

The 2014 MOZAIC–IAGOS 20th Anniversary Scientific Symposium on Atmospheric Composition Observations by Commercial Aircraft

Climate change, weather forecasting, air quality, stratospheric ozone depletion and the oxidising capacity of the atmosphere are a few of the major issues that require detailed, long-term observations of atmospheric chemical composition on a global scale. Since 2004, internationally recognised strategies for integrated global air chemistry observations have underlined the large gap filled by routine in-service aircraft observations. For more than 20 years, the European research projects MOZAIC, CARIBIC and their successor IAGOS¹ have harnessed the potential of in-service aircraft to respond to these needs. With few exceptions, these programmes have been unique² in collecting regular *in situ* observations of reactive gases, greenhouse gases and aerosol concentrations in the upper troposphere/lowermost stratosphere (UTLS) at high spatial resolution. This special issue contains a selection of papers presented at the international symposium held from 12 to 15 May 2014 in Toulouse, France. This compendium serves to describe the IAGOS programme and to highlight the scientific achievements using commercial aircraft as measurement platforms. Observations of atmospheric composition along vertical ascents/descents and along cruise-altitude cross-sections coupled with detailed meteorological and chemical analysis

have yielded many new insights into atmospheric processes and global change. Achievements of these studies include understanding UTLS composition and trends, the long-range transport of air pollutants, control of upper tropospheric humidity and clouds, atmospheric composition in many remote areas, changing climate and air quality. This aircraft research also improves other observations through independent evaluation of satellite and surface-based remote sensing observations and the development of new instrumentation meeting the specific requirements of operation aboard in-service commercial aircraft. As a globally-oriented European Research Infrastructure, IAGOS will provide a long-term framework for generating essential information on the composition of our future Earth. For details, see www.iagos.org/.

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¹MOZAIC (Measurement of OZone and water vapor by Airbus in-service airCRAFT): measurements 1994–2014; CARIBIC (Civil Aircraft for the Regular Investigation of the Atmosphere Based on an Instrument Container): 1997–ongoing, entered IAGOS in 2008; IAGOS (In-service Aircraft for a Global Observing System): 2005–ongoing.

²The only other routine commercial aircraft-based programme focusing mainly on long-lived greenhouse gases is CONTRAIL (Comprehensive Observation Network for TRace Gases by Air-Liner) operated by a Japanese research and airline consortium.