SINT-3: Fuentes sismogénicas corticales en Sudamérica

New insight into Chile´s most active faults: Magallanes-Fagnano Fault (MFS) and Liquiñe-Ofqui Fault Zone (LOFZ), Southern Patagonia, from lidar and digital photogrammetry.

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The neotectonic activity and crustal seismic hazard in Southern Chile has not been properly evaluated because of the limited and inaccurate records of historical seismicity. This results in an underestimation of seismic hazard. Nevertheless, the evidence of seismic phenomena has been currently present in the region in remarkable geomorphologic features of recent activity and historical crustal earthquakes of high magnitude (M>6) were registered since 1879 associated along the two main crustal faults system in southern South America, Liquiñe-Ofqui Fault Zone (LOFZ) and the Magallanes-Fagnano Fault System (MFS).

This work uses a combination to high-resolution models to improve the mapping of these faults and characterization of these faults as seismogenic sources. Specifically, light detection and ranging (lidar)-derived topography and digital elevations models (DEM) developed using Structure for motion (SfM) techiques. SfM uses photogrammetry to develop 3D DEMs from several 2D images acquired through an Unnamed Aerial Vehicle (UAV)-based aerial remote sensing (drone). The results were several digital elevations models with a spatial resolution of from 2 m to less than 1 m, in which aids mapping, the determination of slip rates, and other key fault parameters based on geomorphological evidence. These data are the first to be based on geological evidence in an area with field observations are scarce because of challenging access, climate conditions and the abundance of peat bogs in addition to modifications in the terrain by the action of beavers. Both faults show rapid strike slip displacements along clear fault traces whereas the LOFZ shows evidence for transpression with dextral reverse faulting (up to the east). Key young (Holocene to Historic) features visible in these data (and verified in the field) along the faults include shutter ridges, mole tracks, and displaced channels. Along both faults, are regions where the population and industrial activity is growing and thus it is fundamental to obtain the field data to improve our models of the seismic hazard. The new results presented here demonstrate that these faults are fast slipping and with high associated seismic hazard.

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