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Repeated GPS measurements spanning 15 years to study the extensional deformation regime in the inner southwestern Alps (Briançon region, France)

A. Walpersdorf (1), C. Sue (2), S. Baize (3), L. Thirard (4), N. Cotte (1), and the Briançon Team

(1) ISTerre, Université Joseph Fourier, CNRS, Grenoble, France (andrea.walpersdorf@ujf-grenoble.fr), (2) Chrono-Environnement, CNRS, Université de Franche-Comté, Besançon, France (christian.sue@univ-fcomte.fr), (3) IRSN/DEI/SARG/BERSSIN, Fontenay-aux-Roses, France (Stephane.BAIZE@irsn.fr), (4) INSA, Strasbourg, France (louise.thirard@wanadoo.fr)

A network of 30 geodetic markers installed in the Briançon region, southwestern Alps, has been surveyed in 1996, 2006 and 2011 by GPS. The study zone is characterized by a moderate seismicity with mainly extensive focal mechanisms and some dextral strike-slip along N160 oriented faults. The dense temporary GPS network covering this zone has an extent of 40 x 40 km^2. It is inserted in the French permanent GPS network for research purposes (RENAG) starting in 1998, with four permanent stations located in the study zone, two of them operational since 2005. Previous analyses combining triangulation data and the 1996 GPS campaign indicated extensional geodetic deformation rates more than 10 times higher than seismic deformation. Permanent GPS analyses of the RENAG network converge since 2000 from millimetric to sub-millimetric horizontal velocities across the western Alps, and millimetric vertical velocities indicating active uplift. While the campaign measurements present an increased error budget (antenna setup, equipment changes) with respect to continuous GPS measurements, the observation time span is longer and the network denser than the permanent GPS observations, and the two strategies therefore complementary. Moreover, the combined analysis of up to 13 years of permanent GPS data and three measurement campaigns over 15 years also evaluates sub-mm horizontal velocities in the local network. In this work, we will show if the long observation interval and the redundancy of the campaign network help constraining a significant local deformation pattern in the Briançon region. We will compare the present-day deformation field to the seismic deformation rate and discuss the implications on seismic hazard in the Briançon region. We will confront the instantaneous, geodetic strain pattern with seismotectonic and morphotectonic observations and examine its impact on the global geodynamics of the southwestern alpine arc.