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Satellite laser ranging network: Where should a new station be placed?

Satellite laser ranging has been operated from about 40 stations all over the world whereas the current station network is not uniformly distributed. A simulation analysis is conducted to assess the effectiveness of the location of a new station. This study is made of two steps: generating simulation datasets and running POD simulation. In the first step, realistic numbers of observations for a new station are numerically simulated, based on the actual data acquisition statistics of the existing stations. Then, in the second step, six geodetic satellites, LAGEOS-1, -2, Ajisai, LARES, Starlette and Stella are used in this study. The space geodesy analysis software 'c5++' is used in its simulation mode, with and without the new station, and the difference of the estimated error for each parameter is examined. The X and Y components of the geocenter and the sectoral terms of the Earth's gravity field are largely improved by a station in the polar regions. A middle latitude station best contributes to the tesseral gravity terms, and, to a lesser extent, a low latitude station best performs for the Z component of the geocenter and the zonal gravity terms. We hope this study will contribute to the worldwide ongoing efforts to strengthen the global geodetic network.