Modelling of a dynamic structure of blocks in Central Peru

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Seismicity studies based on statistical and phenomenological analysis of real seismic catalogues, have the disadvantage that the time intervals are too short to analyse the tectonic process responsible for the seismic activity. Additionally, probable seismic patterns that could be identified in a real catalogue can turn up once and disappear in the future. On the other hand, synthetic catalogues obtained through a numerical modelling of the tectonic process, may cover very large time intervals assuming a more realistic assessment of the seismicity. Mathematical modelling of the lithosphere dynamics is a tool to study the process that prepares the occurrence of a large earthquake and is also useful for prediction studies. The basic principles of this type of modelling were developed by Gabrielov et al. (1990).

I present in this work the application of this theory for the Central Peru region. Several properties of the lithosphere such as spatial heterogeneities, the hierarchical blocks structure, gravitational and thermodynamic processes, physic-chemical transitions and fluids and stress migration, are perhaps the more relevant phenomena that control the seismic sequence. The study region has been modelled as a system of rigid blocks separated by fault planes. It is assumed that the displacements among the blocks are infinitely smaller than the size of the blocks. The blocks displacement is considered as a system that is in a quasi static state of equilibrium. The result of this numerical simulation is a synthetic seismic catalogue