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KINEMATICS AND ROTATION OF THE WESTERN ALPS: PALEOMAGNETISM AND ANALOGICAL MODELISATION

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In the western Alps, most kinematic models have considered that, since the late Cretaceous, the convergence between the Adriatic and European plates has been dominantly accomodated by both thickening and horizontal translation of tectonic units. Some models have also inferred large rotations about vertical axis but no data are presently available to support this mechanism. In order to test this hypothesis, we have conducted a paleomagnetic study on the Briançonnais zone of the Western Alpine Arc. This zone features complexe folding structures associated with high pressure- low temperature metamorphism (about 300°), leading at least to a partial remagnetization of remanent magnetization (NRM) during late Eocene-Oligocene period. This remagnetization therefore allows to accede to the post-metamorphic history of the internal units of the Alpine Chain.

About 350 samples on 37 sites were sampled in upper Jurassic rocks (Ammonitico Rosso facies) of the southwestern Alpine Arc, in an area extending from the Grand Galibier massif to the North, to the Ligurian Alps to the South East. A stable component with unblocking temperatures between 200°C and 450°C, is well defined at all the sites and always shows a reverse polarity. Its declination is strongly deviated relative to stable Europe in a range from 47° to the North to 117° to the SouthEast.We interpret these deviations as counterclockwise rotations of the Penninic Alps relative to stable Europe.

This paleomagnetic study has been completed whith analogical modelisation experiments. The purpose of modelisation was to quantify influence of the Apulian plate rotation on the Alpine Arc formation. Crustal models using sand show that rotation could be a major boundary condition for the late Alpine Arc evolution.

Both paleomagnetic and analogical studies allow to propose a global kinematical model for the Western Alps. This model could explain actual deformation like active sismicity whereas GPS measurements do not indicate significant convergence movements between Lyon and Torino.

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