ACOUSTICS2008/740
Solid-fluid coupling on planets: from seismology to acoustics and beyond

Raphael Garcia[a], Philippe Lognonné[b] and Giovanni Occhipinti[b]
[a]DTP-OMP Univ. Toulouse, 14 Avenue E. Belin, 31400 Toulouse, France
[b]IPGP, 4 avenue de Neptune, 94107 Saint Maur des Fossés, France

On Earth, solid-fluid coupling is responsible for acoustic signals created by quakes or volcanic eruptions which have been observed by infrasonic sensors or through ionospheric perturbations produced by infrasounds. Similarly volcanic explosions, ocean surface waves and ocean internal gravity waves are producing seismic signals. A specific normal mode coupling theory has been developed for the whole solid/ocean/atmosphere Earth system in order to model these phenomena. Recent developments for the observation and modeling of the infrasonic waves created by quakes and tsunamis have focused on the ionospheric perturbations produced by the exponential amplification of vertically propagating infrasonic and gravity waves. On Earth, these tools are particularly interesting for the observation of seismic surface waves and tsunamis in the open ocean where sensors are not present. However, the interest is even stronger to infer the internal structure of planets for which the deployment of seismometers is almost impossible. Theoretical modeling of solid/atmosphere coupling on Venus is presented, including open questions concerning the attenuation of infrasounds by Venus atmosphere. An attempt to observe quake signals with VIRTIS instrument on board Venus Express ESA mission is also described. Finally, a mission analysis tool and other ideas for future planetary investigations of atmospheric acoustic normal modes are discussed.