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Regional Tomography targetting mantle plumes by waveform inversion: the case of la Réunion Island

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The mantle plumes, their origin, their surface signature (as hotspots) and their role in global geodynamics are considered as one of the "last frontier" challenges in Earth sciences. To first order, seimsic and volcanic activities are well understood by plate tectonics. But mantle plumes cannot be explained by plate tectonics. Their birth, life and death play a fundamental role on the evolution of biological life on Earth, on plate tectonics reorganization. In that respect, La Réunion island is one of the largest hotspot on Earth. Its birth, 65Ma ago, creating the Deccan volcanic traps in India (almost 1million km^2) are associated with the Cretaceous-Tertiary boundary and might have provoked the disappearance of more than 90% of life on Earth (including dinosaurs). However, the deep structure of this geological object and the exact geometry of volcanic plumes are still the subject of controversies. The use of seismic data acquired by the French-German RHUM-RUM experiment in the Indian ocean around La Reunion volcanic hostpot (2012-2016) and the collection of broadband seismic data by Incorporated Research Institution for Seismology (IRIS) enable us to investigate the deep structure of La Réunion Plume along its complete track from its birth to its present stage in the Indian Ocean around La Reunion. The recent progress in inversion techniques enables a better resolution of these structures, by taking into account the full information of seismograms. We present preliminary results with an enhanced resolution in the transition zone (410-660 km) .