Imaging deep reflectors in the zone of the 1958 (Mw 7.7) Ecuador subduction earthquake : Integrated inversion of MCS and wide-angle data for a better estimation of the velocity macro-model

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One of the most challenging task in exploration seismology is to estimate, with a required level of accuracy, the propagation velocities of seismic waves within the earth. Accurate velocity information is the basis of many processing and interpretation situations. For instance, it is well known that during the depth migration process, errors in the velocity macro-model not only misrepresent the depth of reflectors but also distort their images and modify their amplitudes (a serious restriction to perform quantitative imaging). In most of practical cases, velocity information is obtained entirely from MCS data. However, the acquisition geometry of MCS, characterized by nearly vertical propagation, represents an inherent limitation to its ability to estimate deep velocities. In contrast, wide-angle reflexion/refraction acquisition geometry allows to record reflected and refracted waves with a much wider range of incident angles and provides better constrained deep velocities. In this work we want to emphasize about the intrinsic limitation of velocity macro-model estimation based on MCS data only. We will aim to demonstrate that wide-angle data is an alternative to improve the accuracy of the deep part of the velocity macro-model and we shall propose a procedure to combine MCS and wide-angle derived velocities to improve depth migration with an application to a marine case study in a geological complex area near to the 1958 (Mw 7.7) Ecuador subduction earthquake (see the companion paper entitled "Subduction channel, Inherited crustal structures and the 1958 (Mw 7.7) Ecuador subduction earthquake." by Collot et al.).