

Diffuse mantle upwelling and melts accumulation beneath the Italian Apennines

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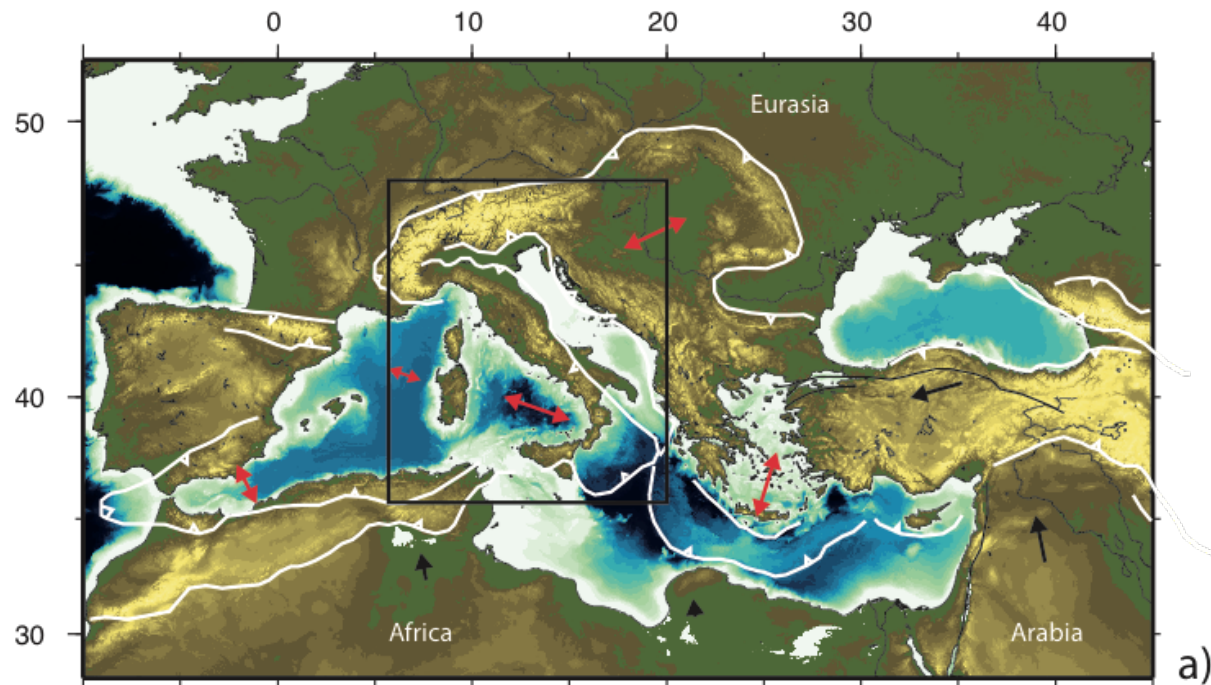
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INTRODUCTION

We present new observations on the structure of the uppermost mantle beneath the Apennines belt of Italy.

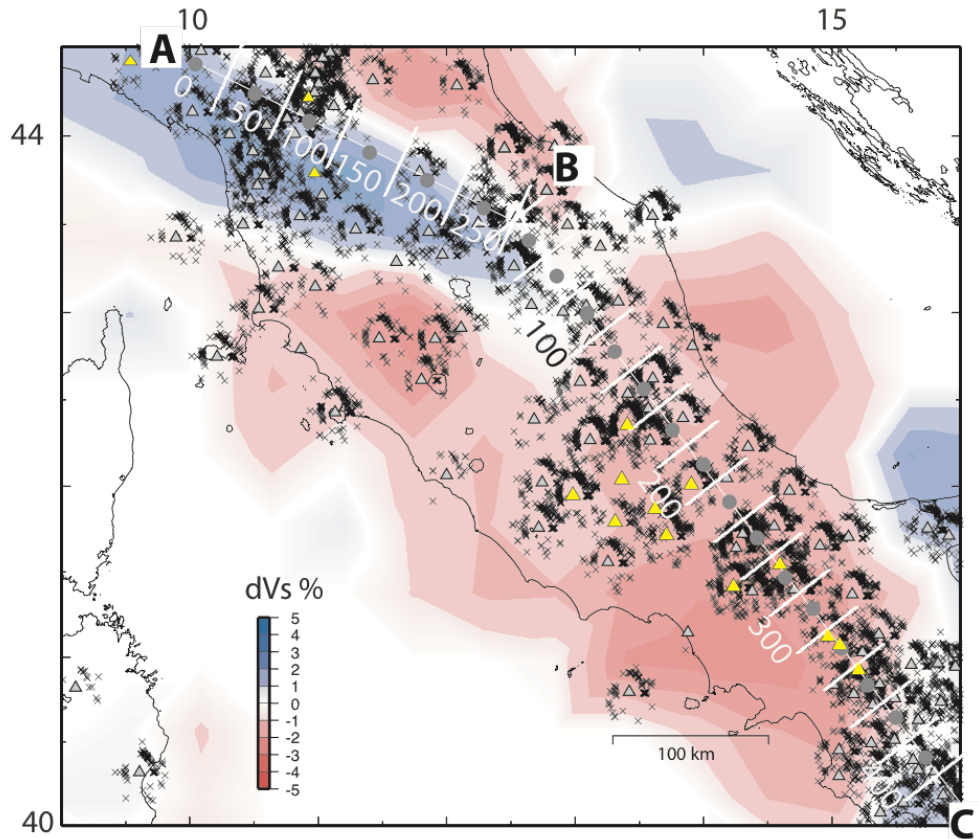
Receiver functions and seismic tomography consistently define a broad zone in the shallow mantle beneath the mountain belt where the shear wave velocities are lower than about 5% and the V_p/V_s ratio is higher than 3%.

We interpret these anomalies as a pronounced mantle upwelling with accumulation of melts underneath the belt, on top of which extensional seismicity responds to the crustal bending

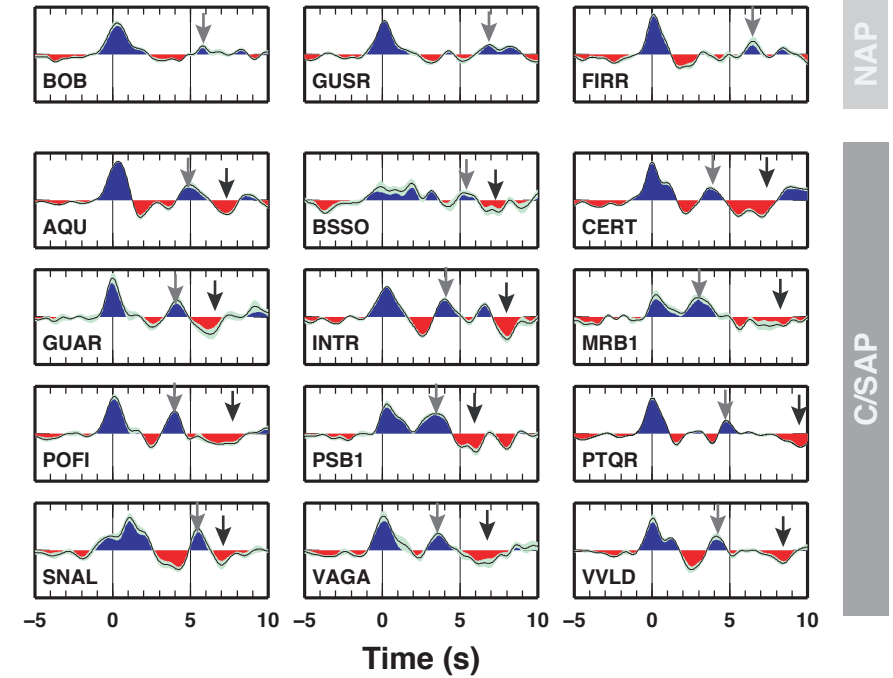


Map of the Mediterranean region showing the main compressional fronts (white lines), the direction of stretching of back-arc basins (red arrows), and the general direction of major plates (with respect to a fixed Eurasia).

DATA

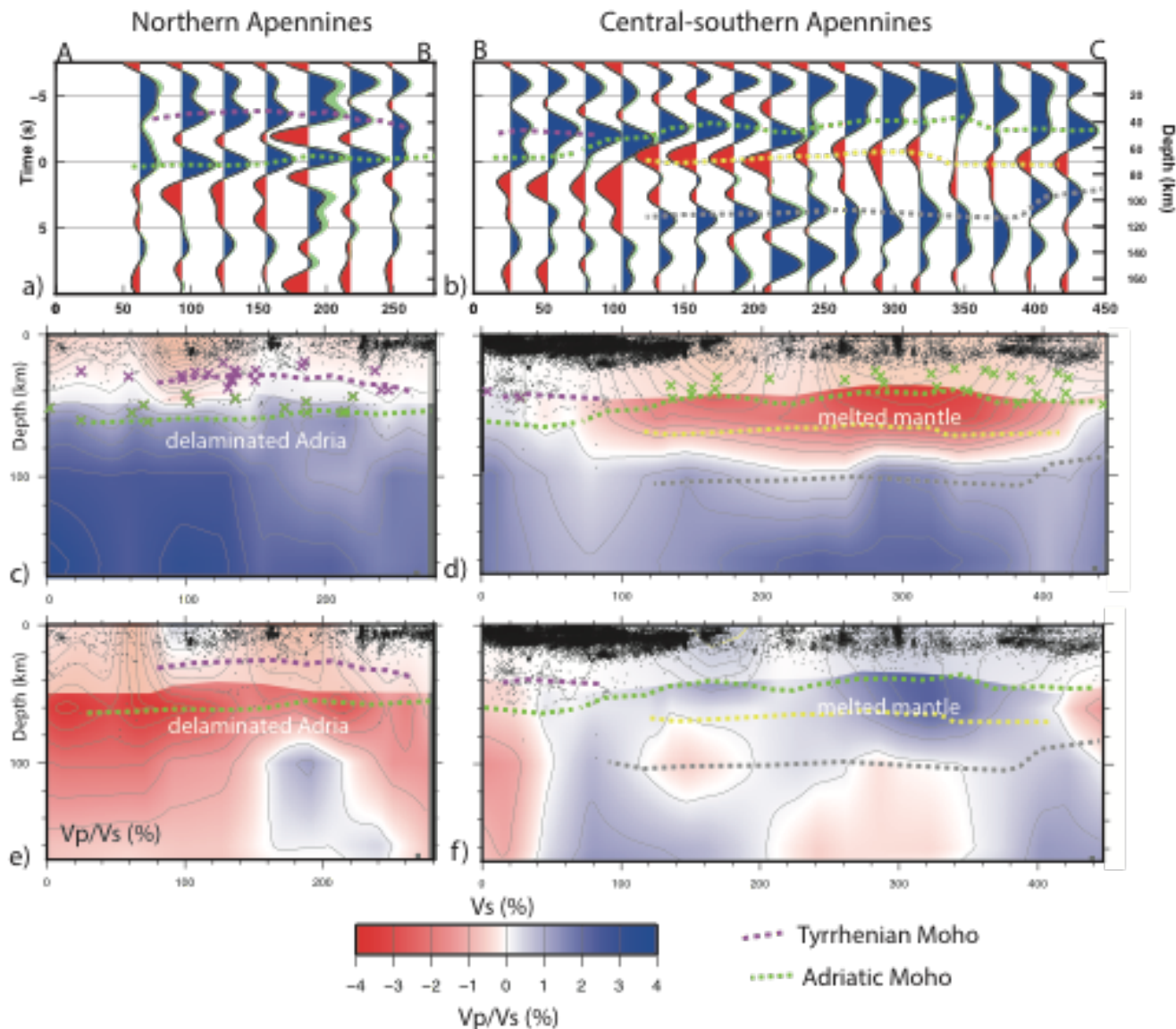


Vs anomalies of the uppermost mantle from the tomographic model by Giacomuzzi et al. (2012), at 120 km depth. The central Apennines show low velocity anomalies, while the northern show Apennines a high velocity anomaly.



RF computed at station in the Northern Apennines (NAP) and Central-Southern Apennines (C/SAP) showing the main RF pulses generated by discontinuities within the lithosphere. Gray arrows indicate the Moho discontinuity (both NAP and C/SAP); black arrows highlight a the negative phase which is detected in the C/SAP stations only.

INTERPRETATION



Velocity profile of the Vs structure as defined by RF stacking for the northern (a) and central-southern Apennines (b). Dashed lines are interpreted as: Adria Moho (green), Tyrrhenian Moho (purple), uppermost mantle low Vs (yellow), high Vs detached lithosphere (gray). Velocity profiles of Vs (c, d) and Vp/Vs (e, f) from the tomography model by Giacomuzzi et al. (2012). Seismicity occurring at +/- 30 km from the line is taken from Chiarabba et al., (2015). Crosses are the Moho depth from Piana Agostinetti and Amato (2009) and Piana Agostinetti (2015), green=Tyrrhenian neo-formed Moho, purple=Adria Moho. Note the bumping of seismicity on top of the low Vs anomaly