A method to retrieve an improved high resolution reflection response from HiCLIMB array recordings of local earthquake scattering coda (PPT)

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Abstract content:

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We discuss a method to interferometrically retrieve the body wave reflection response from local high-frequency scattering coda wave fields with the purpose to obtain an input dataset suitable for the application of advanced exploration-type imaging methods. An image derived from a reflection response with a well constrained virtual source would provide deterministic impedance contrasts, which can complement transmission/refraction tomographies. Scattering coda forms a diffusive and isotropic wave field and is sensitive to smaller scale variations, compared to the ballistic part of the earthquake response. The illumination properties of this wavefield strongly rely on the physical properties and characteristic length scales of the heterogeneous subsurface. We have numerically generated scattering coda for a wide variety of 2D models, which has allowed us to establish a relationship between the accuracy, resolution and depth sensitivity of the retrieved reflection response and specific properties of the scattering medium. Examples of these properties are the crustal thickness, Moho reflectivity and the scattering mean free path. It is known that these properties determine the decay of the intensity of the coda with time, as quantified by the coda attenuation factor. In the past, this coda attenuation factor has been mapped over the surface of several areas worldwide. We have decided to work with a dataset acquired by the HiCLIMB array which crosses the border from Nepal to Tibet. The small inter-receiver distance of the array and the coda attenuation factor of the area meet our established requirements for retrieving an accurate and high resolution reflection response.

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Keywords:
scattering coda interferometry scattering mean free path reflection response impedance contrasts advanced exploration-type imaging coda attenuation factor HiCLIMB array

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