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# Seismogenic potential of the High Durance Fault constrained by 20 years of GNSS measurements in the Western European Alps

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Due to the steady moderate seismicity observed along the Briançon seismic arc, in the southwestern French Alps, three temporary GNSS surveys took place in 1996, 2006 and 2011, across a ~50x60 km² wide area, to investigate the surface deformation field. The horizontal velocity field computed from these three surveys showed an east-west extension in the network. A fourth campaign was led in 2016, creating a 20 year observation span, resulting in measurements which reach a sufficient accuracy to assess whether extension found within the Briançon network is localized onto any particular tectonic feature. Several faults in this area are known to be active normal faults. Assessing the localization of the deformation may lead to a better understanding of the active tectonics of the Alpine belt. To address this issue, a robust velocity field was computed from the combination of the different campaign and permanent GNSS data. Strain rate tensors were derived for the first time in this area on a 0.1 by 0.1 degrees grid to assess the distribution of the deformation. The regional deformation appears localized in the Briançon area and reaches up to 20 +/- 5 nanostrain/yr in the center of the network. The observed velocities were projected on a profile across the network and compared with modelled interseismic deformation to characterize the behavior of the major active faults known in the study zone. While a two-fault model provides the best fit to the data, a single fault model has only marginally higher residuals, with parameters that are more consistent with the seismotectonics of the region. The localization of the single modelled fault is consistent with the location of the High Durance Fault. Therefore, we used the known geological location of this structure as a priori information in a block model to compute a fault slip rate at the interface between the two blocks. The velocities on the interface indicate 0.4 to 0.5 mm/yr of extension, and therefore strain accumulates along the High Durance Fault throughout the seismic cycle. The geodetically derived fault slip rate is converted into an equivalent seismic moment release rate, which is consistent within its uncertainty bounds with the known historical and instrumental seismicity of the Briançon area.

**Mots-Clés :** Geodetic instrumentation, Transient deformation, Dynamics and mechanics of faulting, Seismicity and tectonics, Continental tectonics: extensional, Neotectonics

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