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Influence of the upper limit altitude on the Earth atmospheric modes modelisation

M. Delatre

Laboratoire Domaines Océaniques, IUEM (delatre@sdt.univ-brest.fr)

The Earth-atmosphere coupling observed after Mt. Pinatubo eruption (1991) triggered new investigations about atmospheric modes and their modelisation. Following the helioseismology studies (Unno *et al* ,1989), Ph. Lognonné *et al* (1998) and N. Kobayashi (2007) used the radiative boundary conditions to model the acoustic atmospheric modes spectrum.

In this study, we investigate the influence of the upper limit altitude in the atmospheric modes spectrum, for acoustic and gravity modes. For that study, we use a new method based on the direct computation of the couple frequency mode - attenuation , implementing a direct integration of the normal modes equations with a Runge-Kutta method ; we consider a perfect fluid atmosphere model, coupled with a standard Earth model.

Using this new tool, we study the spectrum for different upper limit altitudes. We show that, while the trapped modes remain stable with this variation, the radiative modes spectrum is extremely sensitive. This behaviour suggests that future modelisations of atmospheric modes should include the viscosity in the upper atmosphere, in order to get a better stability of the results with the upper limit position.