



## **A preliminary analysis of atmosphere-only high-resolution climate simulations with IPSL-CM**

Thomas Dubos (1), Yann Meurdesoif (3), Abdoul-Khadre Traoré (2), Josefine Ghattas (4), Laurent Fairhead (2), Ehouarn Millour (2), Frédéric Hourdin (2), Francois Lott (2), David Cugnet (2), Jan Polcher (2), Arnaud Caubel (3), Sébastien Fromang (5), Stella Bourdin (3), Marie Sicard (3), Masa Kageyama (3), Pascale Braconnot (3), Olivier Marti (3), and Marie-Alice Foujols (4)

(1) IPSL/LMD, Ecole Polytechnique, Palaiseau, France, (2) IPSL/LMD, CNRS, Paris, France, (3) IPSL/LSCE, CEA, Gif-sur-Yvette, France, (4) IPSL, CNRS, Paris, France, (5) IRFU, CEA, Gif-sur-Yvette, France

The typical resolution used in CMIP-class Earth system models limits, among others, the ability to assess climate risks that are associated with smaller-scale weather phenomena such as tropical cyclones. We introduce higher-resolution atmosphere-only simulations following the HighResMIP Tier1 protocol. A baseline simulation (LMDZ-OR) is run with LMD-Z, the atmospheric component of the IPSL-CM Earth System model, with CMIP6 physics including the land-surface model ORCHIDEE, at a resolution equivalent to 50km at mid-latitudes. Large-scale parallel I/O with on-the-fly data processing is enabled by the XIOS I/O server. In two additional simulations (ICO-LMDZ-OR), the LMD-Z latitude-longitude dynamical core is replaced by the more scalable DYNAMICO dynamical core, using icosahedral-hexagonal meshes with quasi-uniform resolution of 50km and 25km.

We provide a description and preliminary analysis of these simulations. We present the scalability and throughput of LMDZ-OR and ICO-LMDZ-OR. Some differences between LMDZ-OR and ICO-LMDZ-OR with respect to the processing of input datasets, especially orography, are discussed. The climates in LMDZ-OR and ICO-LMDZ-OR simulations at similar resolutions are compared. Dependence on resolution of key climate features is examined.