

## WS18 P13

# Velocities in imaging and stratigraphic inversion: new opportunities for integration

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## Summary

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For long in seismic processing, velocity model building and depth migration/inversion have produced information on the subsurface velocity model with no overlap in terms of resolved vertical wavelengths. The uncovered wavelengths, among which the famous mid wavenumber gap, had then to be recovered in stratigraphic inversion with constraints from external information such as borehole data. The recent progresses in acquisitions (long offset and low frequency) and imaging tools had significantly closed this gap and started to make a wavenumber overlap possible between different processing/imaging/ inversion approaches. For example, high-resolution tomography has reported to reach an unprecedented vertical resolution up to 6 Hz, which is directly overlapping with the stratigraphic inversion of images from broadband data with low frequencies down to 2.5 Hz. Furthermore, in the area investigated by recorded diving waves, FWI potentially recovers the full range of vertical wavenumbers and thus overlaps with the resolution of both high-resolution tomography and stratigraphic inversion.

This new status has motivated investigations about improved ways of integrating these sources of information. We review here several of these attempts that allow various approaches for the benefits of reliability and interpretability of the results.

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This new status has motivated investigations about improved ways of integrating these sources of information. We review here several of these attempts that allow various approaches for the benefits of reliability and interpretability of the results. The estimation of uncertainties in ray based tomography is a precious add on for assessing the reliability of the final result of the imaging/inversion workflow.