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Active deformation at the northeastern corner of the Adria-Europe collision zone: Inferences from 1994-2006 GPS campaigns in Slovenia

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We present regional deformation rates and 4-12 yr site velocities from ∼60 GPS stations in Slovenia and NW Croatia, obtained in several campaigns during the 1994-2006 period. The investigated area sits at the NE corner of the Adria-Europe collision zone and spans from the Istria peninsula (rigid Adria outcrop) accross the Dinaric and Southalpine deformed belt, and crosses over the Periadriatic fault system into the Eastern Alps domain. Our earlier investigation of the Adria microplate motion, for the first time using GPS sites from the Istria peninsula, indicated that the Adria-Europe rotation pole is located more eastward than previously believed, which produces active ∼N-S shortening in most of the territory of Slovenia as a consequence of CCW rotation of Adria. The total amount of Adria-Europe convergence in the area amounts to ∼2-3 mm/yr. Most existing geological and numerical models predict dextral shear along the eastern Adria margin. The prominent NW-SE-trending “Dinaric” faults with map-scale dextral offsets are believed to accomodate this motion. Our GPS data however show only insignificant dextral motion along the “Dinaric” faults of southwestern and central Slovenia. Thrusting and/or reverse-dextral faulting is probably the active tectonic mechanism there. Dextral shear of 1-3 mm/yr was determined on the faults of the Periadriatic fault system, the Sava fault and the Periadriatic fault. The Karavanke shear lens between the two faults is apparently deforming transpressively. Our measurments reconfirm that the area of the Eastern Alps is moving eastward 1-2 mm/yr with respect to both Europe and Adria. The present-day regional deformation therefore seems to be strongly partitioned between N-S shortening in the Dinarides and in

the Southern Alps, and eastward extrusion of the Eastern Alps, facilitated by dextral activity of the Periadriatic fault system.