

Global Monitoring of Atmospheric Composition by In-service Aircraft for a Global Observing System (IAGOS)-CORE Aircraft: Current Achievements and Future Developments Including Involvement of U.S. Partners

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The largest uncertainties in our current knowledge on climate change are associated with the complex feedback mechanisms in the climate system, e.g., the amplification of the CO₂-induced greenhouse effect by water vapor and the role of deep convection for transport of gases and aerosol particles into the tropopause region. For reducing uncertainties in climate prediction, climate models require detailed, regular long-term *in situ* observations of atmospheric chemical composition on a global scale.

The European Research Infrastructure IAGOS (www.iagos.org) responds to this increasing request by using in-service aircraft as observation platforms, equipped with instrumentation for measuring gaseous species (O₃, CO, CO₂, CH₄, NO_x, NO_y, H₂O), aerosols and cloud particles. Figure 1 illustrates the destinations of the two new IAGOS-CORE aircraft operated by Lufthansa and China Airlines in 2012 while Figure 2 demonstrates the use of IAGOS data for near-real-time validation of global models in the framework of Monitoring Atmospheric Composition & Climate (MACC) (www.iagos.fr/macc/). Only in January and February 2013, 120 vertical profiles were measured by IAGOS aircraft worldwide with the focus on Europe, Middle and Far East. The envisaged involvement of a U.S. airline will significantly improve the density of the network over North America, moving IAGOS closer to its goal of full global coverage.

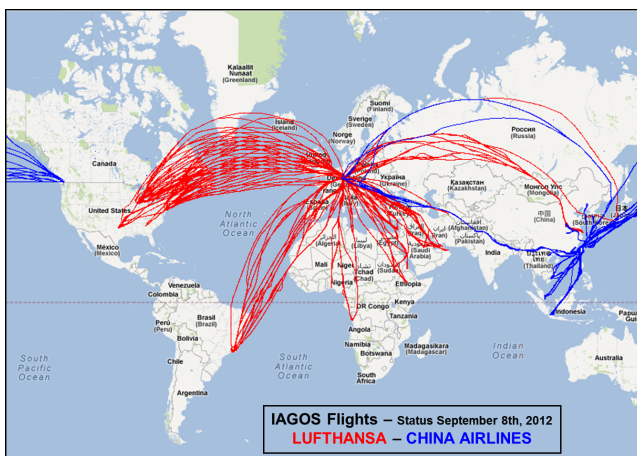


Figure 1. Destinations of IAGOS-CORE aircraft operated.

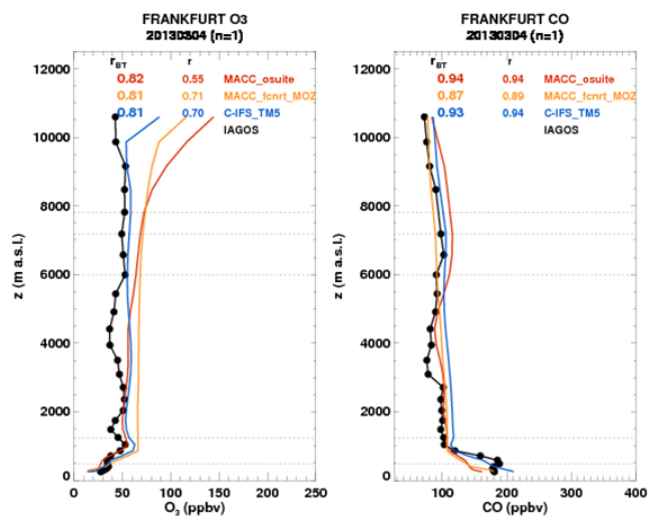


Figure 2. Vertical profiles of O₃ and CO measured by Lufthansa and China Airlines for Year 2012, done by IAGOS-CORE aircraft during the descent to Frankfurt airport and validation runs of MACC models.