Geophysical Research Abstracts
Vol. 18, EGU2016-6111, 2016
EGU General Assembly 2016

Comparing hydroacoustic and T-phases from terrestrial and ocean-bottom recordings around La Réunion Island, Indian Ocean

Branwen Snelling (1), Karin Sigloch (1), Guilhem Barruol (2), and Valérie Ferrazzini (3)

(1) University of Oxford, Department of Earth Sciences, Oxford, United Kingdom, (2) Laboratoire GéoSciences Réunion, Université de La Réunion, Institut de Physique du Globe de Paris, Paris, (3) Observatoire Volcanologique du Piton de la Fournaise, Institut de Physique du Globe de Paris, Paris

A survey of hydroacoustic signals detected on an array of 57 OBS stations in the Indian Ocean is presented. The OBSs were capable of recording broadband signals (0.01 Hz to 25 Hz). They covered a diverse geological setting, and ranged to depths as great as 5500 m. Once hydroacoustic phases were identified they were cross referenced with an earthquake catalogue in order to confirm their association with seismic activity. The results of this survey revealed 20 hydroacoustic events throughout the 13-month dataset, which were detected at 20 or more stations in the OBS network. The characteristics of these hydroacoustic signals were compared to the characteristics of T-phases, which propagated through the SOFAR channel to a coast-proximal seismic land station on La Réunion island. The waveforms, durations, and spectral contents of hydroacoustic and T-phase signals were similar. A power comparison revealed that the magnitudes of T-phases at the island stations were up to two orders of magnitude greater than the magnitudes of hydroacoustic arrivals at OBS stations at a similar distance from the seismic event. Despite this, hydroacoustic phases were observed on the OBS stations up to 10,000 km distance. A modeling investigation attempted to constrain the propagation mechanism by which hydroacoustic energy was reaching the deep ocean. Ray tracing revealed that in order for a ray to contribute energy to an arrival at an OBS it would have to reflect or diffract at extreme water depths, below the SOFAR waveguide. These observations imply that hydroacoustic arrivals on OBS stations can be used over teleseismic ranges just like T-phase observations on land-based stations and hydrophones. A better understanding of the propagation mechanism of this energy to the deep ocean will be necessary to exploit their full potential.