



## **Spatial distribution of scatterers in the crust by inversion analysis of seismic coda envelopes: a case study of Gauribidanur seismic array site (southern India) and Galeras volcano (Colombia)**

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The three-dimensional spatial distribution of relative scattering coefficients in southern India and Galeras volcano is estimated by means of an inversion technique applied to coda wave envelopes. The inversion analysis was performed for the first time in this kind of seismological research by means of the Simultaneous Iterative Reconstruction Technique (SIRT) and Filtered Back-Projection method (FBP). Whereas the first one allows to obtain more exact solutions, the second one is a much faster non-iterative algorithm that has proved to provide very accurate reconstructions.

Results for the Gauribidanur seismic array site (GBA) are almost independent of the inversion method used. They show a remarkably uniform distribution of the scattering strength in the crust around GBA. However, a shallow (0-24 km) strong scattering structure, which is only visible at low frequencies, seems to coincide with the Closepet granitic batholith which is the boundary between the eastern and western parts of the Dharwar craton.

On the contrary, the Galeras volcano region reveals a highly non-uniform distribution of relative scattering coefficients. Strong scatterers show frequency dependence, which is interpreted in terms of the scale of the heterogeneities producing scattering. Two zones of strong scattering are detected: the shallower one is located at a depth from 4 km to 8 km under the summit whereas the deeper one is imaged at a depth of  $\sim 37$  km from the Earth's surface. Both zones may be correlated with the magmatic

plumbing system beneath Galeras volcano. The second strong scattering zone may be probably related to the deeper magma reservoir that feeds the system.

We conclude that the method proposed may be an effective approach to image the location of heterogeneities in the crust.