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In-service aircraft for a global observation system

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Understanding the chemistry of our atmosphere and its reaction to human influences is vital in developing global solutions to tackle climate change and air quality. Passenger aircraft provide a unique platform for directly measuring atmospheric composition, particularly in the tropopause region. The MOZAIC programme, which was initiated in 1993 as a cooperation between European Scientific Institutions, Avionic Industry and four European Airlines used five AIRBUS A340 aircraft to monitor atmospheric gases day by day. Starting with measurements of O3 and H2O in 1994, instruments for CO and NOy were added in 2001. Until 2005, MOZAIC has provided data from more than 100 million flight kilometres in the UTLS and 40000 vertical profiles in the troposphere. The data are open to researchers worldwide.

IAGOS (Integration of Routine Aircraft measurements into a Global Observing System) prepares the transition from a scheme of individual research projects into a sustainable infrastructure with enhanced measurement capabilities and global coverage. This will be achieved by developing lighter, smaller and low maintenance instrument packages, based on the former MOZAIC instrumentation, as well as new instrumentation for carbon dioxide, aerosol, and clouds - key unknowns in climate modelling.

Routine observations from passenger aircraft are a key component of IGACO, itself a key element of a new multi-governmental initiative on Global Earth Observations (GEO) with its secretariat at the World Meteorological Organization.

Key findings from MOZAIC are presented, including the abundance of ice supersaturation in the upper troposphere, extreme CO concentrations observed over East Asia and the influence of surface emissions and lightning on the NOy distribution in the UT.