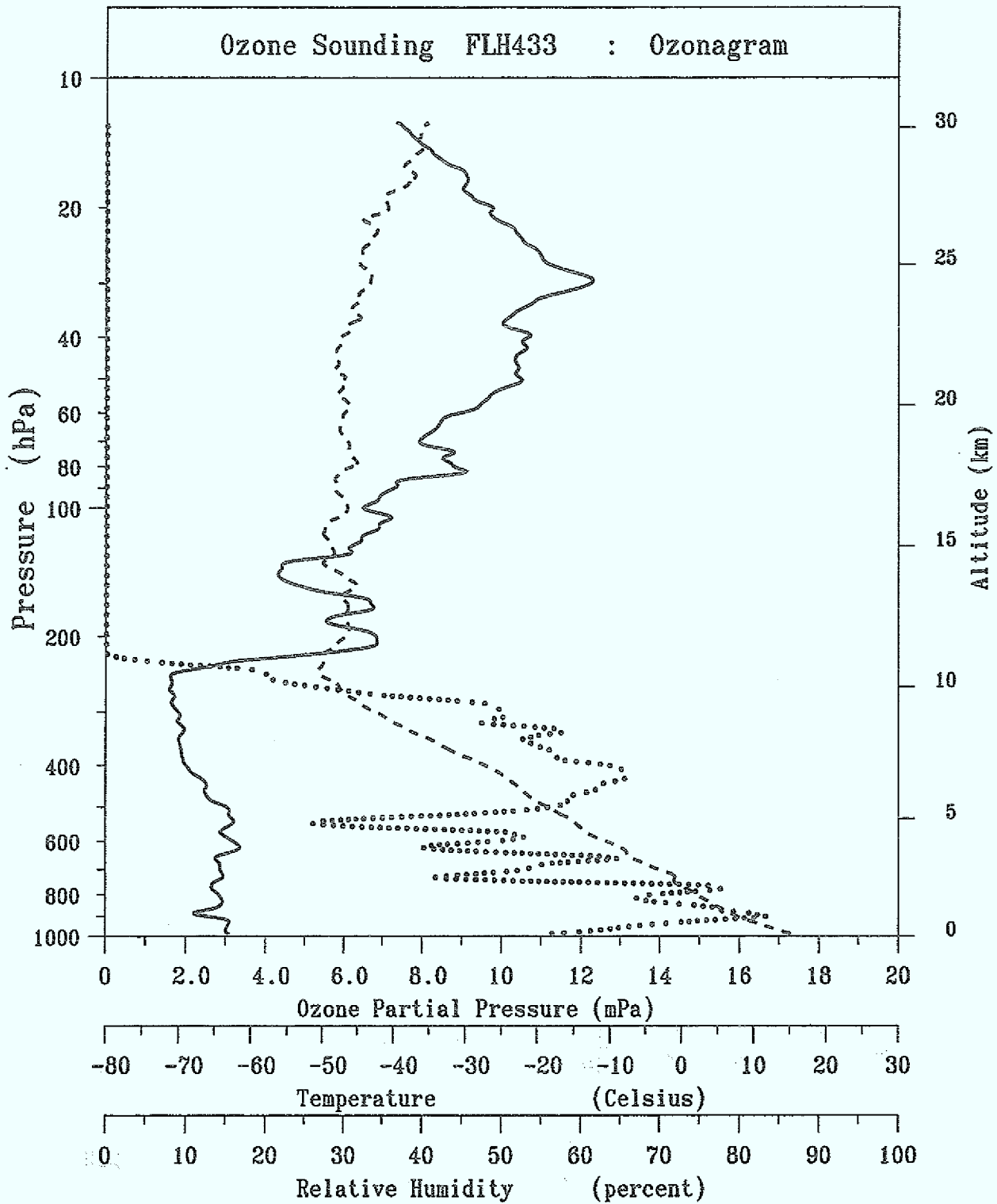
Date 27-08-1992
 Time at launch 11:58 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity



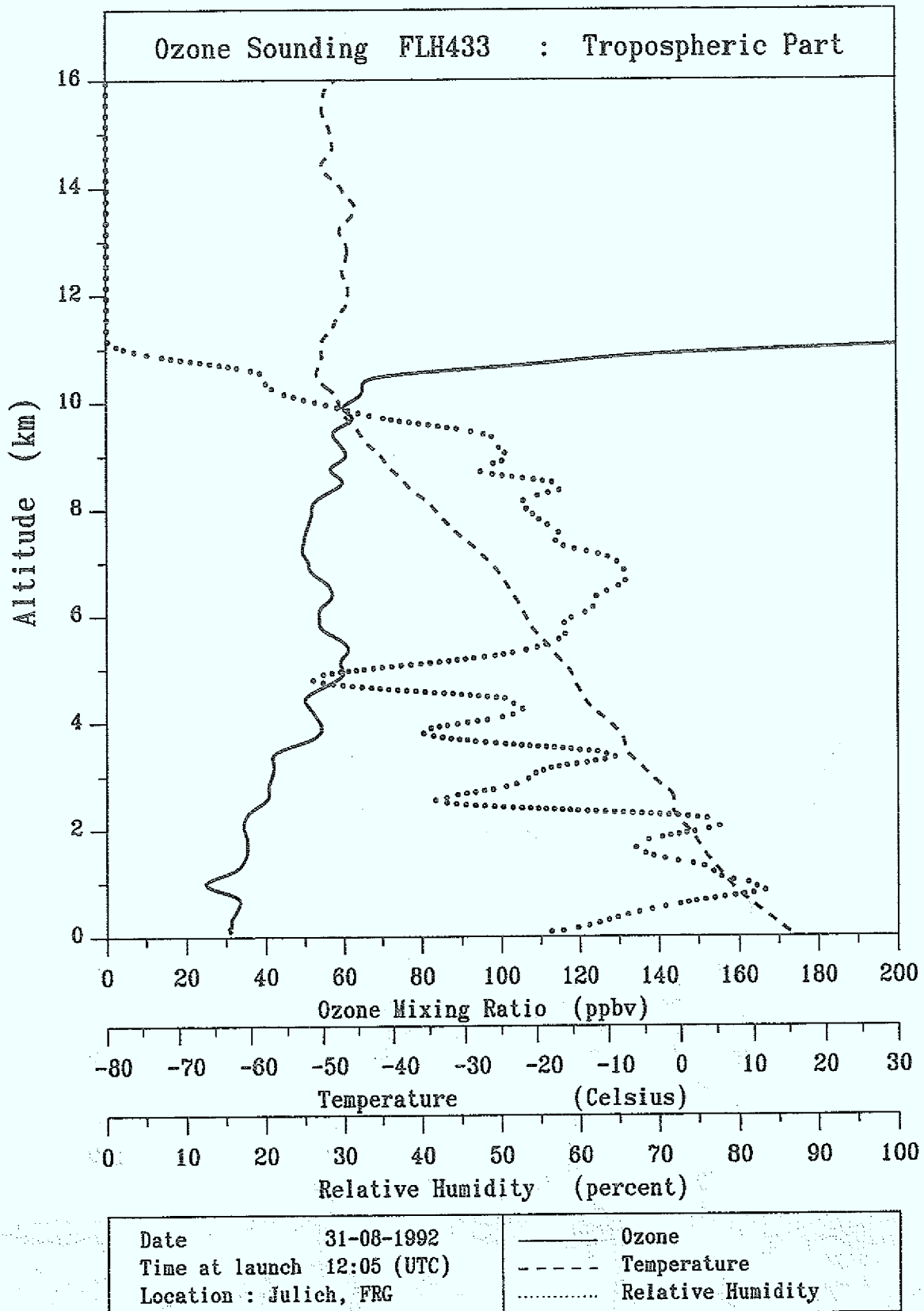
Date 27-08-1992
 Time at launch 11:58 (UTC)
 Location : Julich, FRG

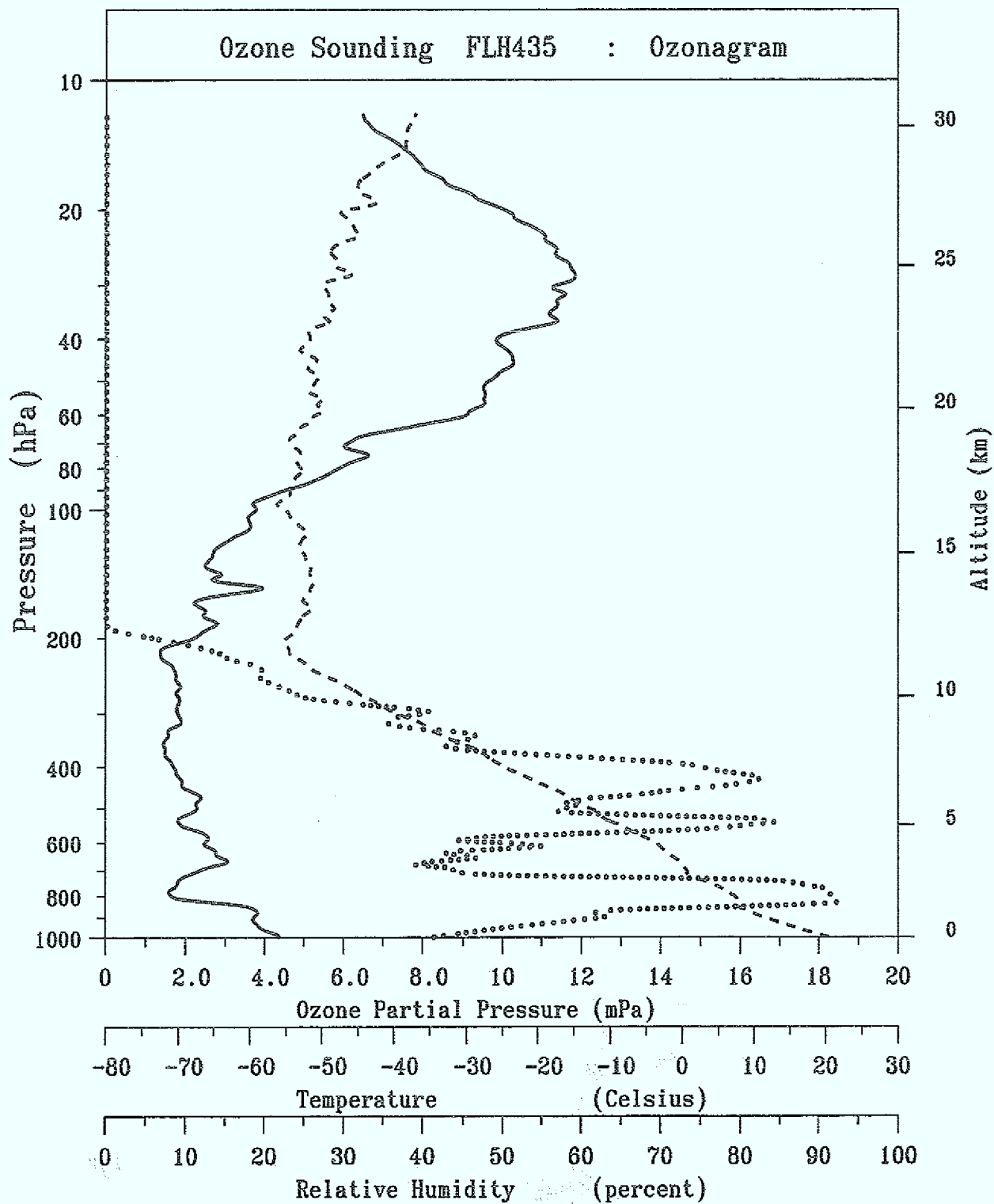
— Ozone
 --- Temperature
 Relative Humidity



Date 31-08-1992
 Time at launch 12:05 (UTC)
 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity

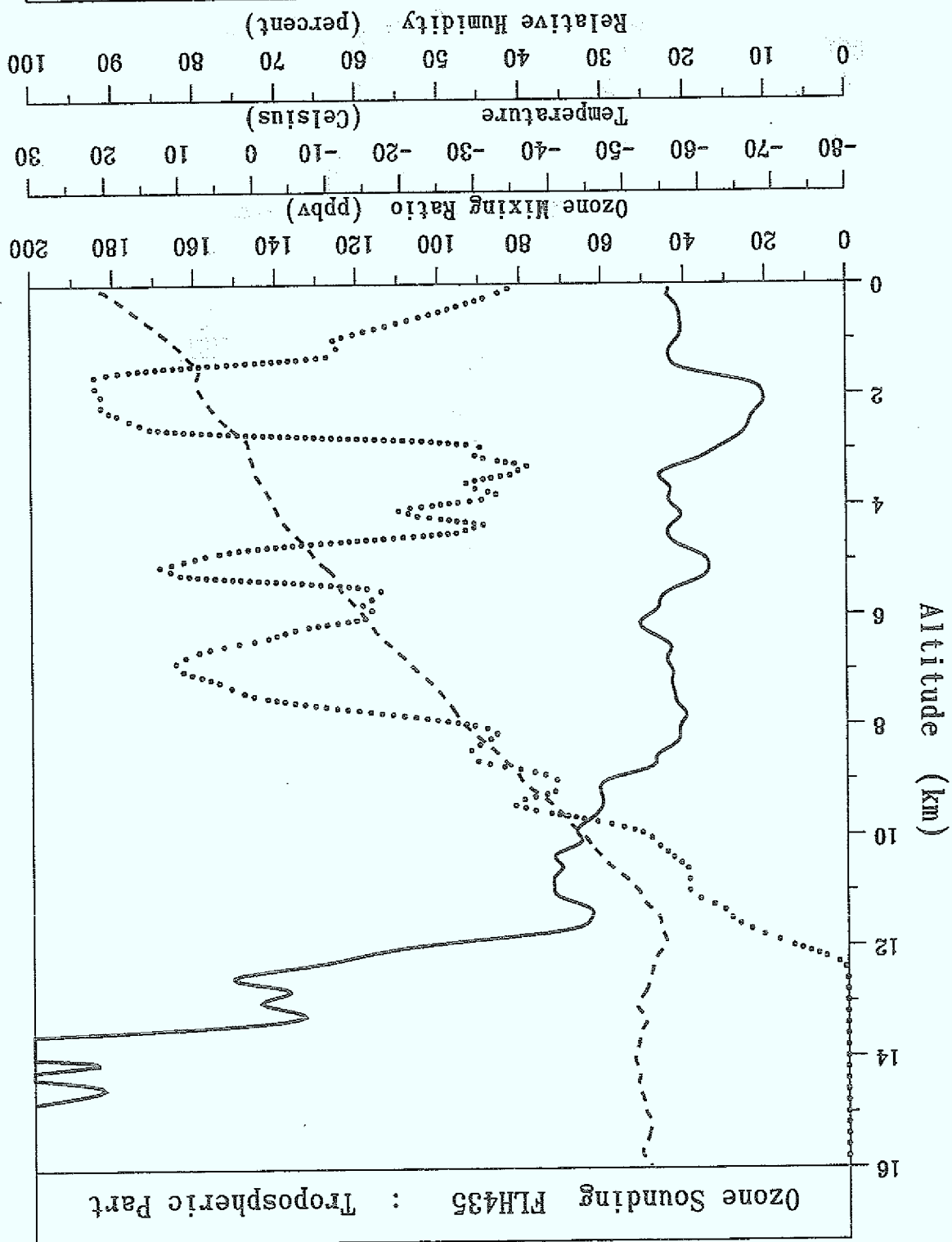


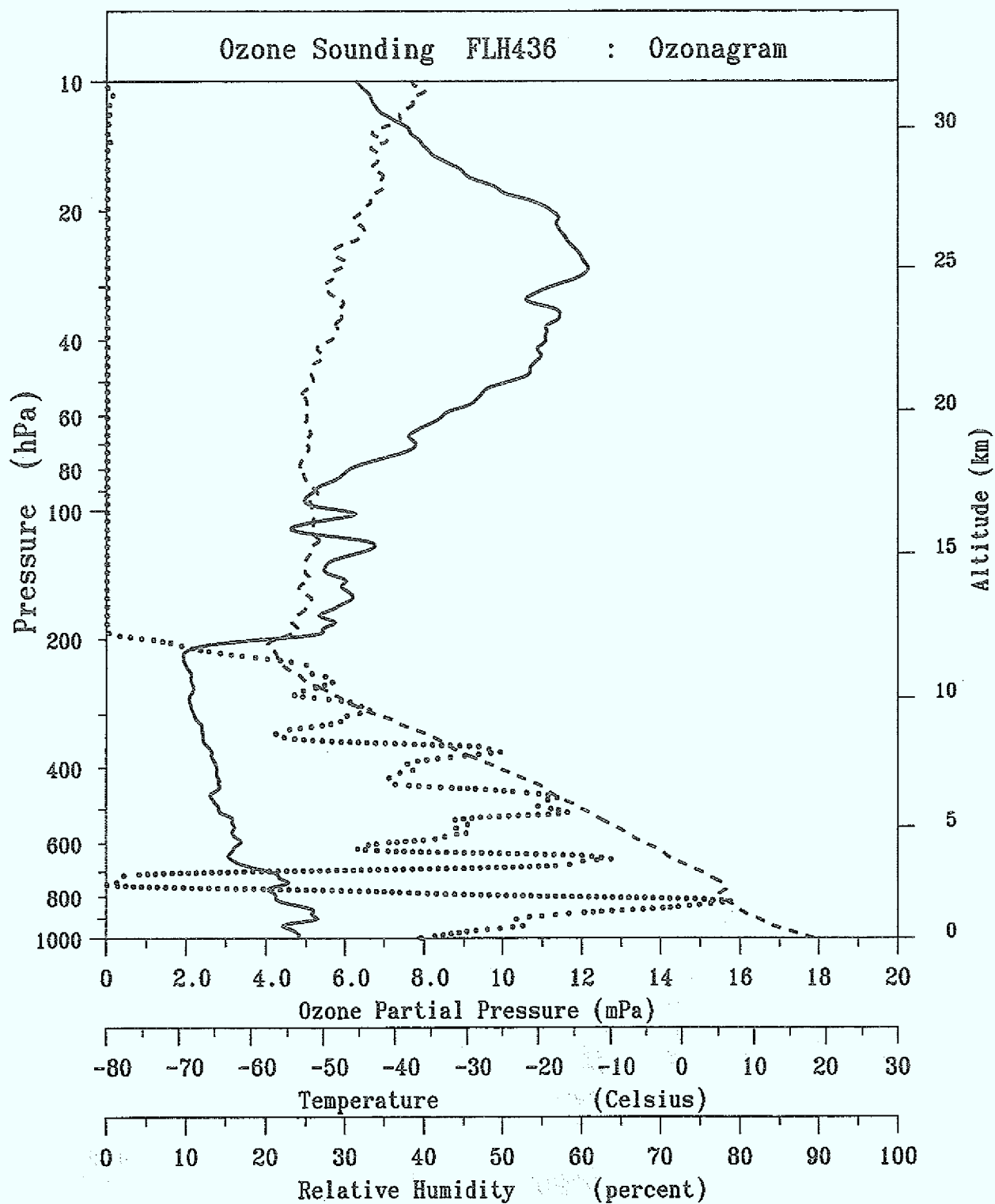


Date 07-09-1992
 Time at launch 12:09 (UTC)
 Location : Julich, FRG

— Ozone
 - - - - - Temperature
 Relative Humidity

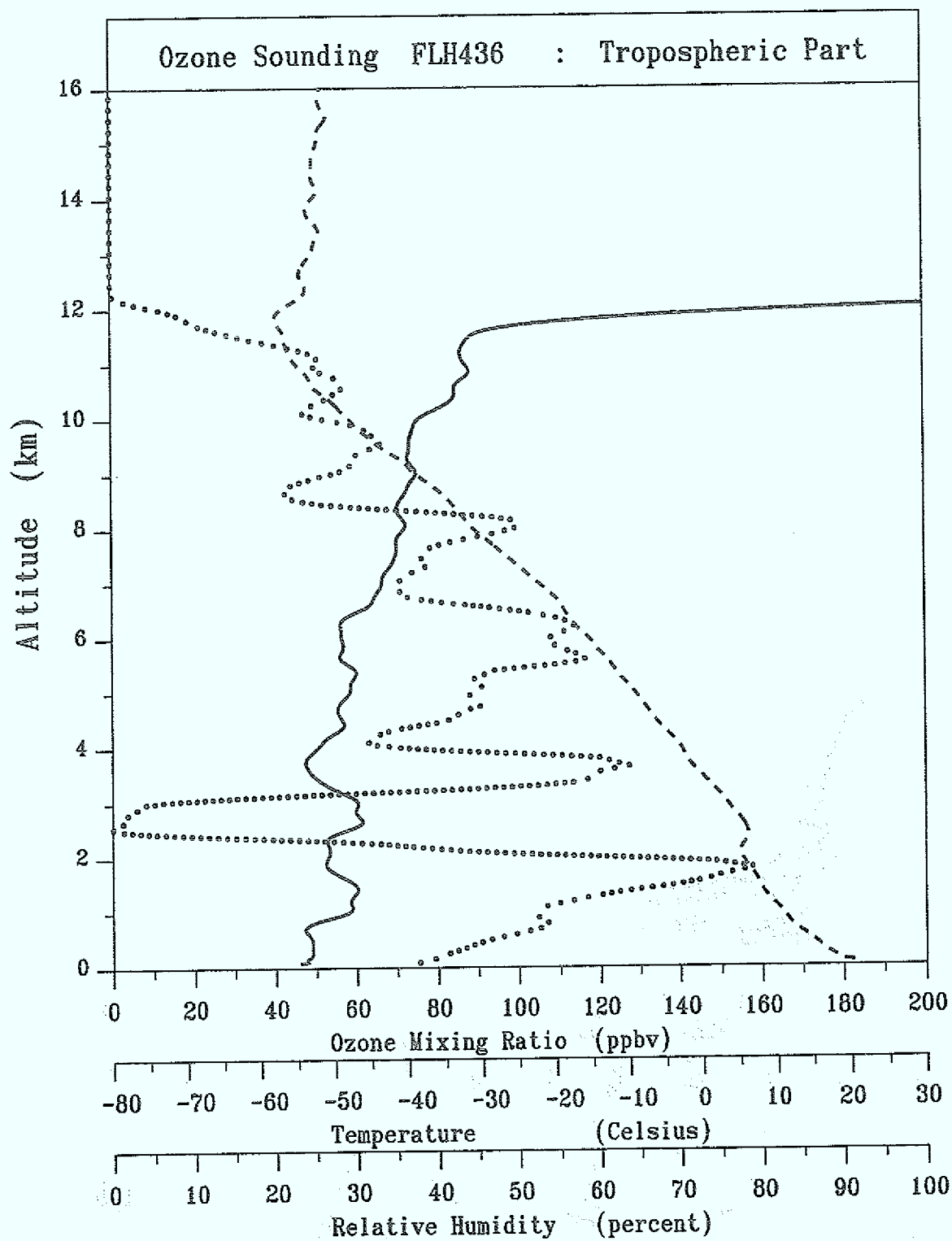
Date	07-09-1992
Time at launch	12:09 (UTC)
Location	Julich, FRG
Ozone	—
Temperature	- - -
Relative Humidity	.....





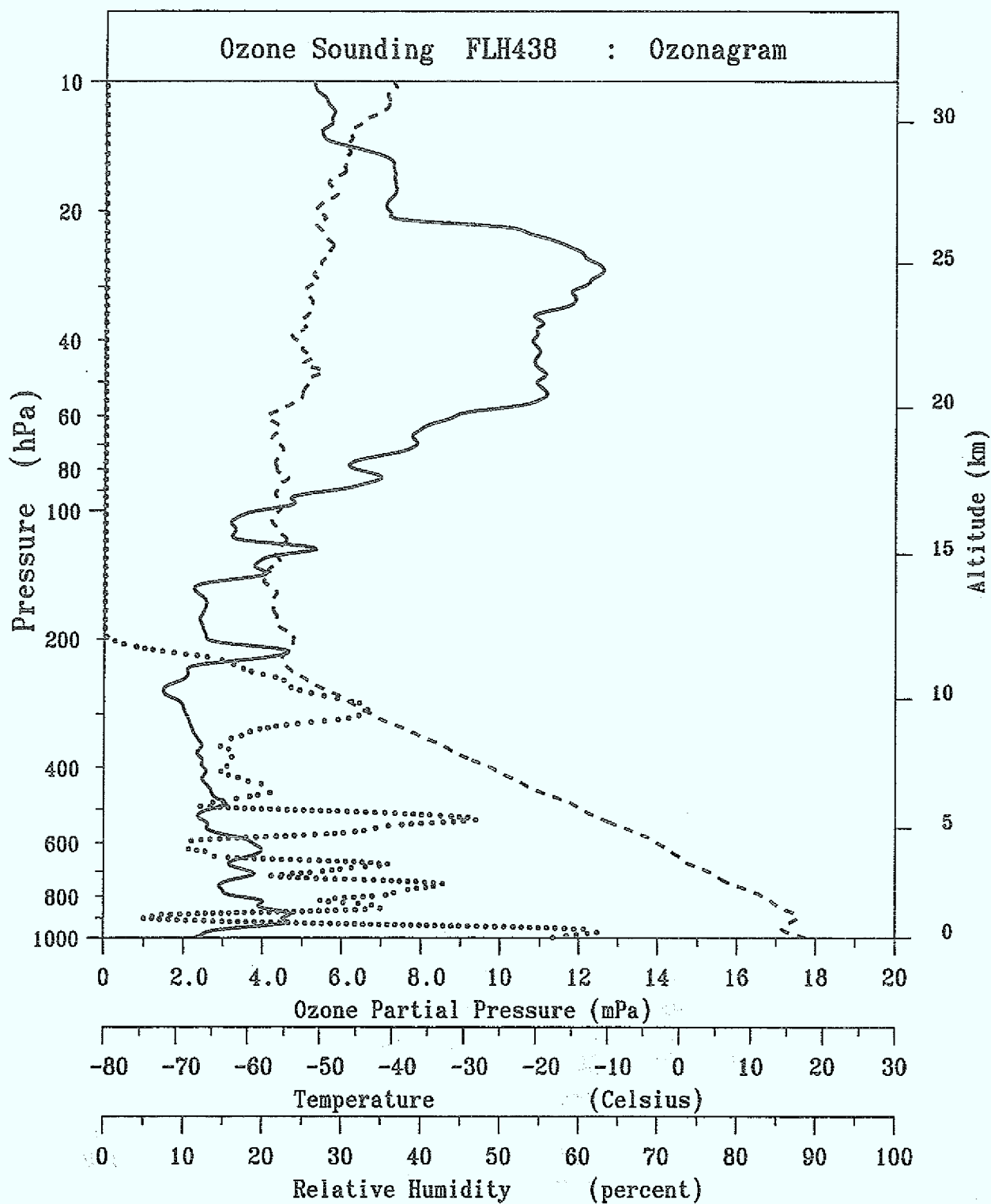
Date 10-09-1992
 Time at launch 12:00 (UTC)
 Location : Julich, FRG

— Ozone
 - - - - - Temperature
 Relative Humidity



Date 10-09-1992
 Time at launch 12:00 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity



Date 17-09-1992

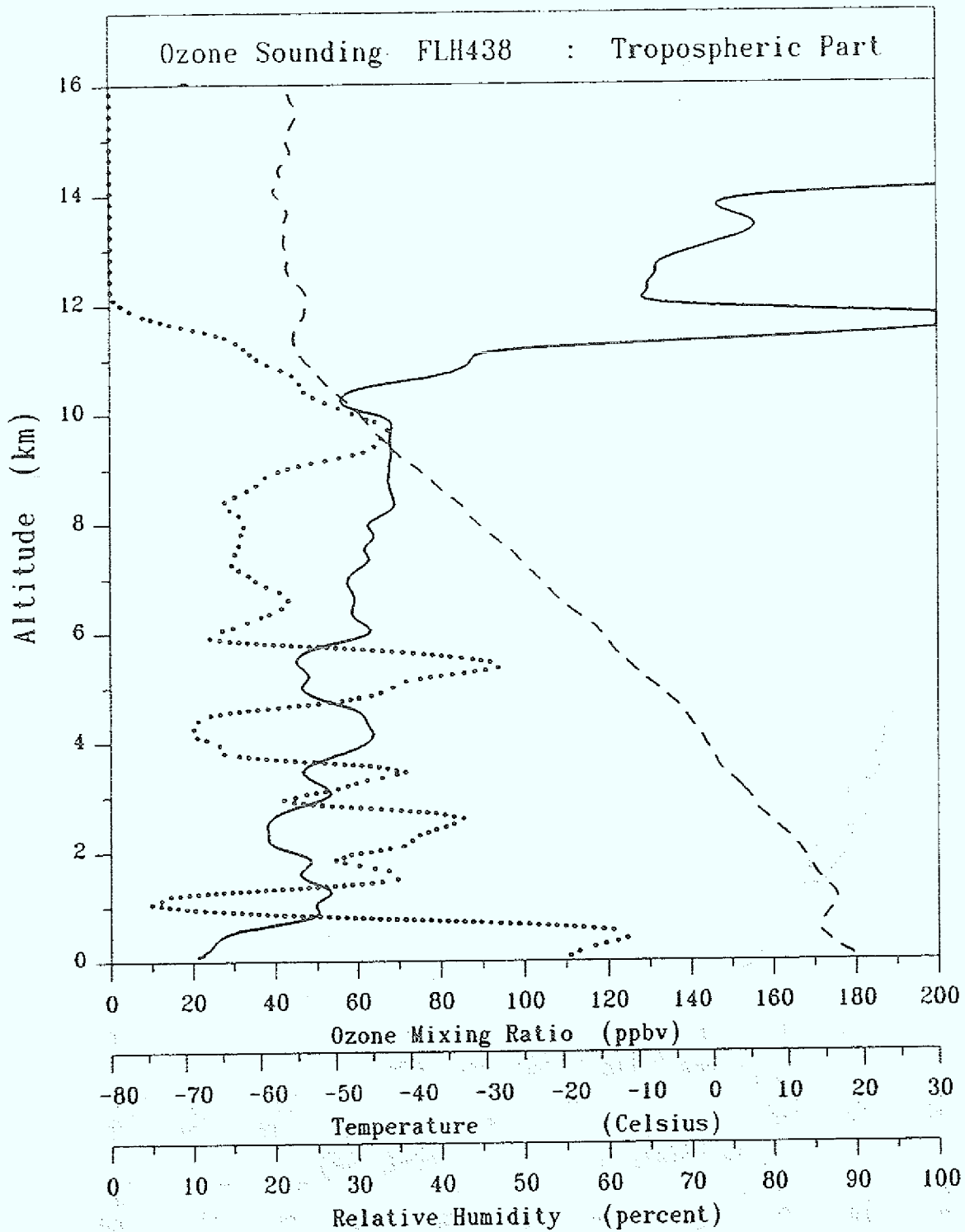
Time at launch 11:56 (UTC)

Location : Julich, FRG

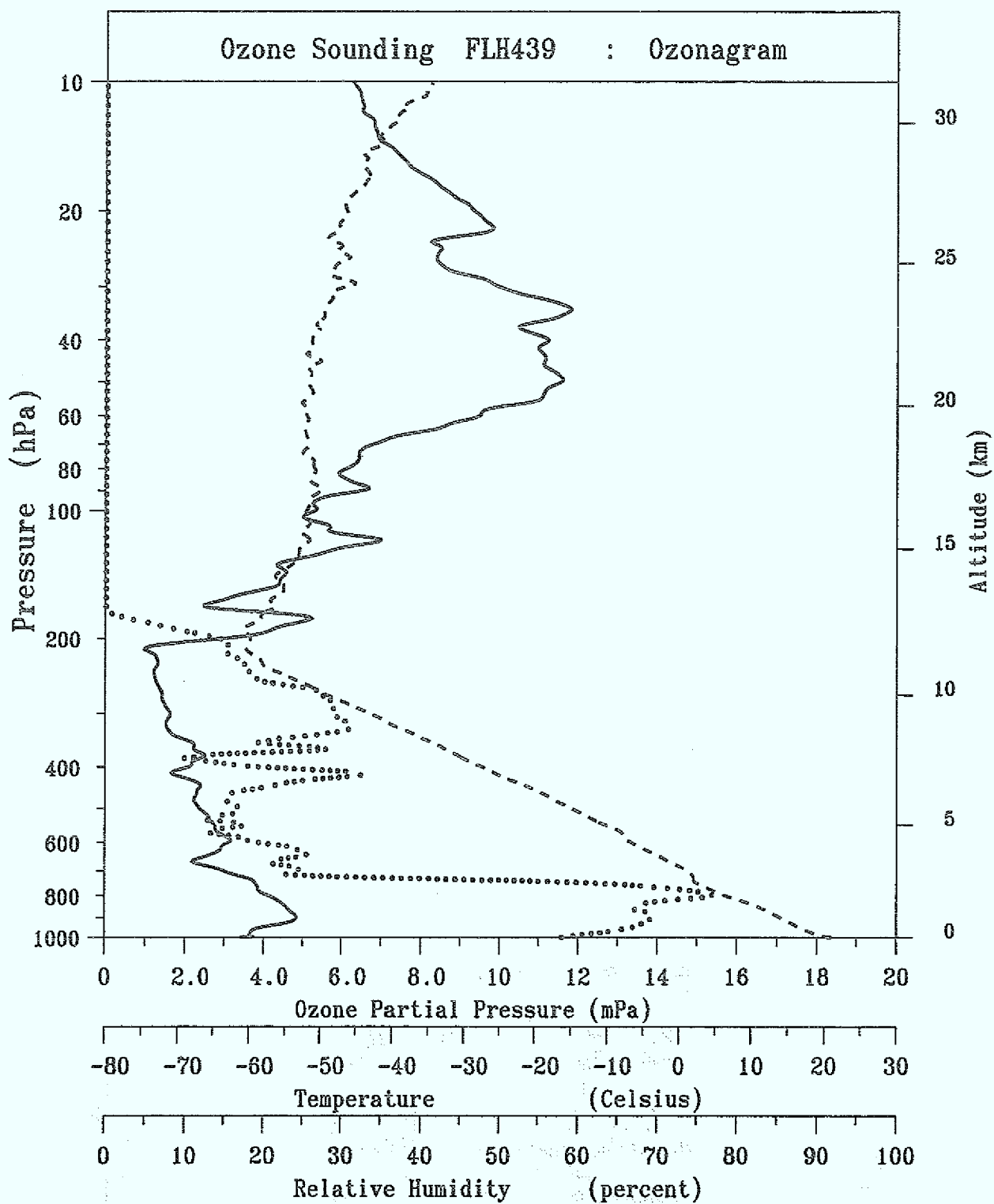
—— Ozone

----- Temperature

..... Relative Humidity

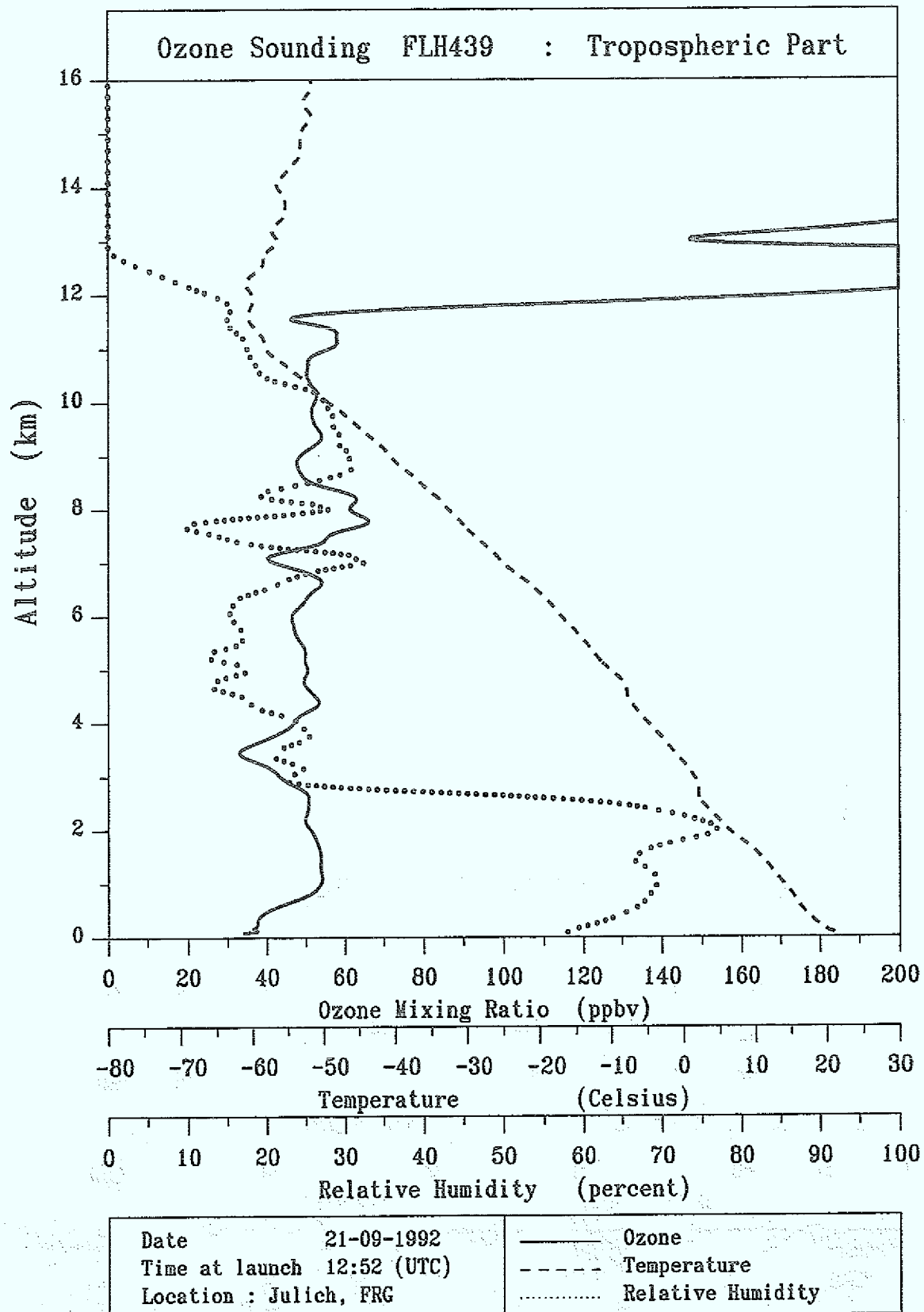


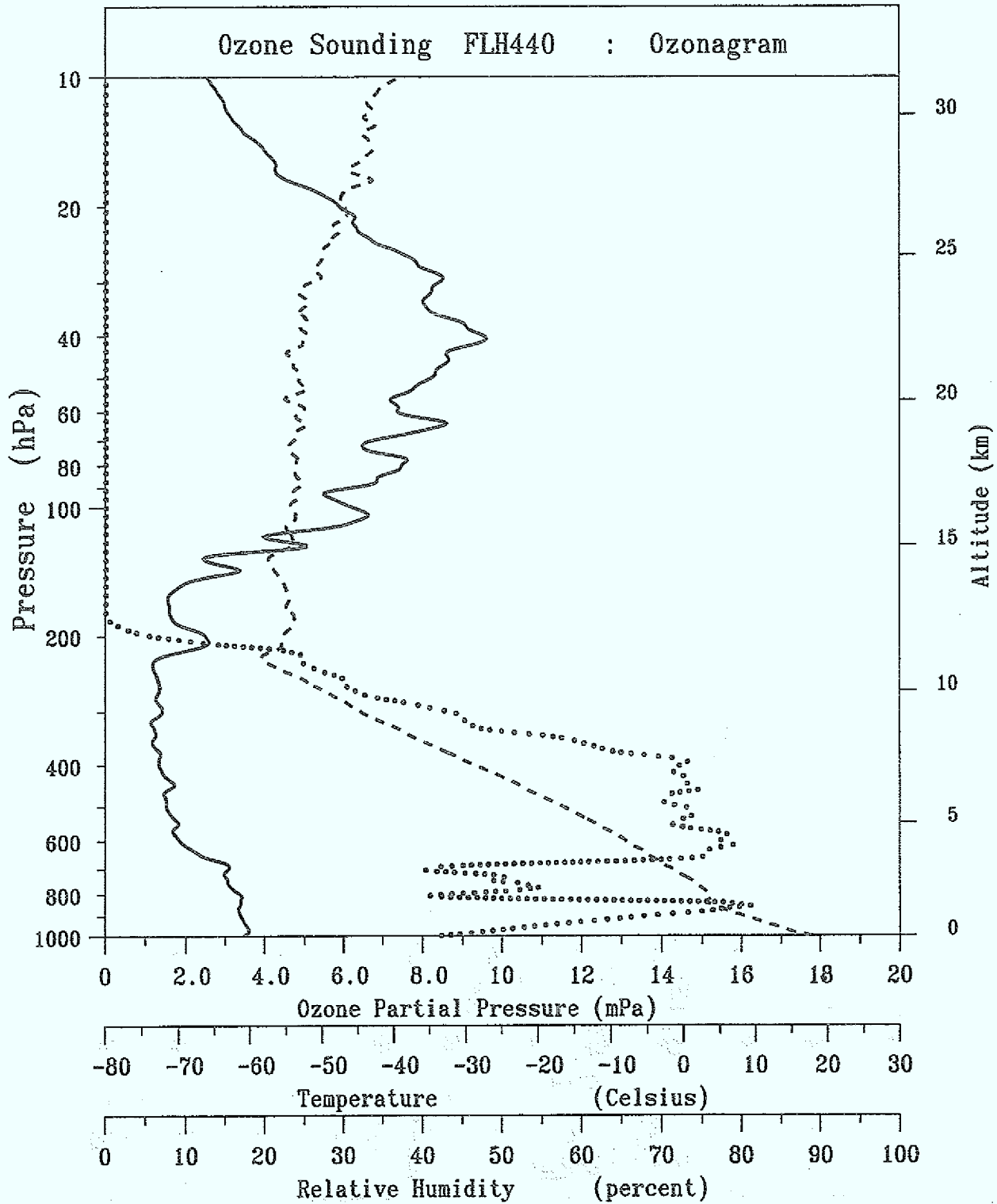
Date	17-09-1992	—	Ozone
Time at launch	11:56 (UTC)	- - -	Temperature
Location	Julich, FRG	.....	Relative Humidity



Date 21-09-1992
 Time at launch 12:52 (UTC)
 Location : Julich, FRG

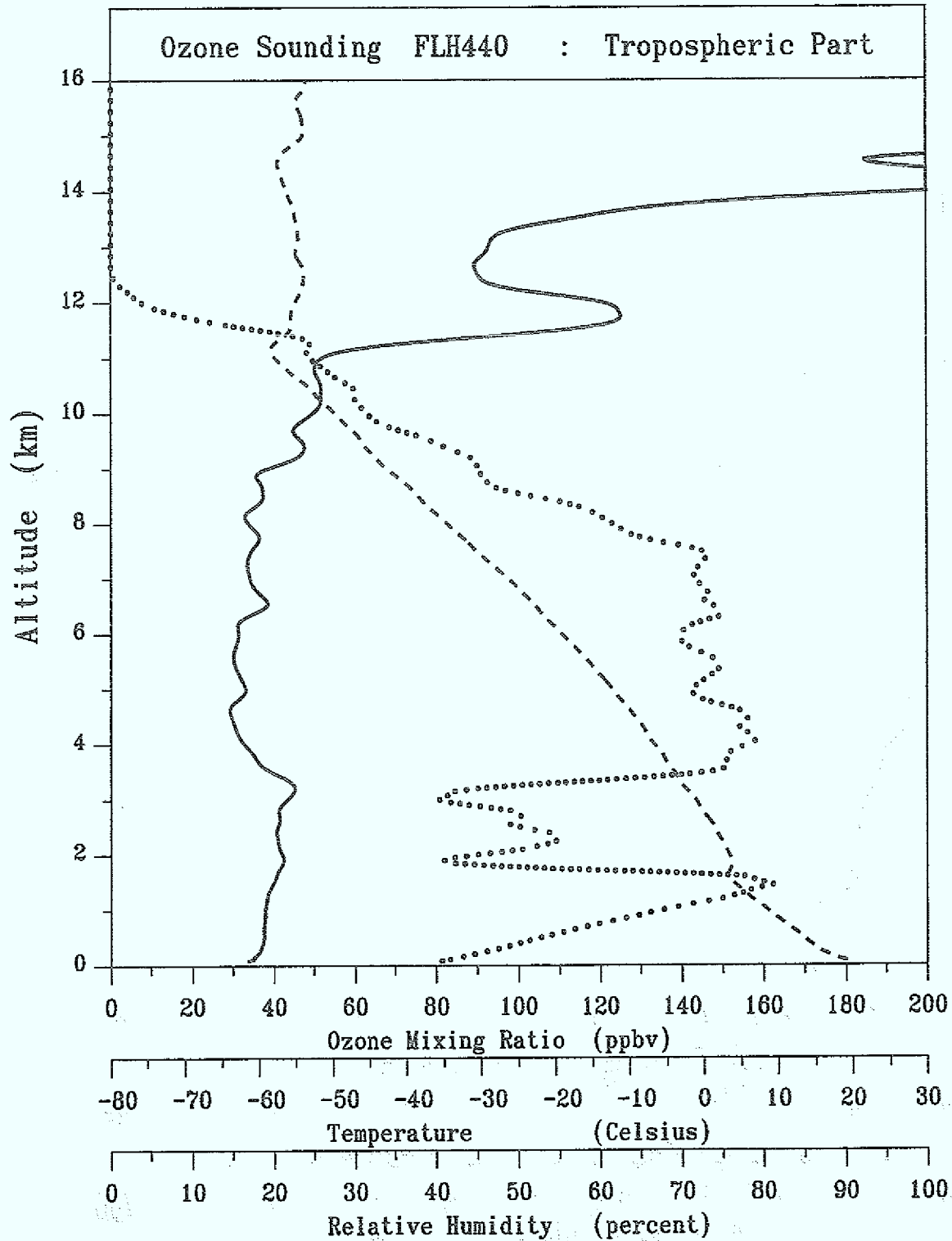
— Ozone
 - - - - Temperature
 Relative Humidity





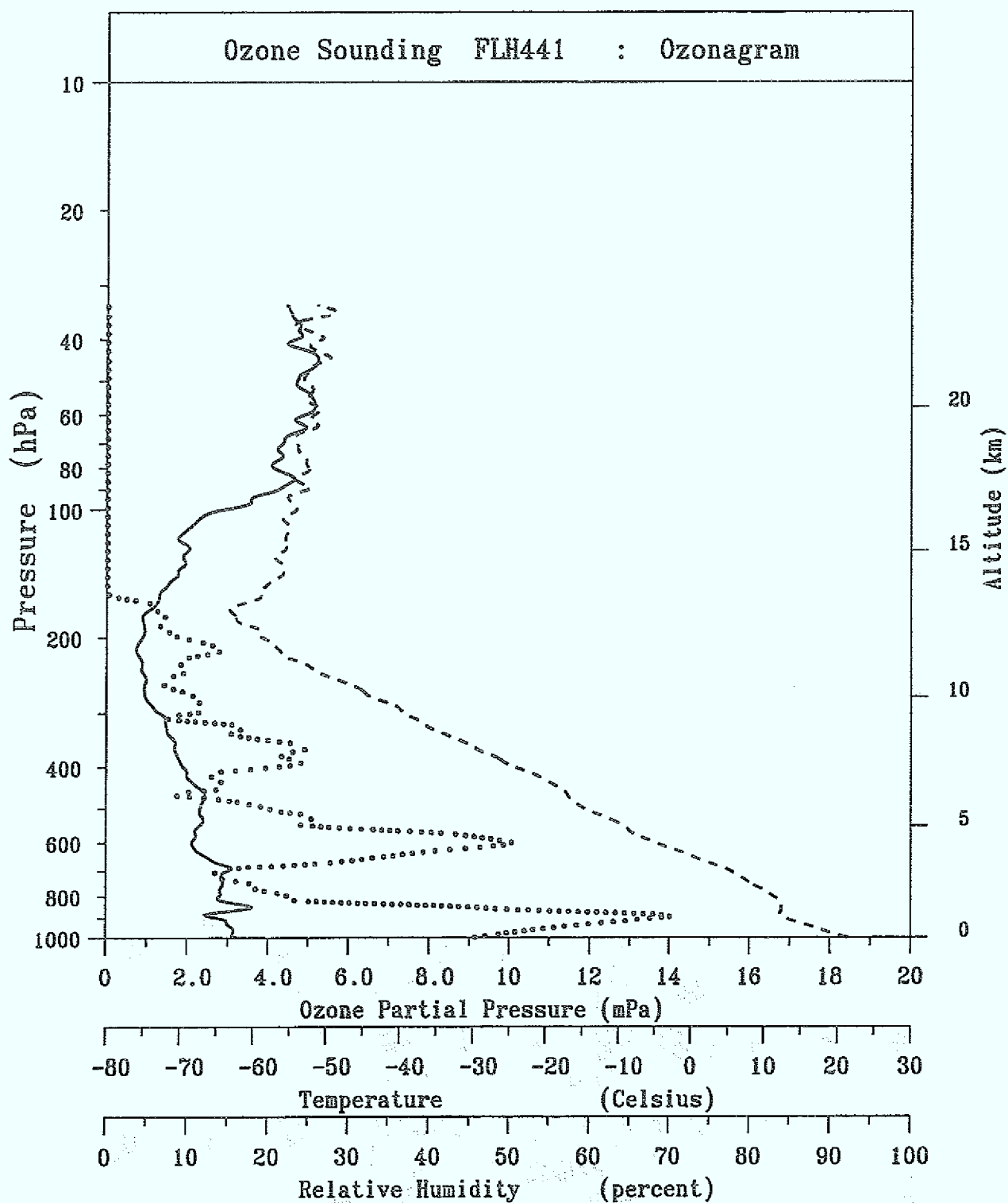
Date 24-09-1992
 Time at launch 11:37 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity



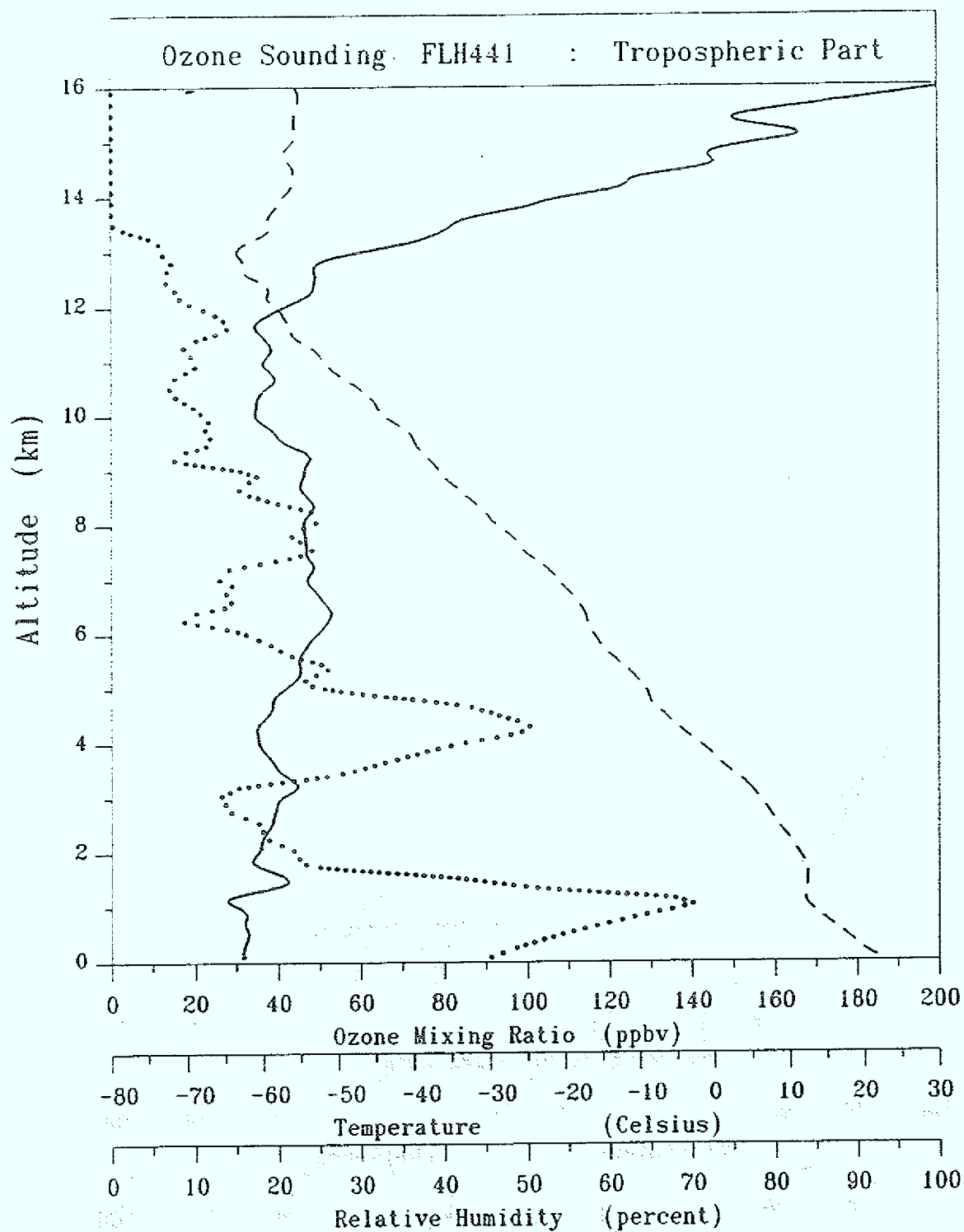
Date 24-09-1992
 Time at launch 11:37 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity



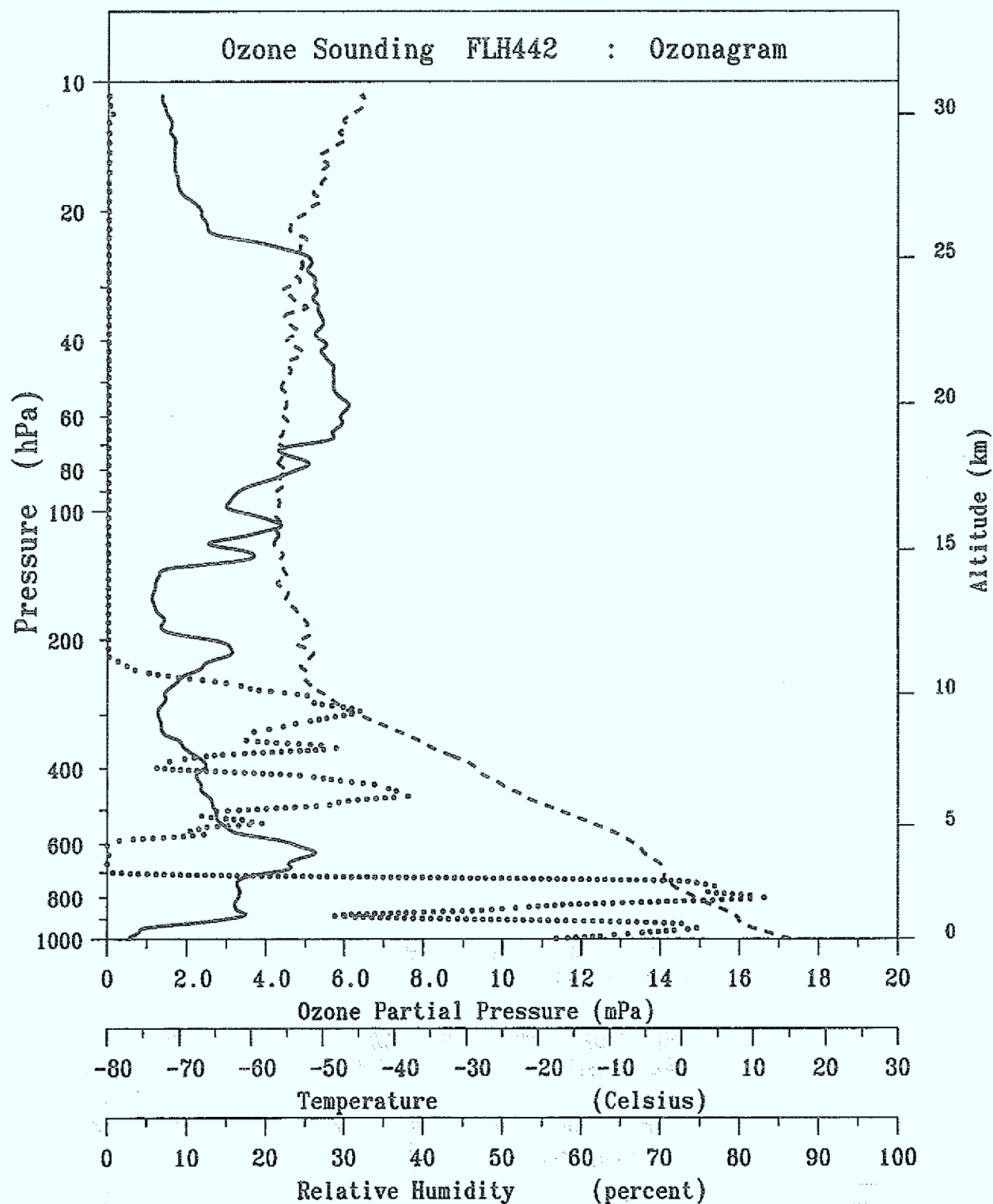
Date 28-09-1992
 Time at launch 12:10 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity



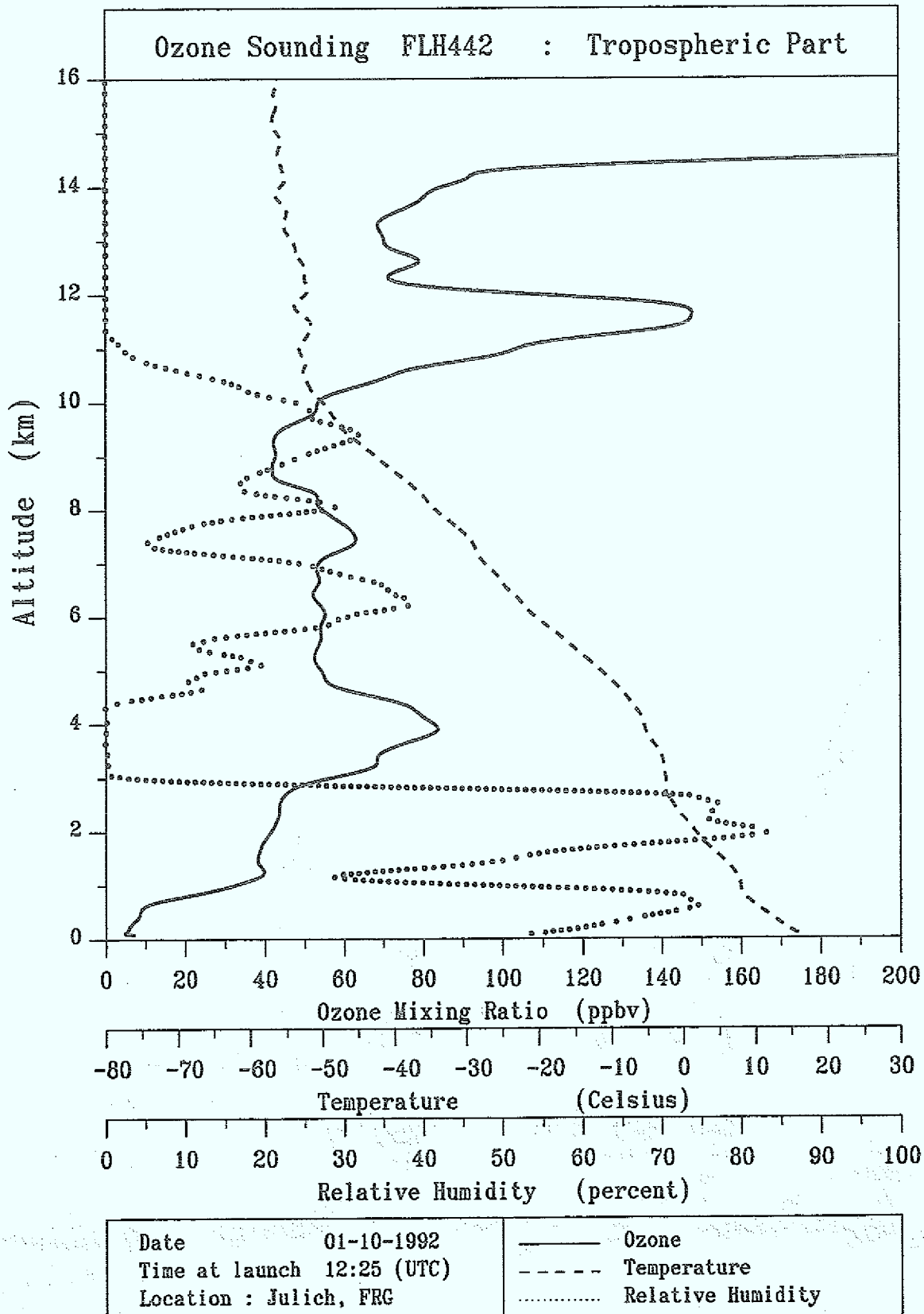
Date 28-09-1992
 Time at launch 12:10 (UTC)
 Location : Julich, FRG

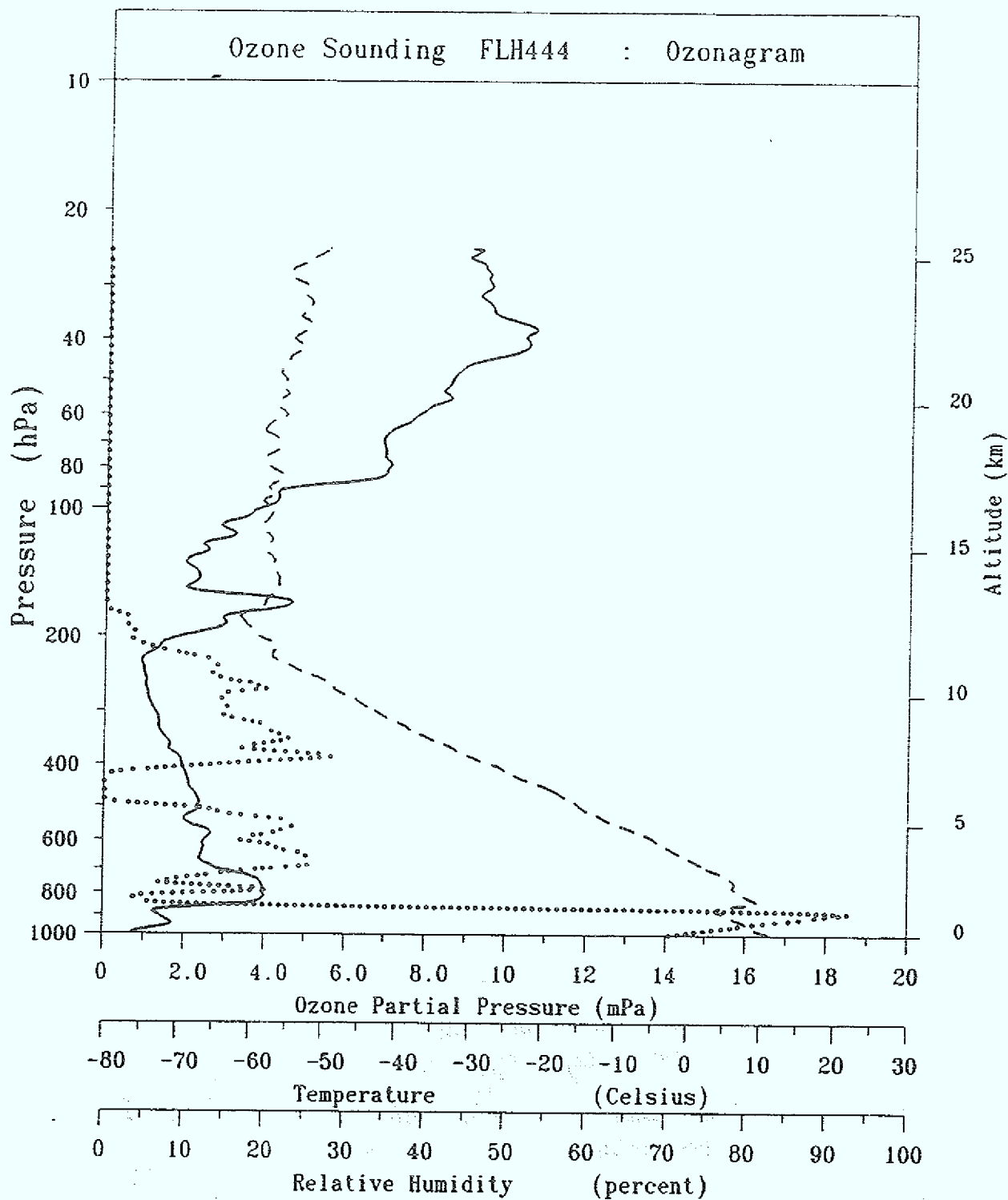
— Ozone
 - - - Temperature
 Relative Humidity



Date 01-10-1992
 Time at launch 12:25 (UTC)
 Location : Julich, FRG

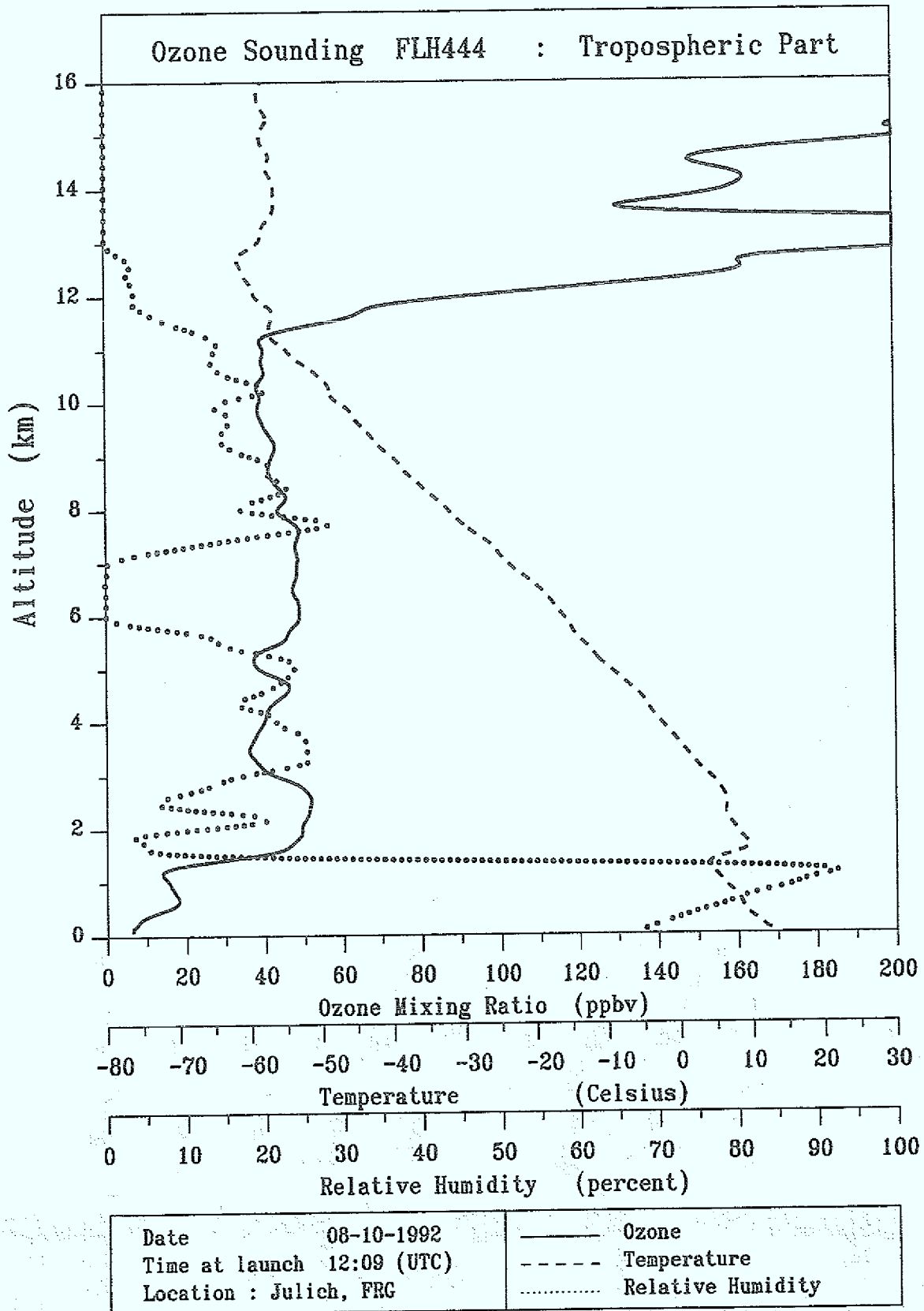
— Ozone
 - - - Temperature
 Relative Humidity

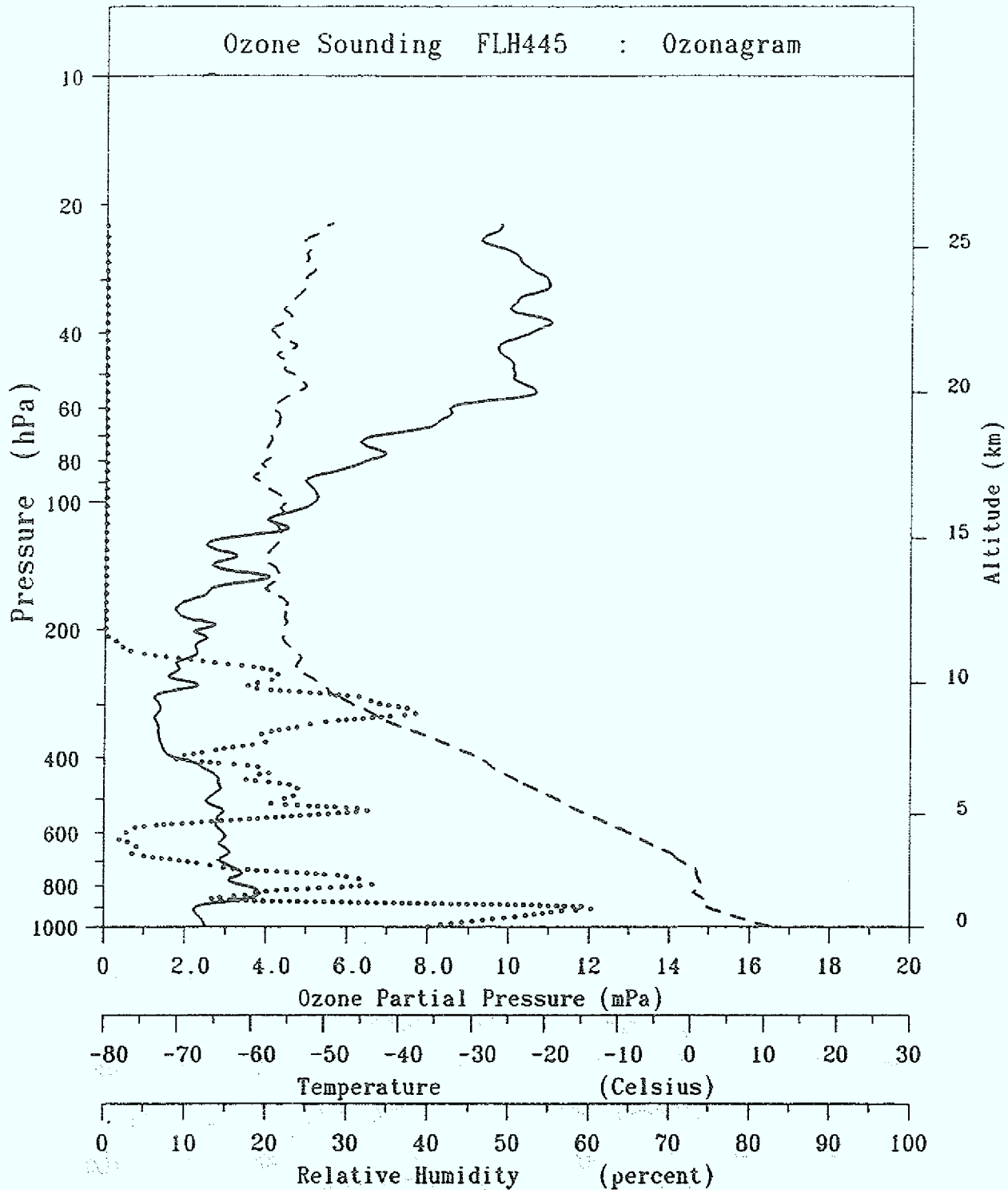




Date 08-10-1992
 Time at launch 12:09 (UTC)
 Location : Julich, FRG

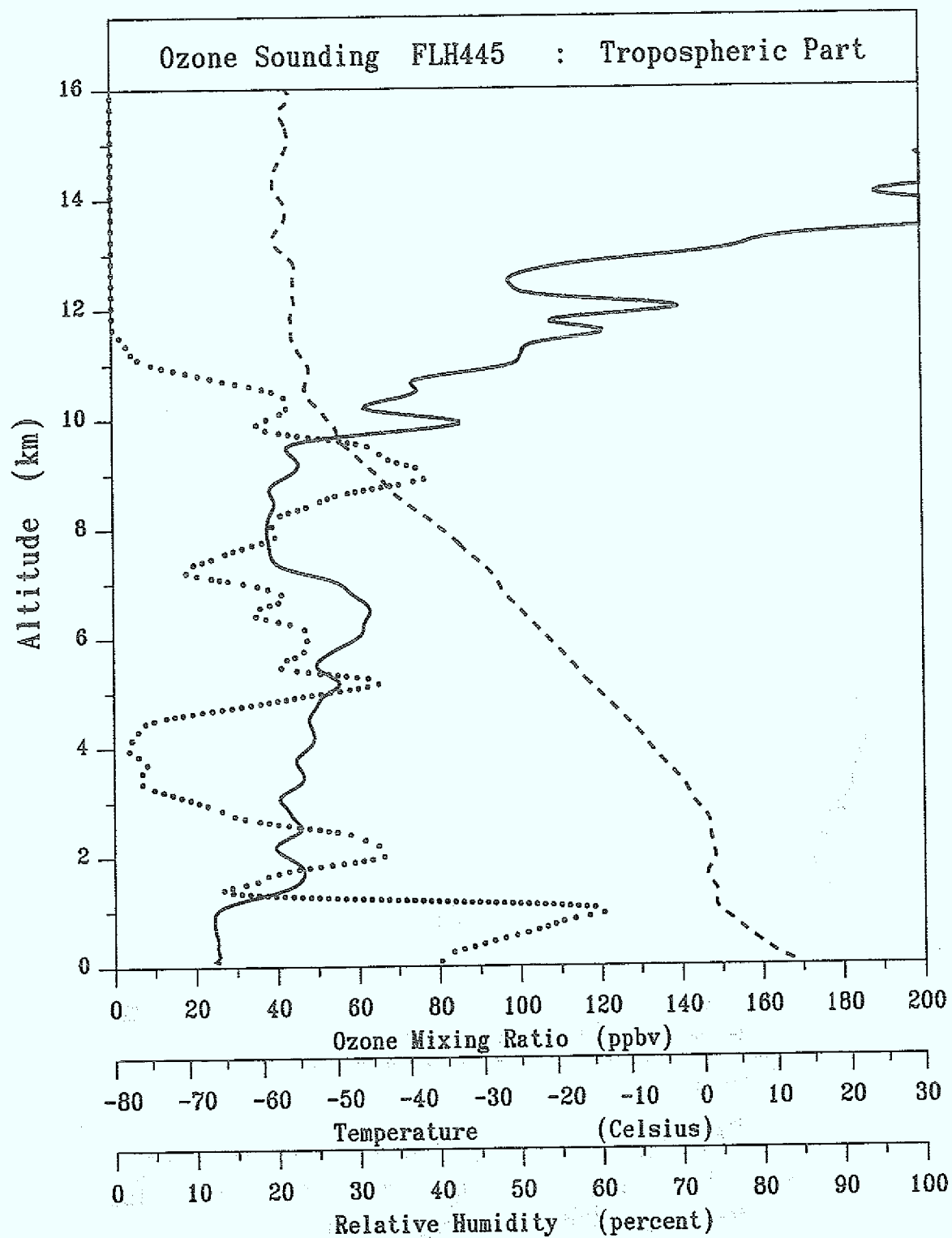
— Ozone
 - - - Temperature
 Relative Humidity



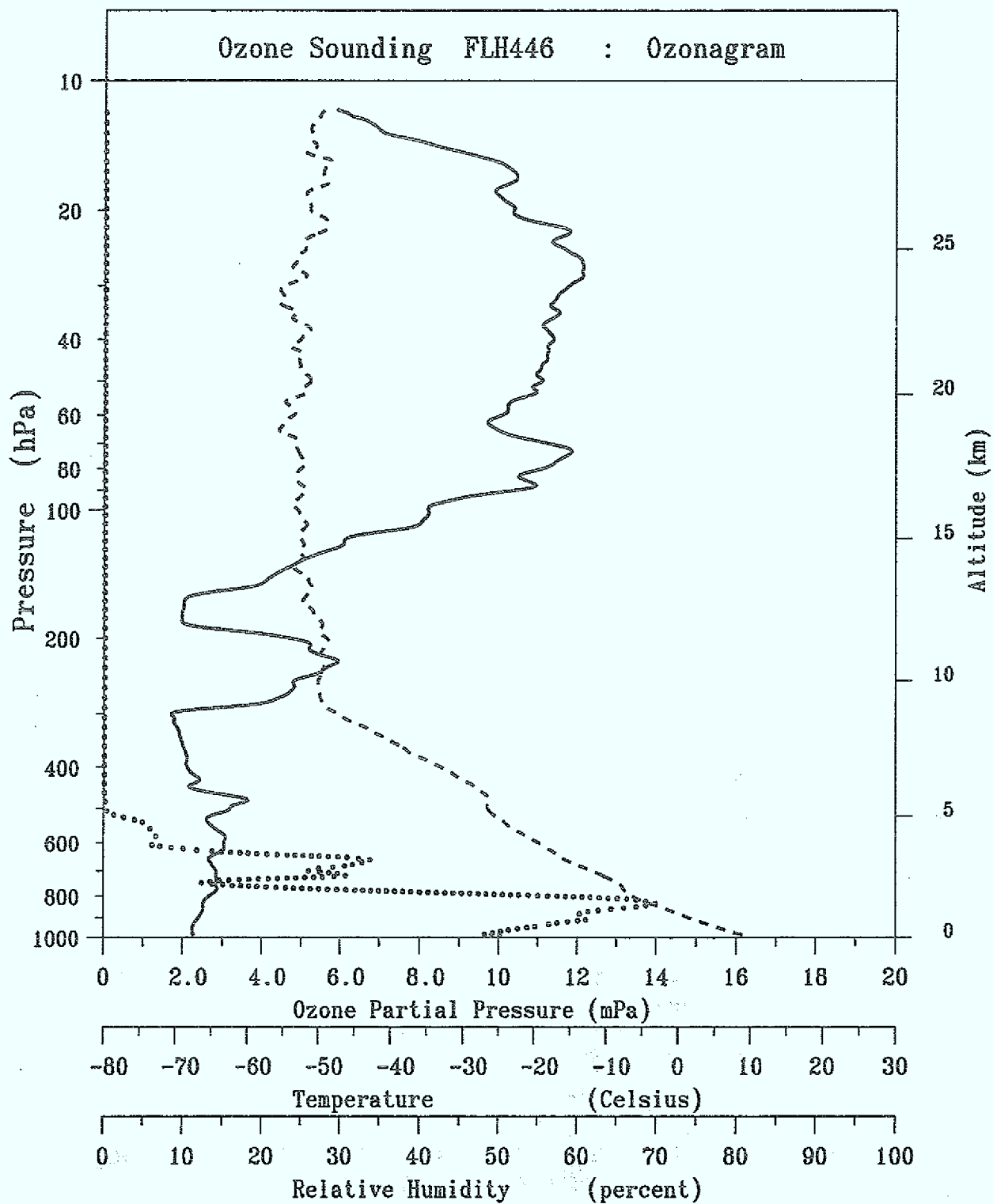


Date 12-10-1992
 Time at launch 12:21 (UTC)
 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity

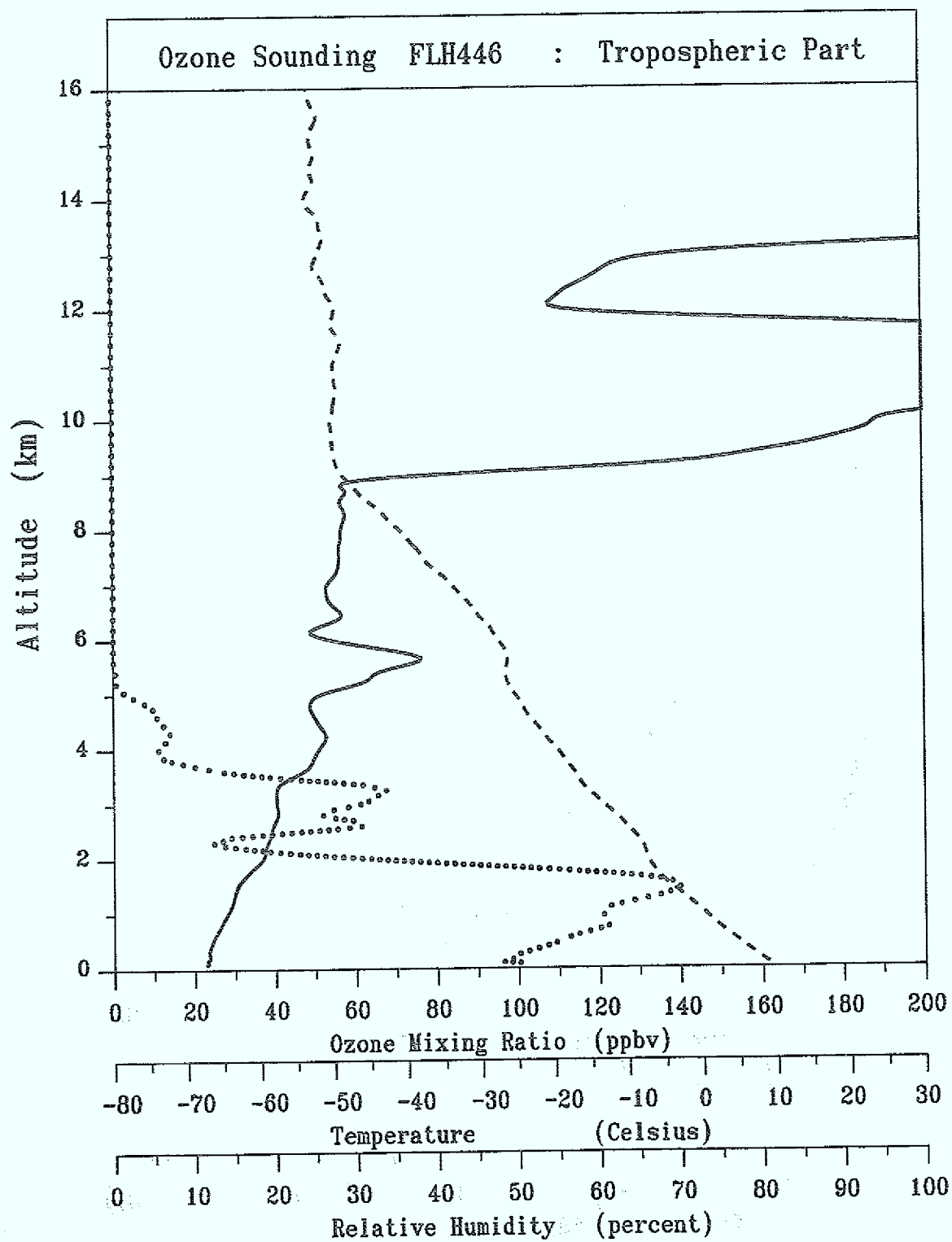


Date	12-10-1992	—	Ozone
Time at launch	12:21 (UTC)	- - - -	Temperature
Location : Julich, FRG		.....	Relative Humidity

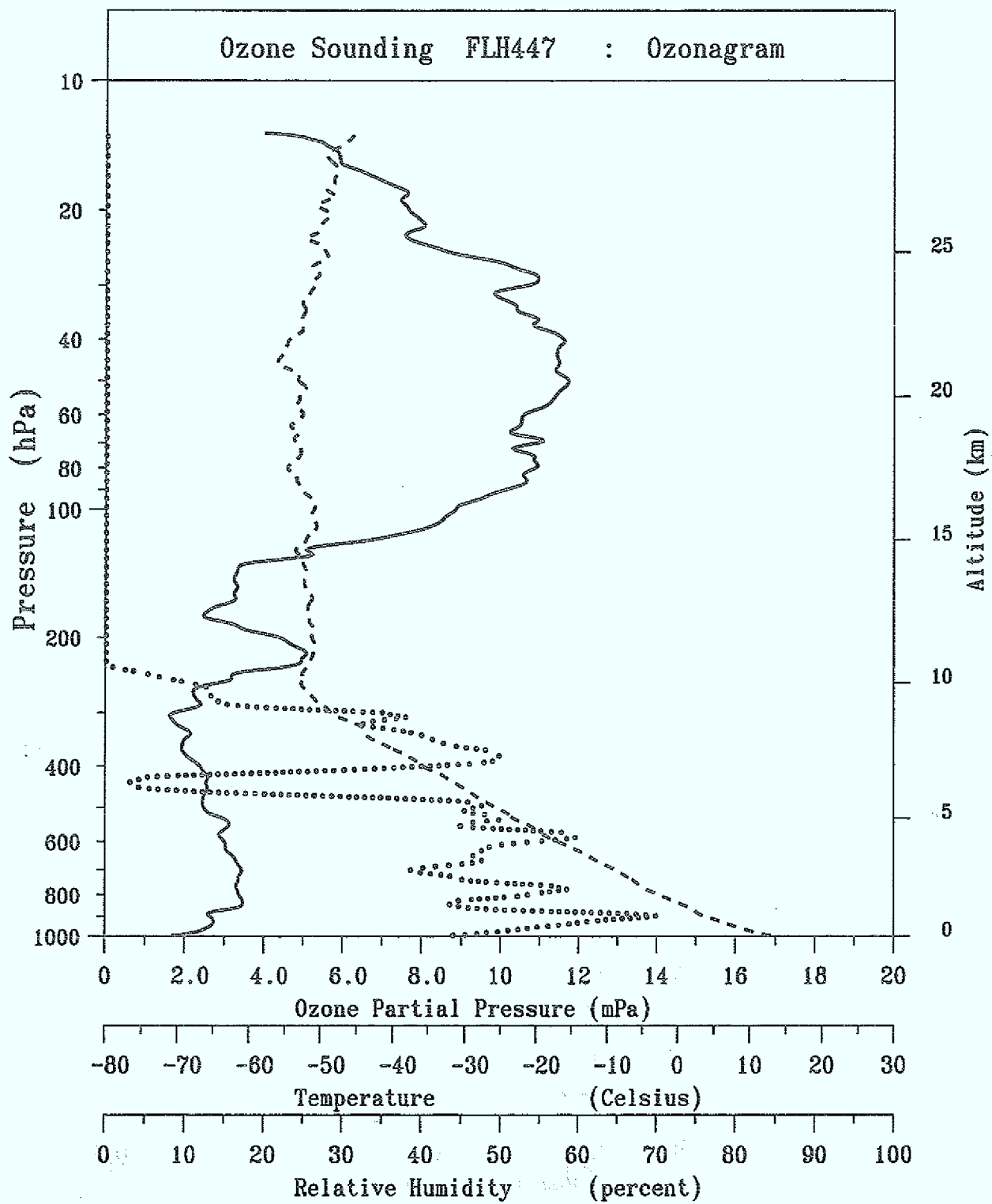


Date 15-10-1992
 Time at launch 12:12 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity

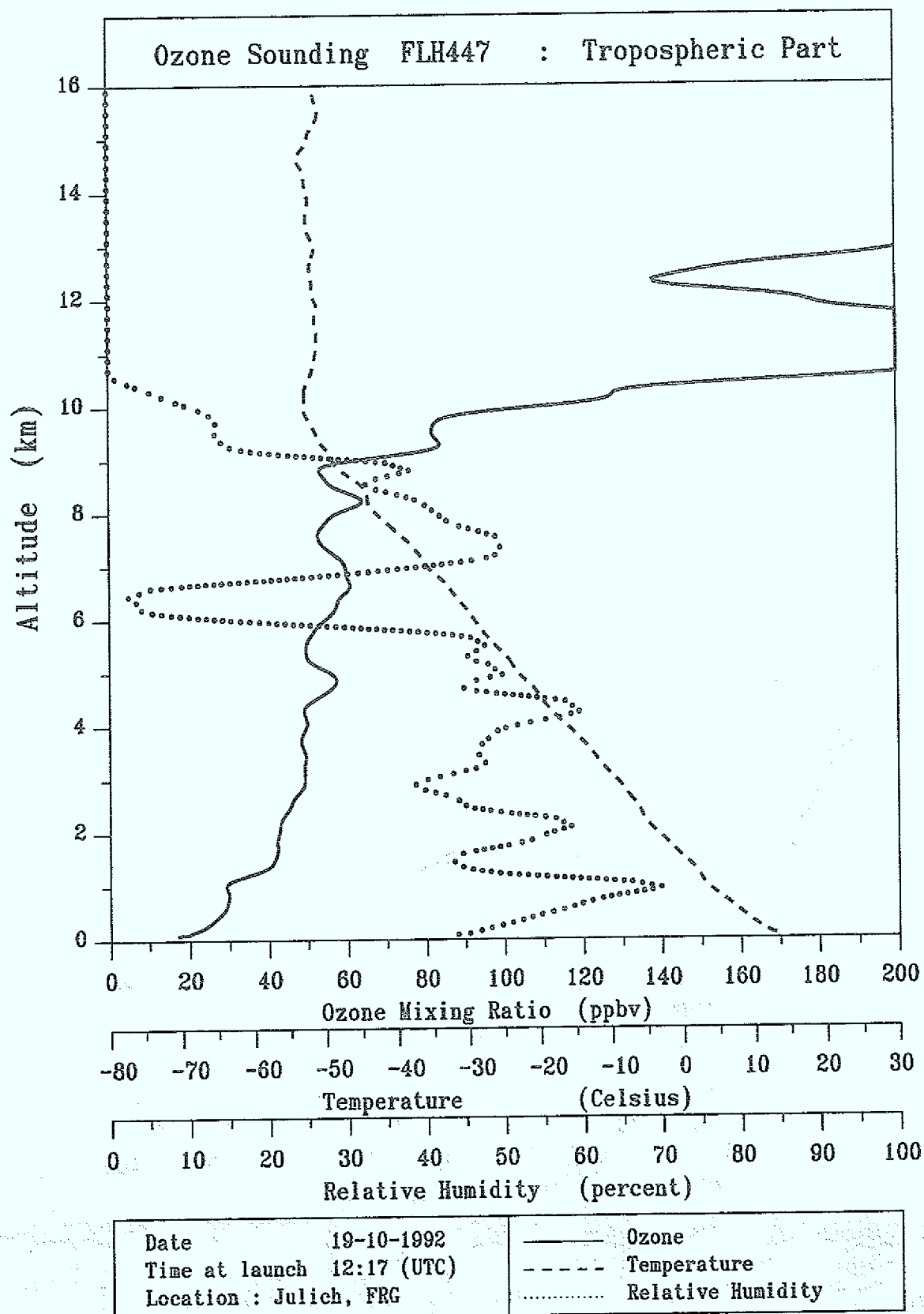


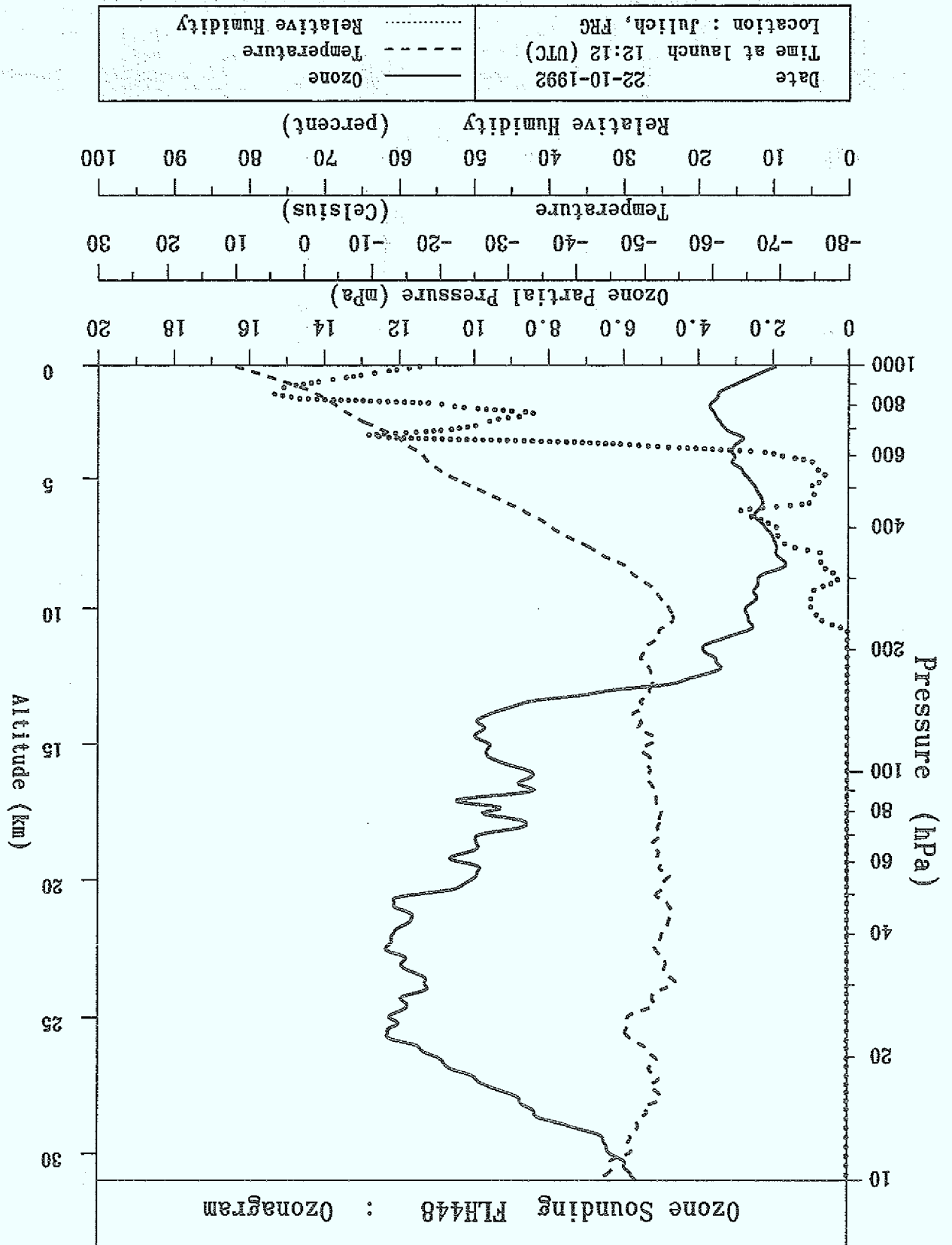
Date	15-10-1992	—	Ozone
Time at launch	12:12 (UTC)	- - - -	Temperature
Location : Julich, FRG		.....	Relative Humidity

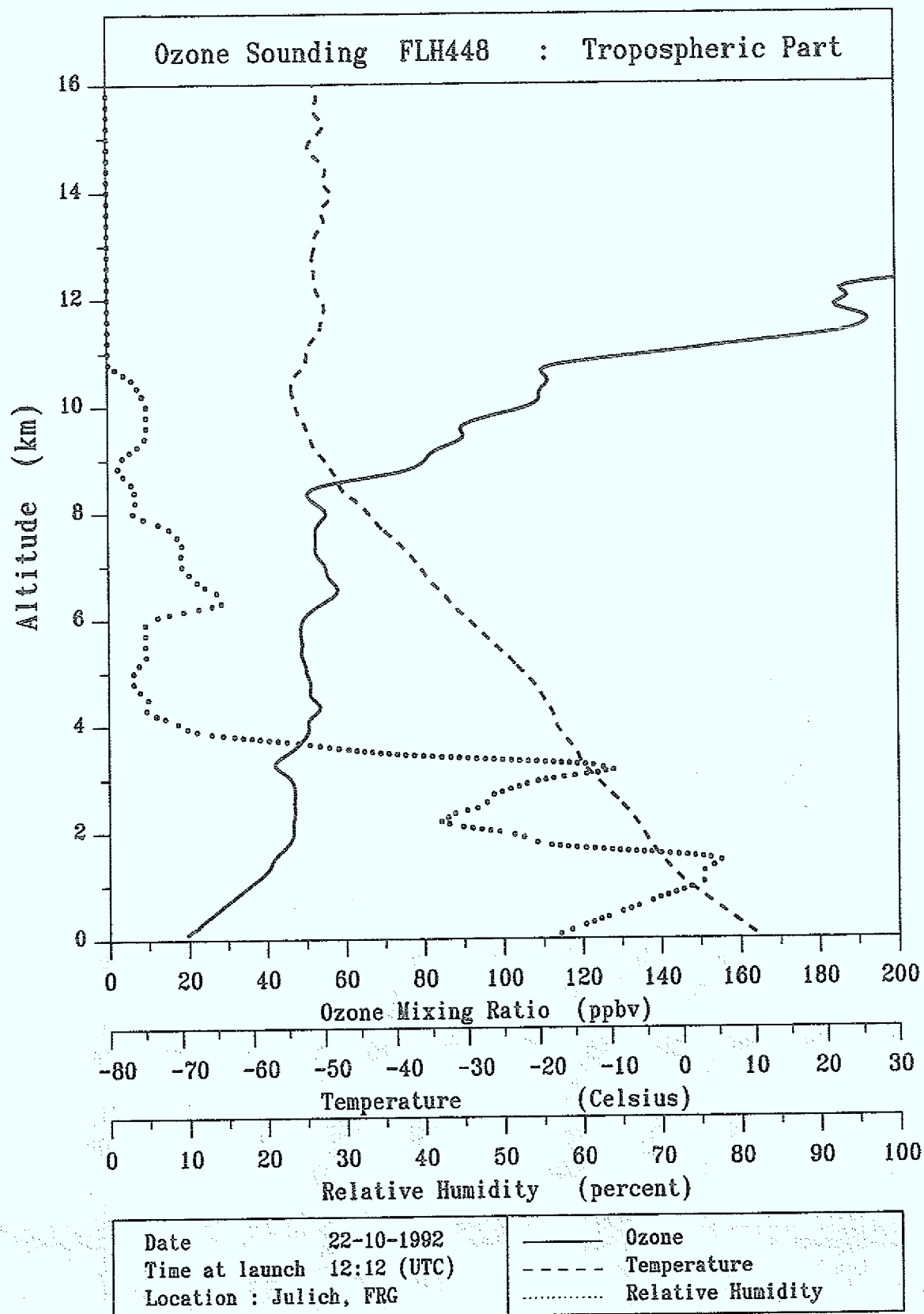


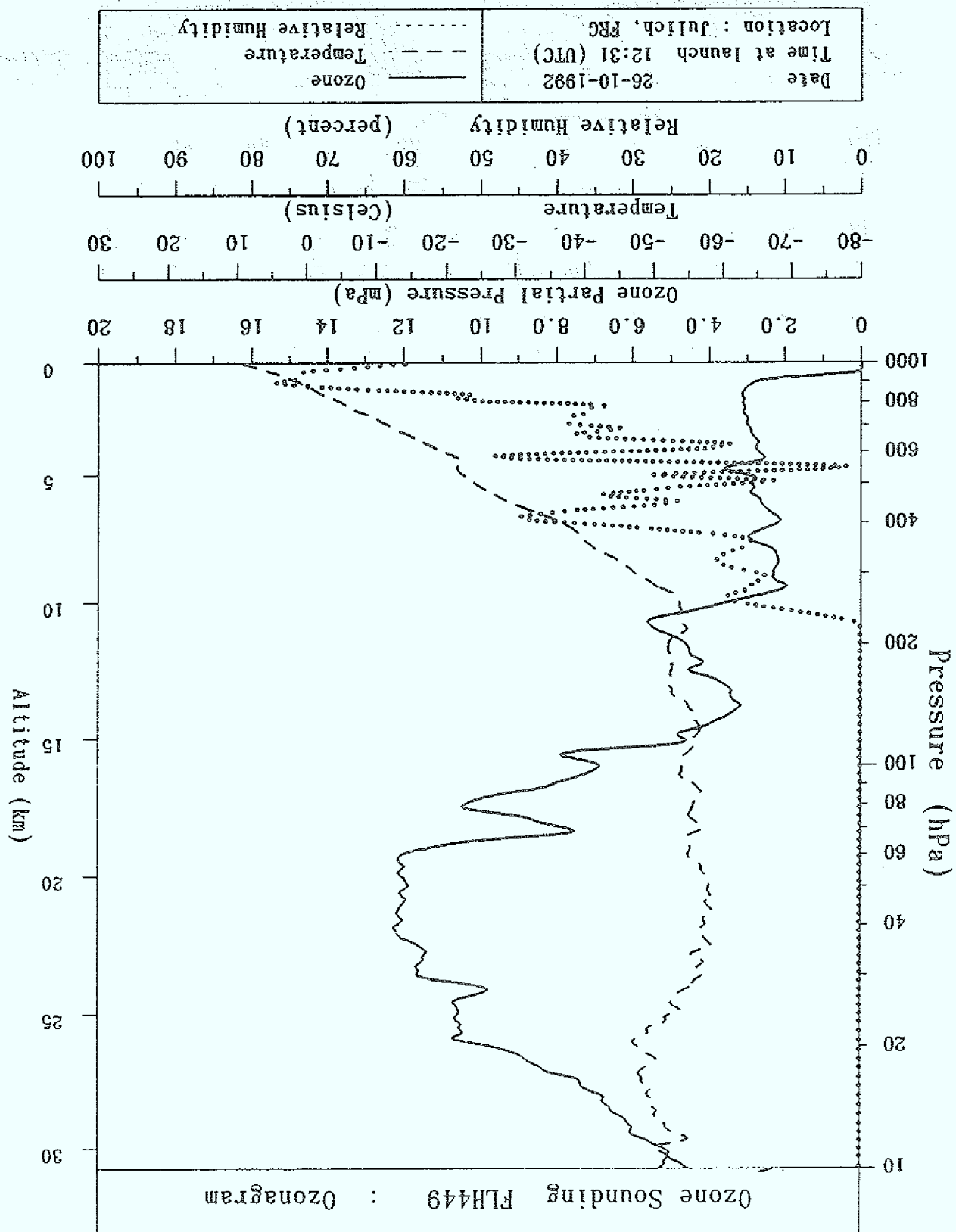
Date 19-10-1992
 Time at launch 12:17 (UTC)
 Location : Julich, FRG

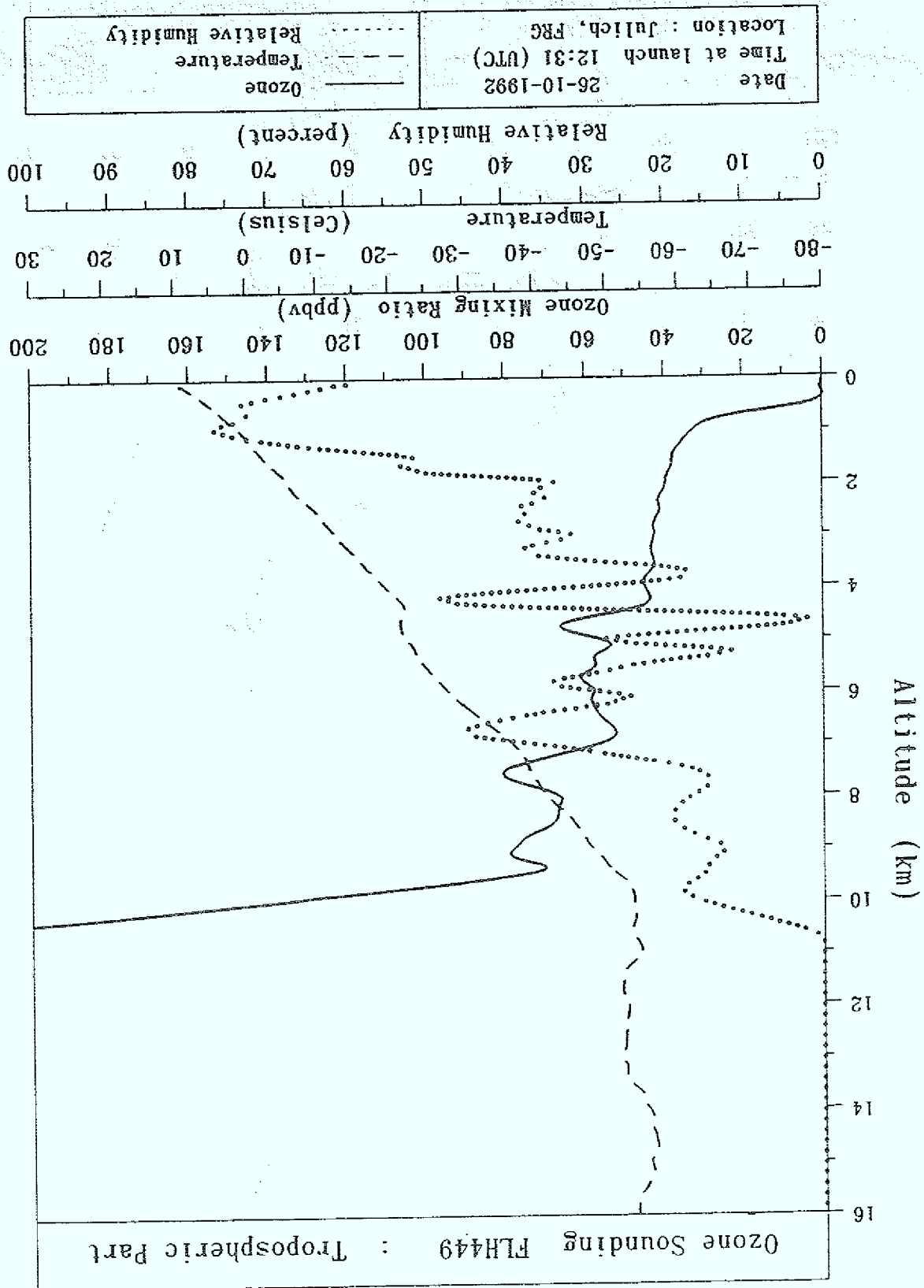
— Ozone
 - - - - Temperature
 Relative Humidity

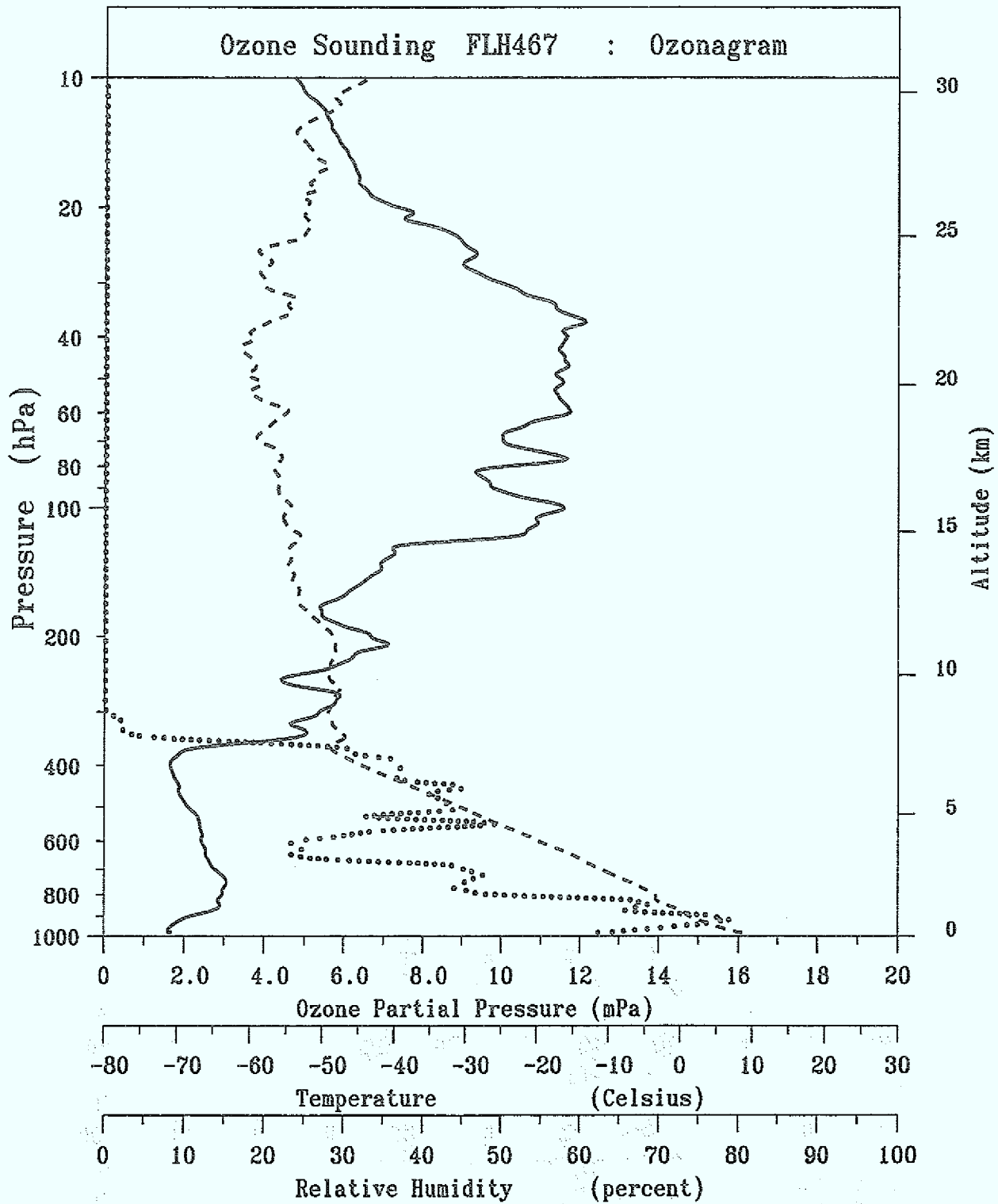






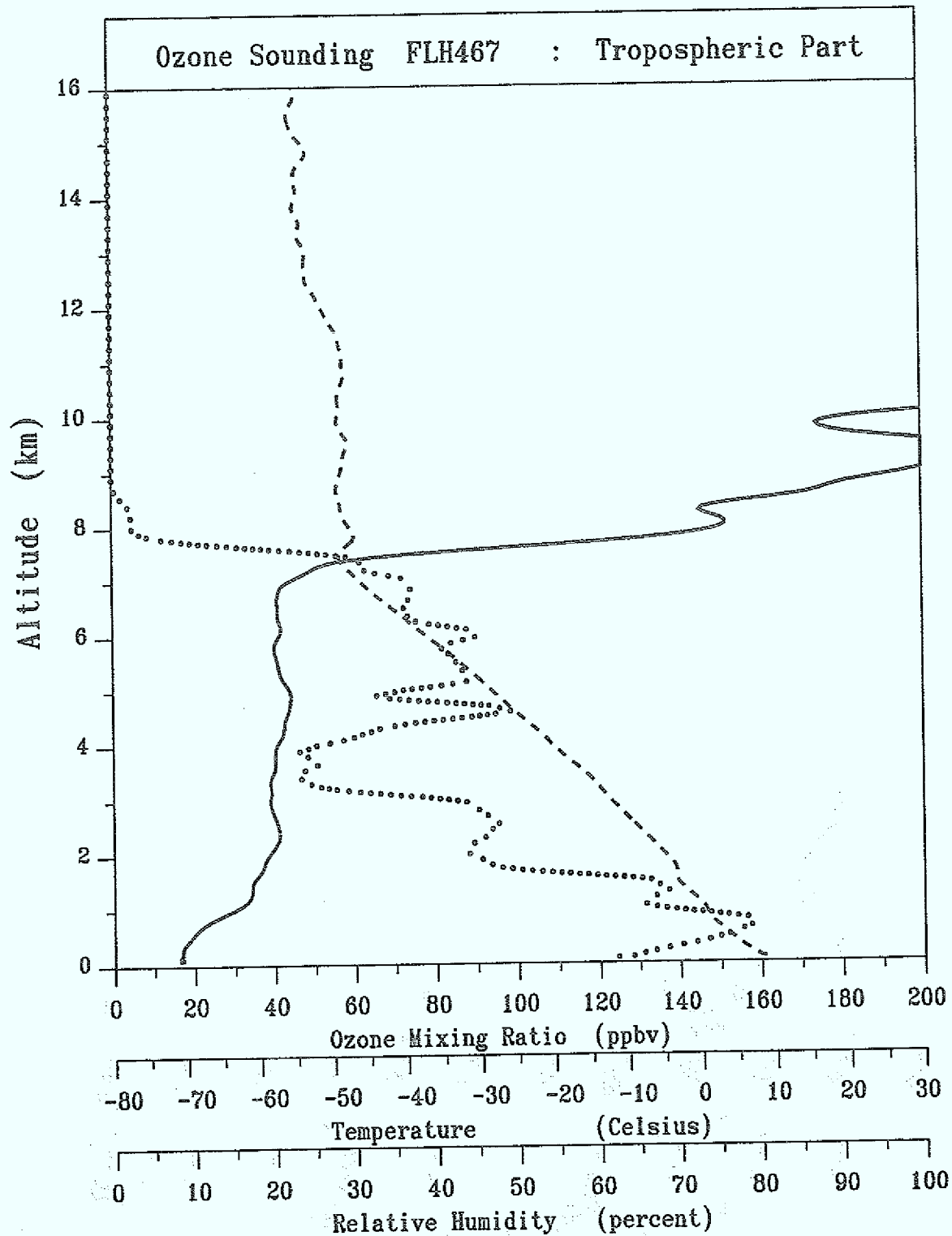




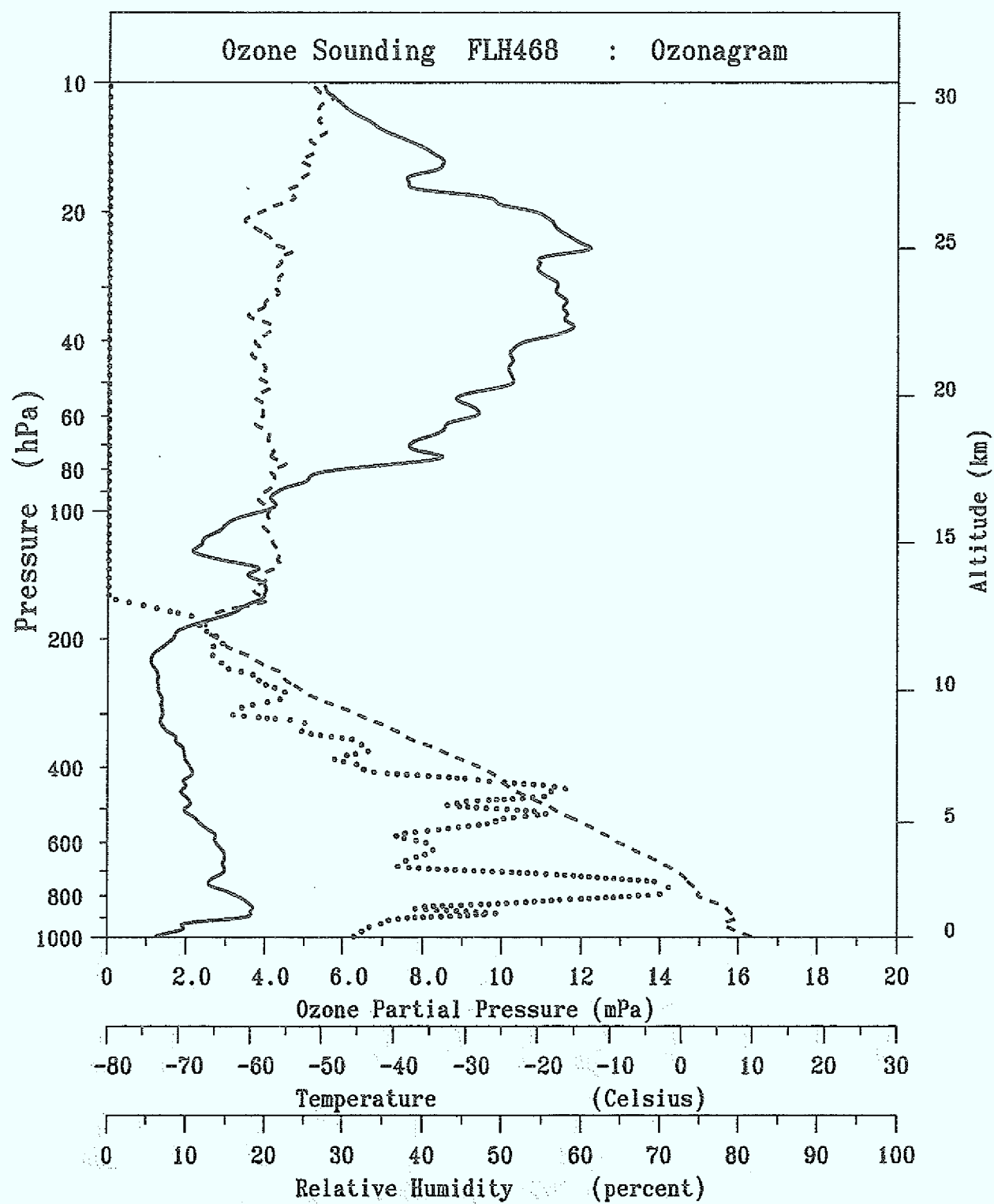


Date 29-10-1992
 Time at launch 12:04 (UTC)
 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity

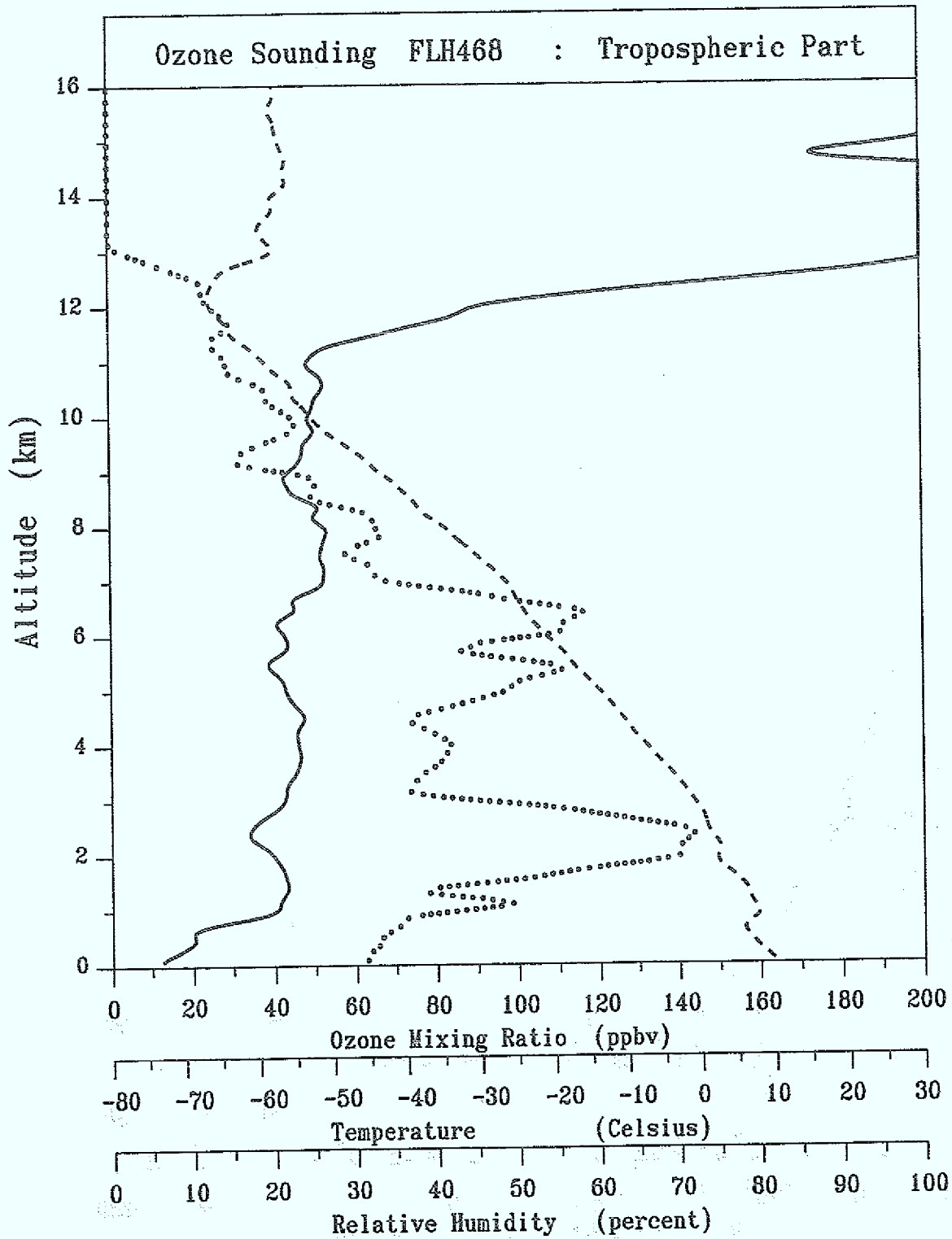


Date	29-10-1992	—	Ozone
Time at launch	12:04 (UTC)	- - - -	Temperature
Location : Julich, FRG		.....	Relative Humidity

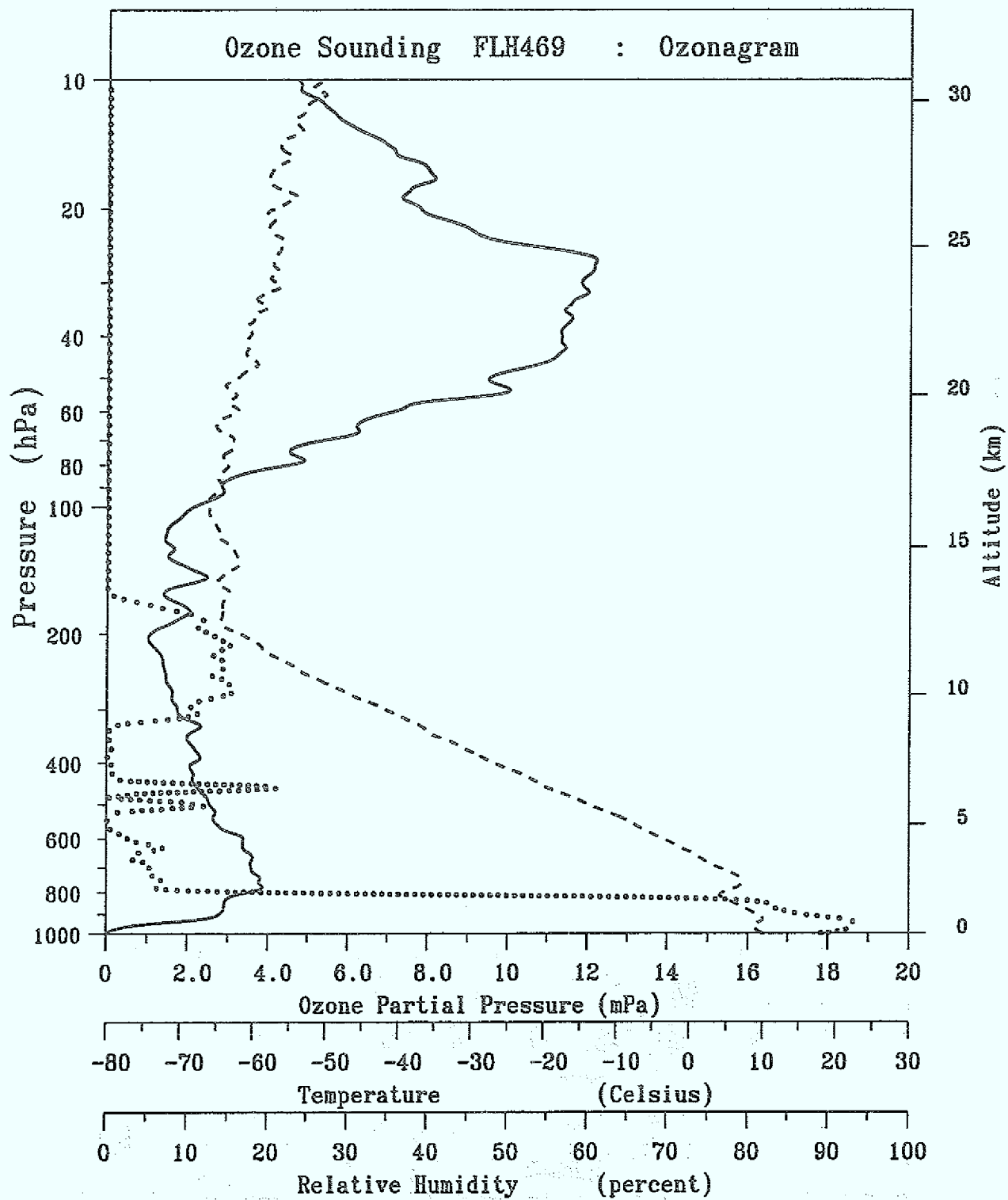


Date 02-11-1992
 Time at launch 12:11 (UTC)
 Location : Julich, FRG

— Ozone
 - - - - Temperature
 Relative Humidity

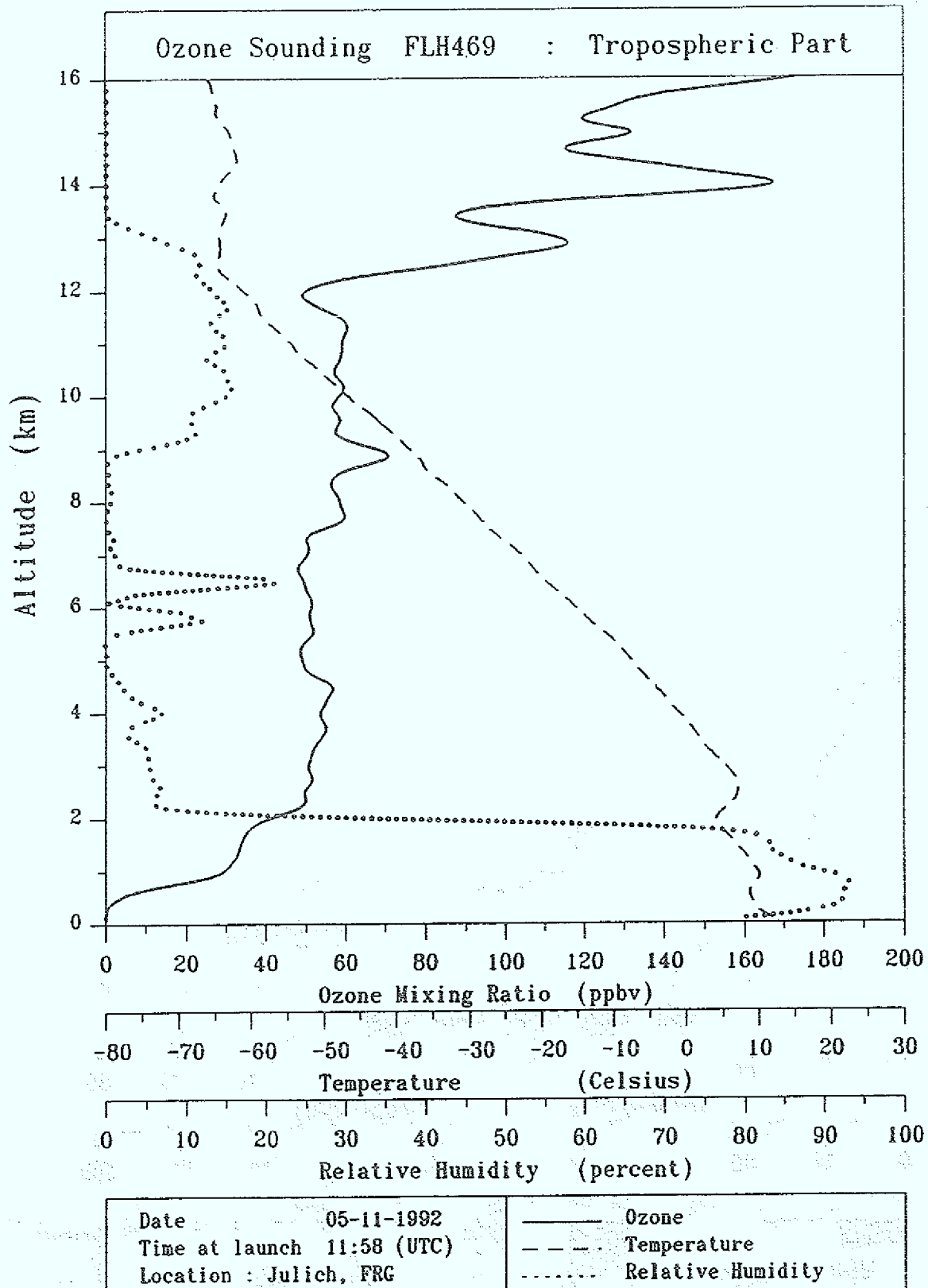


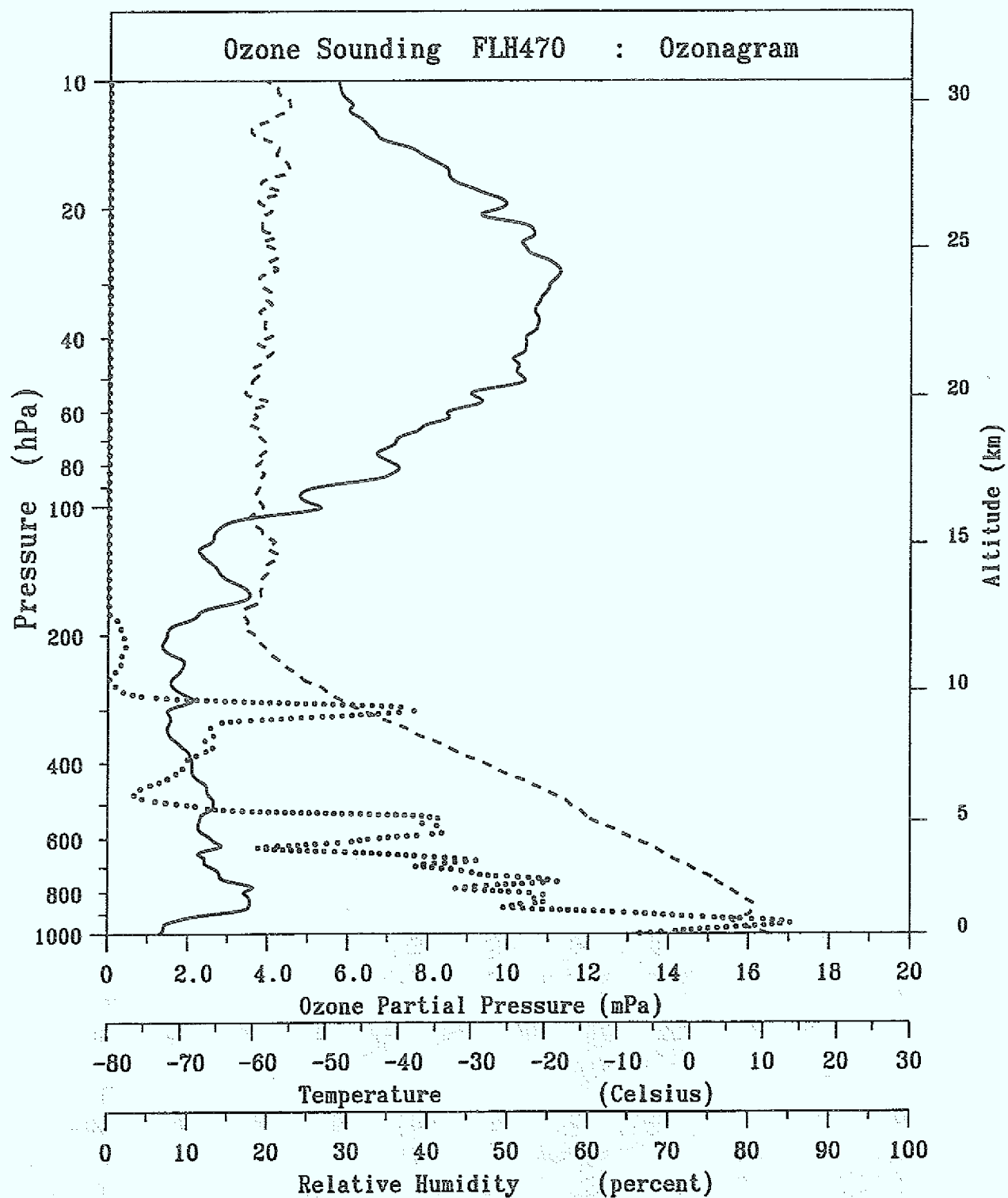
Date	02-11-1992	—	Ozone
Time at launch	12:11 (UTC)	- - - -	Temperature
Location : Julich, FRG		.....	Relative Humidity



Date 05-11-1992
 Time at launch 11:58 (UTC)
 Location : Julich, FRG

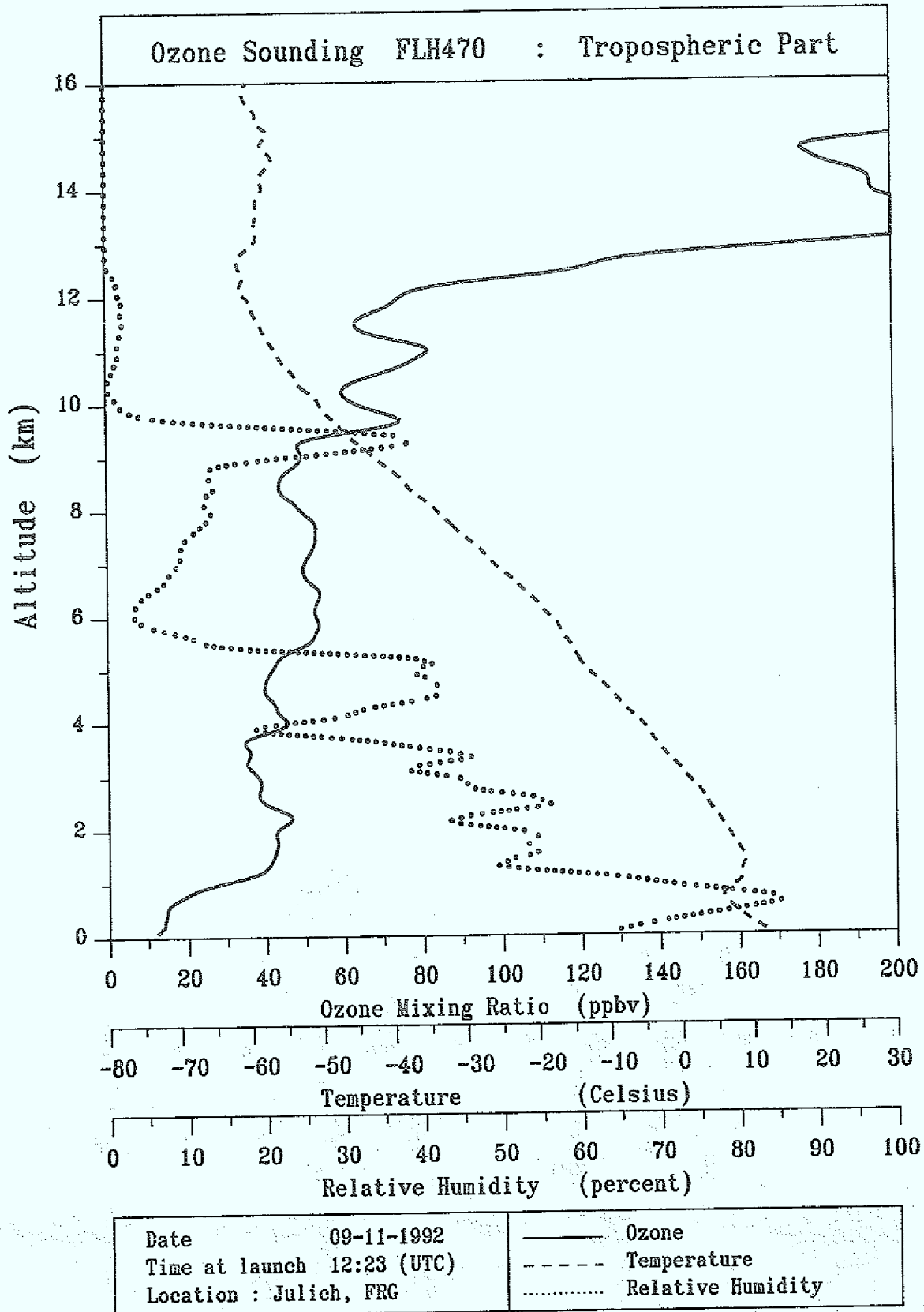
— Ozone
 --- Temperature
 Relative Humidity

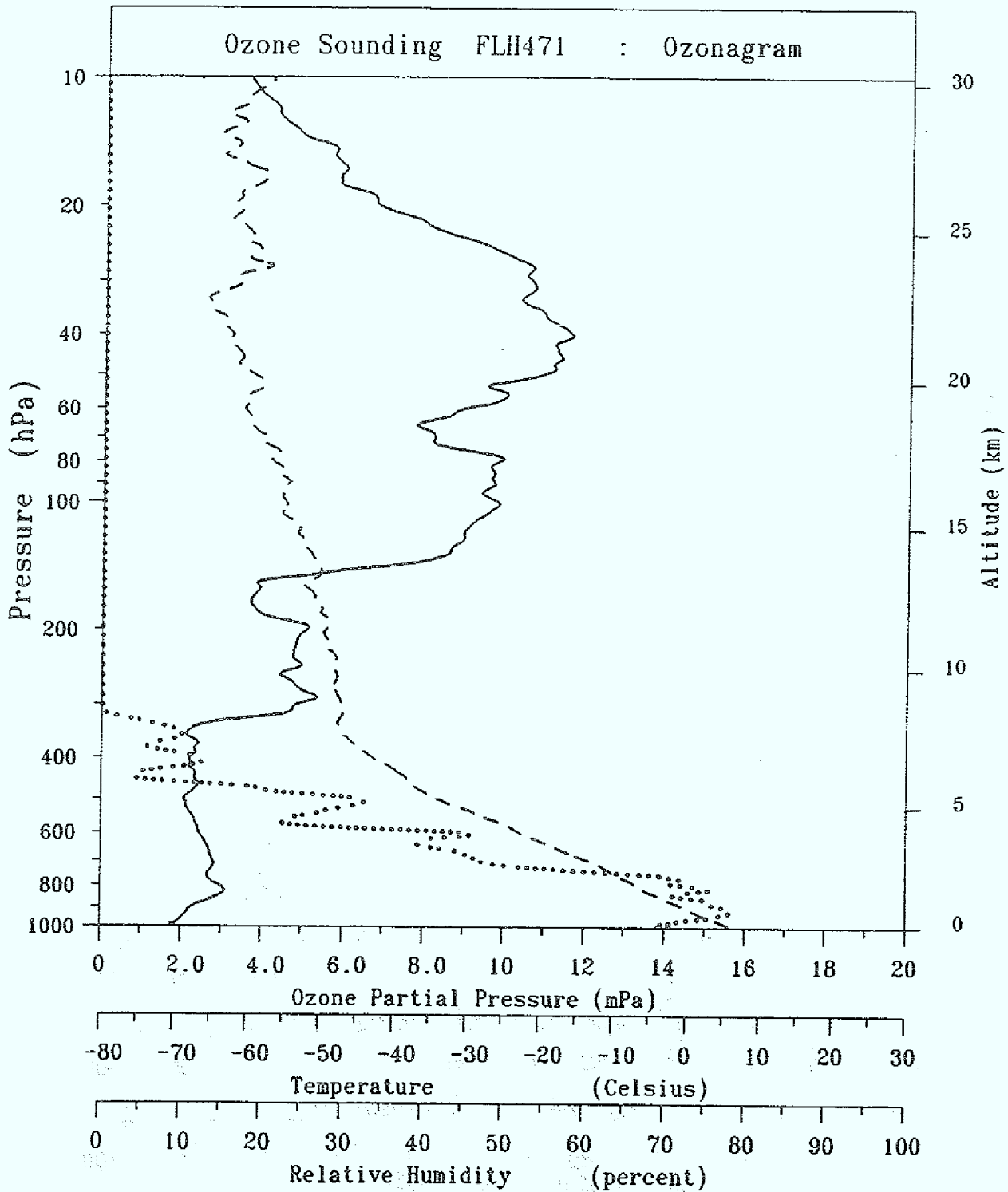




Date 09-11-1992
 Time at launch 12:23 (UTC)
 Location : Julich, FRG

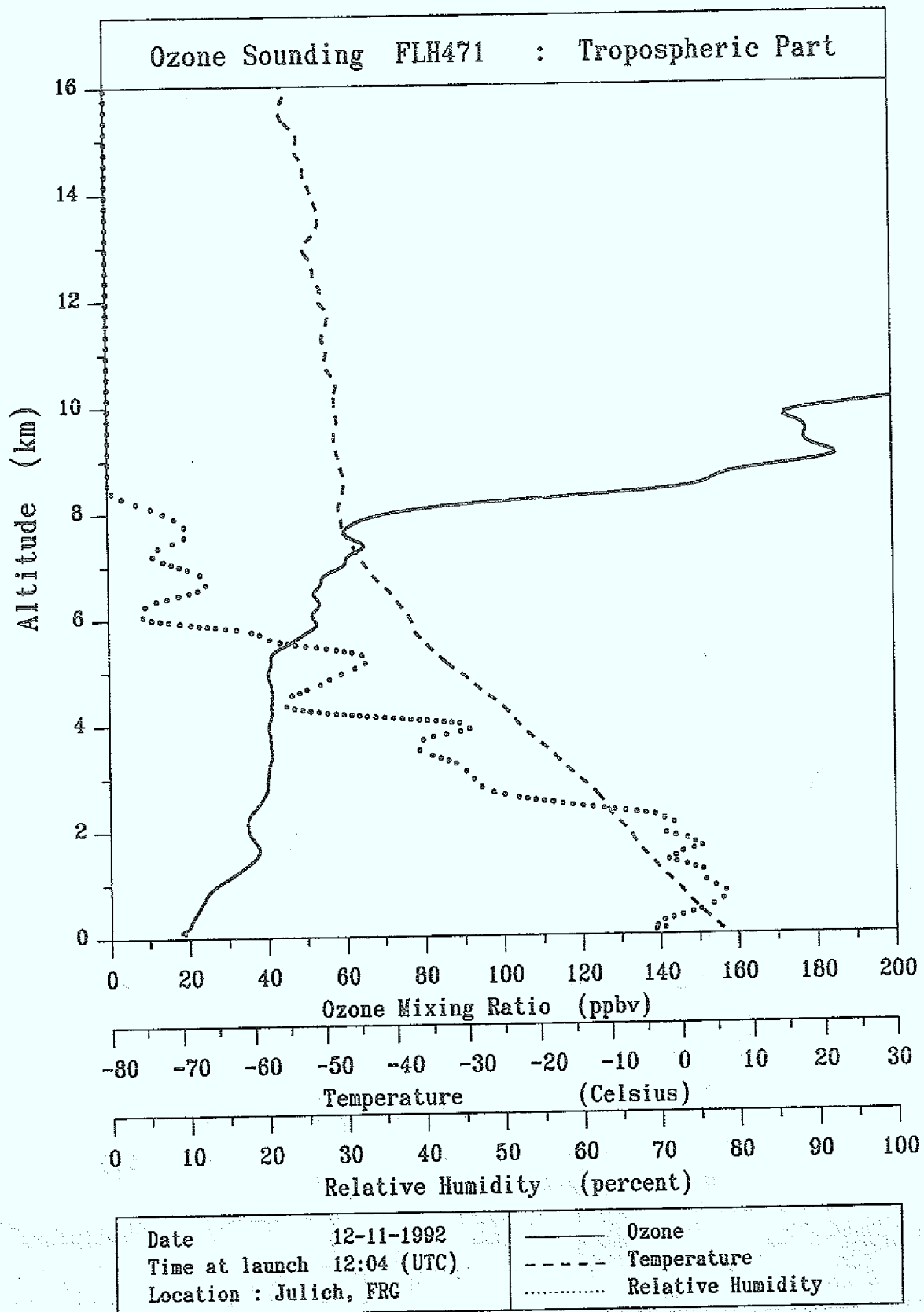
—— Ozone
 ---- Temperature
 Relative Humidity

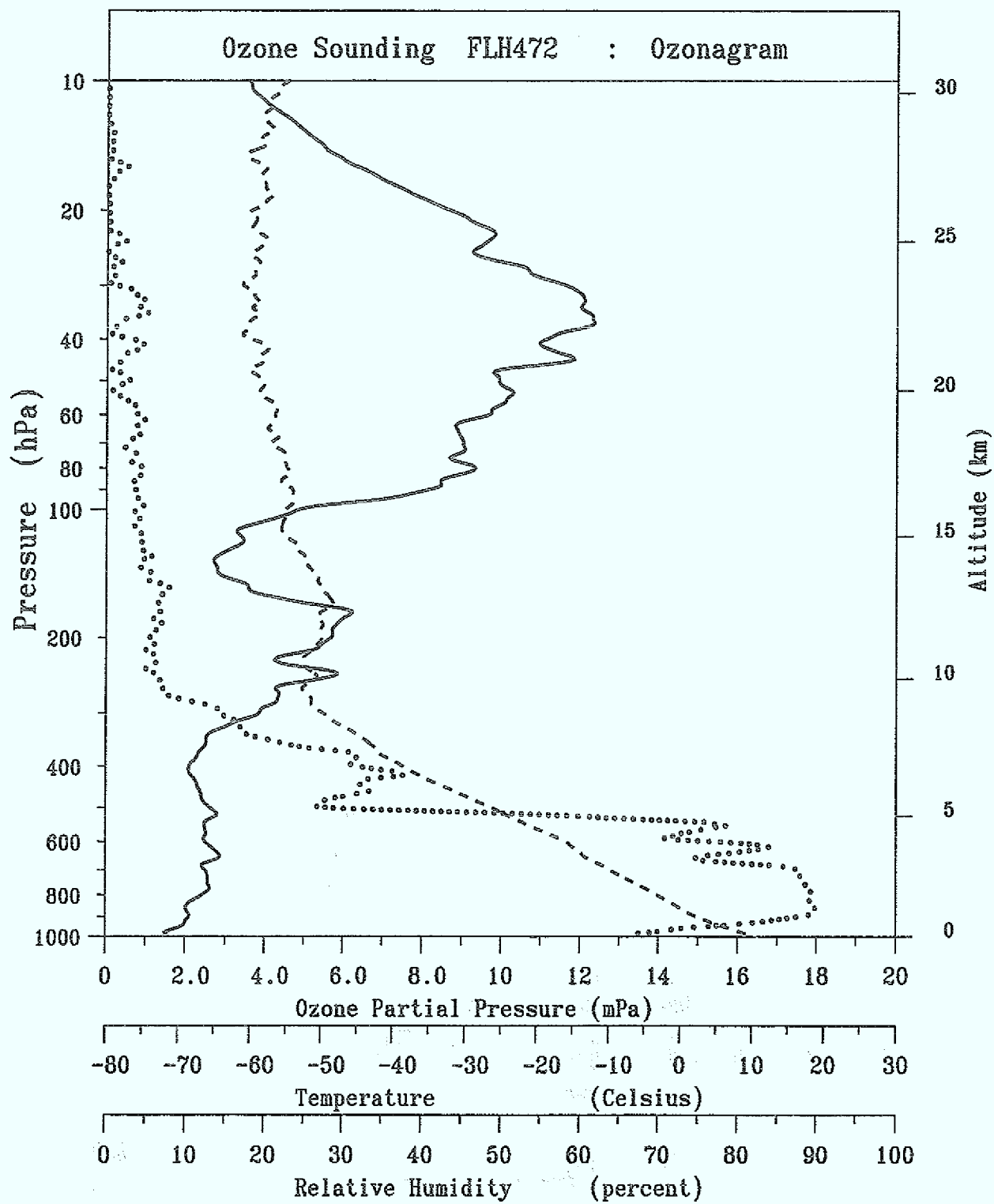




Date 12-11-1992
 Time at launch 12:04 (UTC)
 Location : Julich, FRG

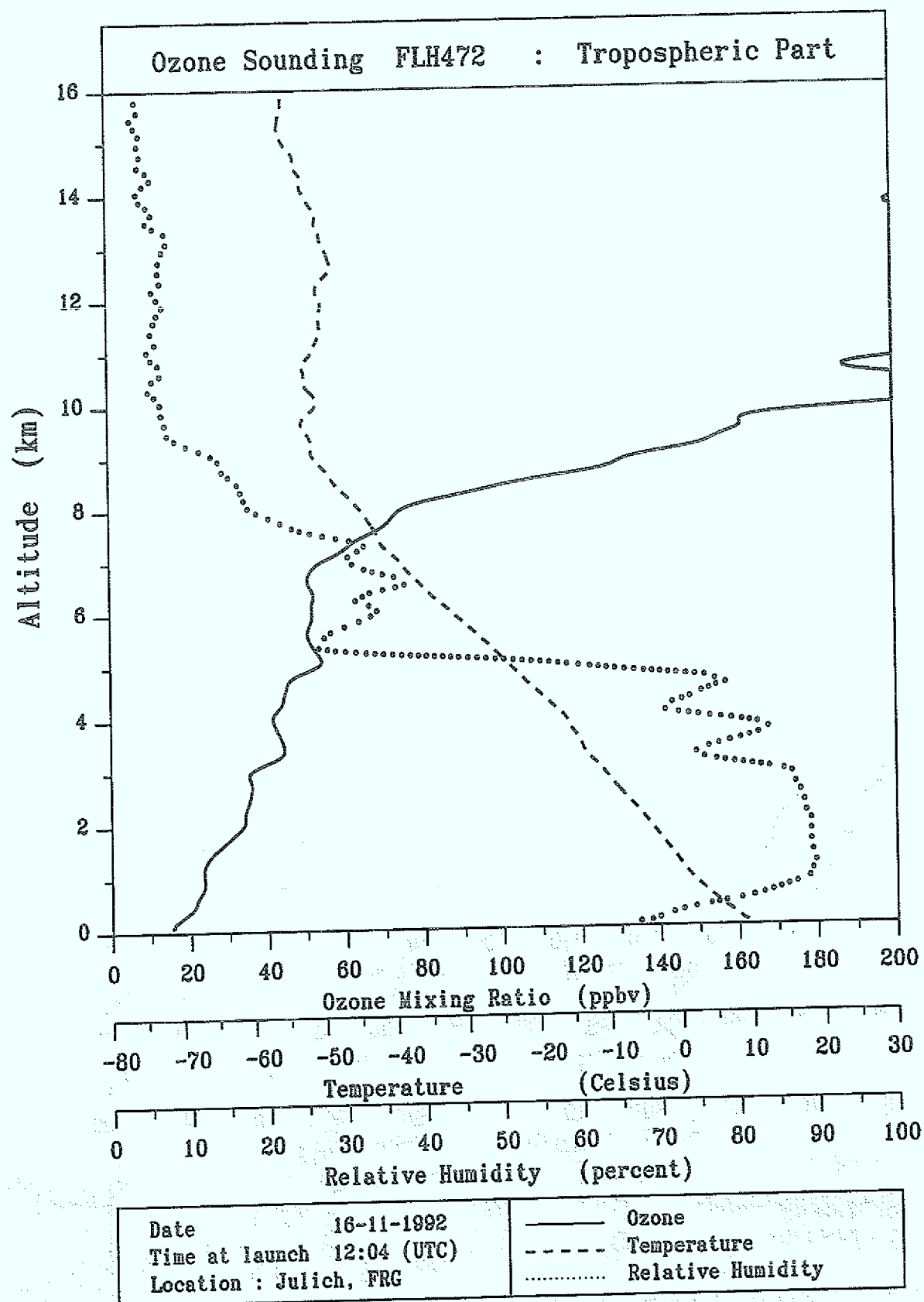
— Ozone
 --- Temperature
 Relative Humidity

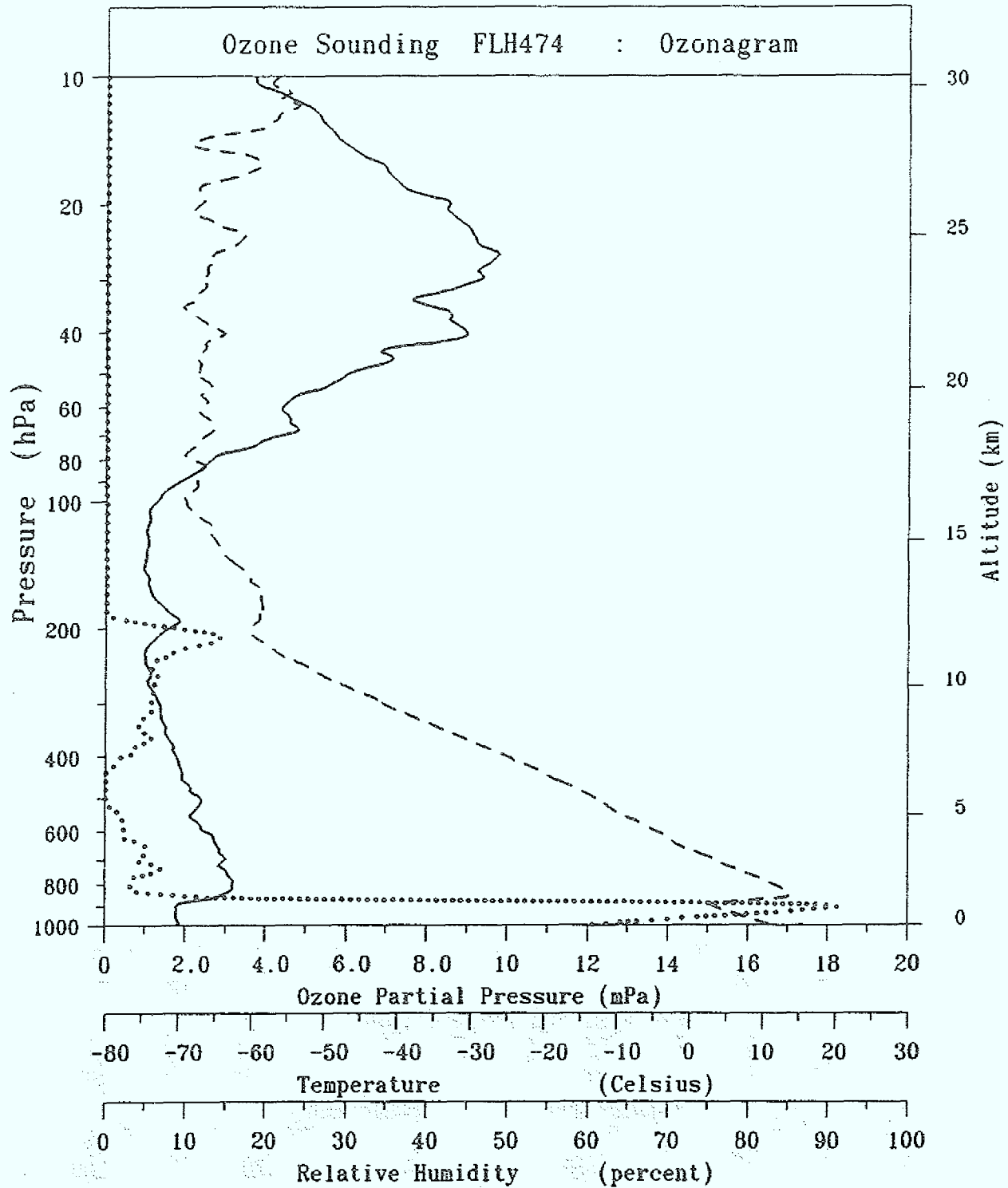




Date 16-11-1992
 Time at launch 12:04 (UTC)
 Location : Julich, FRG

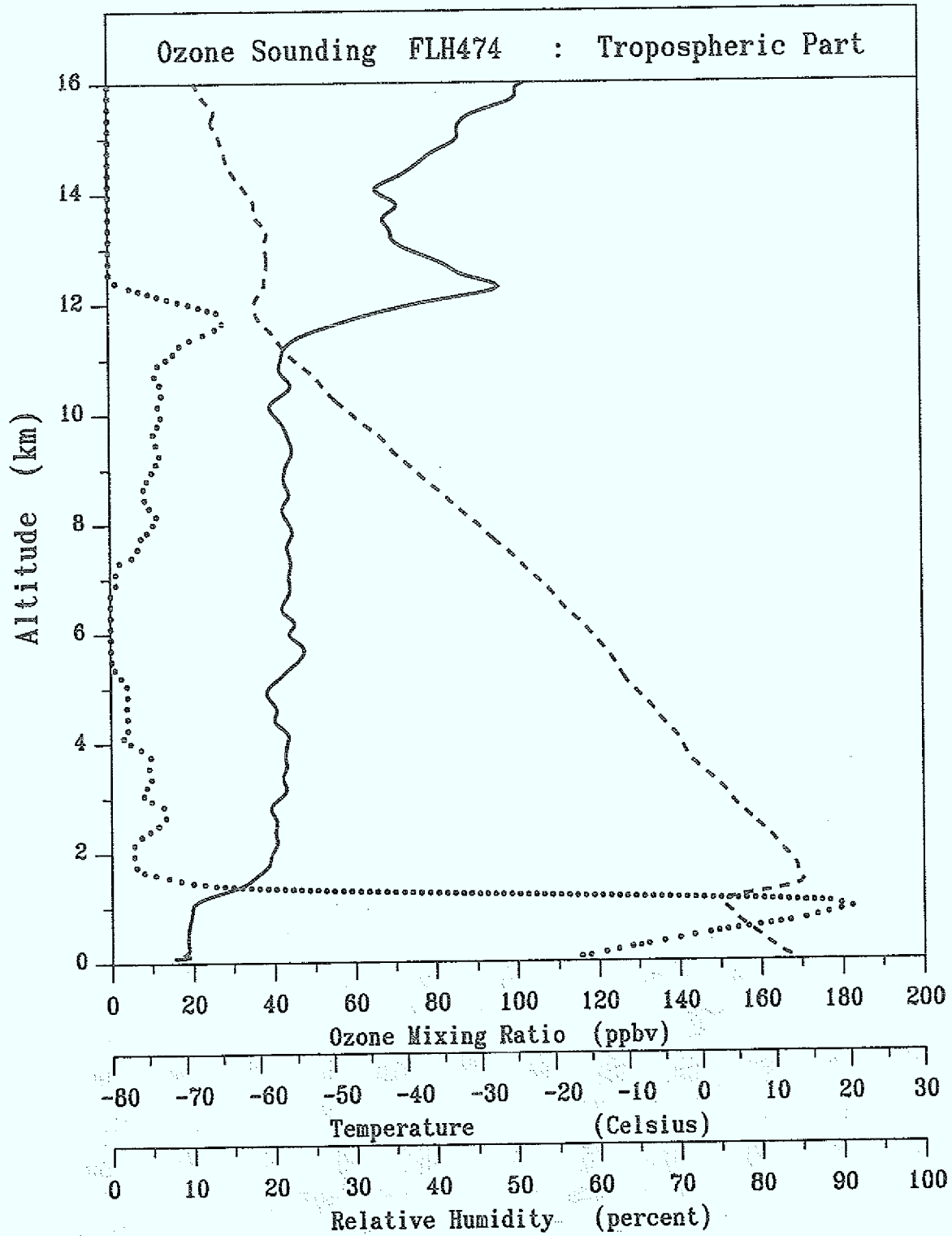
— Ozone
 --- Temperature
 Relative Humidity



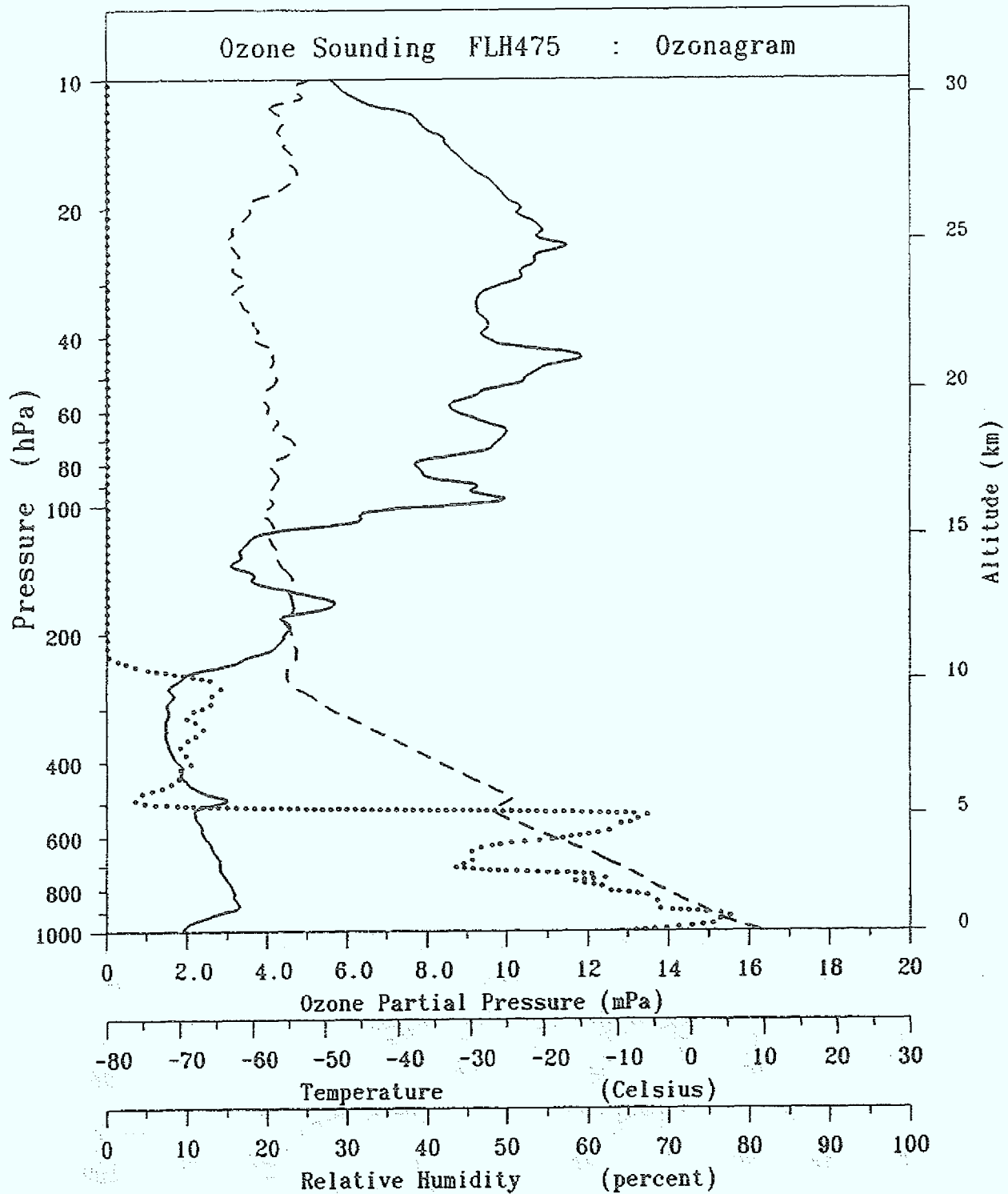


Date 23-11-1992
 Time at launch 12:13 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity

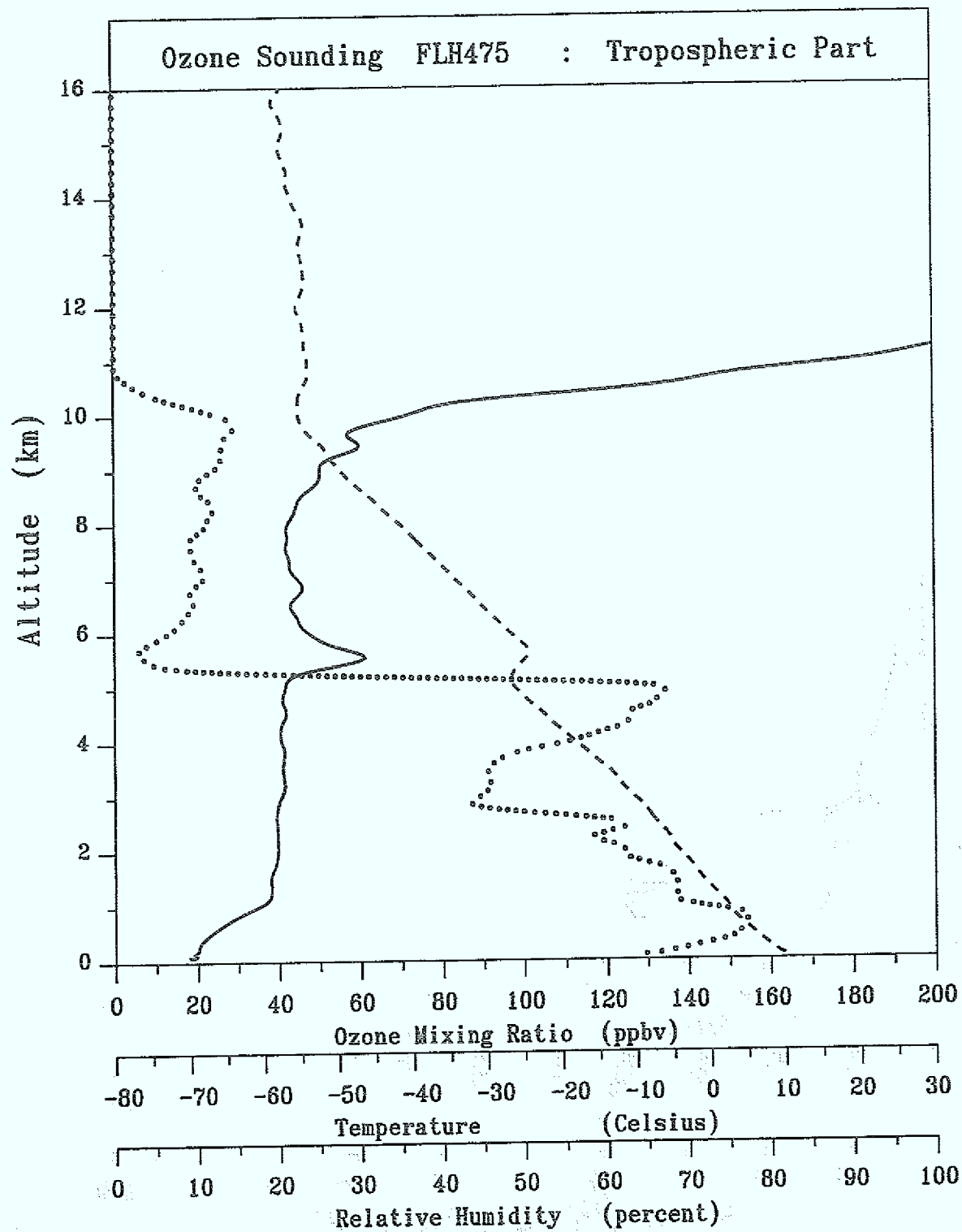


Date	23-11-1992	—	Ozone
Time at launch	12:13 (UTC)	- - -	Temperature
Location	Julich, FRG	.....	Relative Humidity

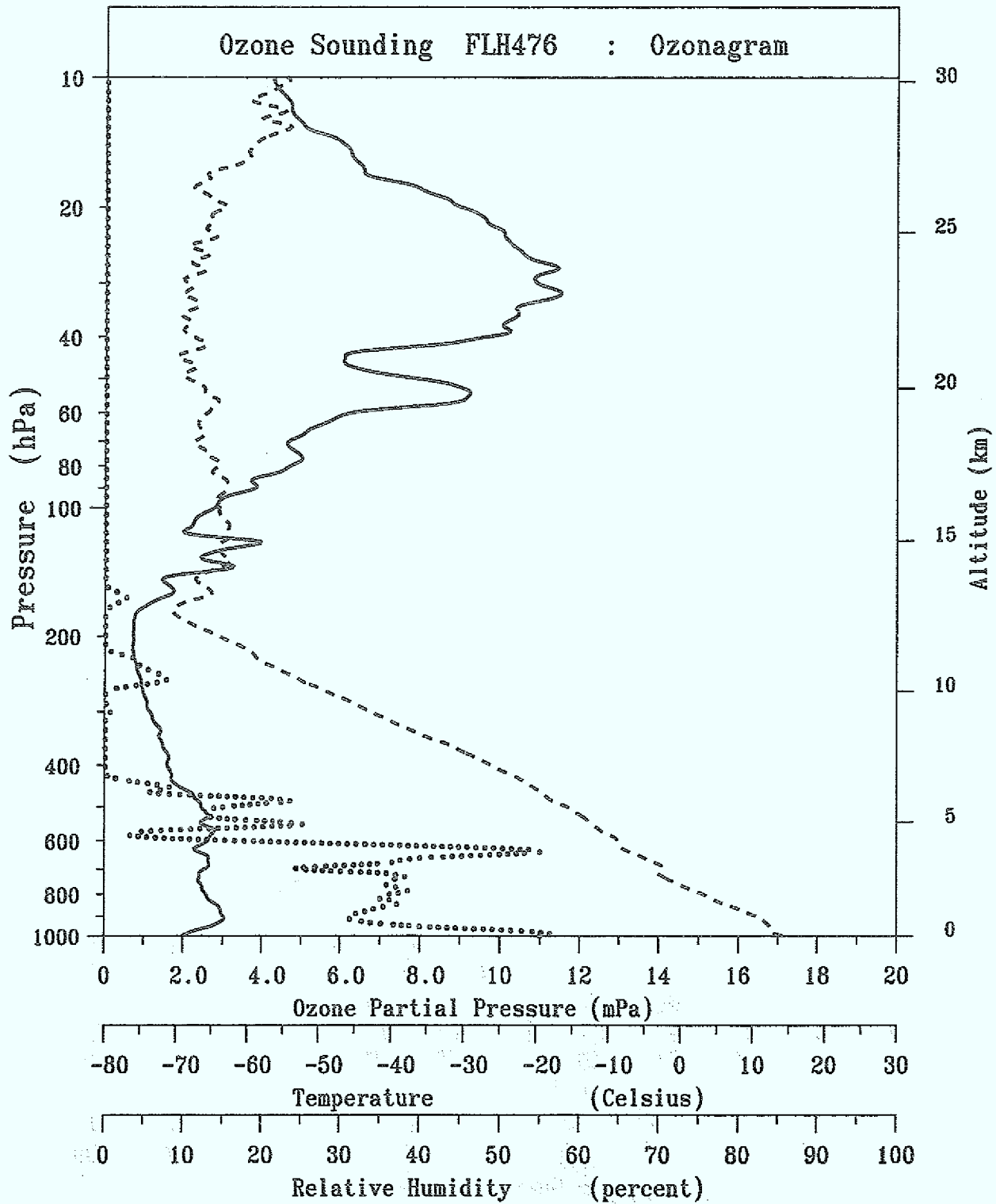


Date 26-11-1992
 Time at launch 12:45 (UTC)
 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity

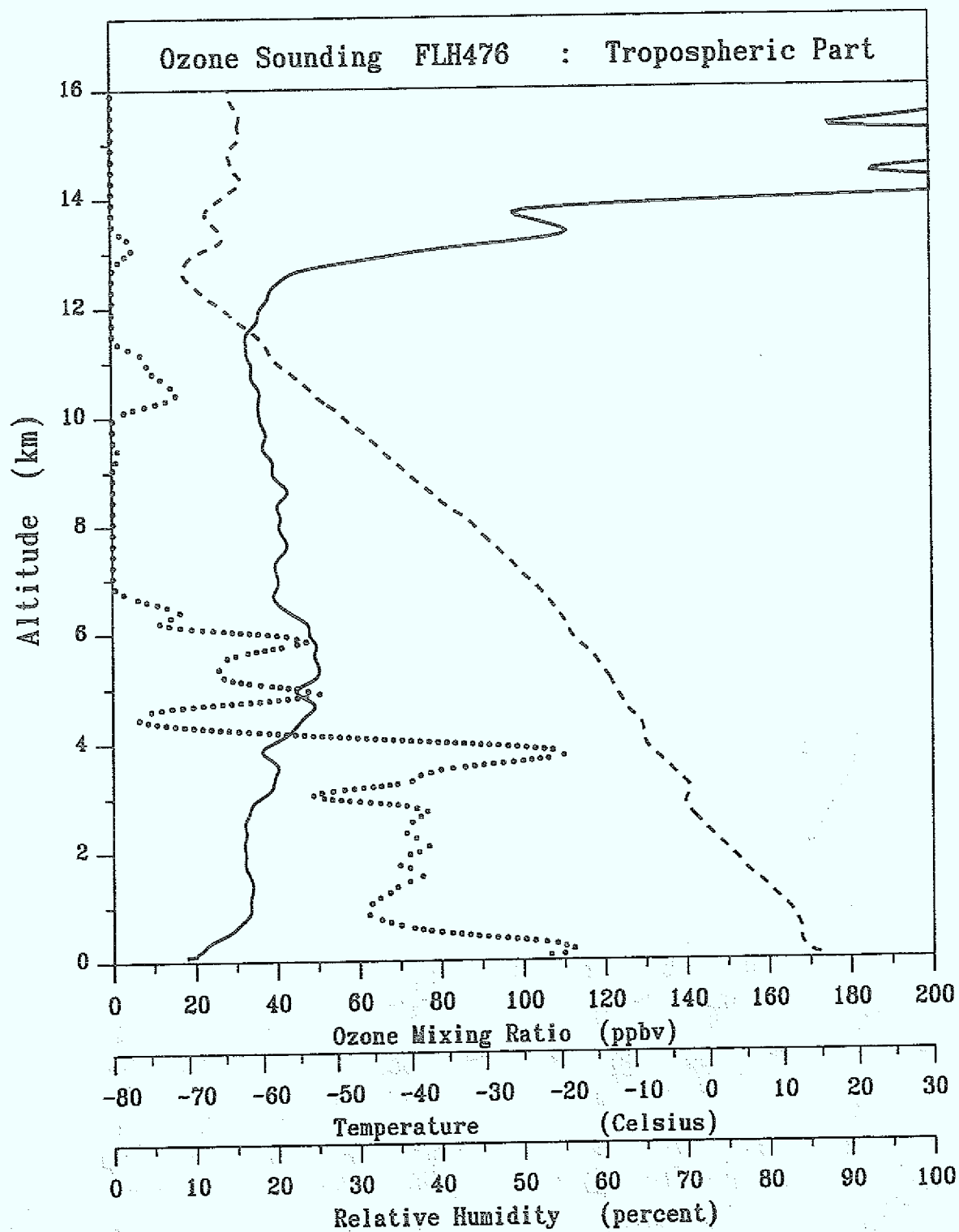


Date	26-11-1992	—	Ozone
Time at launch	12:45 (UTC)	- - -	Temperature
Location	Julich, FRG	.....	Relative Humidity



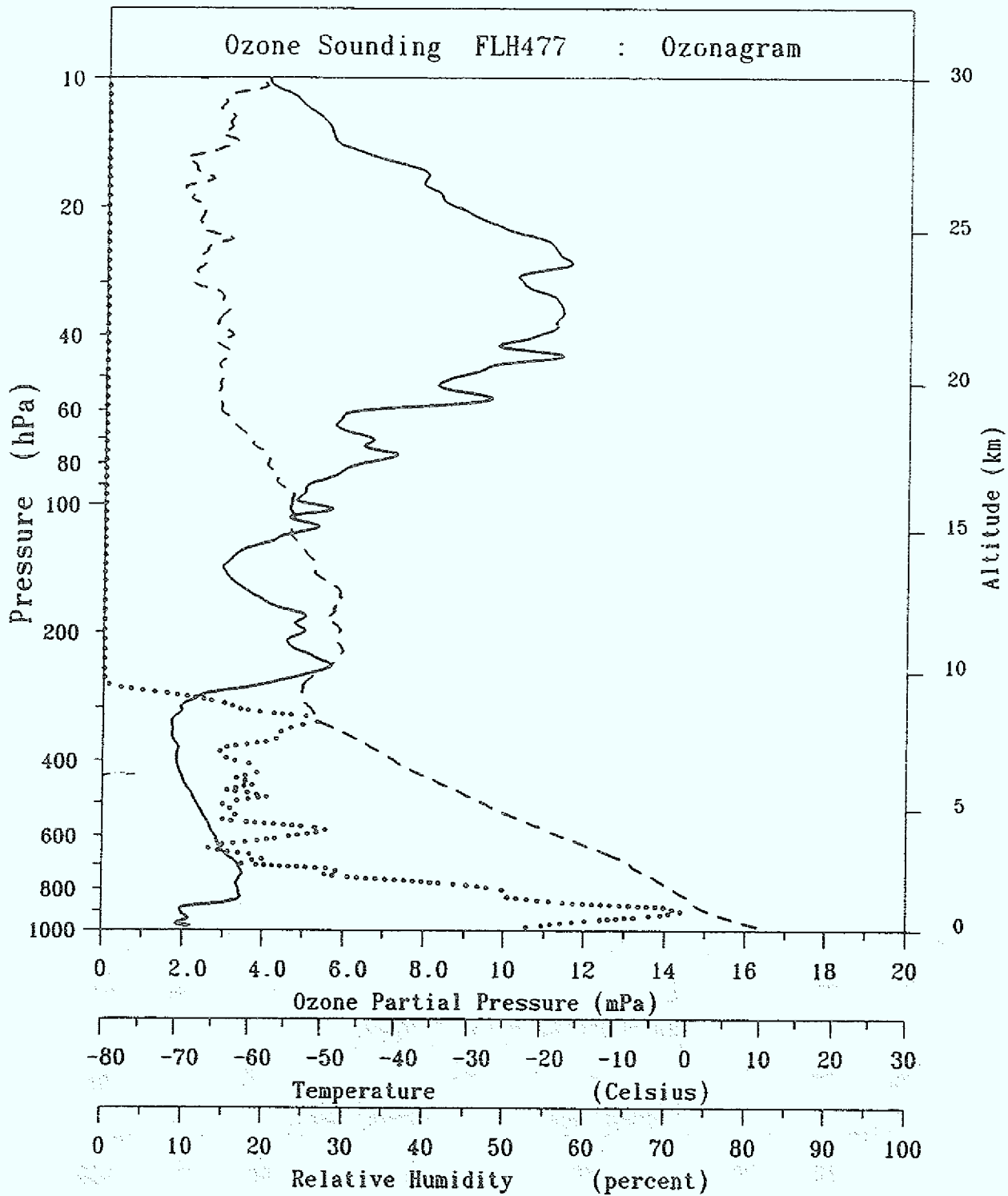
Date 30-11-1992
 Time at launch 12:34 (UTC)
 Location : Julich, FRG

— Ozone
 - - - - - Temperature
 Relative Humidity

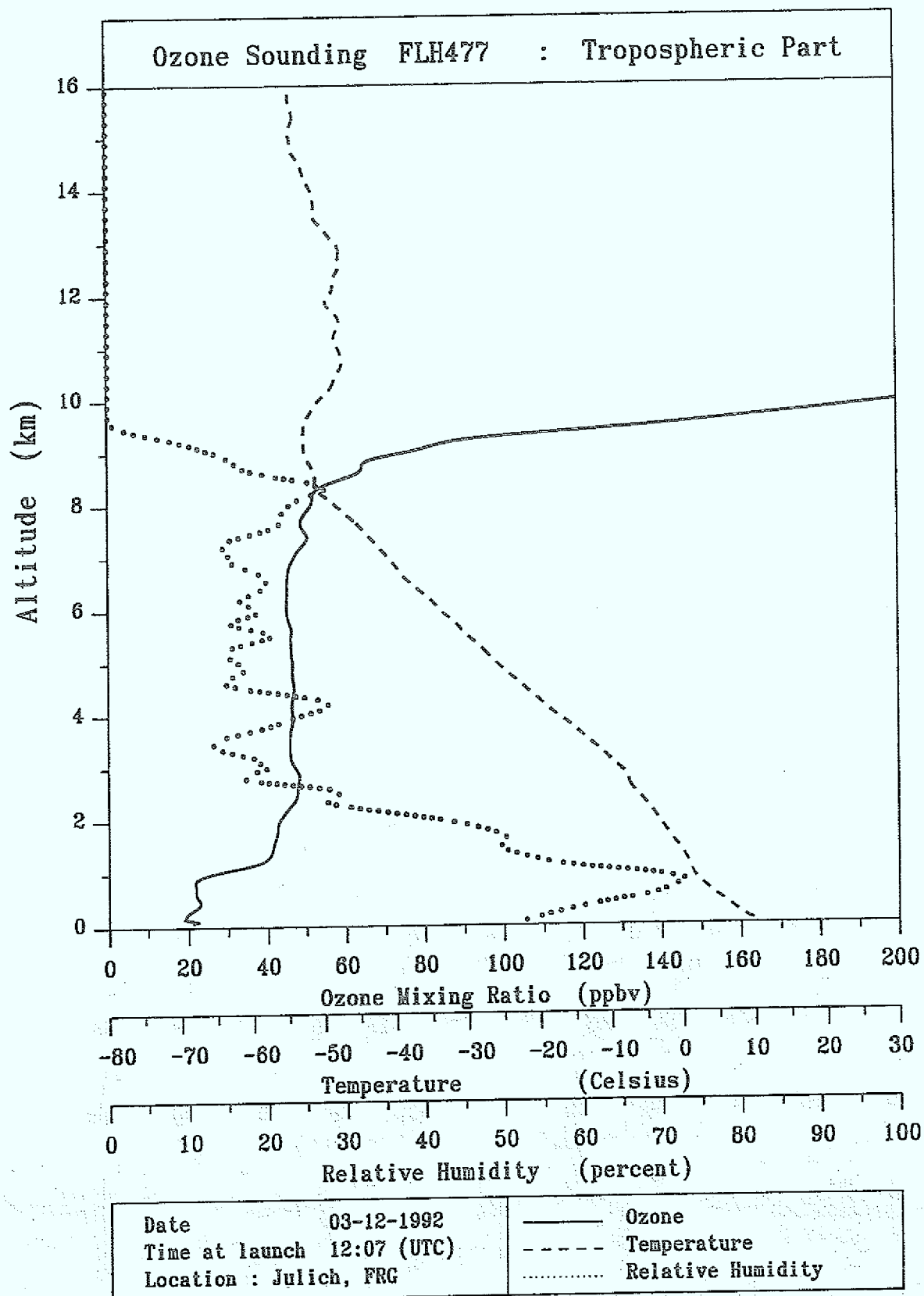


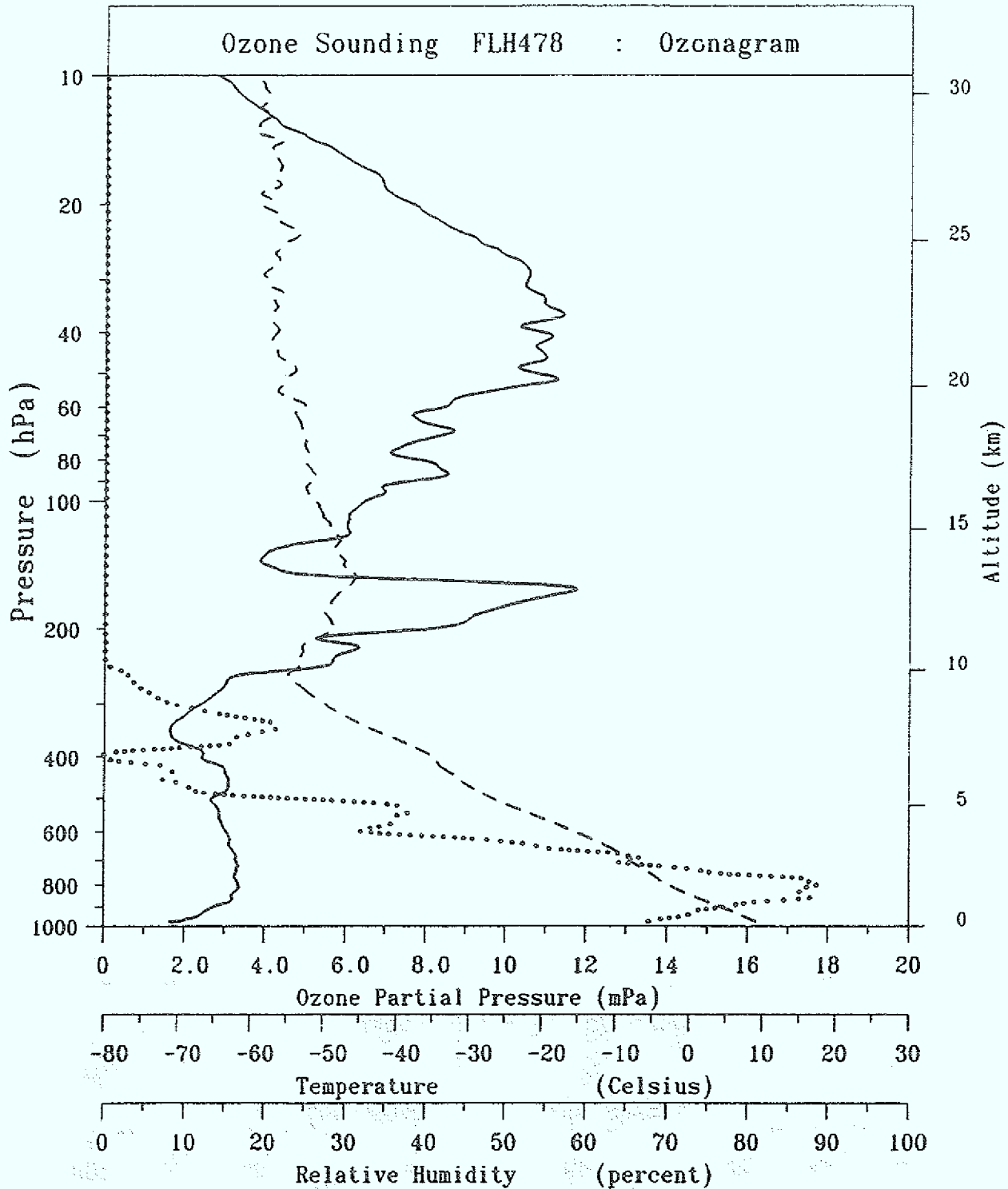
Date 30-11-1992
 Time at launch 12:34 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity

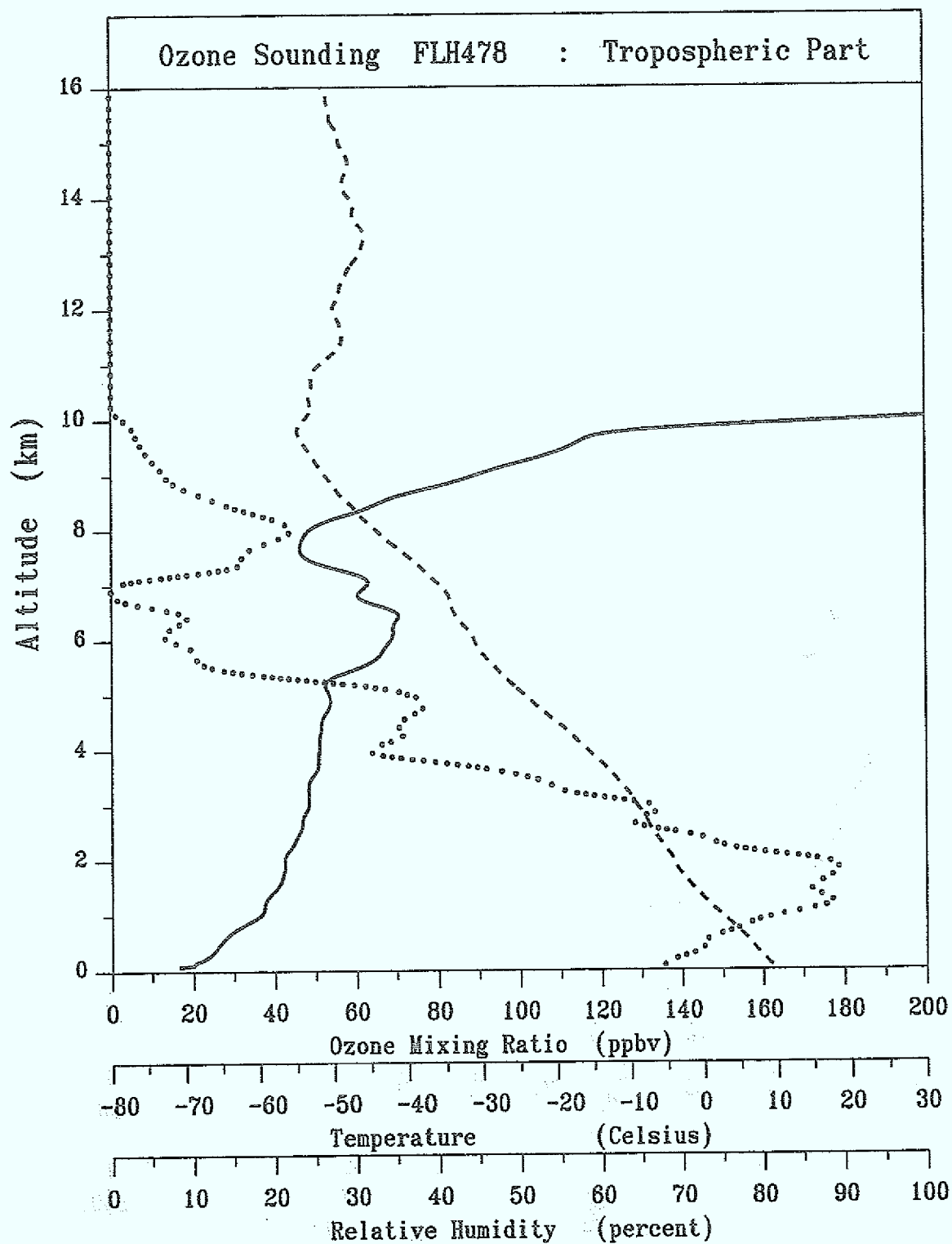


Date	03-12-1992	—	Ozone
Time at launch	12:07 (UTC)	- - -	Temperature
Location	Julich, FRG	.....	Relative Humidity



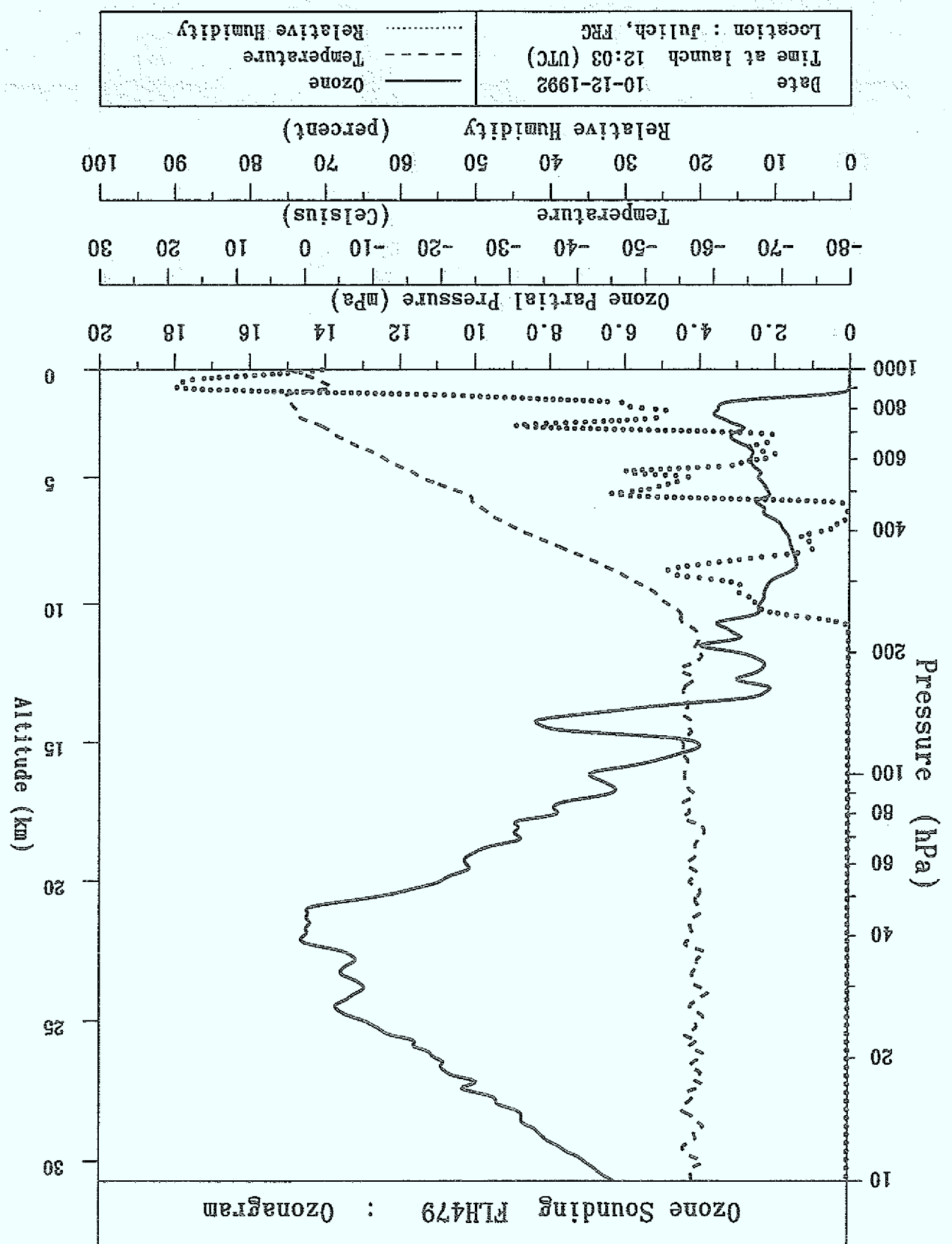


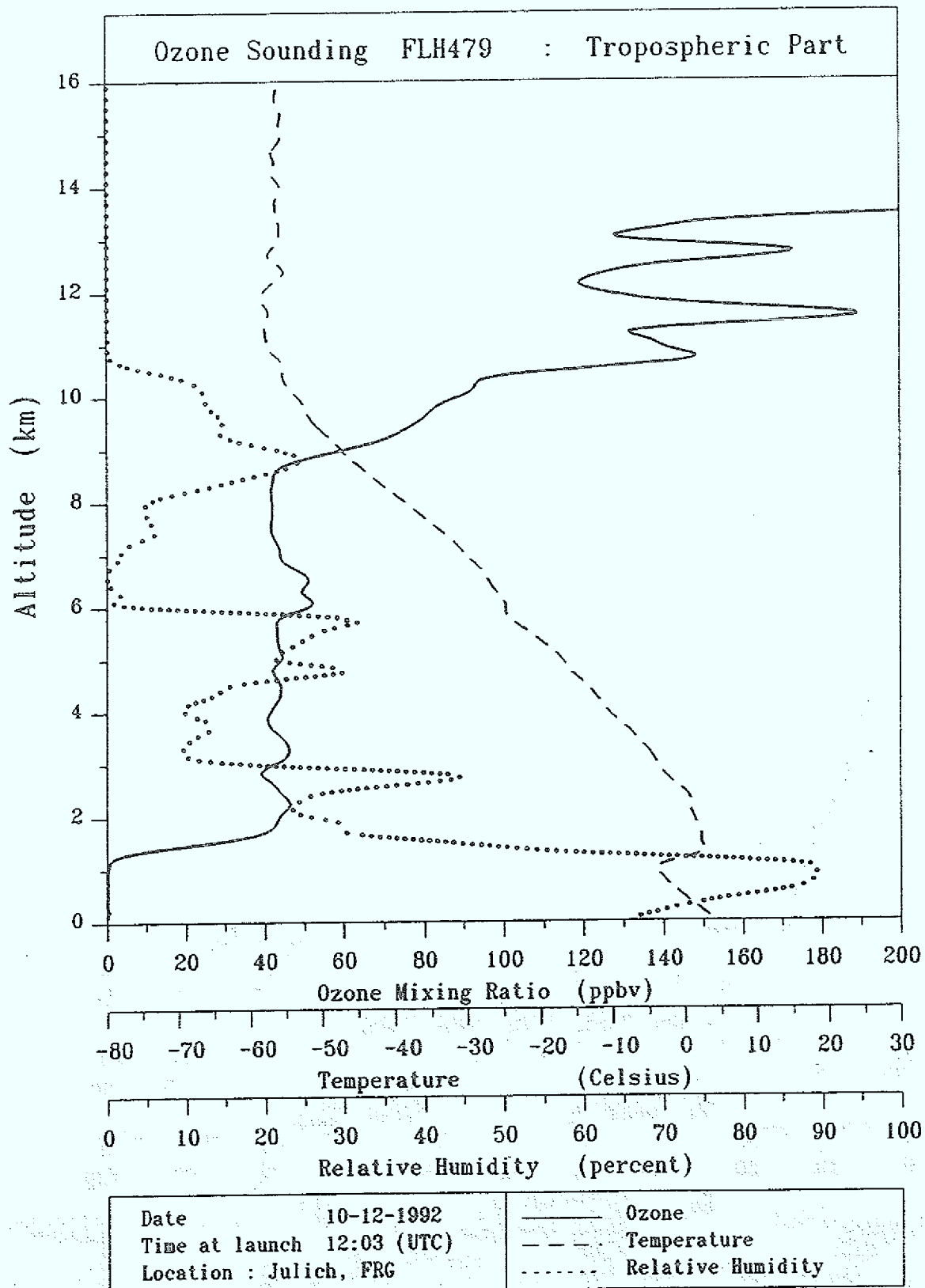
Date	07-12-1992	—	Ozone
Time at launch	12:33 (UTC)	- - -	Temperature
Location : Julich, FRG		.....	Relative Humidity

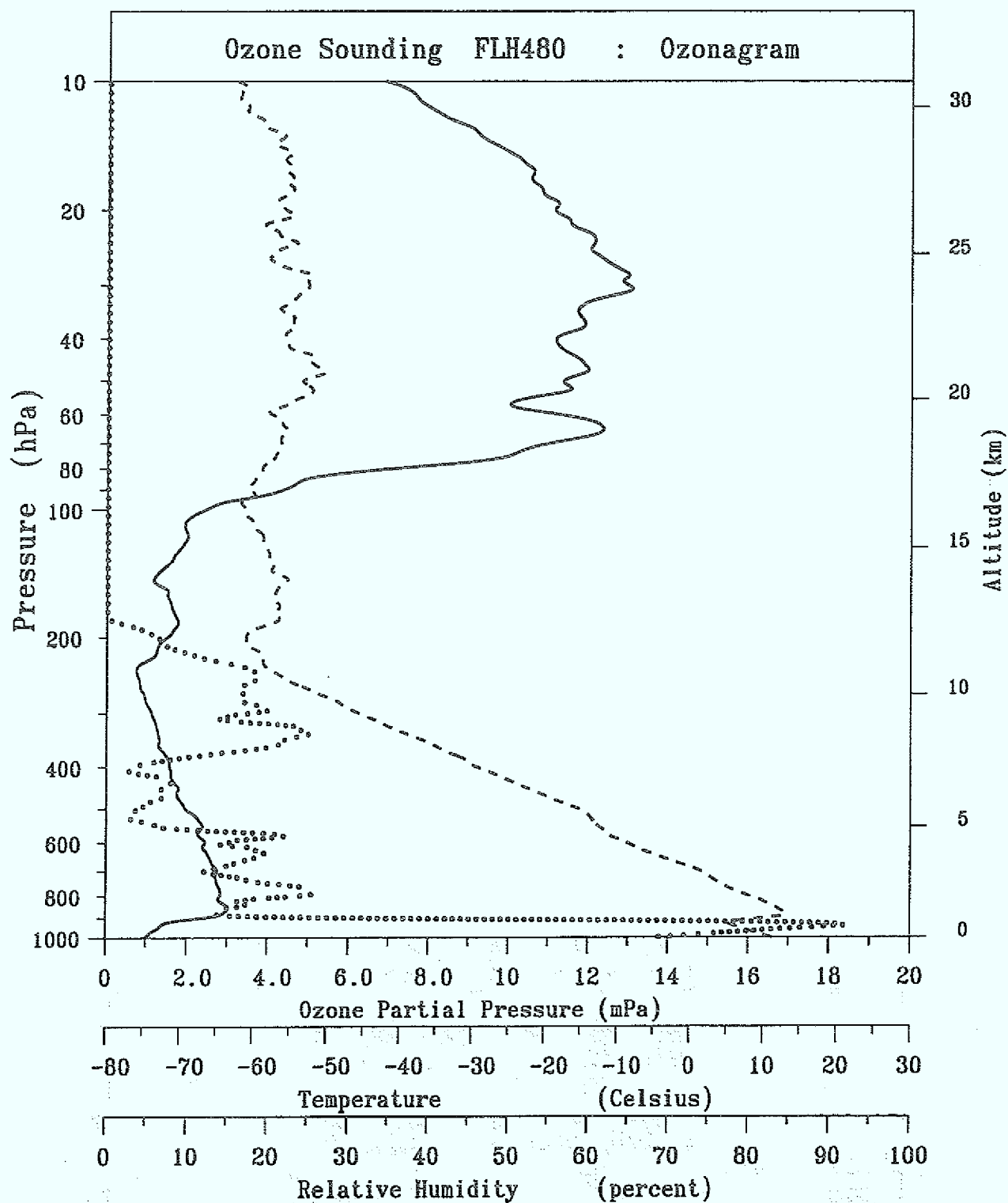


Date 07-12-1992
 Time at launch 12:33 (UTC)
 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity

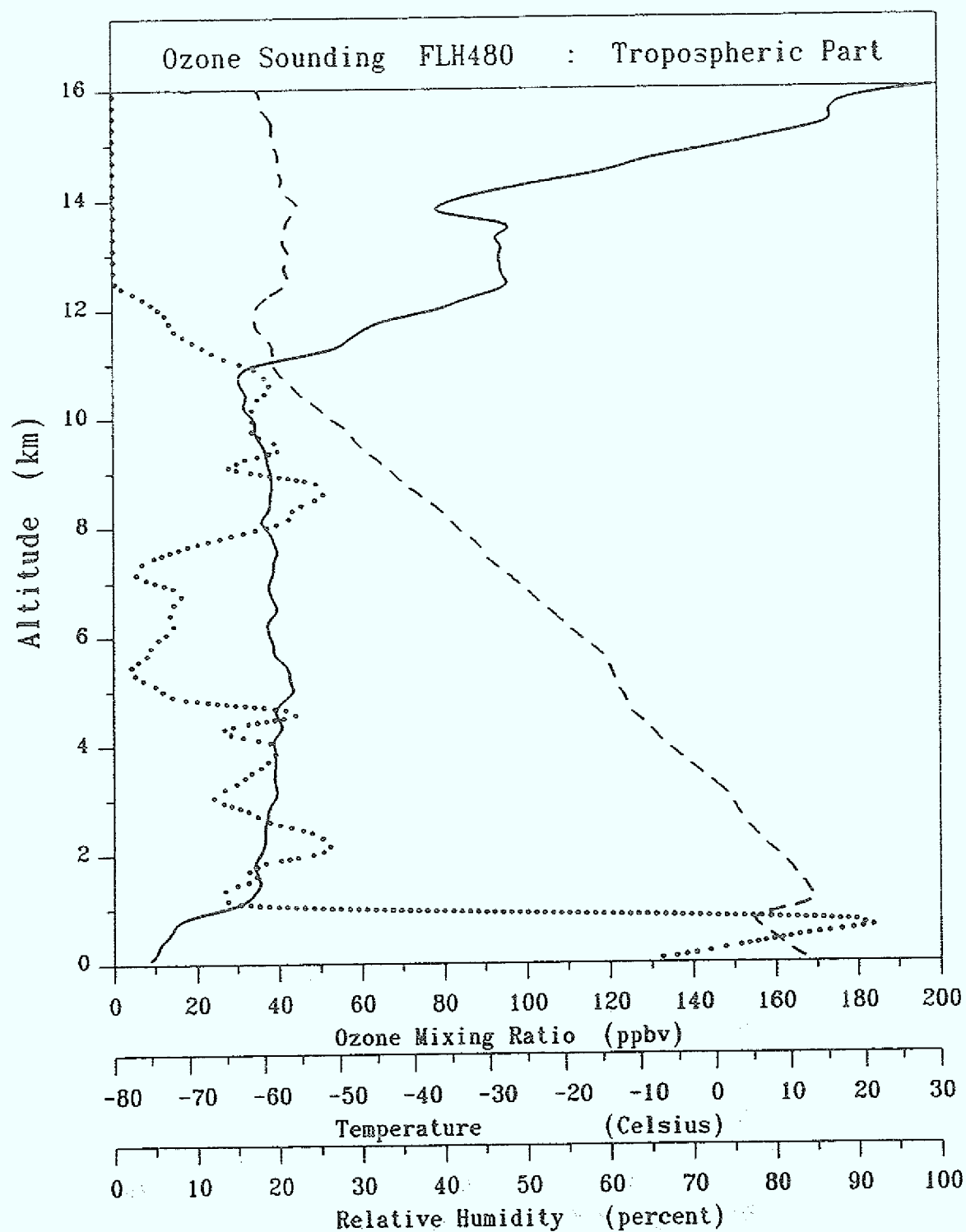






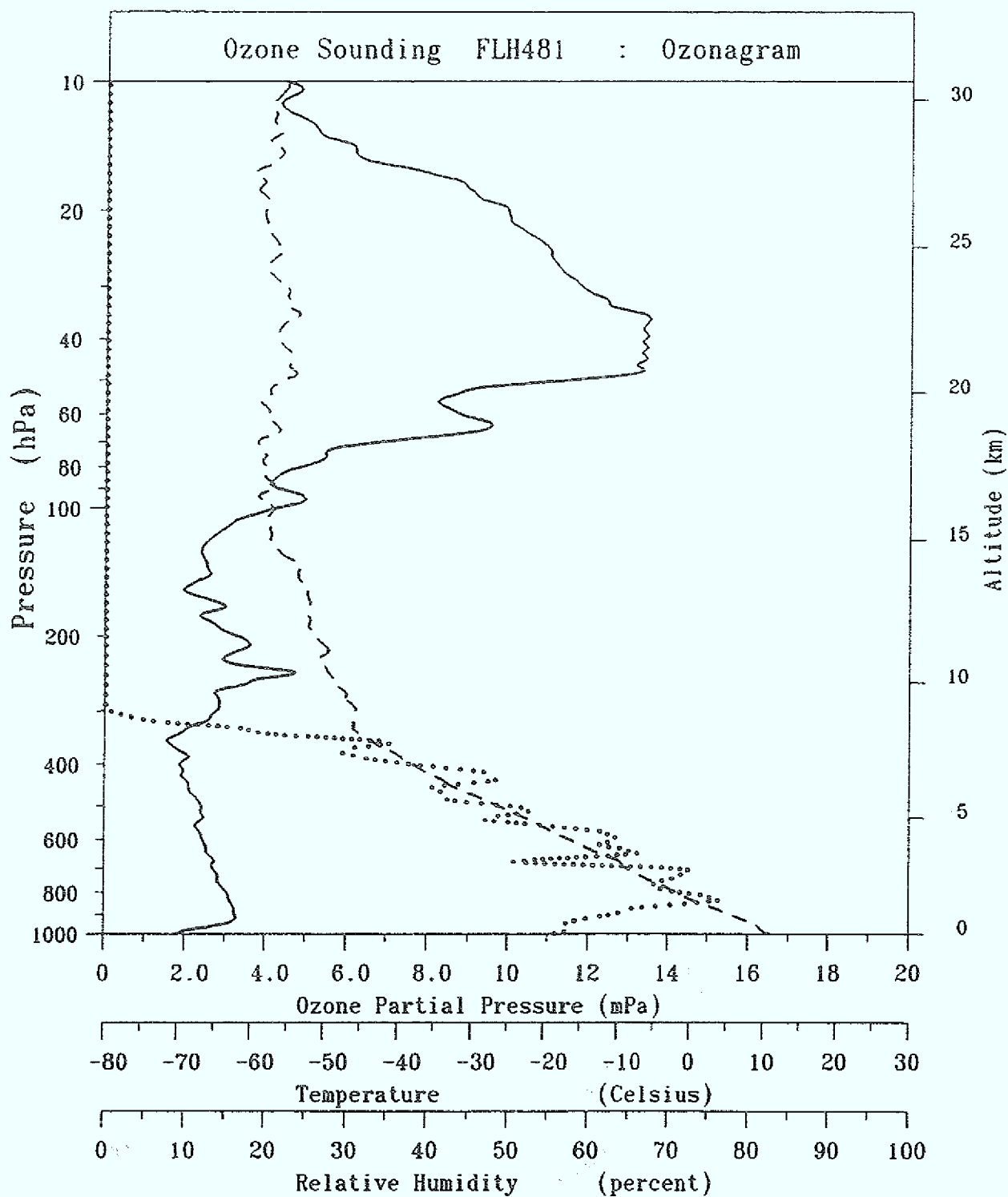
Date 14-12-1992
 Time at launch 12:17 (UTC)
 Location : Julich, FRG

— Ozone
 - - - Temperature
 Relative Humidity



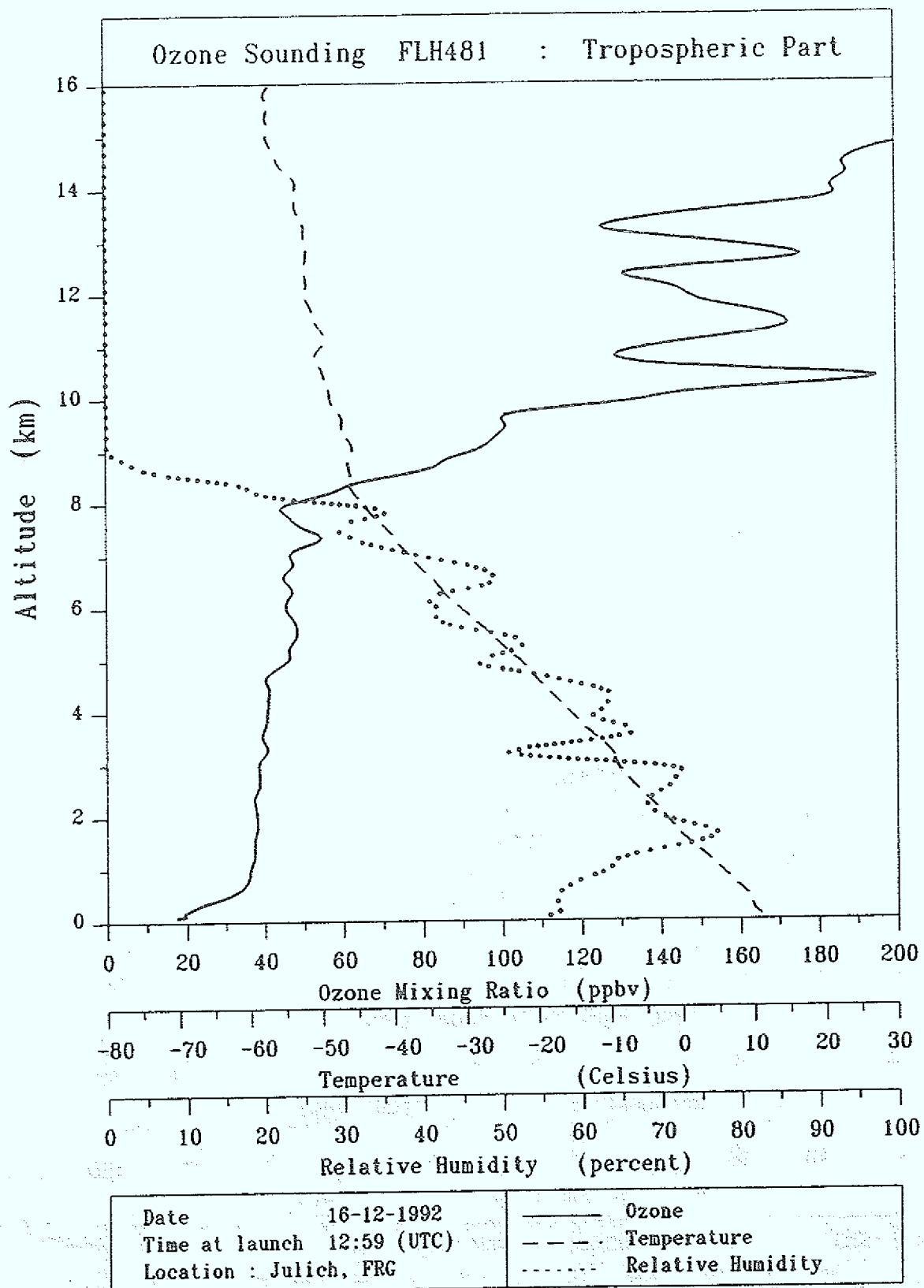
Date 14-12-1992
 Time at launch 12:17 (UTC)
 Location: Julich, FRG

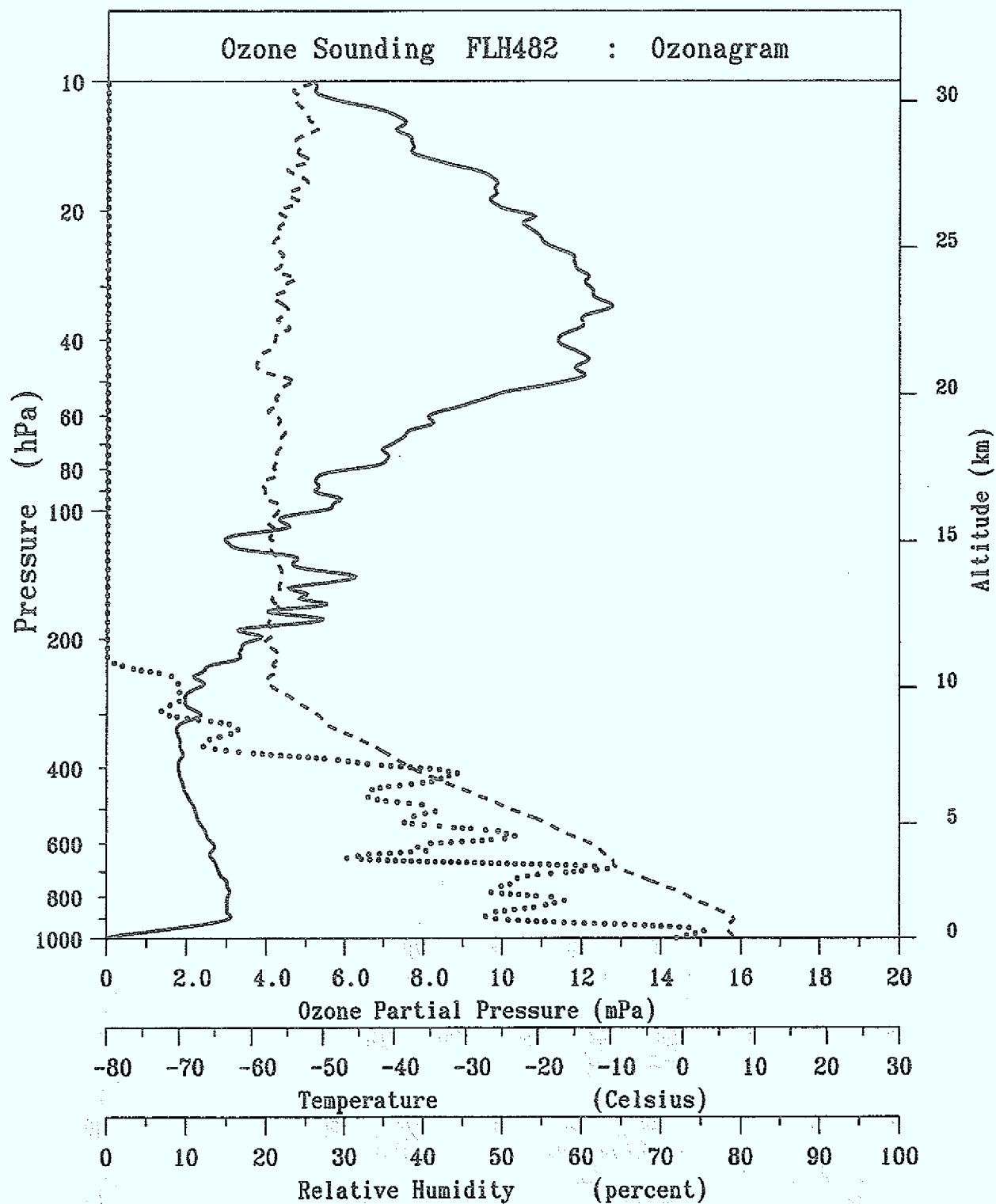
— Ozone
 - - - Temperature
 Relative Humidity



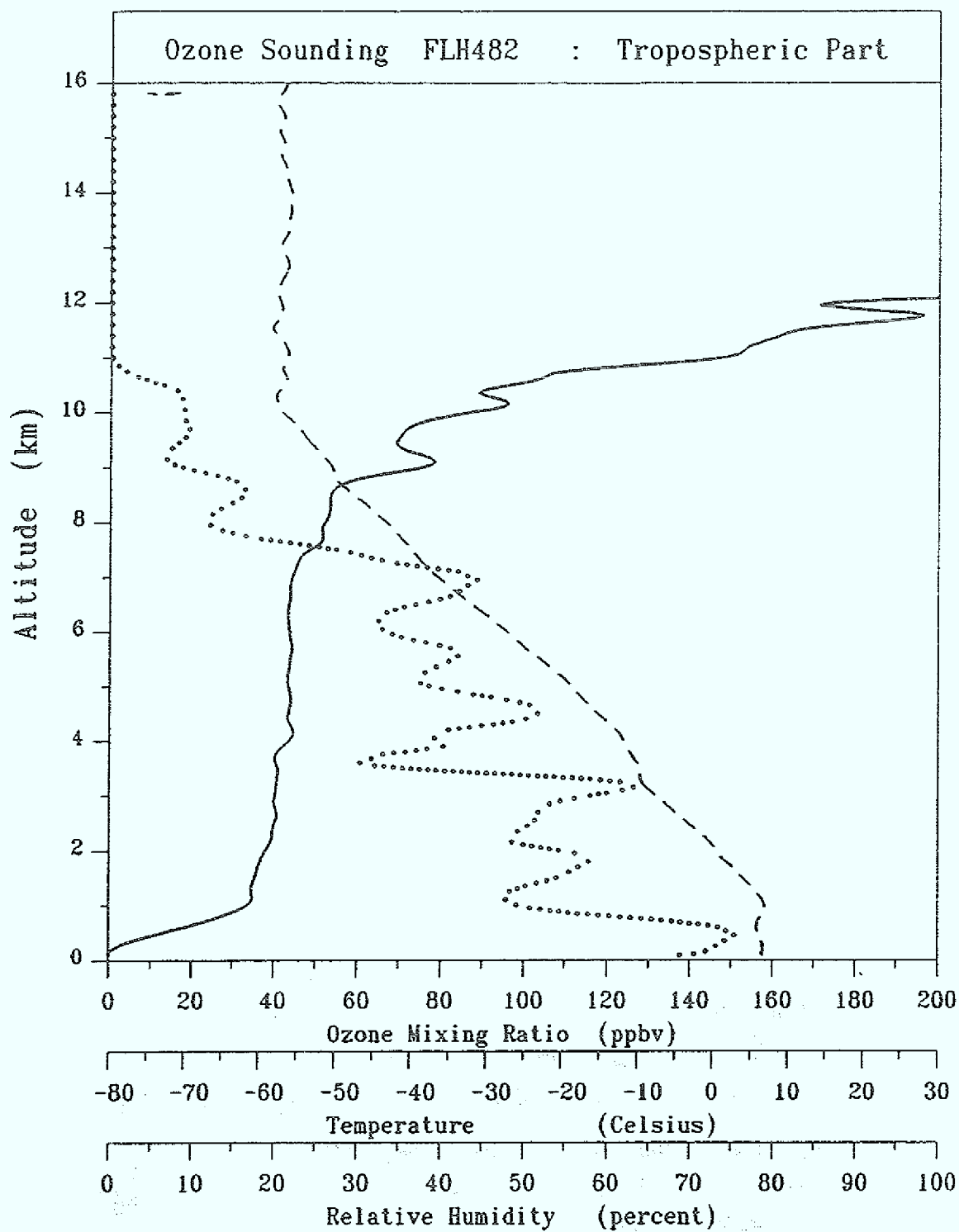
Date 16-12-1992
 Time at launch 12:59 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity

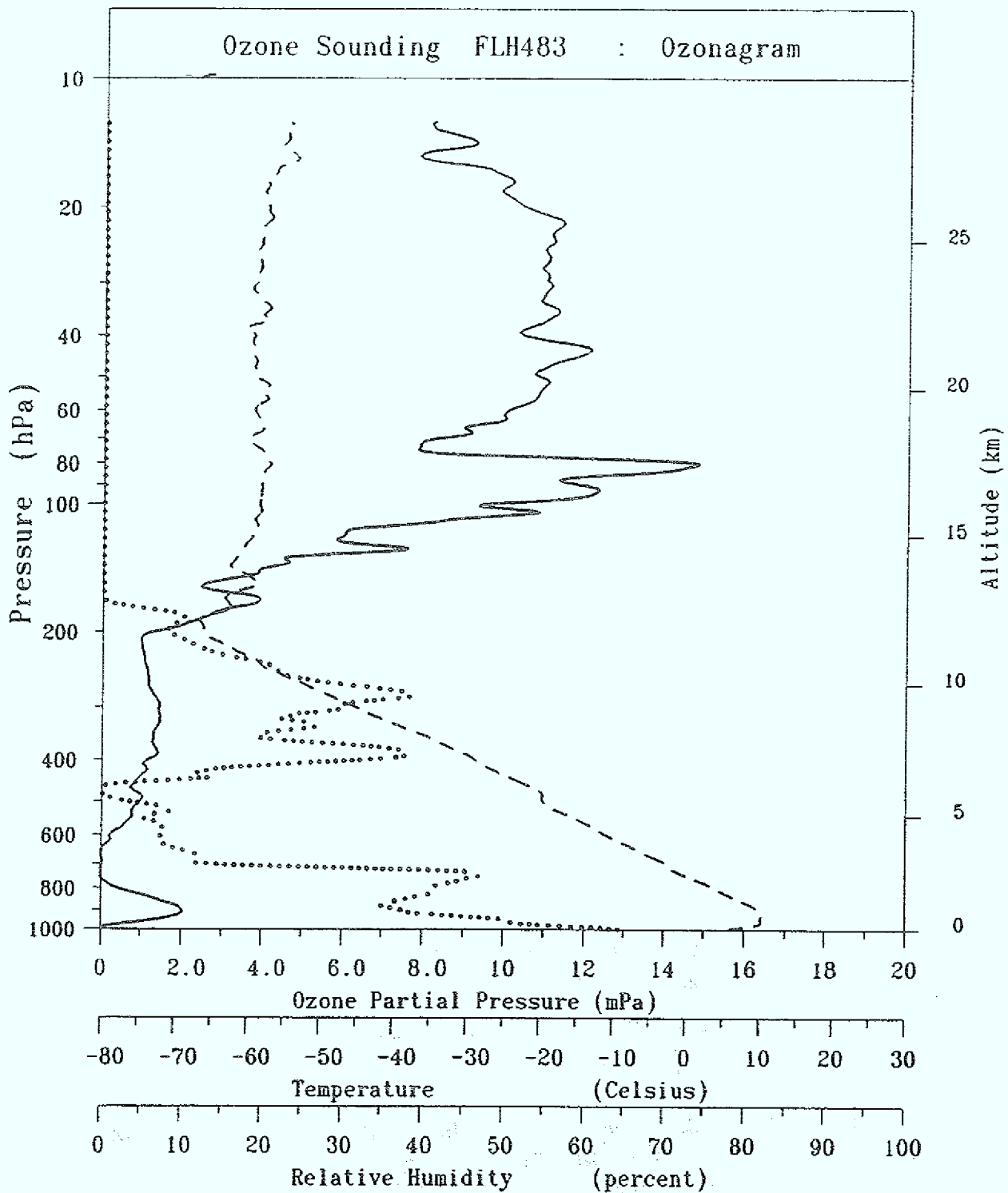




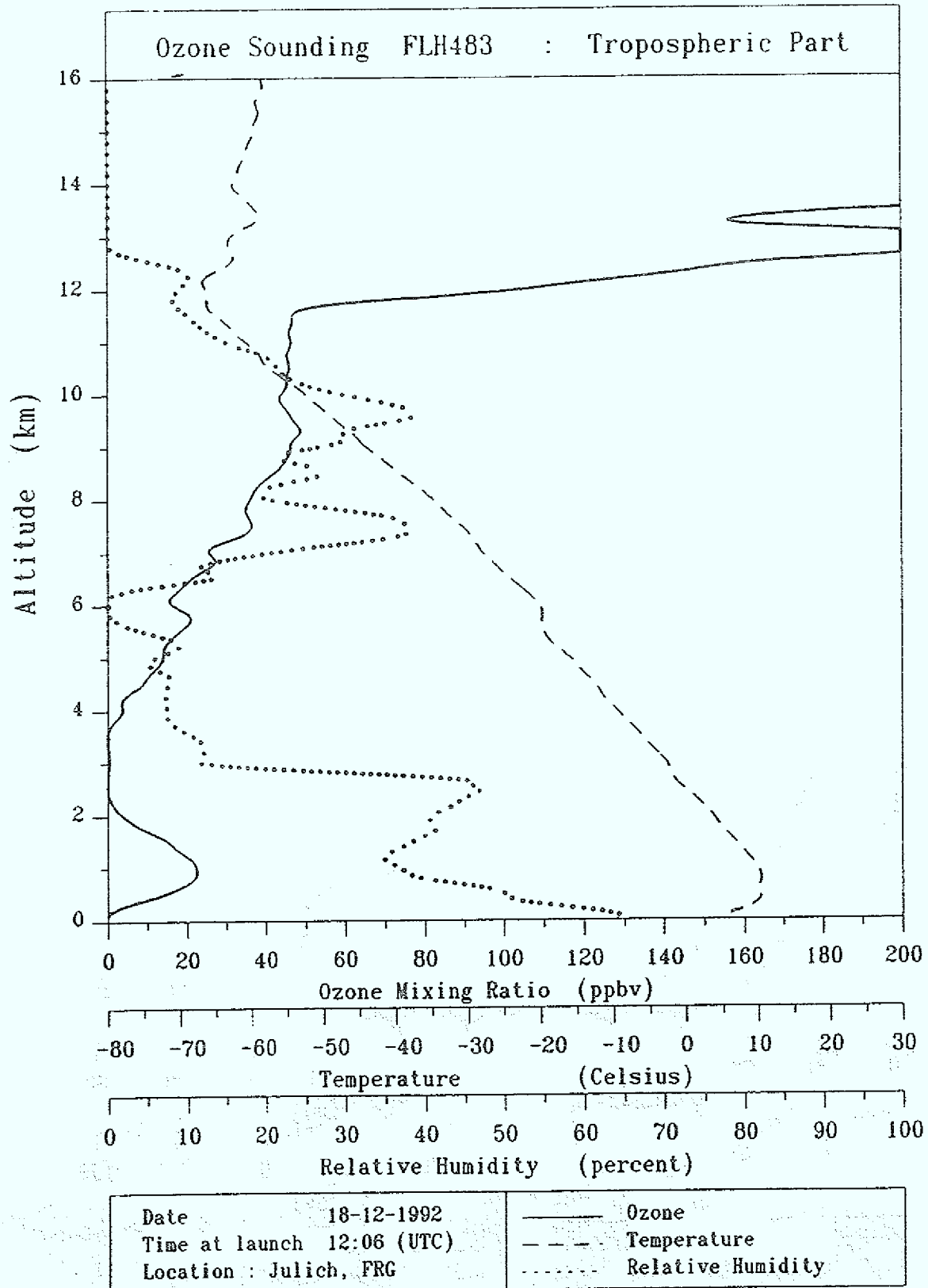
Date	17-12-1992	—	Ozone
Time at launch	12:01 (UTC)	- - -	Temperature
Location	Julich, FRG	.....	Relative Humidity

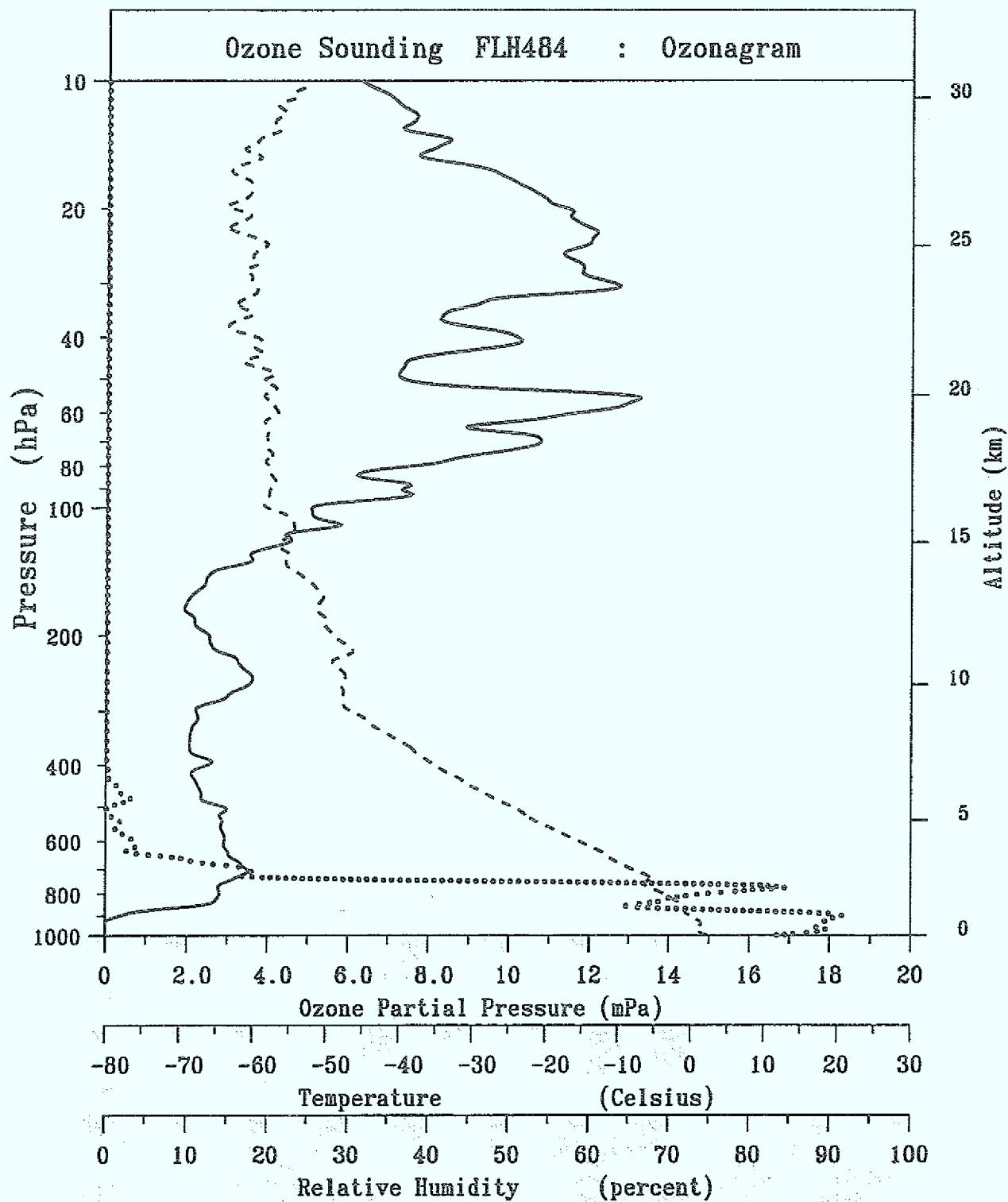


Date	17-12-1992	—	Ozone
Time at launch	12:01 (UTC)	- - -	Temperature
Location	Julich, FRG	.....	Relative Humidity



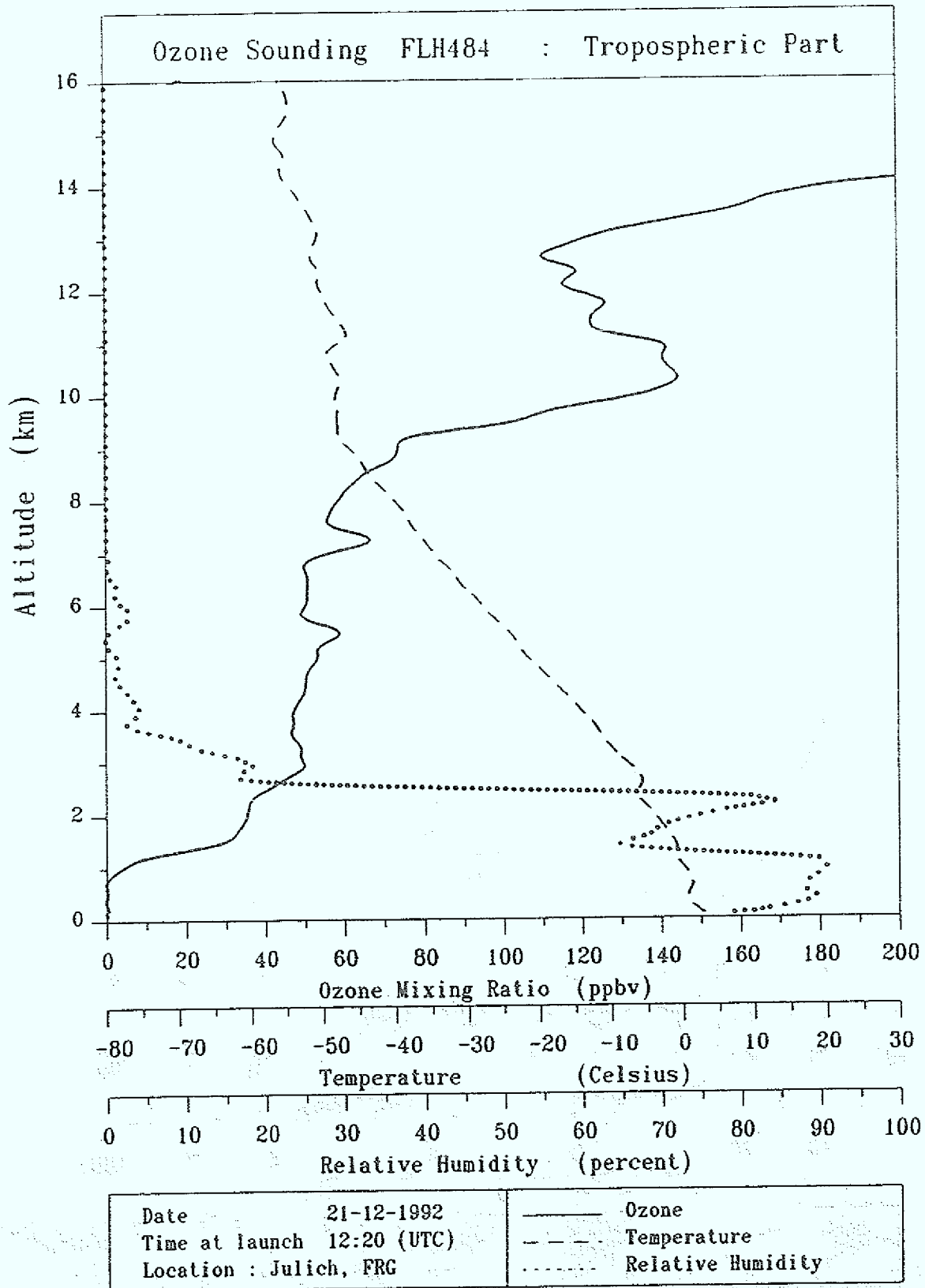
Date	18-12-1992	—	Ozone
Time at launch	12:06 (UTC)	- - -	Temperature
Location	Julich, FRG	.....	Relative Humidity

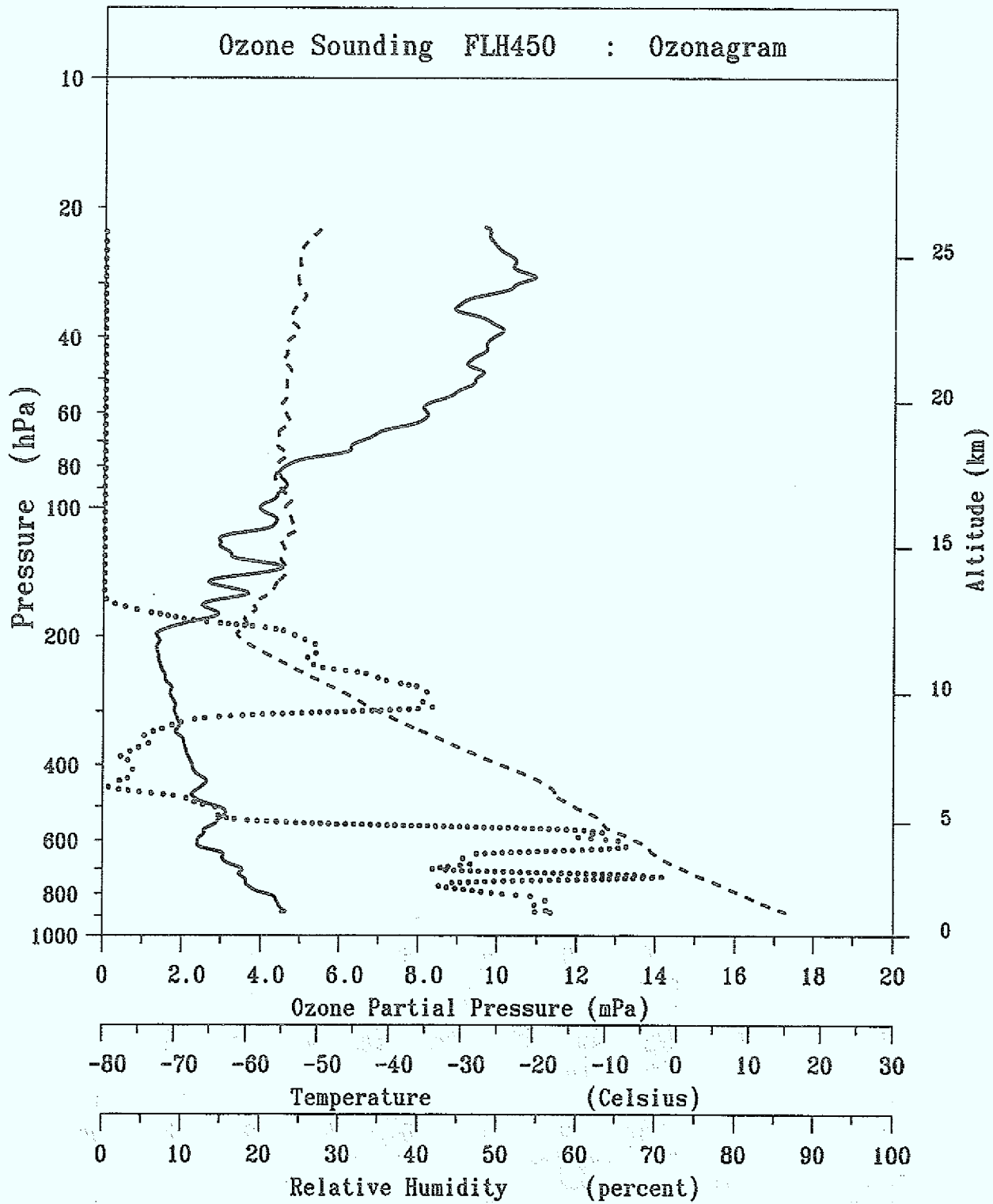




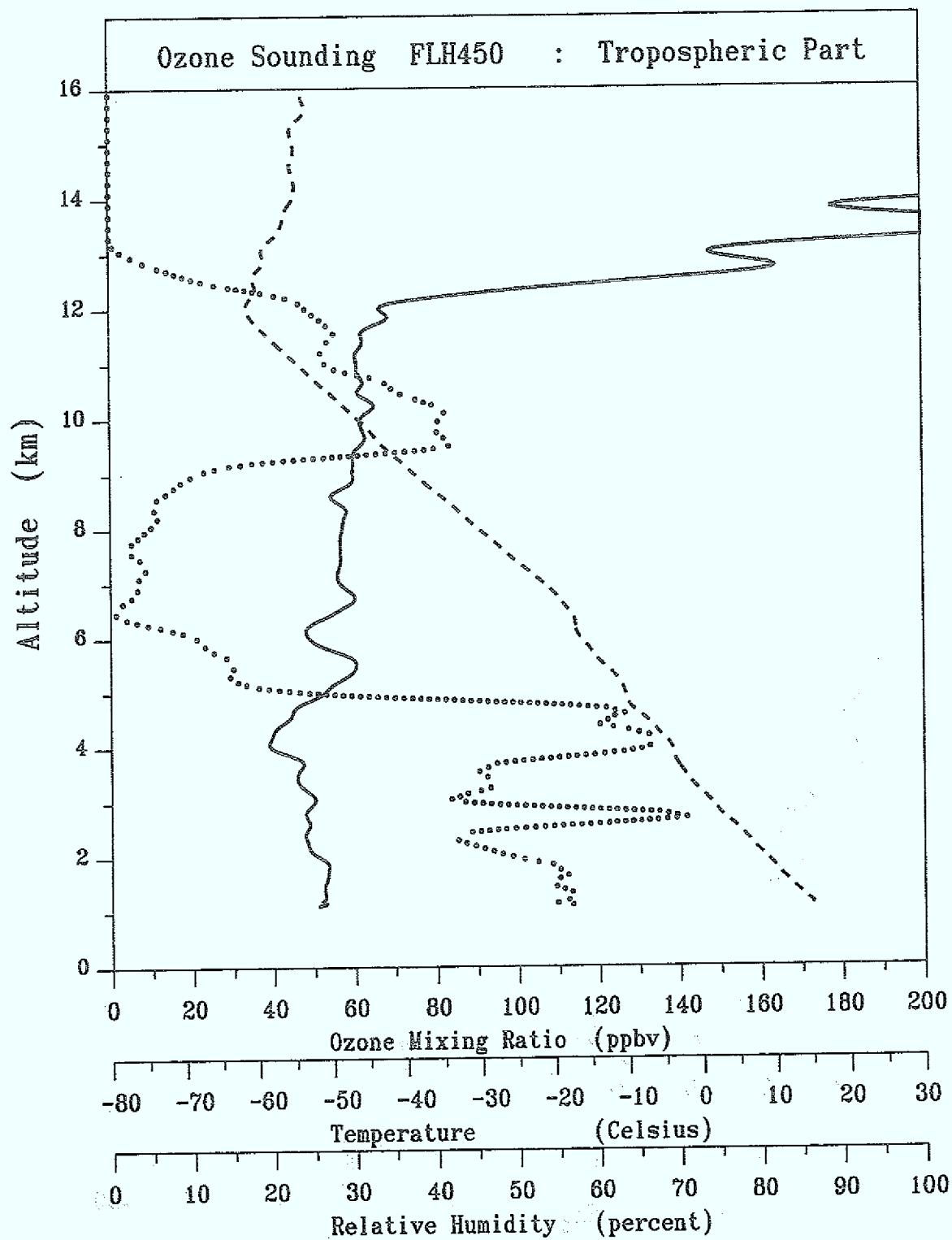
Date 21-12-1992
 Time at launch 12:20 (UTC)
 Location : Julich, FRG

— Ozone
 --- Temperature
 Relative Humidity

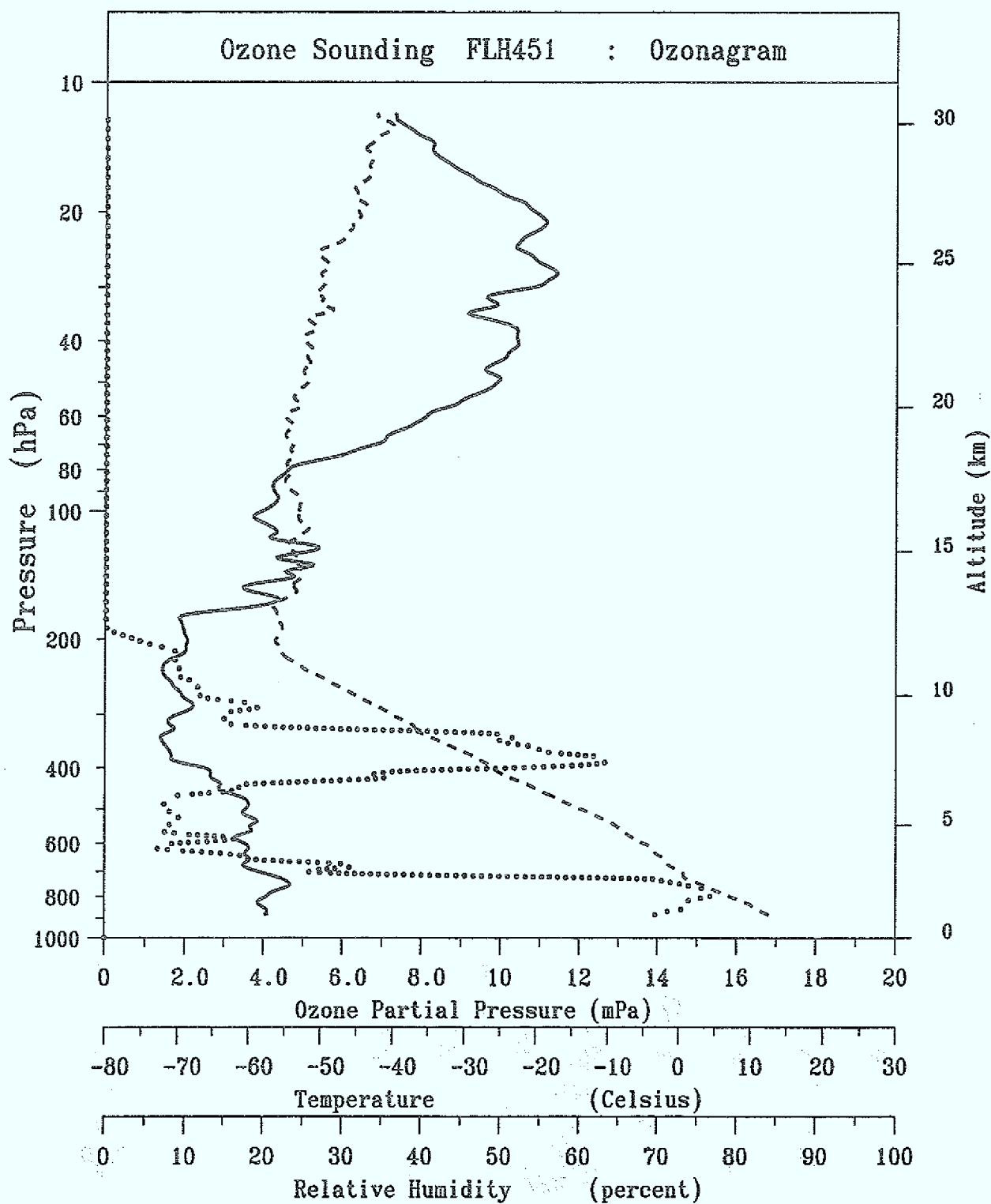




Date	11-09-1992	—	Ozone
Time at launch	16:30 (UTC)	- - - -	Temperature
Location : Schauinsland, FRG		.....	Relative Humidity

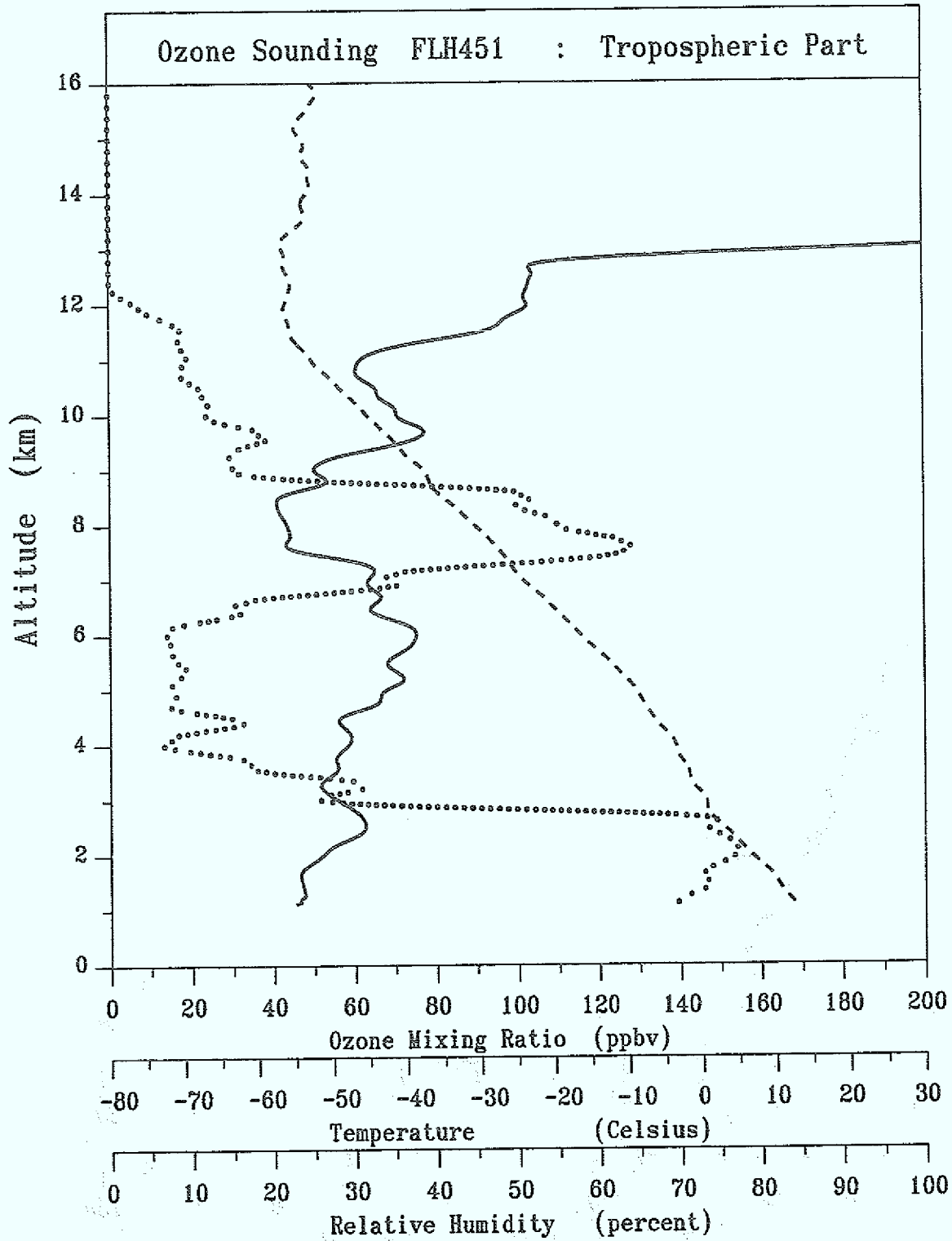


Date	11-09-1992	—	Ozone
Time at launch	16:30 (UTC)	- - - -	Temperature
Location	Schauinsland, FRG	.....	Relative Humidity

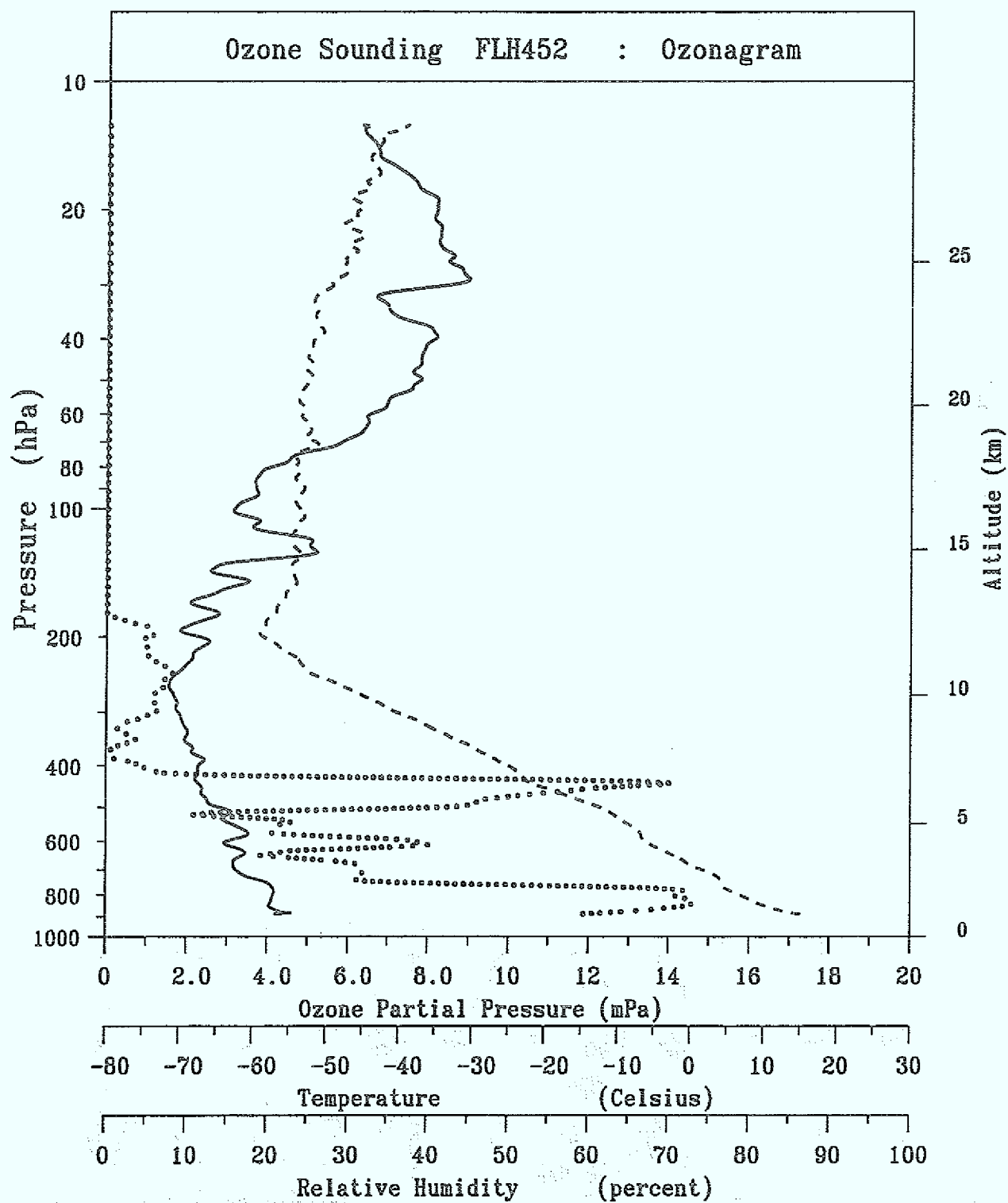


Date 11-09-1992
 Time at launch 06:15 (UTC)
 Location : Schauinsland, FRG

— Ozone
 - - - Temperature
 Relative Humidity

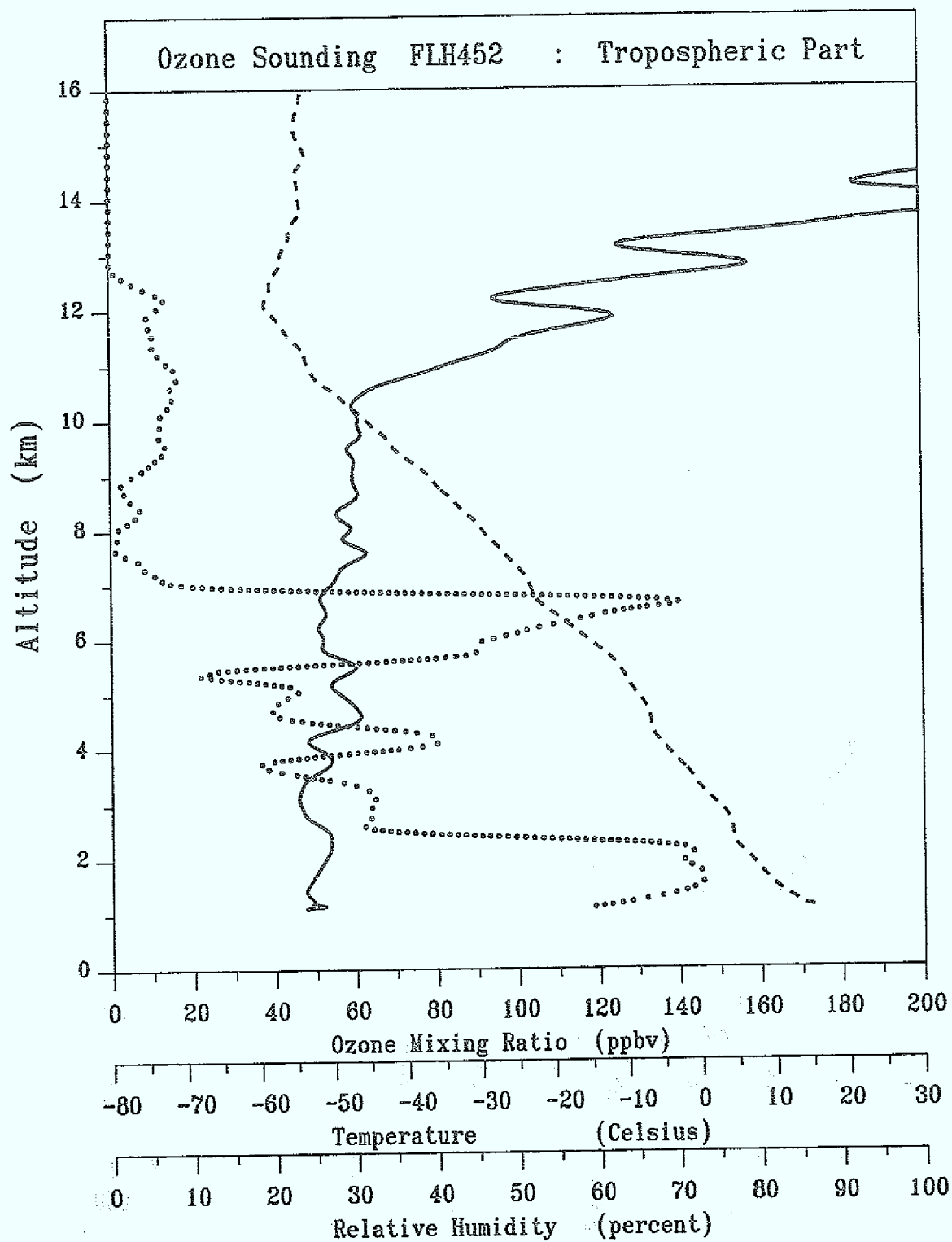


Date	11-09-1992	—	Ozone
Time at launch	06:15 (UTC)	- - - -	Temperature
Location : Schauinsland, FRG		.....	Relative Humidity

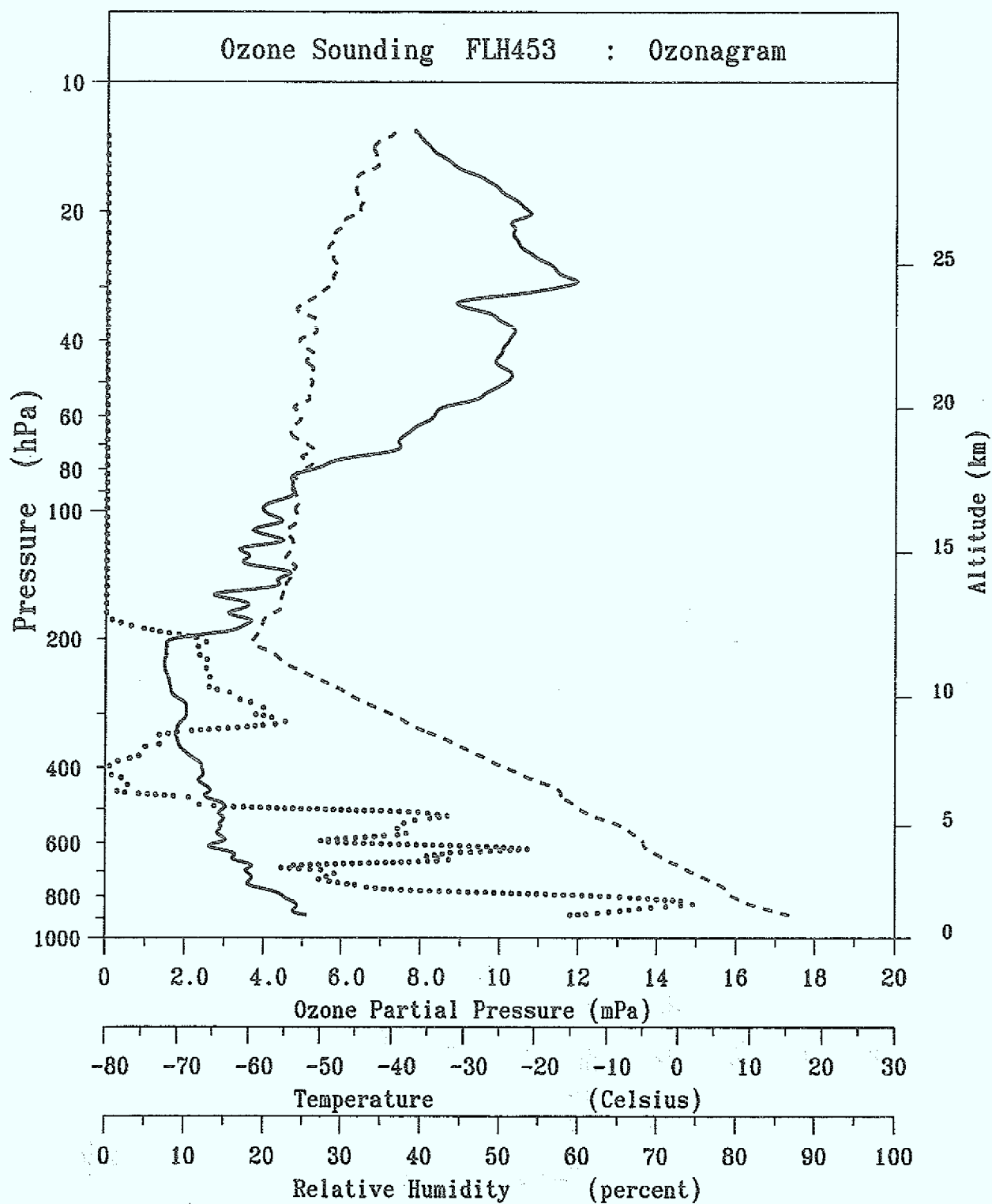


Date 11-09-1992
 Time at launch 09:58 (UTC)
 Location : Schauinsland, FRG

— Ozone
 --- Temperature
 Relative Humidity

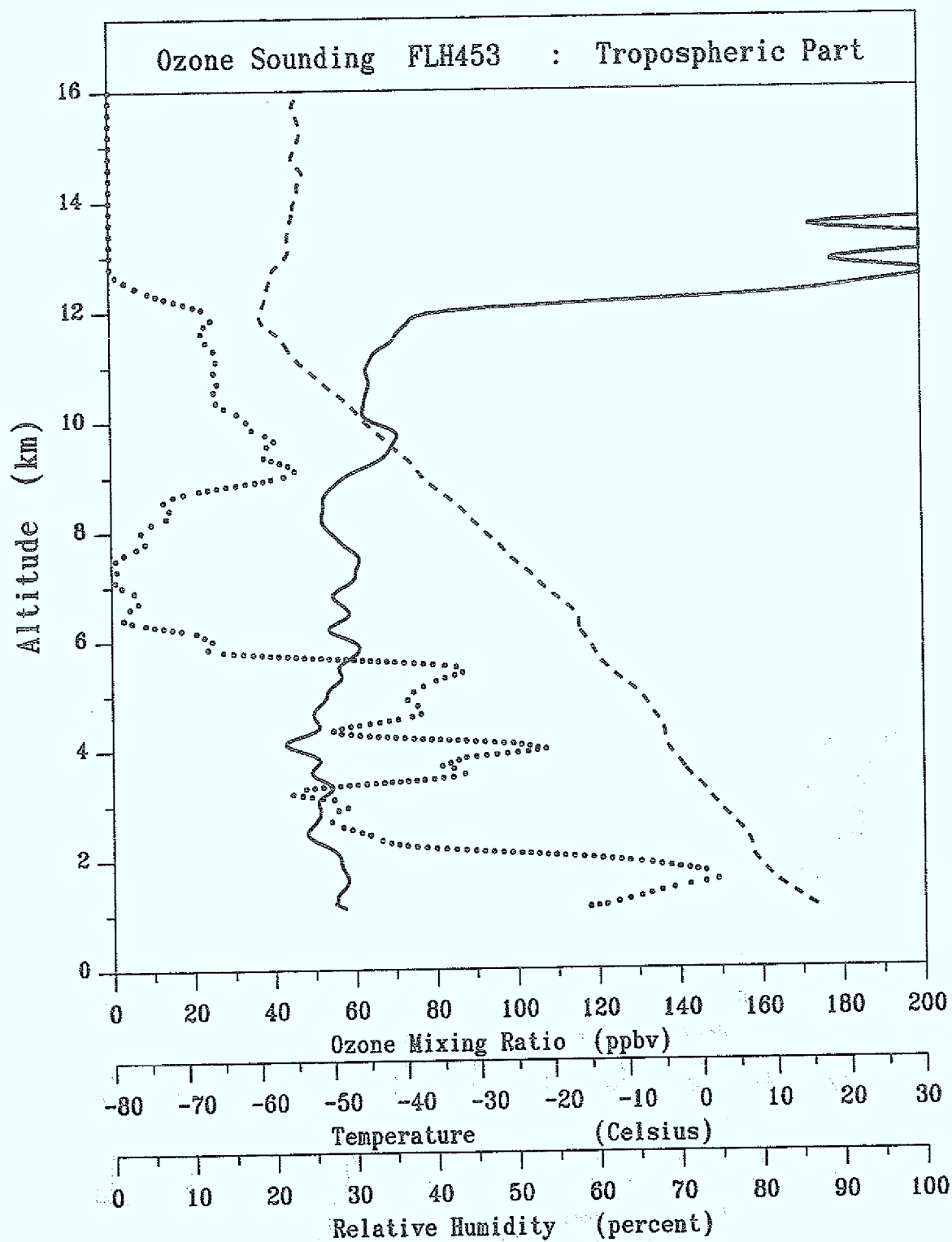


Date	11-09-1992	—	Ozone
Time at launch	09:58 (UTC)	- - - -	Temperature
Location	Schauinsland, FRG	.....	Relative Humidity

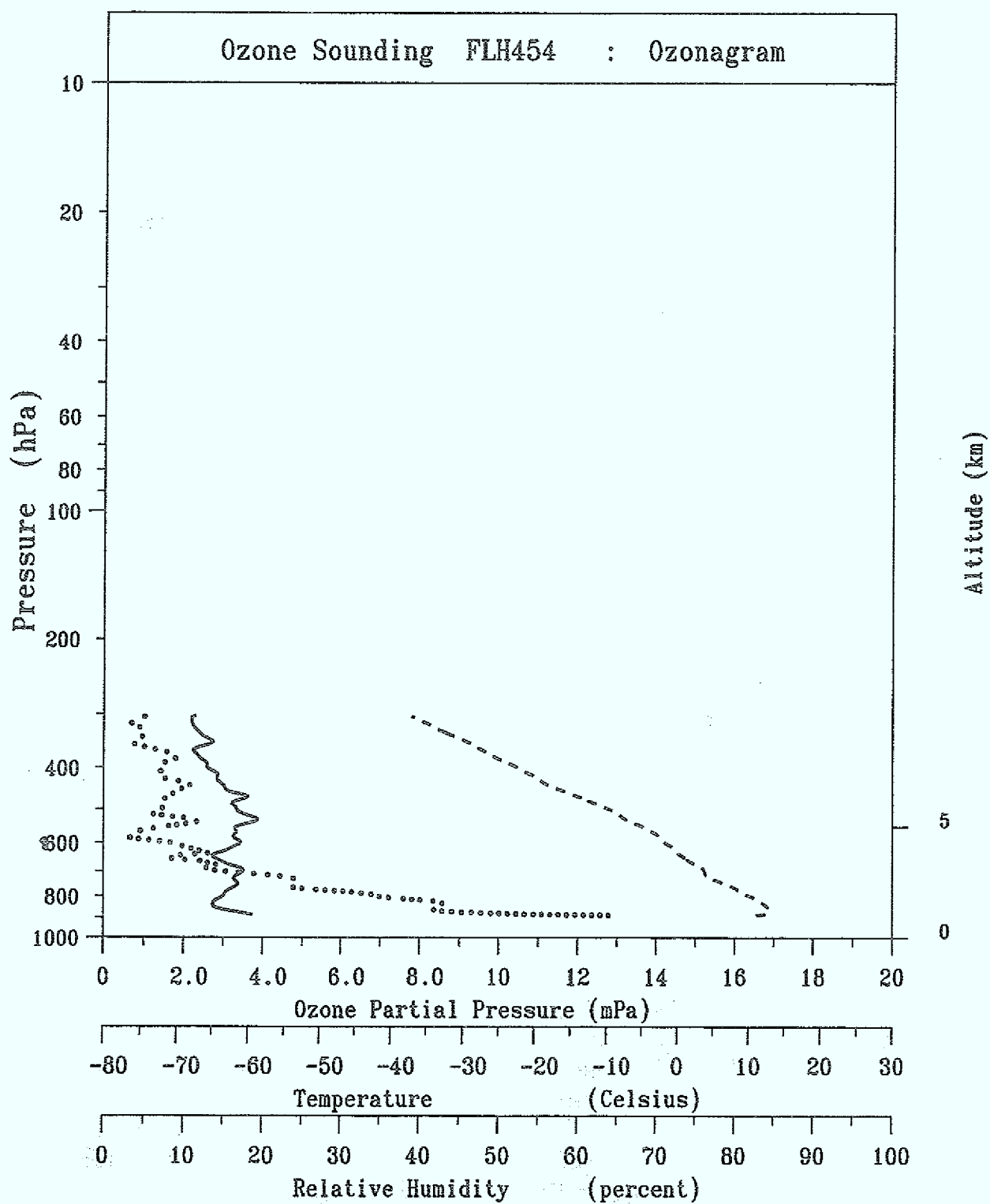


Date 11-09-1992
 Time at launch 12:59 (UTC)
 Location : Schauinsland, FRG

— Ozone
 --- Temperature
 Relative Humidity

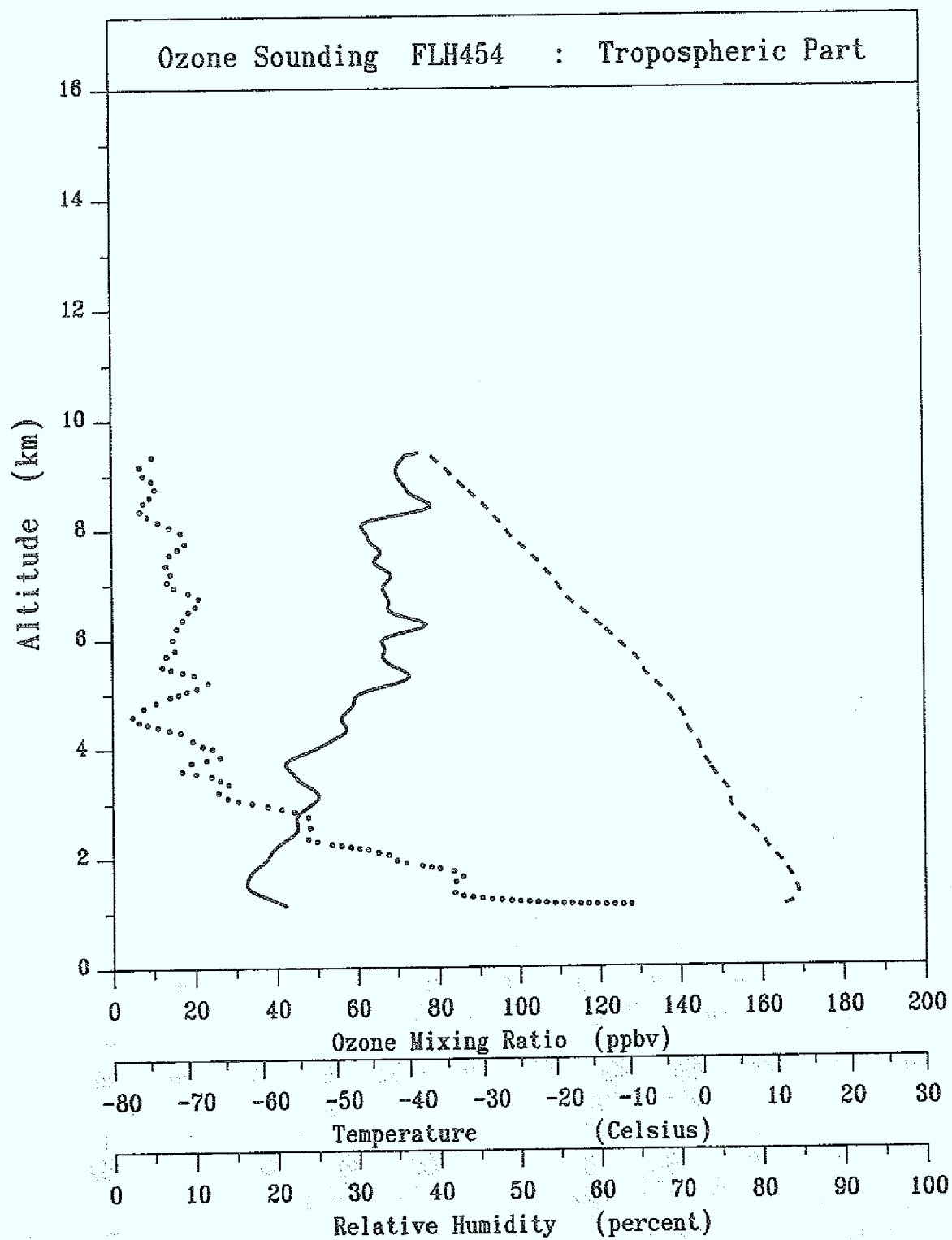


Date	11-09-1992	—	Ozone
Time at launch	12:59 (UTC)	- - - -	Temperature
Location	Schauinsland, FRG	.....	Relative Humidity



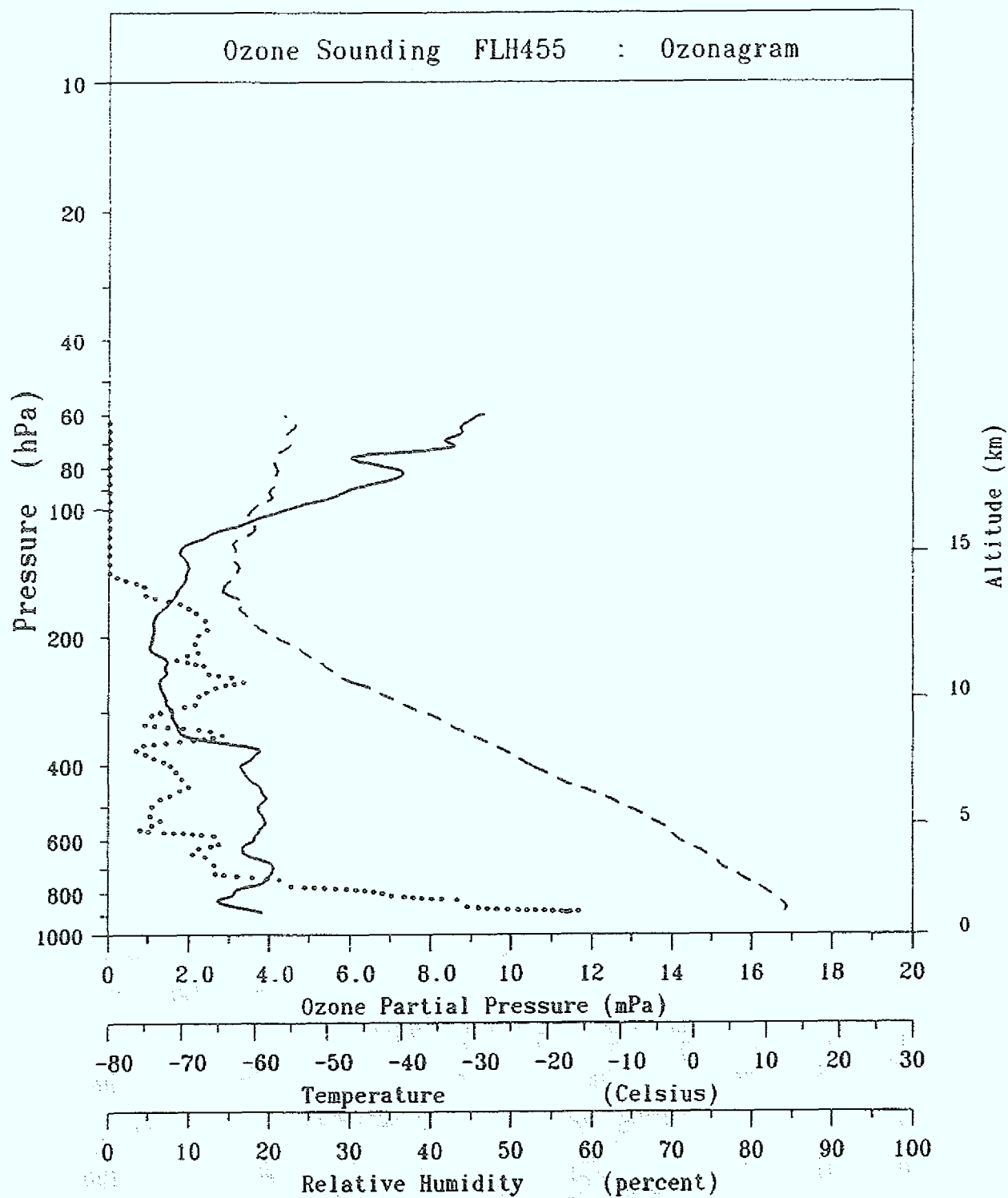
Date 16-09-1992
 Time at launch 05:02 (UTC)
 Location : Schauinsland, FRG

— Ozone
 --- Temperature
 Relative Humidity



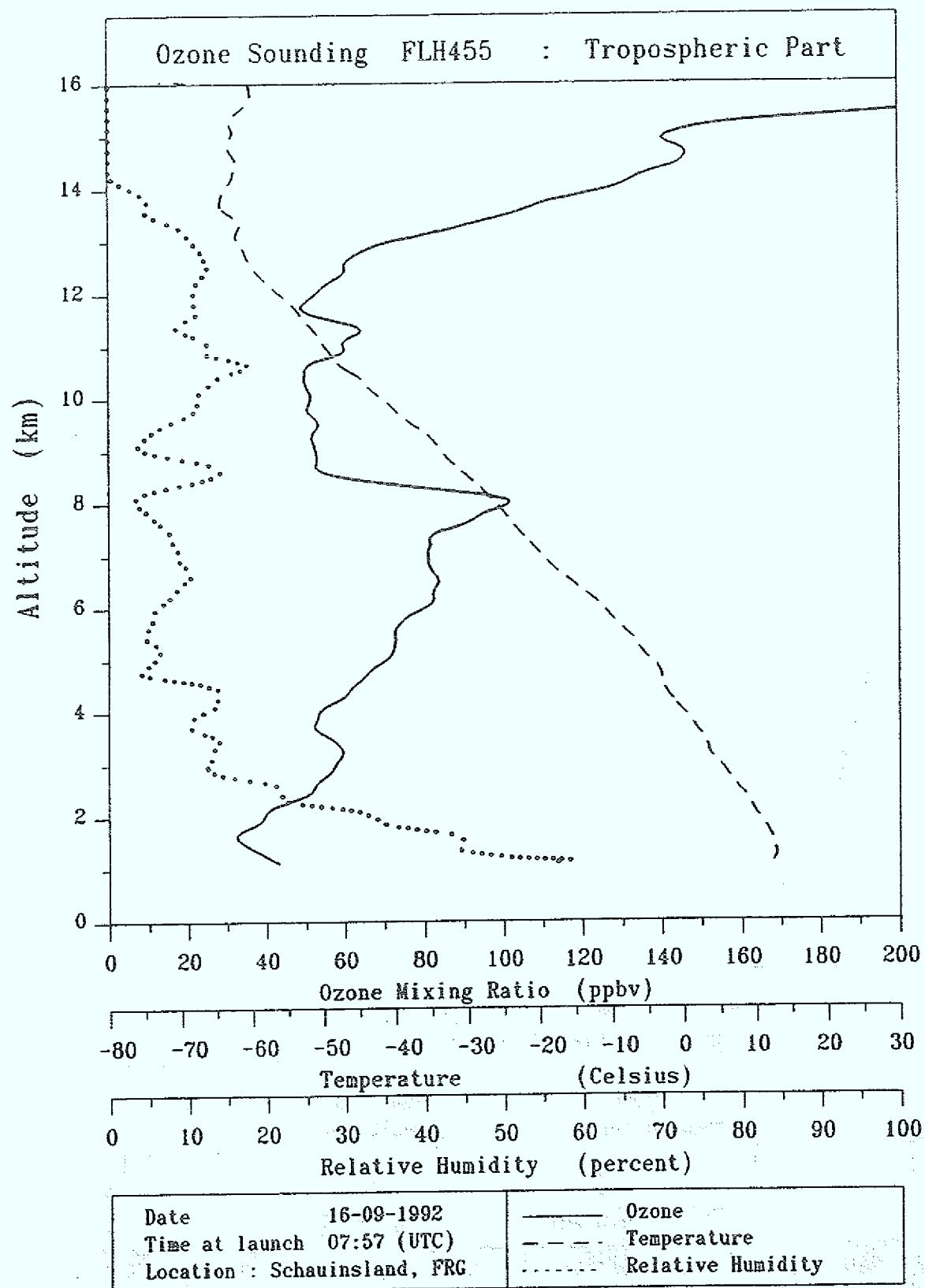
Date 16-09-1992
 Time at launch 05:02 (UTC)
 Location : Schauinsland, FRG

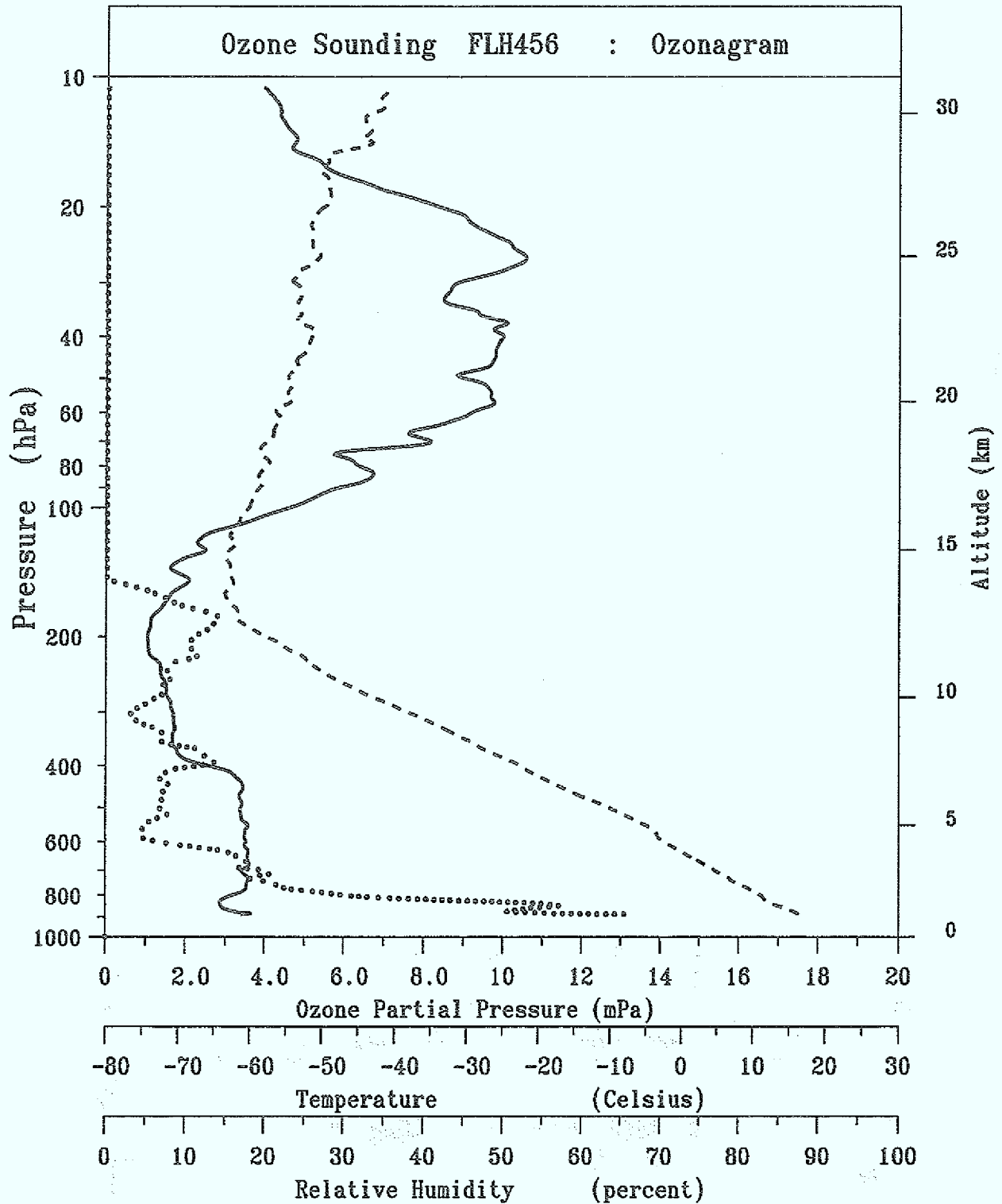
—— Ozone
 - - - - Temperature
 Relative Humidity



Date 16-09-1992
 Time at launch 07:57 (UTC)
 Location : Schauinsland, FRG

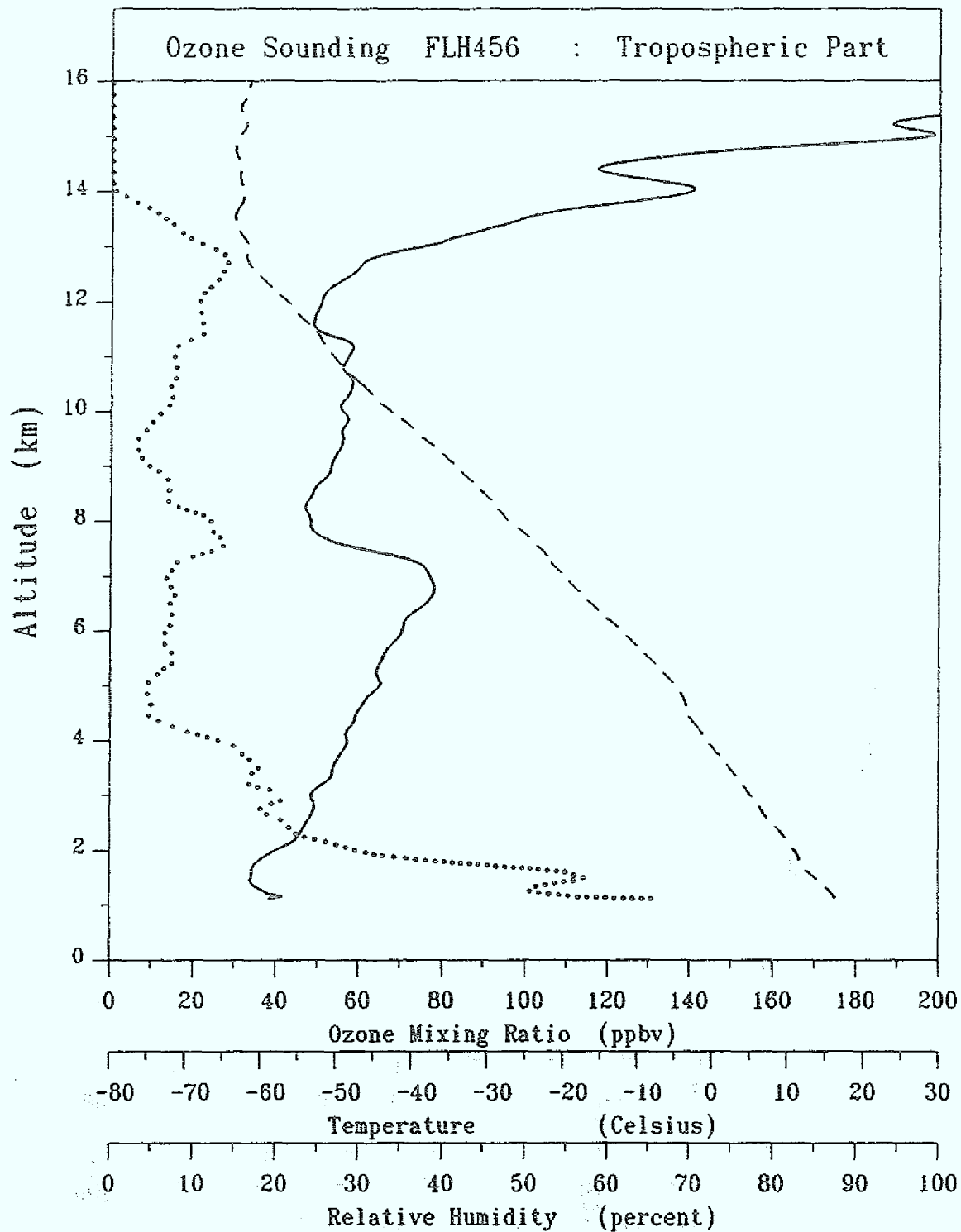
— Ozone
 - - - Temperature
 Relative Humidity





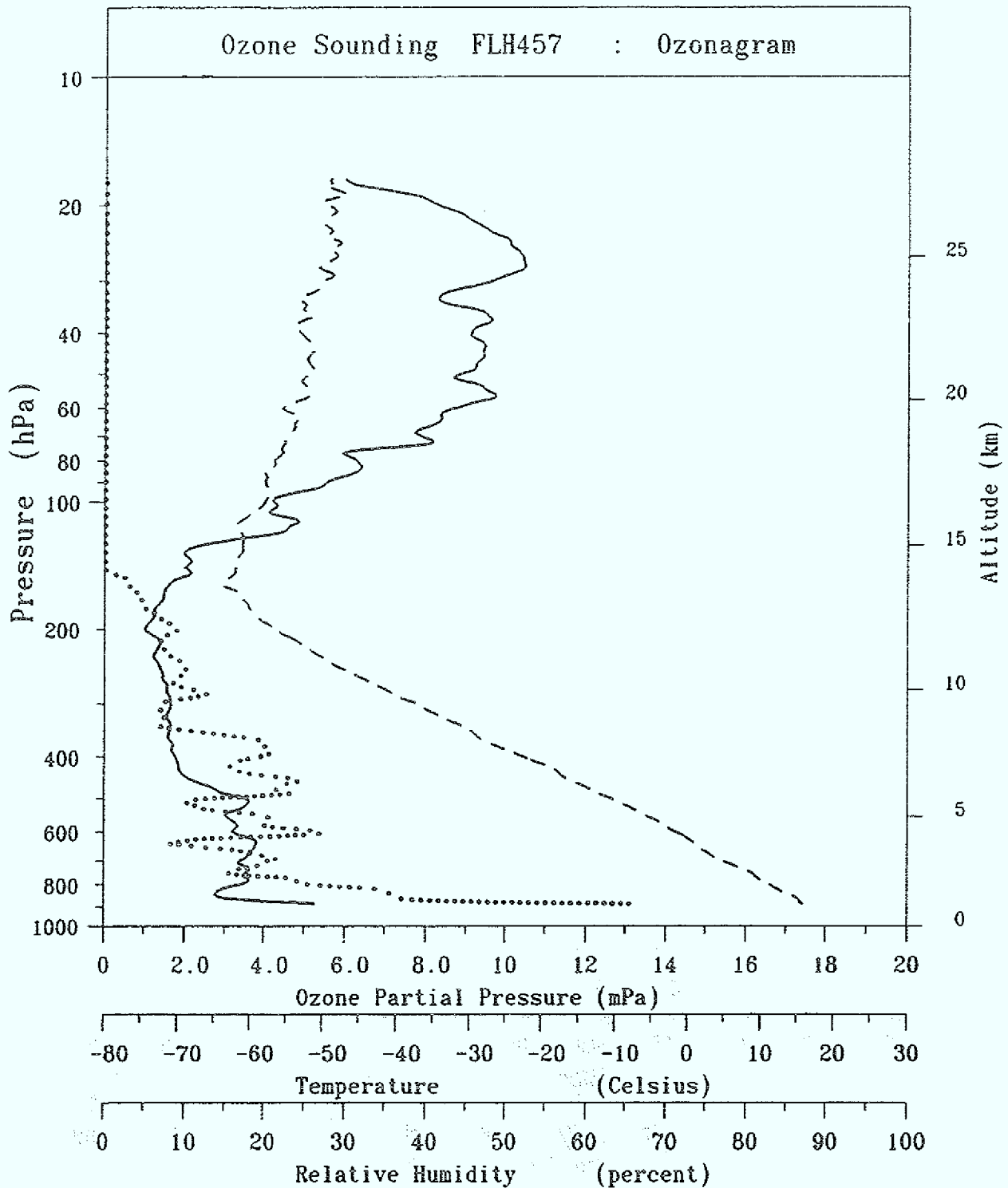
Date 16-09-1992
 Time at launch 11:50 (UTC)
 Location : Schauinsland, FRG

— Ozone
 - - - Temperature
 Relative Humidity



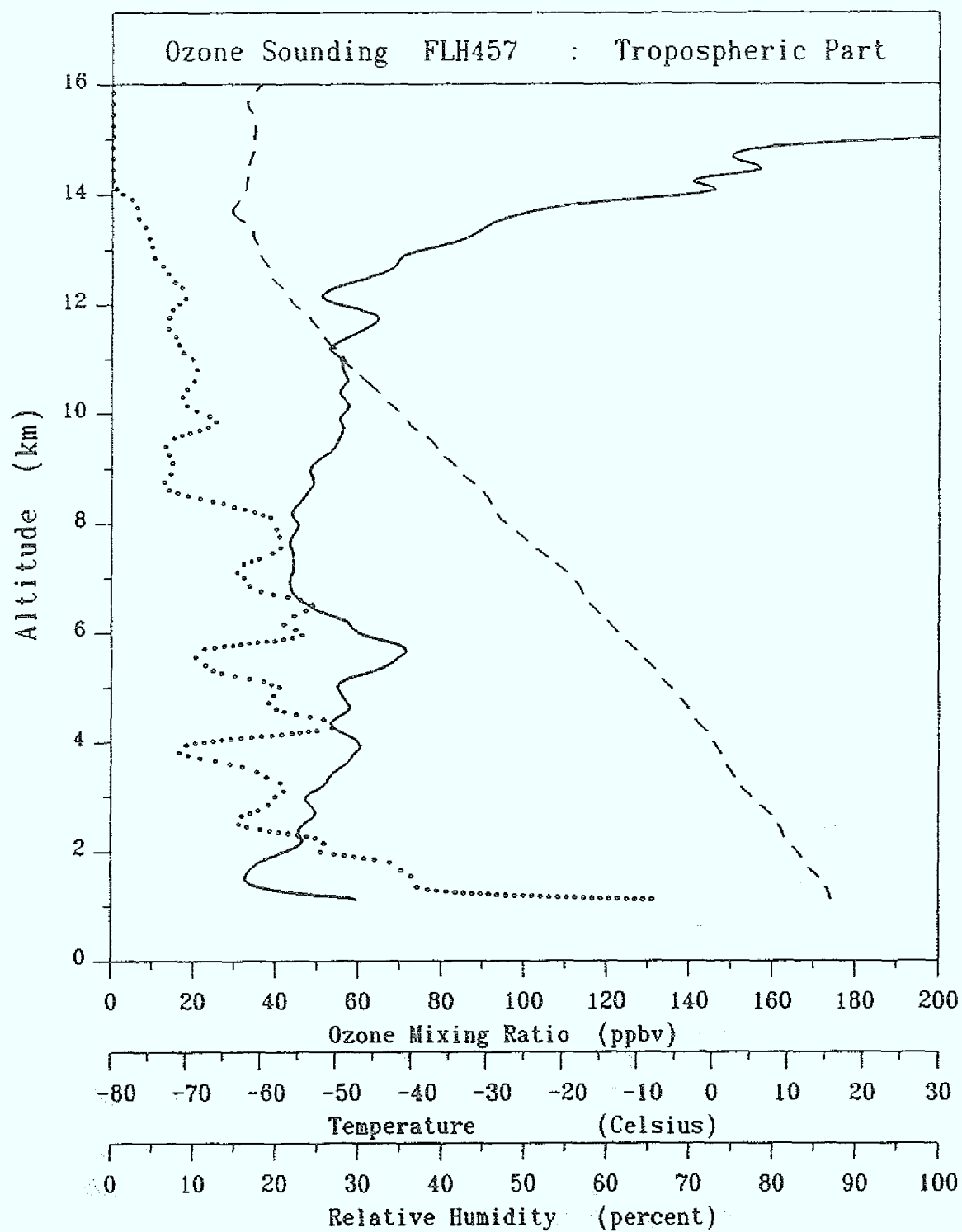
Date 16-09-1992
 Time at launch 11:50 (UTC)
 Location : Schauinsland, FRG

— Ozone
 --- Temperature
 Relative Humidity



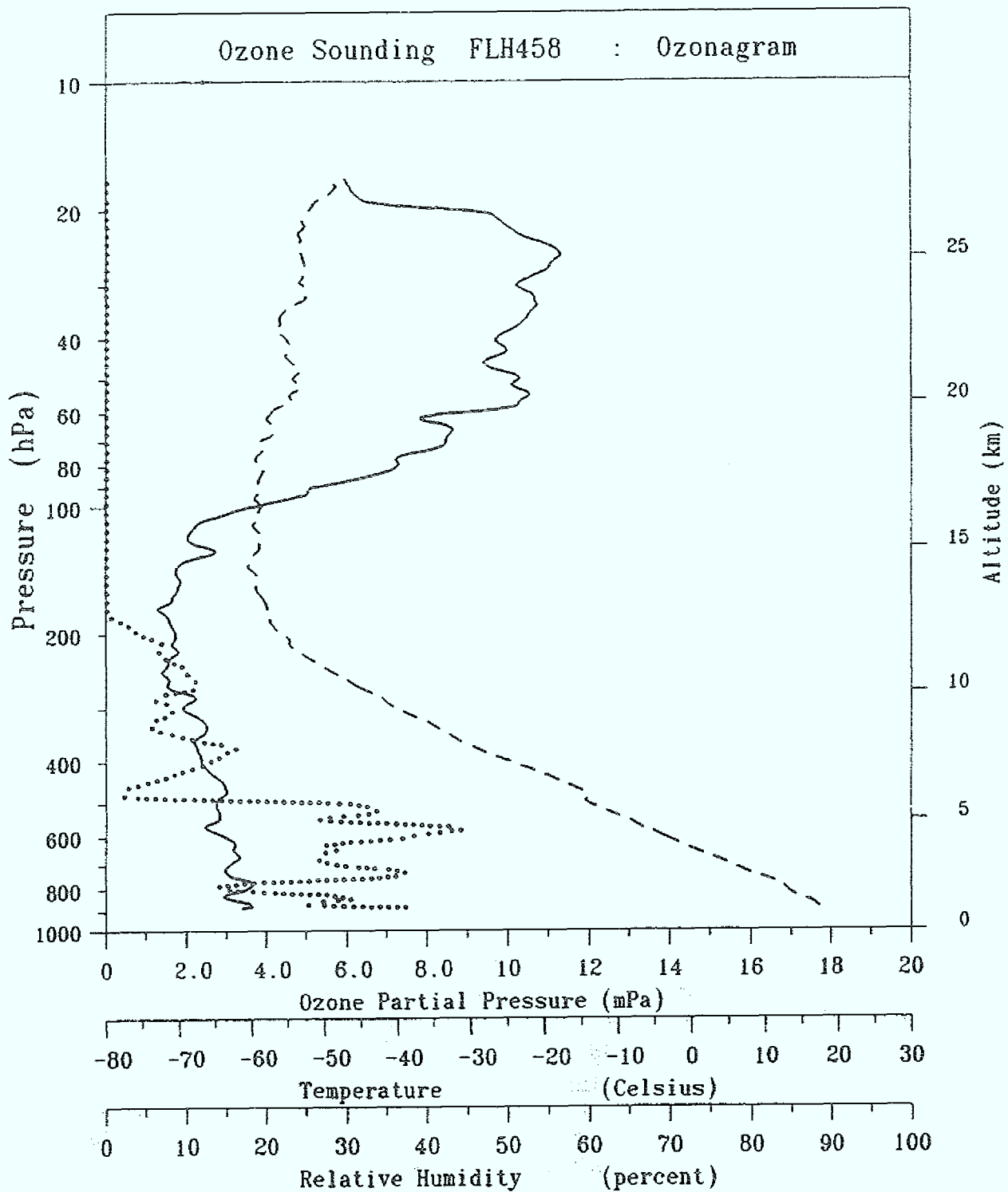
Date 16-09-1992
 Time at launch 15:01 (UTC)
 Location : Schauinsland, FRG

— Ozone
 - - - Temperature
 Relative Humidity



Date 16-09-1992
 Time at launch 15:01 (UTC)
 Location : Schauinsland, FRG

— Ozone
 - - - Temperature
 Relative Humidity



Date 17-09-1992

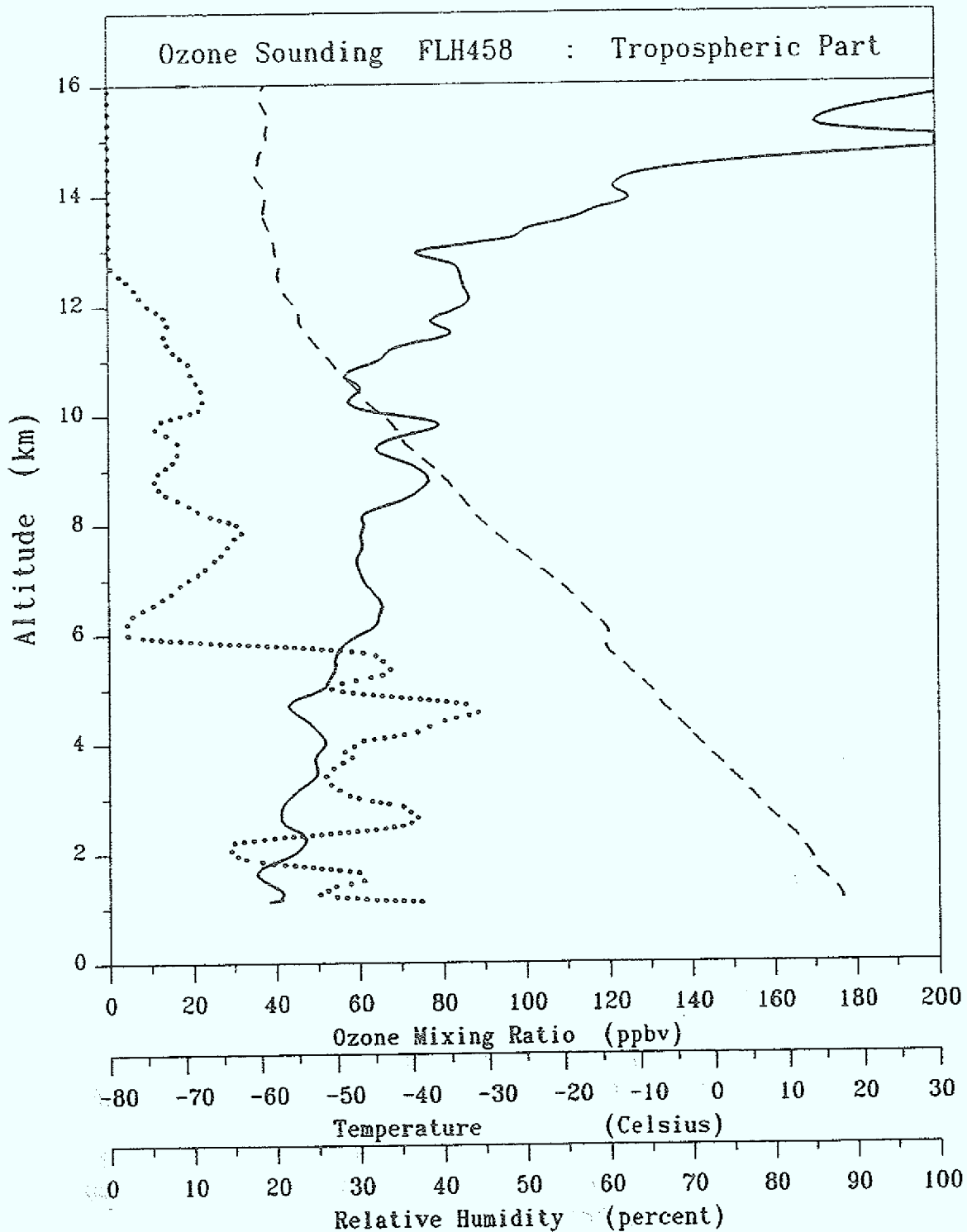
Time at launch 07:24 (UTC)

Location : Schauinsland, FRG

— Ozone

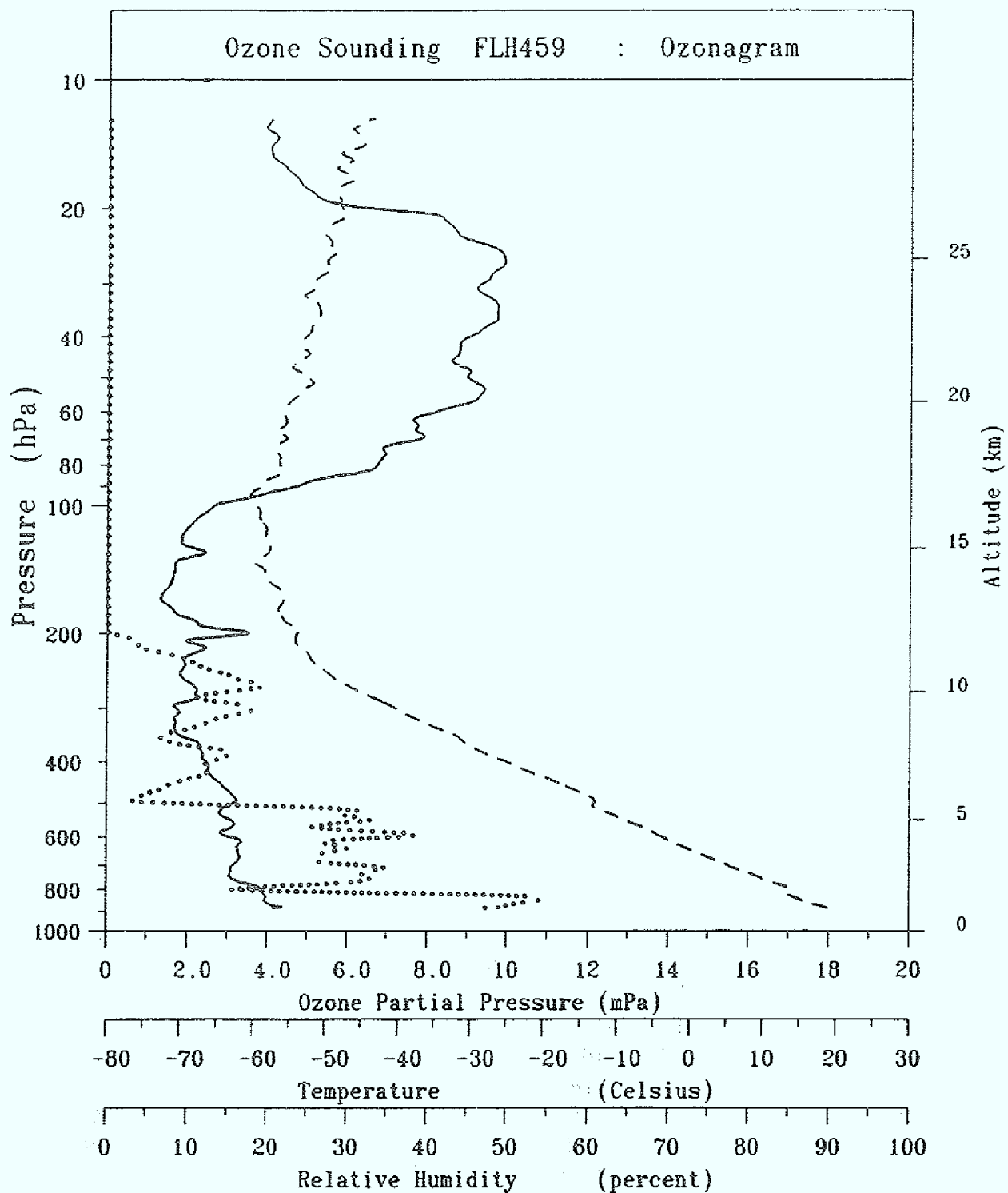
--- Temperature

..... Relative Humidity



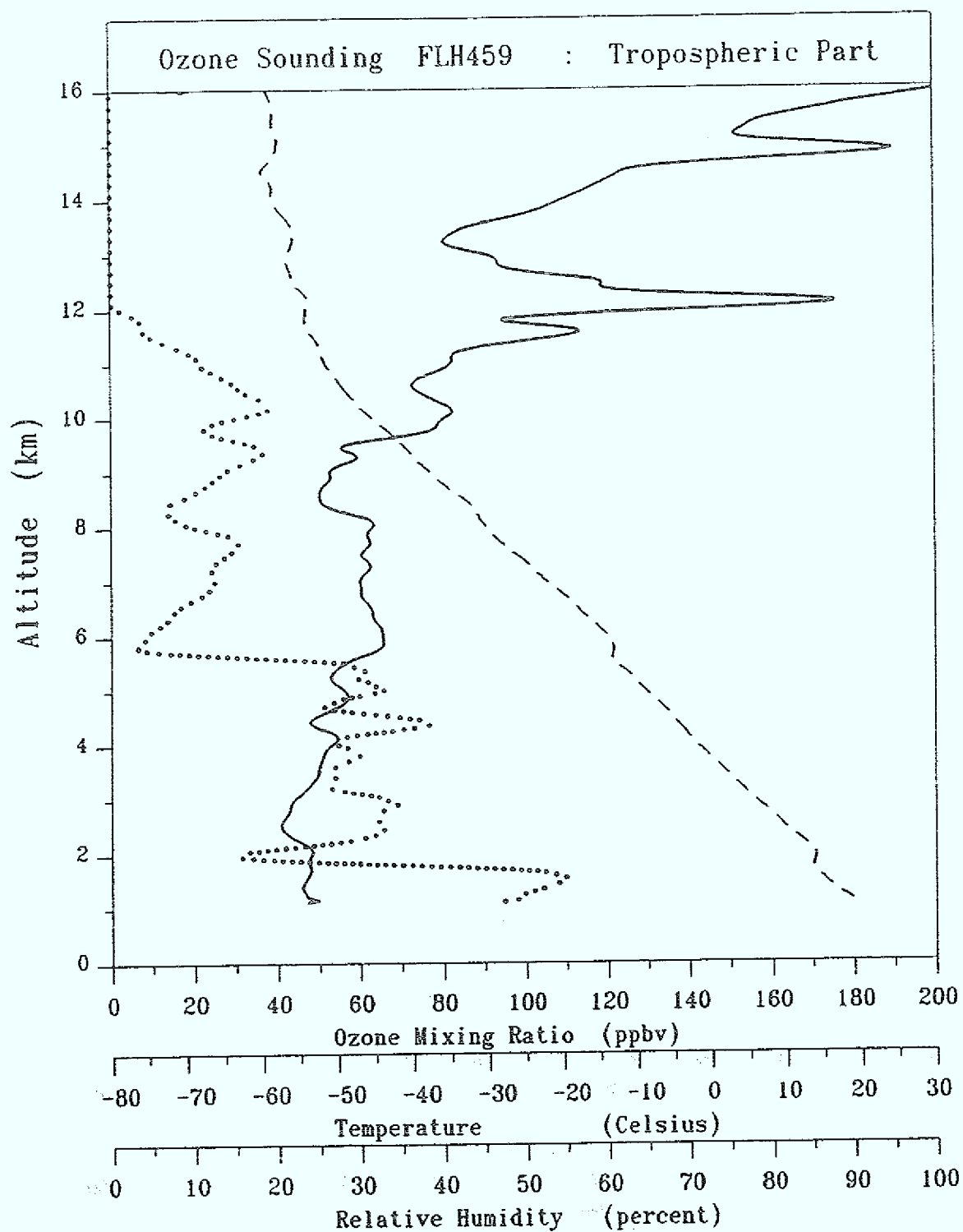
Date 17-09-1992
 Time at launch 07:24 (UTC)
 Location : Schauinsland, FRG

— Ozone
 --- Temperature
 ... Relative Humidity



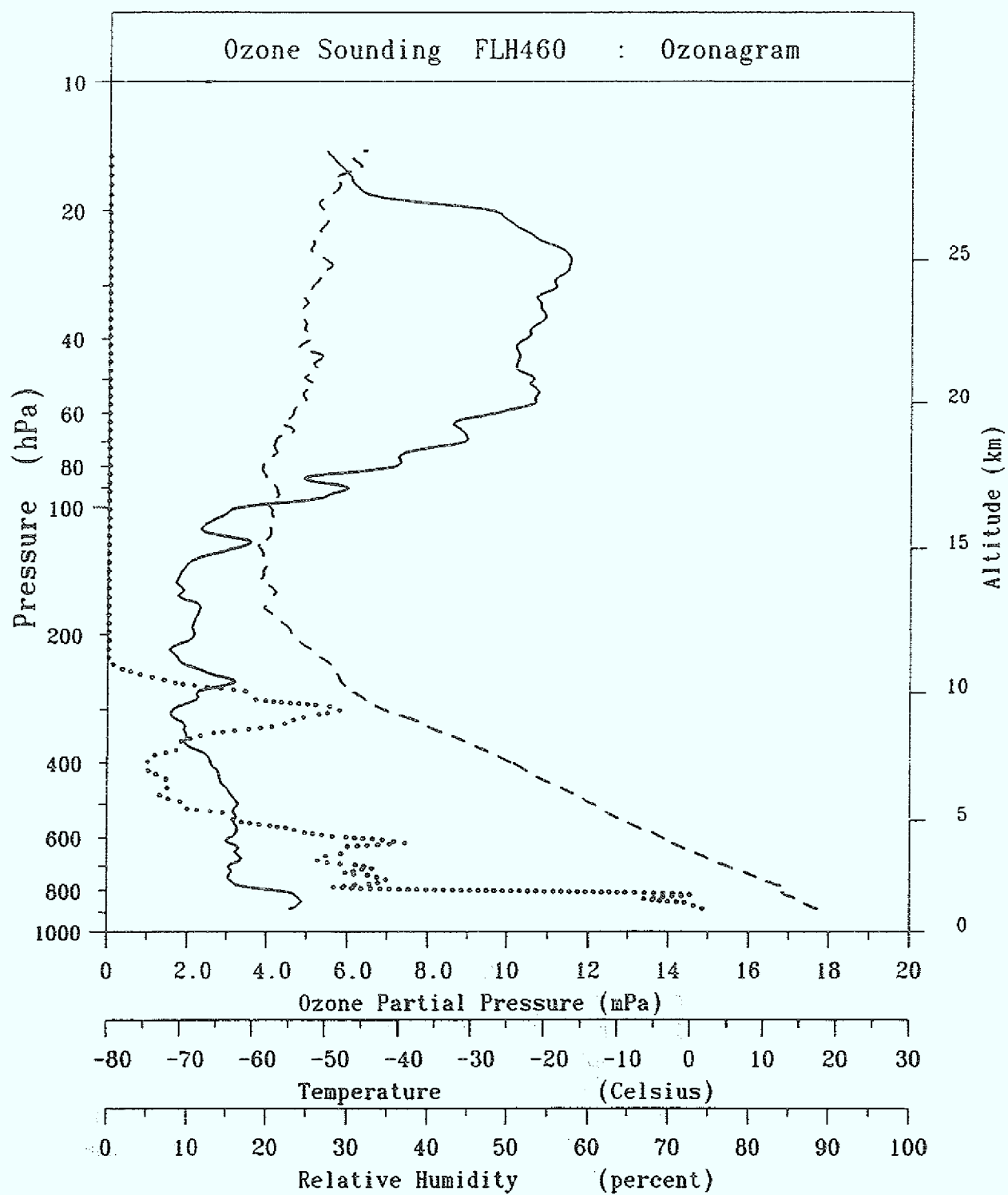
Date 17-09-1992
 Time at launch 11:48 (UTC)
 Location : Schauinsland, FRG

— Ozone
 - - - Temperature
 Relative Humidity



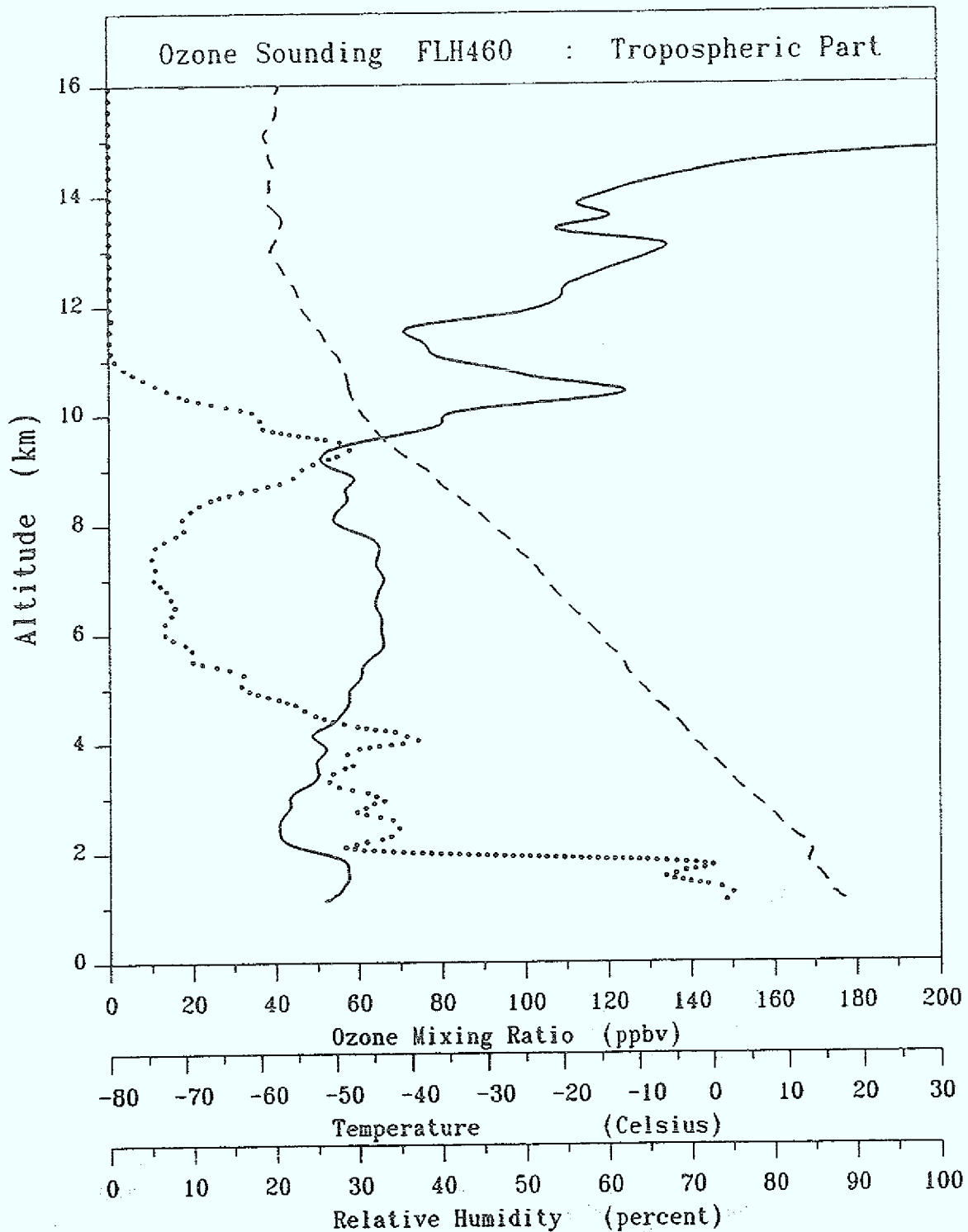
Date 17-09-1992
 Time at launch 11:48 (UTC)
 Location : Schauinsland, FRG

— Ozone
 - - - Temperature
 . . . Relative Humidity



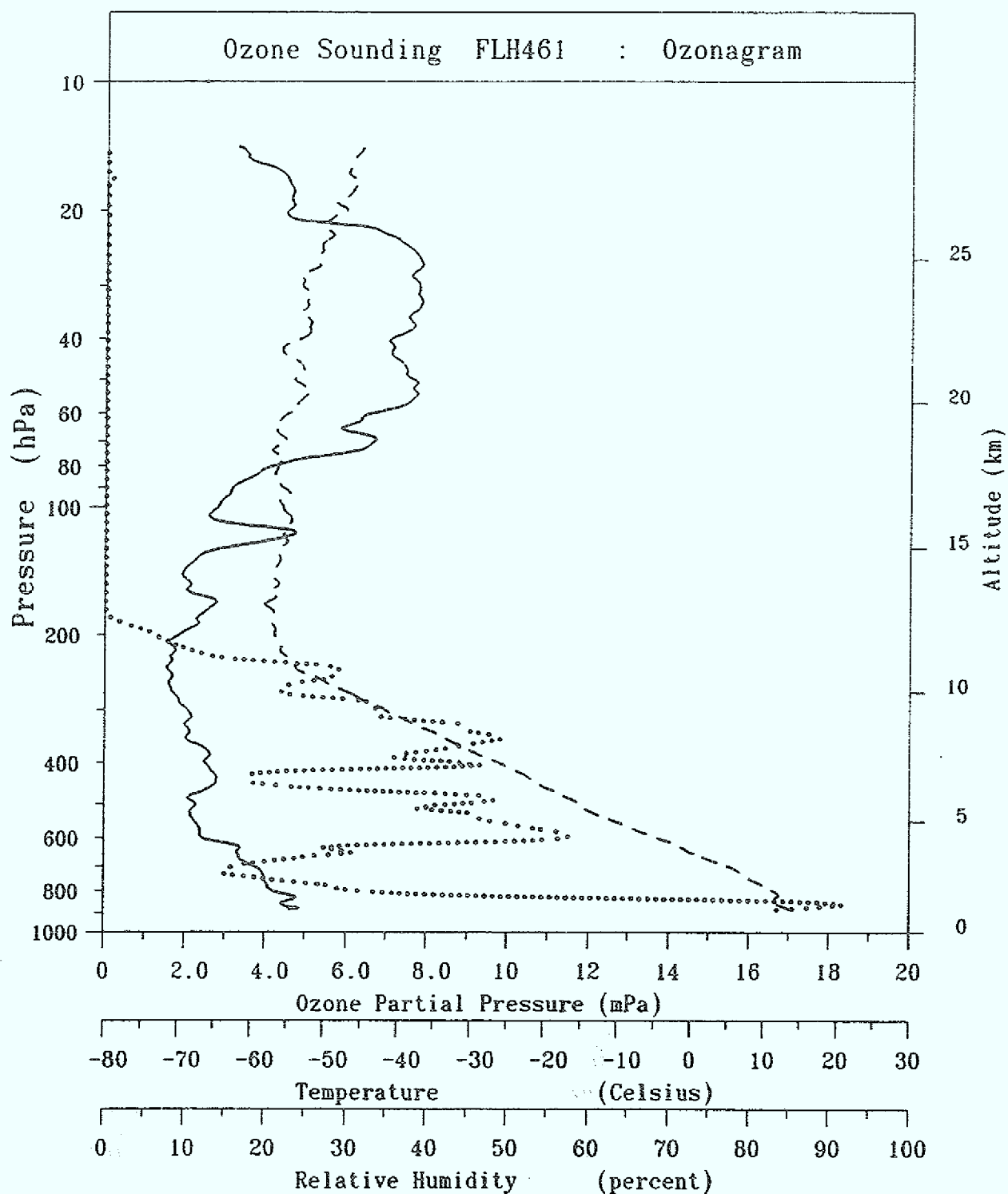
Date 17-09-1992
 Time at launch 14:54 (UTC)
 Location : Schauinsland, FRG

— Ozone
 - - - Temperature
 . . . Relative Humidity



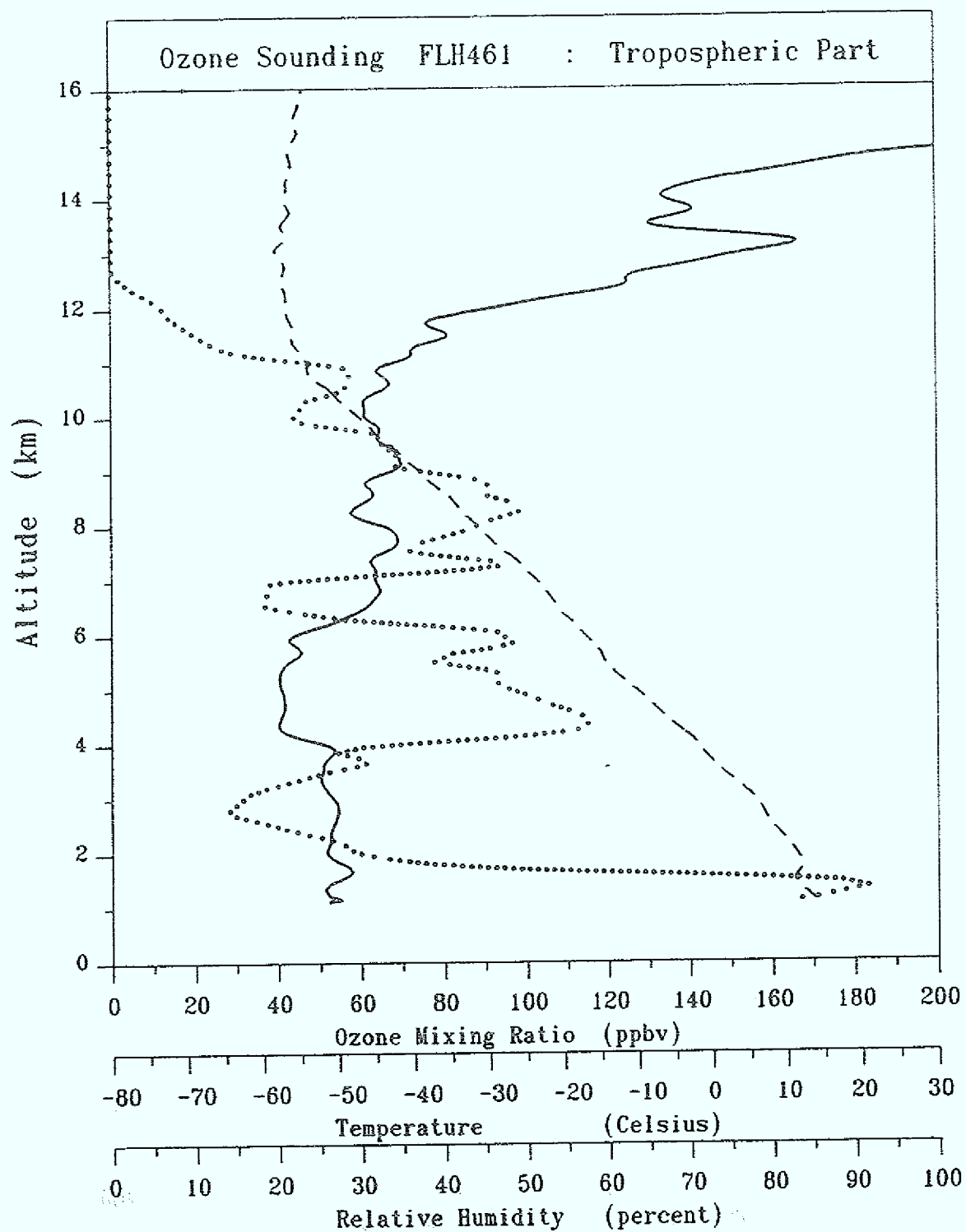
Date 17-09-1992
 Time at launch 14:54 (UTC)
 Location : Schauinsland, FRG

— Ozone
 - - - Temperature
 Relative Humidity



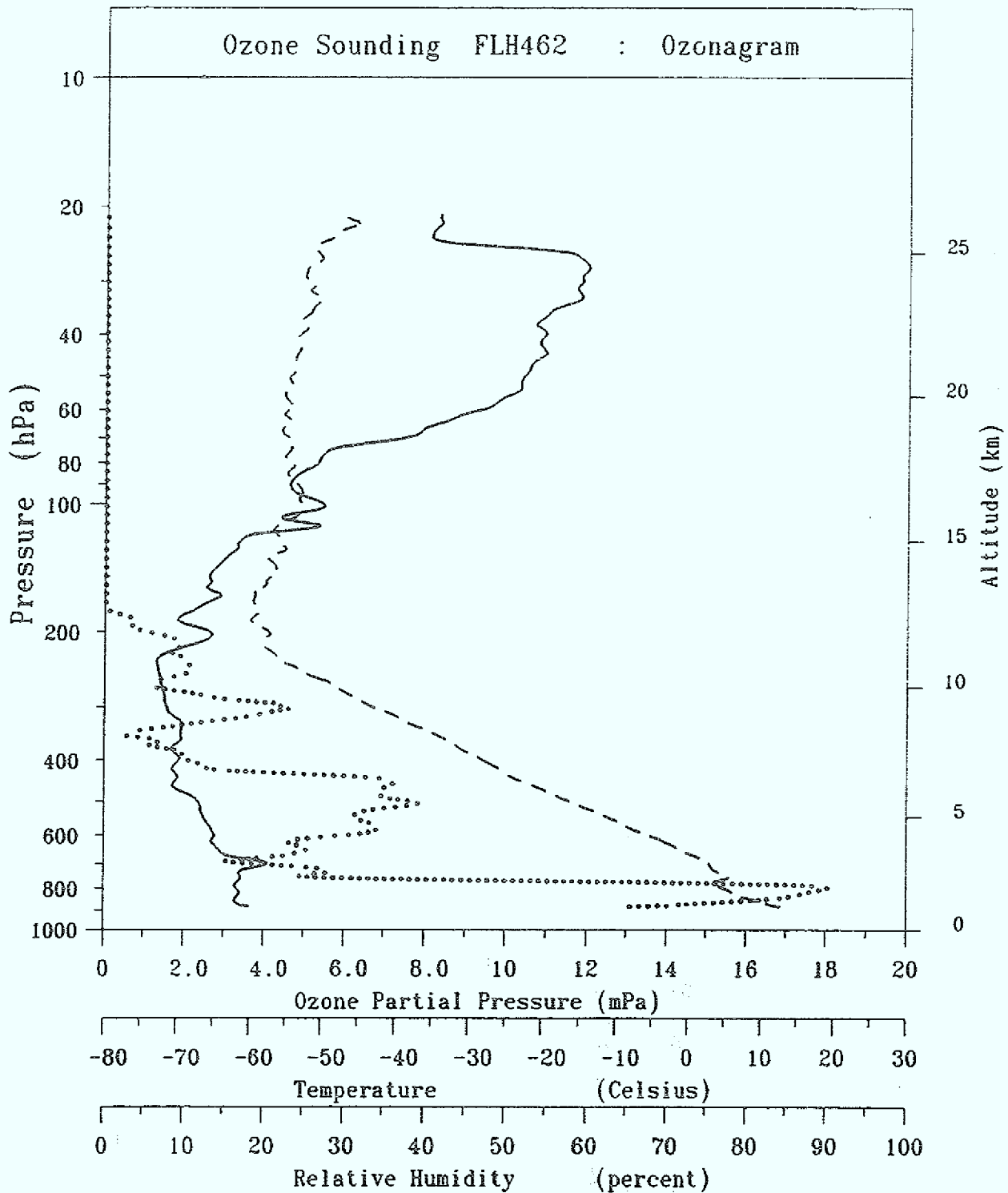
Date 18-09-1992
 Time at launch 09:55 (UTC)
 Location : Schauinsland, FRG

— Ozone
 - - - Temperature
 Relative Humidity

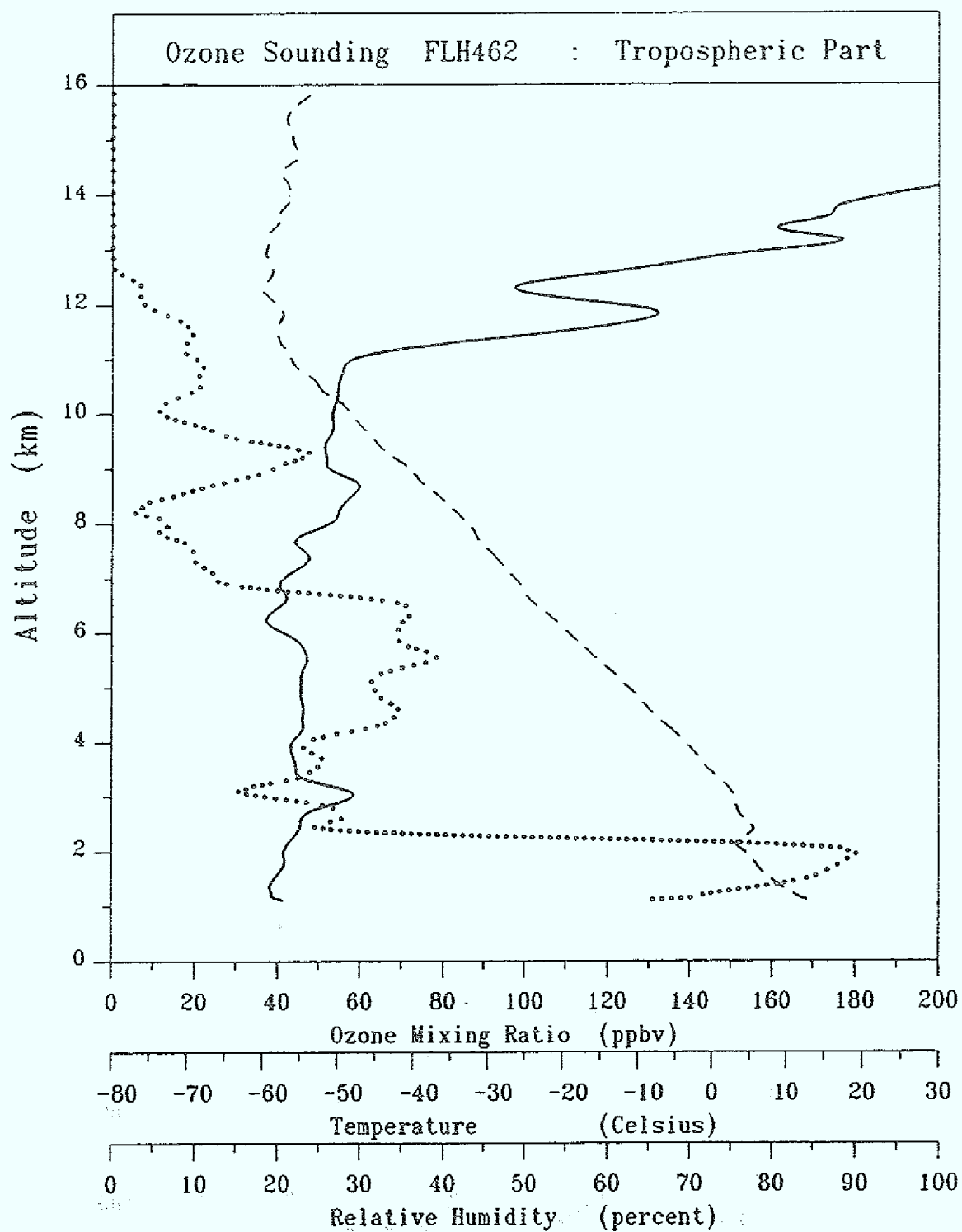


Date 18-09-1992
 Time at launch 09:55 (UTC)
 Location : Schauinsland, FRG

— Ozone
 - - - Temperature
 Relative Humidity

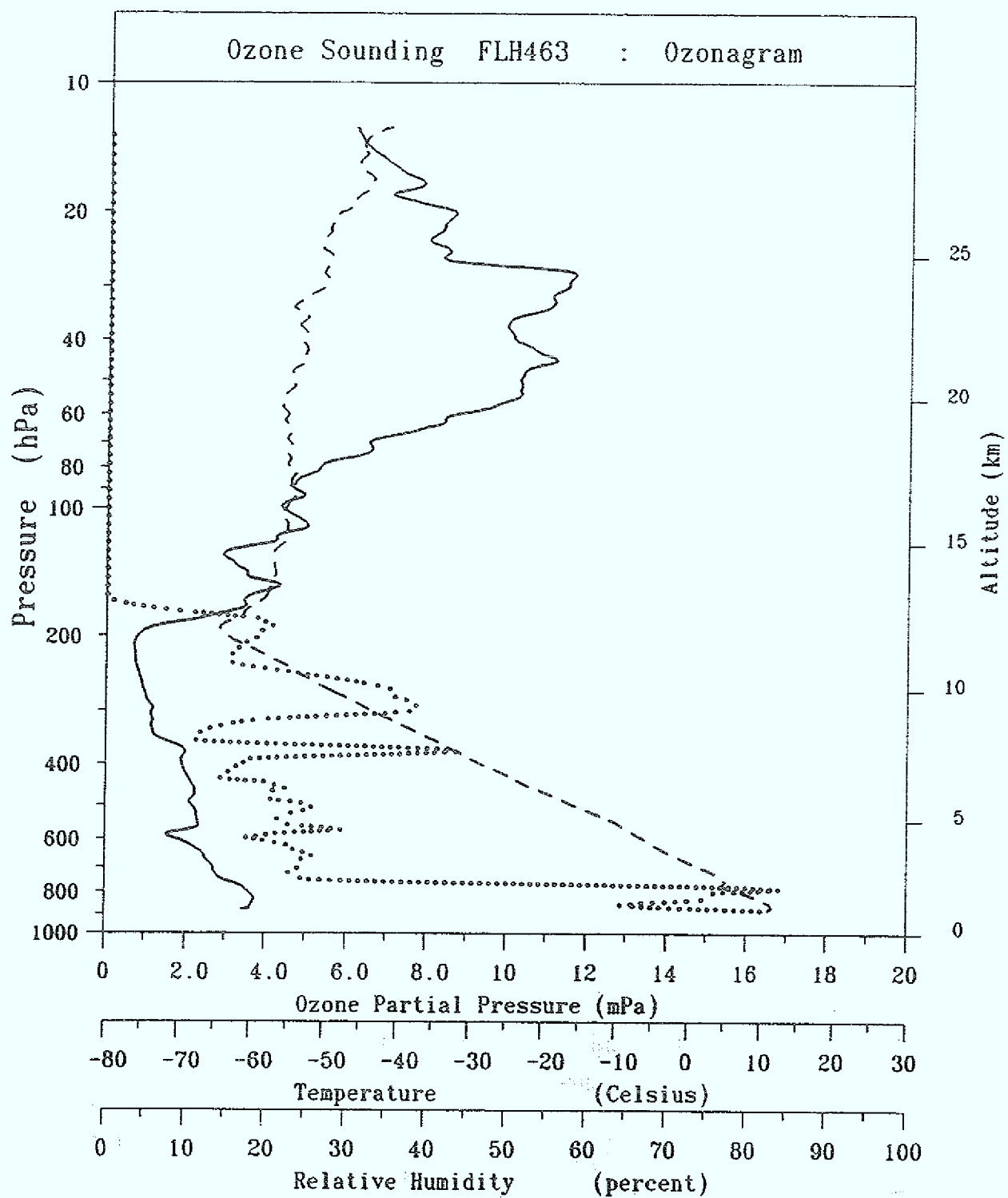


Date	20-09-1992	—	Ozone
Time at launch	08:50 (UTC)	- - -	Temperature
Location : Schauinsland, FRG		.....	Relative Humidity



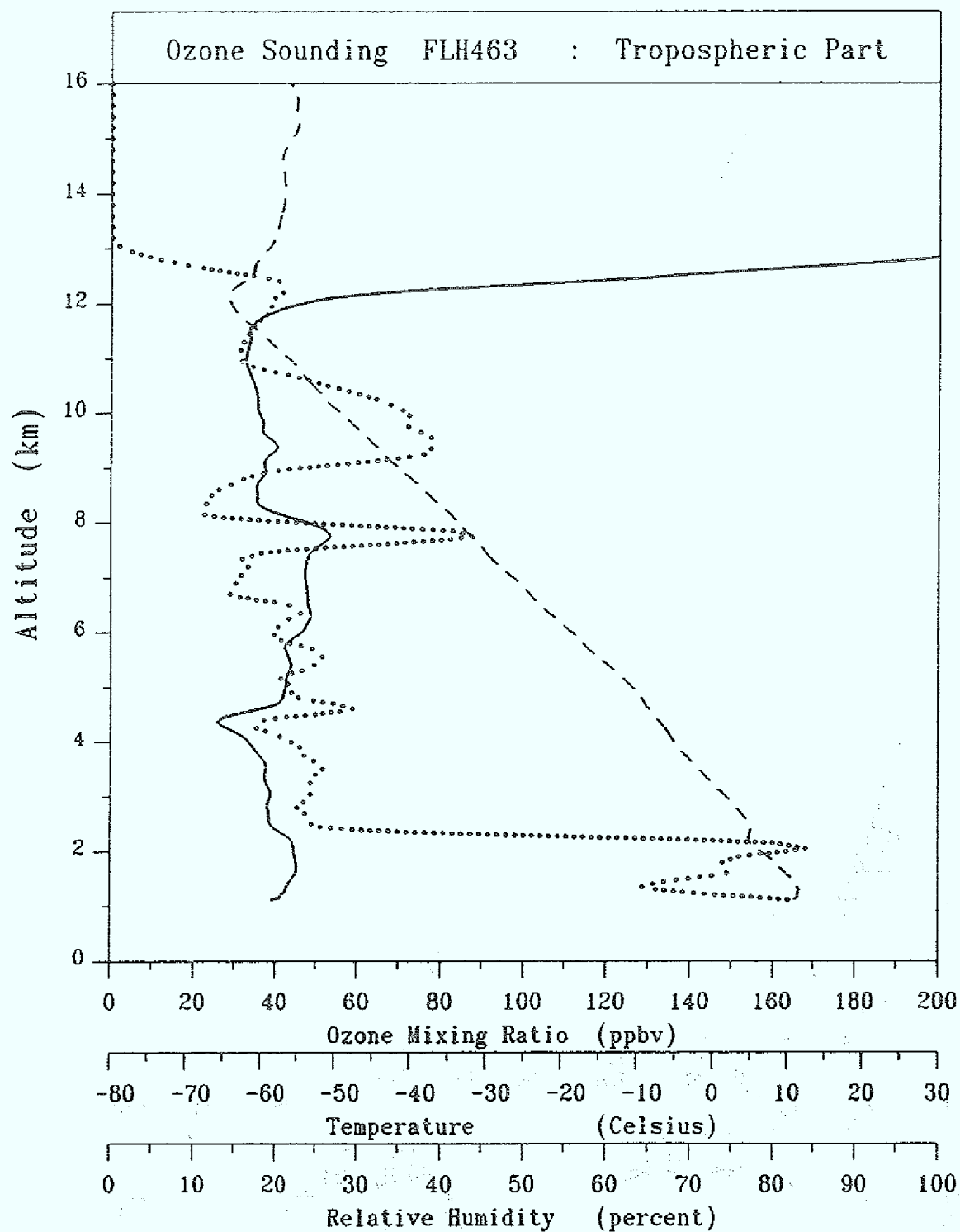
Date 20-09-1992
 Time at launch 08:50 (UTC)
 Location : Schauinsland, FRG

— Ozone
 - - - Temperature
 . . . Relative Humidity

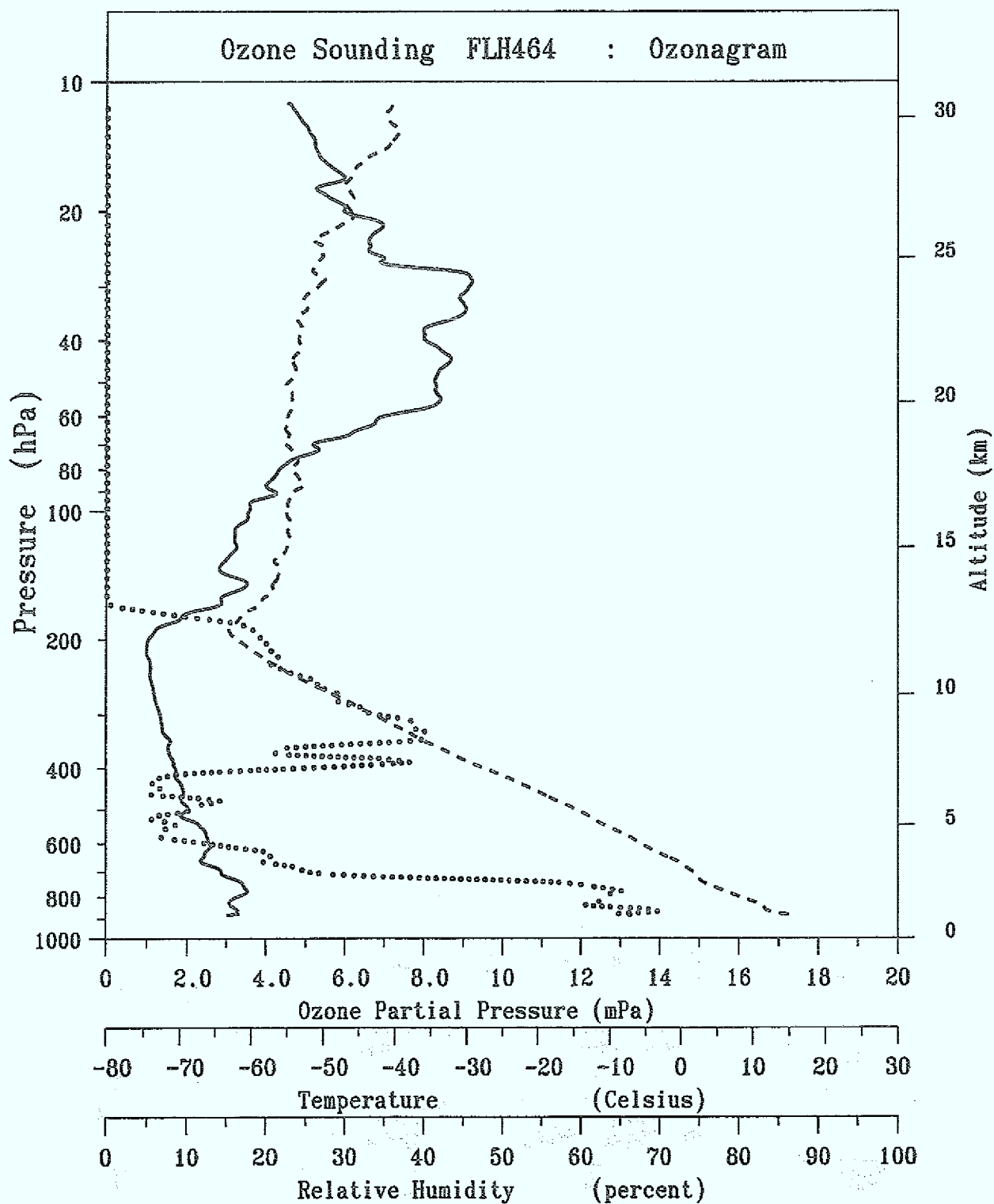


Date 21-09-1992
 Time at launch 05:01 (UTC)
 Location : Schauinsland, FRG

— Ozone
 - - - Temperature
 Relative Humidity

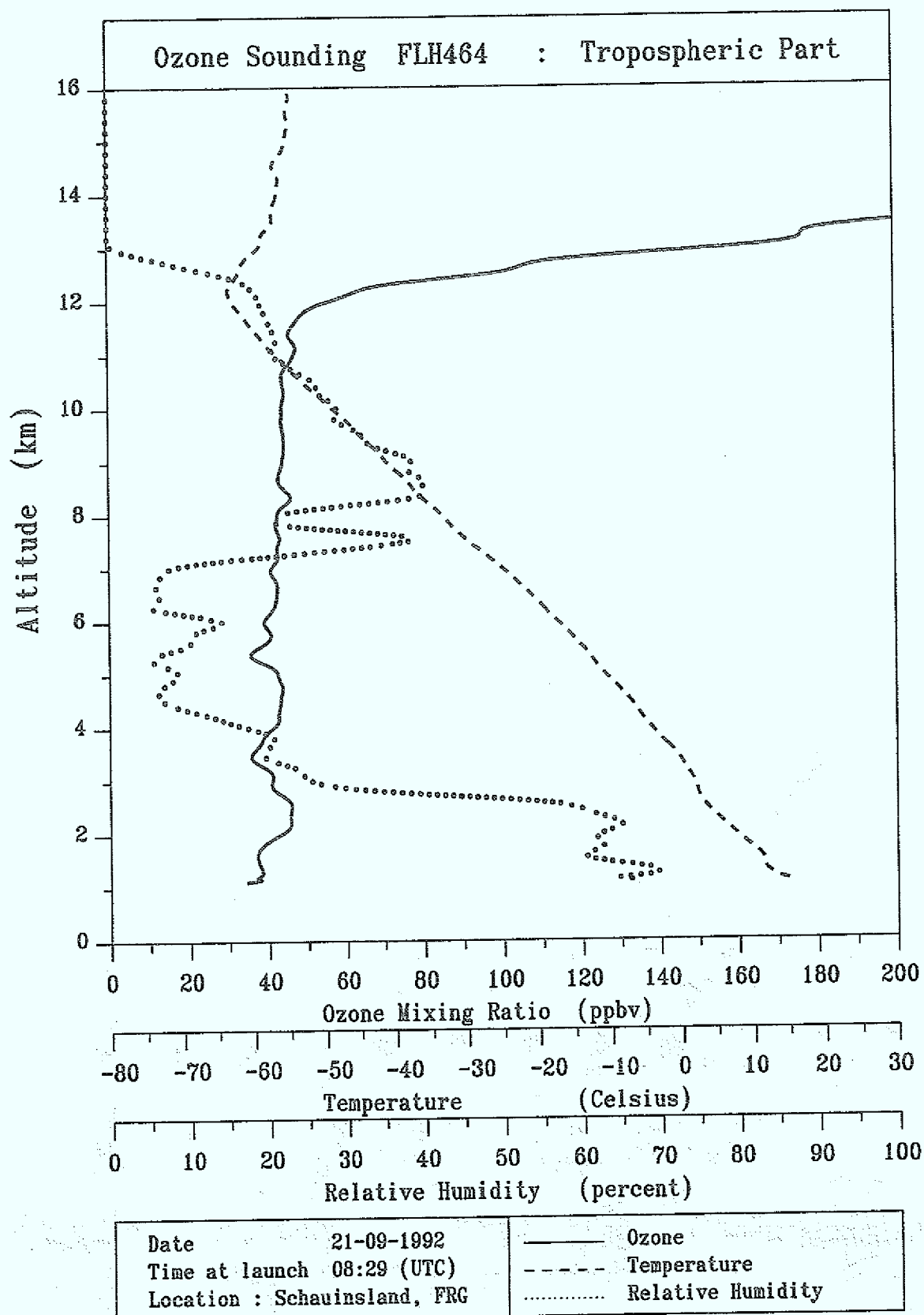


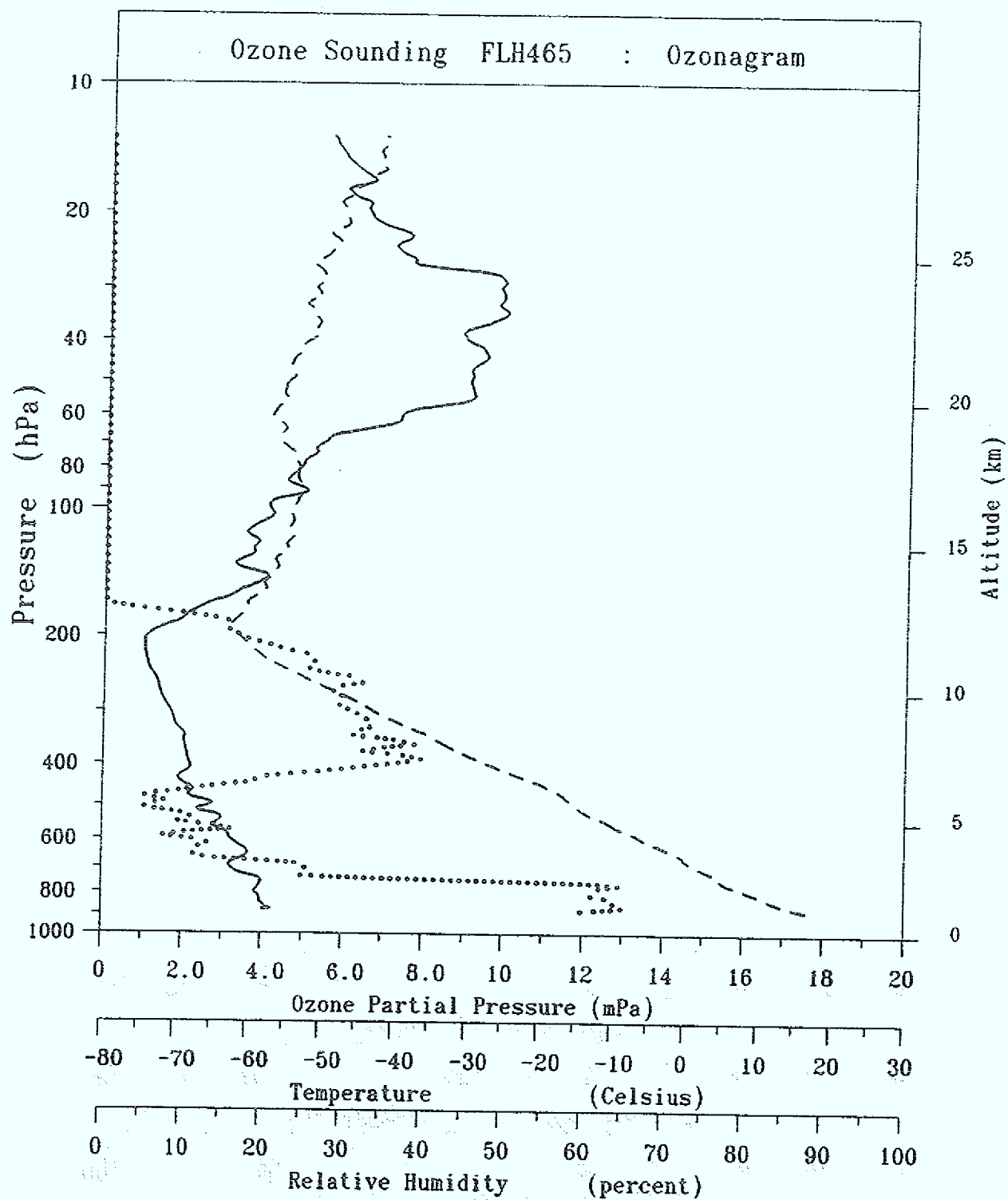
Date	21-09-1992	—	Ozone
Time at launch	05:01 (UTC)	- - -	Temperature
Location : Schauinsland, FRG		.....	Relative Humidity



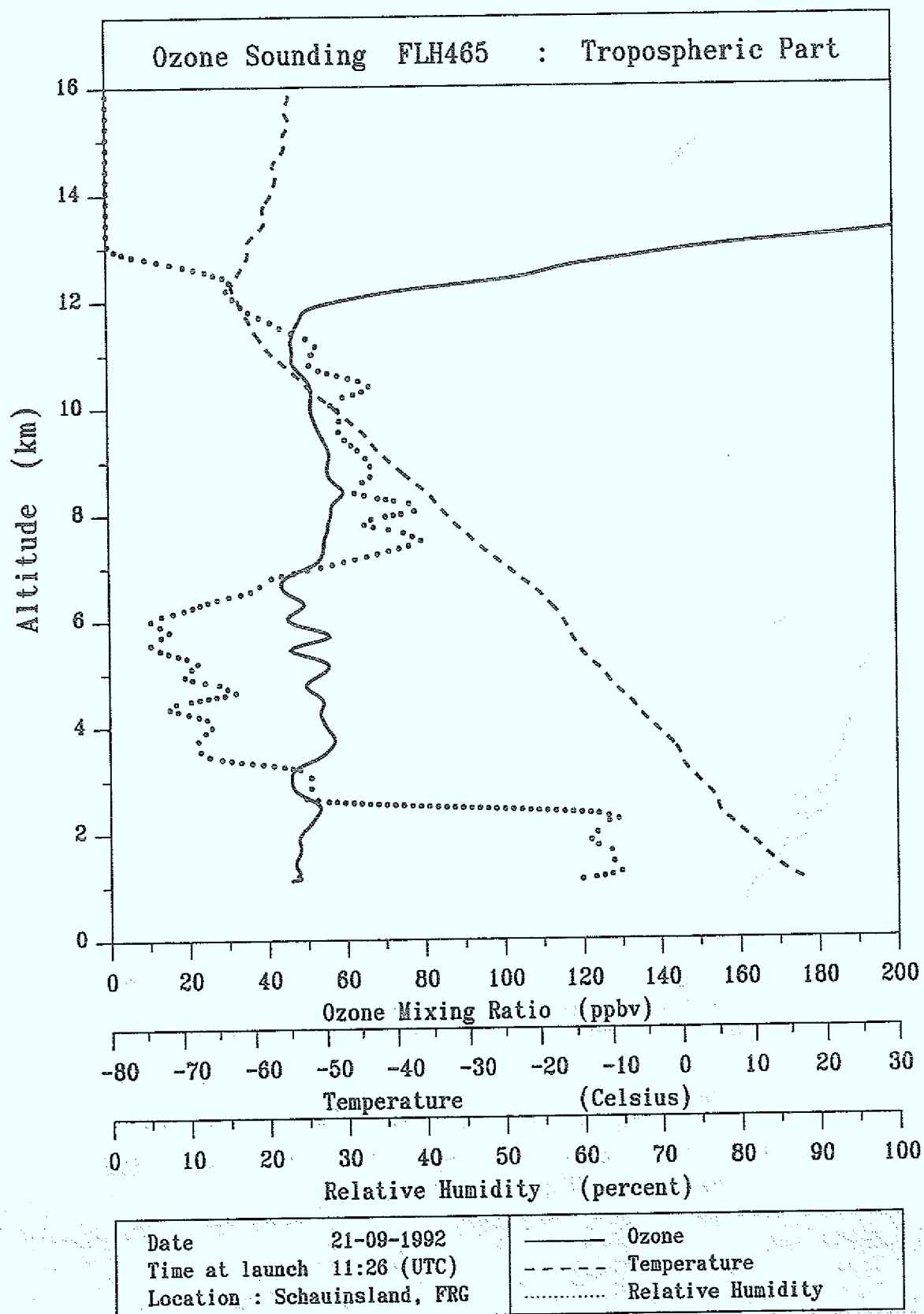
Date 21-09-1992
 Time at launch 08:29 (UTC)
 Location : Schauinsland, FRG

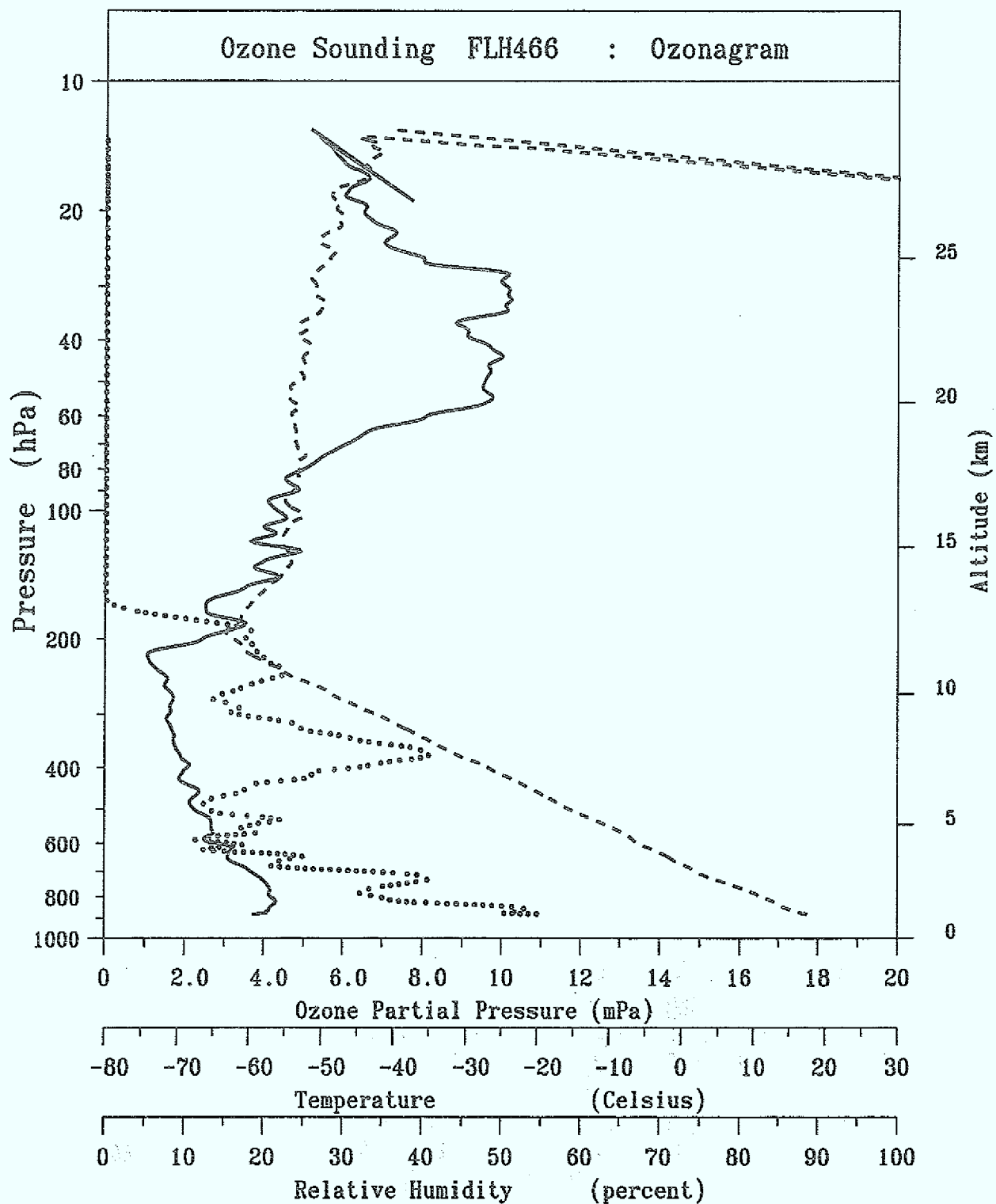
— Ozone
 --- Temperature
 Relative Humidity





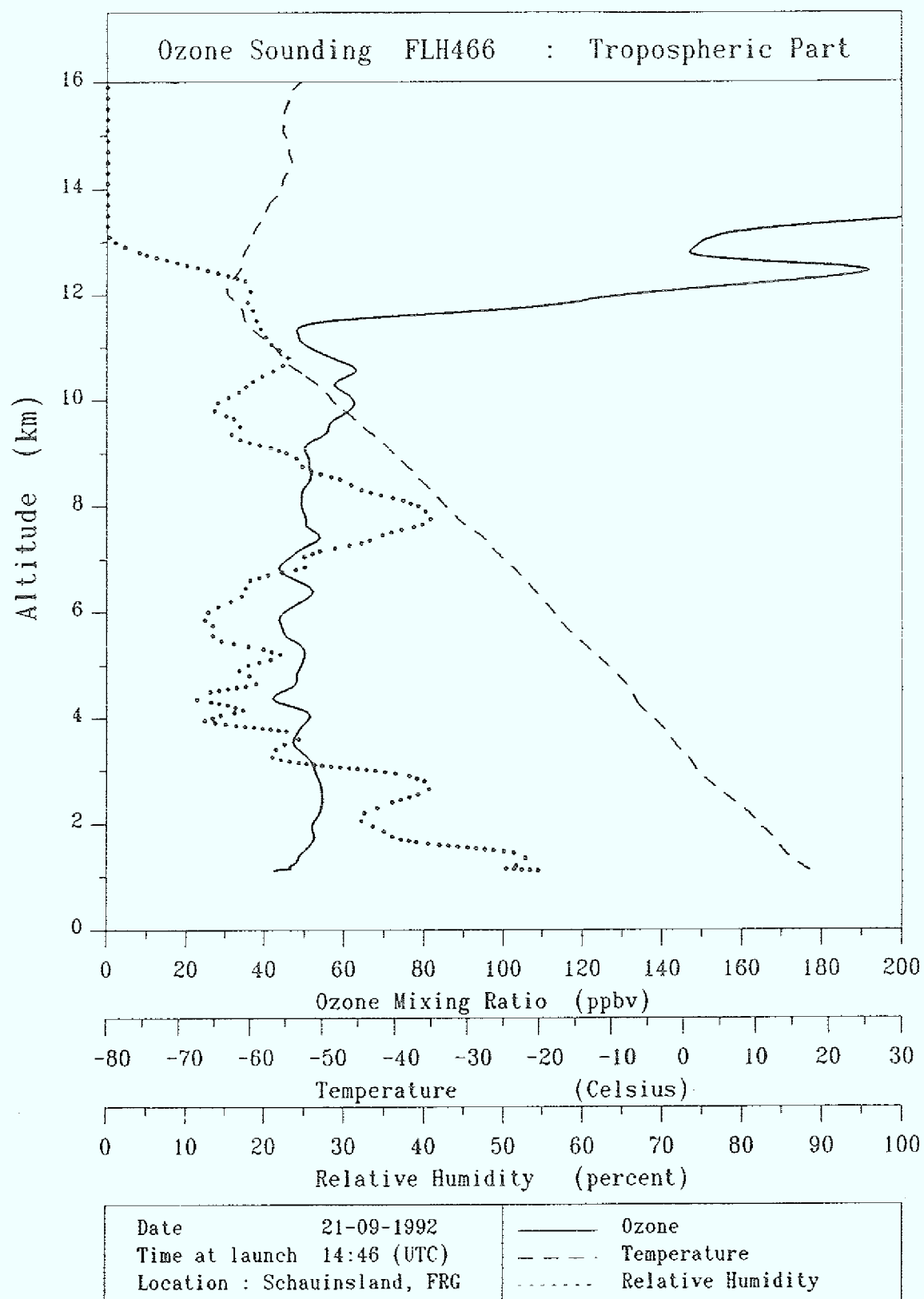
Date	21-09-1992	—	Ozone
Time at launch	11:26 (UTC)	- - -	Temperature
Location	Schauinsland, FRG	.....	Relative Humidity





Date 21-09-1992
 Time at launch 14:46 (UTC)
 Location : Schauinsland, FRG

— Ozone
 --- Temperature
 Relative Humidity



Handwritten text in the middle section of the page, consisting of several lines of cursive script.

Handwritten text at the bottom of the page, including what appears to be a signature and additional notes.

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