Kinematic block model of Switzerland

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In 1997 swisstopo began to install and operate the Automated GPS Network for Switzerland (AGNES). Since then the network has been extended to more than 30 stations. From the time series swisstopo derives velocities which are used to create kinematic models of Switzerland under the assumption that the velocities correspond to the tectonic motion. However, one has to be aware of the very small crustal movements relative to the Eurasian plate. The expected velocities are in the range of 1 to 2 millimetres per year. Local influences like monumentation instability and landslides are not negligible and can bias the velocities significantly. For this purpose the time series were initially analysed for common mode effects and seasonal movements using stacking methods.

Additional information from the Tectonic Map of Switzerland, published by swisstopo, helps to delimitate regions belonging to the same with kinematic pattern. The area covering the whole country has been separated into several blocks namely Jura, Basin, Prealps, and Alps. The movements of the blocks were determined by robust estimation, thus reducing the influence of velocities biased by local effects. During this process several stations had to be eliminated by reducing their weight in the inversion. The individual blocks were modelled by the assumption of rigid body dynamics. Two translations and one rotation about the Z-axis have been introduced for the horizontal movements. The vertical velocities are analysed separately using the same block assignments. The unknowns for each vertical block movement are one translation and two rotations about the X- and Y-axis. The block model gives a good first approximation of the tectonic deformation in Switzerlan