

Interactive comment on “3D Seismic Traveltime Tomography Validation of a Detailed Subsurface Model: The case study of the Zancara River Basin (Cuenca, Spain)” by David Marti et al.

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- General comments - The paper uses a dense traveltime refraction dataset to map lithology. Model development part of the paper is strong. Quantitative interpretation part of the paper (Fig. 6 onwards) is weak. Specific comments - The Vp - lithology relation has been built using a series of logs. This is not wrong, just limited in its scope. Logs have a higher resolution than the Vp model. To reconcile logs with the traveltime Vp, authors have averaged the logs within a window and resampled it again. This is

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Discussion paper



a good qualitative approach, not quantitative. Running average is not the same as Backus average, but this is just a minor issue.

Authors will appreciate averaging creates uncertainty. The sense of uncertainty in quantitative interpretation is missing. I suggest approaching quantitative interpretation in one of two ways. Either, develop a rock physics model for individual lithologies or present Fig. 7 - 9 in a probabilistic sense (what is the probability of a certain point in space to correspond to a certain lithology). Authors have everything they need for both approaches. - All the best

One of the main goals of this manuscript was to test the capabilities and the limitations of the guided interpretation of the tomographic model to define structural features such as lithological boundaries. This guided interpretation was mainly based on logging data which was used to define the different lithotypes to be upscaled to the 3D tomographic velocity model. Unfortunately, one of the main problem was the incompleteness of the velocity logs in most of the boreholes (except SVC-6) in their upper part. This fact basically affected the gypsiferous lutites (LT) underestimating the velocity range given to this lithology and introducing a high ambiguity in the LT-Ytr boundary definition but also to differentiate . In addition to that, the bias imposed by the boreholes, located mainly in the central part of the survey, had also a significant impact in the velocity range definition and mismatch observed between the geological interpolated model and the tomography.

For these reasons, the guided interpretation presented in this manuscript is following a qualitative approach. We believe that a rigorous uncertainty analysis is difficult to carry out taking into account the inconsistency in the velocity log data and this approach is beyond the scope of this manuscript. We suggest to modify the figures showing the guided velocity interpretation in order to emphasize those ambiguity areas (velocity ranges) that have not been assigned to any of these upper lithologies (LT and Ytr).

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