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Comparison between inversion of focal mecanisms and paleostress analysis, interpretation of normal fault in SW Alps.

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Seismic hazard assessment of active faults in slow orogenic domains is a challenging issue and even more in regional with polyphase tectonic history. We present a multi-disciplinary approach combining geological observations and sismological analysis along the south-western flank of the Alpine arc (France and Italy). Statistical analysis of strieated fault planes and data inversion allow paleo-stress/strain analysis of fractures that mainly formed in the Miocene to present (20-0 Ma). These data are compared to 'modern' stress tensors computated from focal mechanisms of the 1968-2006 regional sismological database. The paleo-stress tensors are compared with modern stresses in terms of the distribution of orientations and stress ratios in the SW Alps space. In this study 46 new paleo-stress tensors are calculated based on more 850 faults measurements mainly from the edge and into the Argentera-Mercantour massif and 9 new inversions of focal mechanisms.

Paleo-stress analysis provides orientations similar to those derived from the focal mechanisms of current regional seismicity, with the main stress [U+F073]1 oriented north-south, in agreement with a major N140° right-lateral strike-slip active fault system (e.g., Sanchez et al.,2010). The ratios of normal and reverse focal mechanism are sensibly different between south Alps and western Alps. The study of deformation, fracturation and pebbles in Pliocene molasses basin of Nice is in agreement with ongoing strike-slip deformation at least since the early Pliocene (Bauve et al., 2012).

With this study we better constrain the kinematics of SW Alps, and their bearing on seismological hazard. Since 20 Ma, the SW Alps are dominated by a transpressive strain characterised by permutation between reverse and stike-slip fault with high phi ratio (([U+F073]2-[U+F073]3)/([U+F073]1-[U+F073]3)). The extensional stress are clearly localized around the Tinée valley, on the NW edge of the crystalline basement, characterised by large slope instabilities and active landslides. Due to phi ratio we can suppose that 80% of extensionnal faults measured in SW Alps are linked to a gravity process (e.g., Bouissou et al., 2012).

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