



LMDZ-INCA a climate chemistry model for the troposphere and stratosphere

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LMDZ-INCA is a coupled Climate-Chemistry Model developed to study the interactions between dynamical, physical and chemical processes in the troposphere and stratosphere and in particular the upper troposphere and lower stratosphere. The model uses 50 vertical levels from the surface to 76 km and an horizontal resolution of 2.5° in latitude and 3.75° in longitude. 63 chemical species are treated with this model.

In this study, we evaluate LMDZ-INCA by making comparisons with the UARS satellite measurements. We use the CLAES (1991-1993), HALOE and MLS (1991-2005) measurements and especially ozone, methane, CFC12, HNO₃, HCl, N₂O, H₂O and NO_x observations. We compare these observations with simulations over several years created using the conditions of the year 1990. We also compared the LMDZ-INCA ozone field with the TOMS observations and vertical ozone sondes profiles.

After this validation work, we have undertaken a long-term model simulation. Our first reference simulation was to reproduce the 1980-2004 period. This simulation is designed to reproduce the well-observed period of the last 25 years during which ozone depletion is well recorded, and allows for a more detailed investigation of the role of natural variability and other atmospheric changes important for ozone balance and trends. This transient simulation includes all anthropogenic and natural forcings based on changes in trace gases, volcanic eruptions, and sea surface temperatures (SSTs). SSTs in this run are based on observations.

The reference simulation is performed within the European project SCOUT O₃ Activity 1 (Ozone, climate and UV predictions). This reference simulation is also performed

in the framework of the ongoing CCMval activity established within the SPARC project.