



## **Tropospheric ozone trends and carbon monoxide inter-annual variabilities using MOZAIC data (O<sub>3</sub> from 1994-2007, CO from 2002-2007).**

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MOZAIC program (Marenco et al., 1998) is performing 13 years of very accurate O<sub>3</sub>, H<sub>2</sub>O measurements and 6 years for CO with the support of airliners on commercial aircraft. Data from take off and landing for 3 clusters of airports over Germany, East of U.S.A. and Japan with more than 21000 vertical profiles all together and a 50m resolution from ground to 11 km altitude are selected to derive tropospheric ozone trends and on a shorter period carbon monoxide tropospheric inter annual variabilities.

Methodology to access to tropospheric columns as defined in Zbinden et al. (2006) is improved here by taking into account an estimation of the MOZAIC unvisited tropospheric layer up when the tropopause is not reached by the aircraft during ascent or descent phase.

As tropospheric ozone trend is sensitive to tropopause altitude we try to estimate its impact on tropospheric column contents. Defined as the 2pvu potential vorticity surface, we notice a tropopause general increase over the period from +140m over Germany to +680m over Japan and a winter decrease from -80 to -200m.

On one hand, trends from tropospheric O<sub>3</sub> monthly time-series are always positive for O<sub>3</sub> in the range [+0.9, +1.1 %/year] and on the other hand CO inter-annual variabilities are always negative in the range [-2.2, -2.8%/year]. Discussion about stratospheric intrusion contents as pure tropospheric air mass will be excluded from this presentation.

Seasonal aspect of O<sub>3</sub> tropospheric trends exhibits a winter-spring major increase [+0.7, +1.5 %/year] and a minor summer-fall increase [0, +0.8 %/year]. CO inter-annual variabilities seem highly decreasing during summer-fall [-4.5, -1.5 %/year] and during winter-spring inter-annual variabilities is found a minor lessening in the range [0, -2.6%/year].

Contribution of boundary layer, mid-troposphere and upper-troposphere to the tropospheric trends will be detailed. We will also underline the influence of the observational time with a special focus on Germany, most visited by MOZAIC allowing this experience.

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### Références :

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