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# Seismic velocities and change in fluid pressure along the Ecuador interplate décollement by 2D quantitative imaging

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Few studies involving forward modeling and inversion of multichannel seismic reflection data have been carried out to constrain seismic velocity enhancement due to fluids inside and below the interplate decollement and the presence of a low velocity zone associated with fluids in the sediment beneath it. In particular, the small scale velocities inside and below the decollement reservoir are still poorly known. To analyse the physical properties along the decollement we develop an improvement of our previous work based on conventional preserved amplitude prestack depth migration/inversion (PSDM) coupled with a specific post-processing of the tomographic model. The specific post-processing sequence allows us to: (1) mitigate effects of limited source bandwith and source-receiver aperture range from the tomographic images; (2) obtain the absolute values of the seismic attributes; (3) obtain the correct geometry of seismic reflectors reaching the theoretical seismic resolution of the source wavelet. Unlike our previous work, during the post-processing sequence the model space exploration is made automatically via a random search, and optimal models are determined using the very fast simulated annealing algorithm. We present an application to multichannel seismic reflection data to obtain 2-dimensional quantitative imaging of the decollement on a seismic profile cutting across the Ecuador subduction zone. Preliminary results suggest that the decollement corresponds to a 80 meters-thick layer, with a negative velocity perturbation ˜ -50 m/s that can locally reach values as low as -150m/s. Along the decollement we can observe regions with a relative velocity decrease due to the variations of the physical properties between the subducted sediments and the overriding plate materials. The relative velocity decrease can probably be associated with a change in fluid pressure.