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# Slow deformation in the Briançon area (South-Western Alps, France) : can we localize it on active fault(s) ?

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The Western Alps show persistent seismicity and deformation despite the end of the orogenesis. The first stations of the RENAG permanent GNSS network were thus installed in the French Alps since the end of the 1990s. Moreover, three temporary surveys took place in 1996, 2006 and 2011 in the Briançon area, ~50x50 $km^2$ wide, in the South-Western French Alps, where a steady moderate seismic activity along the Briançon seismic arc is observed.
The horizontal velocity field computed from these first three surveys showed an east-west extension in the network, compatible in amplitude and in orientation with the seismic deformation of the area.

A fourth campaign was led in 2016, yielding 20 years of observation span. The measures may now reach a sufficient accuracy to assess if the extension found within the Briançon network is localized on any particular tectonic feature. Several faults in this area indeed showed recent activity in normal faulting. Assessing the localization of the deformation may lead to better understand the origin and processes of the present-day deformation of the Alpine belt. To address this issue, the present study aimed at increasing the resolution of both the velocity and the strain field over the network, by exploiting the long measurement span and the exceptional redundancy of our campaign measurements :
1) A robust velocity field was computed from the combination of the different campaign and permanent data. A single strain tensor was then derived, revealing 20±2 nanostrain/yr, which is consistent with previous studies, and also more accurate.
2) Two inversion methods were then compared to assess the distribution of the deformation over the area. Despite their coherence on the orientation of the deformation, the size of the network compared to the small amplitude of the signal did not enable us to derive significant values of strain over the width of the grid cells.
3) We then tried to localize the deformation by fitting a model to a GPS velocity profile perpendicular to the faults. Despite the high uncertainties on the GPS velocities, a two fault model seems to be the best fit to the data. The localization of the potential faults being the best constrained parameter in this forward model, we used it as apriori information in a block modeling in order to compute fault slip rates as the velocities at the interface of the blocks. The velocities on the interfaces are found to be strongly dependent on the model parameters but remain below 1 mm/yr.

Thanks to the unusual density of the network and long time span of its instrumentation, we were able to increase the accuracy of the deformation pattern observed through the Briançon area. Our results suggest that the extension is localized on two nearby tectonic features, even if the fault parameters retrieved from our models differ slightly from geological and seismotectonics clues. These results encourage us to believe that the next survey will add sufficient signal-to-noise ratio to achieve the data convergence towards the regional tectonic signal.