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Crustal movements in northeastern Italy from permanent GPS stations

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The horizontal absolute motion vectors of northeastern Italy, obtained from the GPS data of a permanent network are compared to the NUVEL1A NNR plate motion model. The results indicate that these sites are moving faster than predicted by the model and with azimuths slightly more northward oriented. The directions of absolute motion in the no-net-rotation system confirm the motion of the Adriatic plate in the global circuit where Africa, Europe and the intervening Adriatic plate are moving north-eastward, although at different velocities and with small variable azimuths which determine relative plate interactions. The data suggest shortening of a few mm/yr between Trieste, located at the leading edge of the Dinarides orogen and the Emilia-Romagna Marina di Ravenna, Medicina and Bologna sites positioned above the Apennines accretionary prism. This can be interpreted either as active thrusting of the Dinarides or/and active thrusting in the Apennines accretionary prism. Seismic reflection profiles and seismicity indicate that both orogens are active, but the Dinarides appear to have slower convergence rates. Active thrusting supports the notion of a lively and retreating subduction beneath the northern Apennines. The height time data of the same sites show subsidence rates of different magnitude. The rates of Marina di Ravenna and Bologna are, to a large extent, of anthropogenic nature.