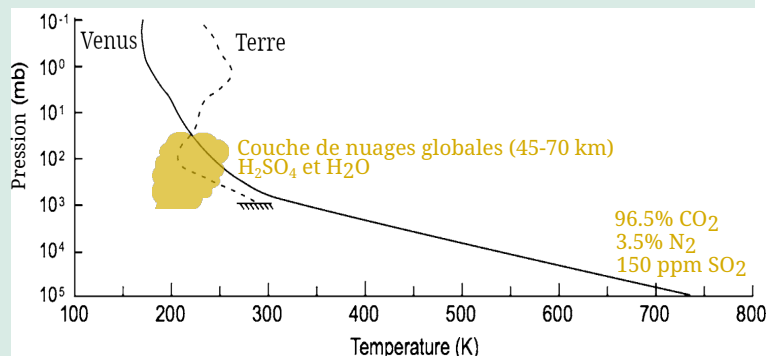


Introduction

Venus is hosting a global sulfuric acid cloud layer between 45 and 70 km which has been investigated by the Venus Express and Akatsuki mission. In this cloud layer, strong turbulence occurs. A 10 km deep convection layer is held in which it remains unclear how this convective cloud layer and mountain waves mix momentum, heat, and chemical species. At cloud-top altitudes, large bow-shape waves stationary above the main equatorial mountain were observed with Akatsuki. The impact on cloud chemistry is not known



Model description

To study the convective layer and the bow-shape waves, a Large Eddy Simulations (LES) model and a mesoscale model have been developed using the Weather-Research Forecast (WRF) non-hydrostatic dynamical core coupled with the IPSL Venus GCM physics package and the photochemistry model. The chemical network has 38 species as well as a simplified microphysics scheme. The LES model has a resolution of 400 m over 60 km, whereas the mesoscale model has a resolution of 40 km, both from the ground to 90 km.

Results

Measure of SO₂ and SO
by VenSpec-U

- First Venus LES with chemistry
- Strong mixing by the convection for species with slow chemical timescale
- Estimation of the vertical eddy diffusivity K_{zz} : several order higher than values prescribed in 1D chemical model
- Estimation of spatial and temporal variability at cloud top for VenSpec-U
- Estimation of spatial and temporal variability at cloud bottom for VenSpec-H
- Estimation of displacement of the cloud bottom boundary altitude by convection
- Estimation of spatial and temporal variability at cloud top for DAVINCI