

In between known earthquakes: Characteristics long period earthquakes from oceanic ridges and ultra-low frequency volcanic tremors

Piero Poli

ISTerre - University of Grenoble

Are we recording all the possible signals that Earth dynamics processes can produce? To answer this question I performed a scan of 20 years continuously recorded seismic data, all over the globe, in search for unknown signals, which escape to routinely applied detection techniques. The method I apply, is an envelope based empirical template matching which can detect various kind of signals, together with their position and occurrence time. This method is well suited to retrieve known seismic events, nevertheless, when catalogued earthquakes are removed, I still have ~ 7000 unknown events. Most of them occur along complex oceanic ridges (e.g. sharp change of direction, triple junctions) other are observed along large volcanic areas (e.g. Comoros islands, Society Hot spot, Southern Italy). Classification of these new signals based on frequency content and waveforms properties, revealed different classes of events. For example oceanic ridge events are enhanced in long period waves, and are characterized by a quasi-periodic recurrence time. Volcanic events, on the other hand, show a resonant-like spectrum at very low frequency, and occur in burst, with recurrence time of ~ 10 days. These thousands of new 'earthquakes' will help us to unravel novel or poorly known aspect plate tectonic and volcanism physical processes.