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Frame Definition of Satellite Laser Ranging Observatories in South America

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The Global Laser Tracking Network has provided accurate three-dimensional positions of participating observatories tracking the LAGEOS I and II geodetic satellites over a time span of sixteen years. SLR stations in stable tectonic regions have made a strong contribution to the definition of the global reference frame in combination with other space techniques.
We examine here the question of how best to integrate positioning information from stations in unstable regions, such as the observatory at Arequipa, Peru on the Altiplano plate in the Nazca/ South American plate subduction zone. This station is experiencing visco-elastic relaxation after an 8.4 magnitude earthquake in 2001, but discontinued tracking operations in 2004. Data obtained during recently renewed operations at the station now confirm evidence from GPS observations that the horizontal motion has not yet returned to its preseismic rate. We provide credible empirical models of motion at the Arequipa SLR observatory, which will allow the station's data to contribute to ITRF realization. These results can be supported by position measurements derived from observations at more recently established SLR stations on the Pacific coast of South America in Concepcion, Chile, and San Juan, Argentina.