SLR-based terrestrial reference frame for ITRF2000 with loose constraints

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A terrestrial reference frame was established from the 10-year laser ranging data by solving for 60 station positions and velocities with loose constraints. We got internal errors of 0.5 (horizontal) to 1.5 mm (vertical) for the position, and 0.2 (horizontal) to 0.4 mm/y (vertical) for the velocity. Our solution improved a strange velocity of the former ITRFs around eastern Asia. We submitted the solution to ITRF2000 which will be the de-facto standard of the terrestrial reference frame. The ITRF2000 preliminary analysis released in Nov 2000 indicated a consistent behaviour of our solution.

A terrestrial reference frame was established from 10-year satellite laser ranging (SLR) data to Lageos-1 and Lageos-2. Using our orbit analysis software CONCERTO, a set of station coordinates was created every 50 days, and 73 sets of them were accumulated for the 10 years' span. We combined them and solved for the positions and velocities of 60 staions applying loose constraints.

Several precise, stable stations showed internal errors of 0.5 (horizontal direction) to 1.5 mm (vertical) for the position, and 0.2 (horizontal) to 0.4 mm/y (vertical) for the velocity. The velocity vectors of these stations agreed with ITRF97 within 1 or 2 mm/y. Our solution improved a strange velocity of the former ITRFs around eastern Asia. Several young stations, including 4 stations of CRL, are newly included.

We submitted the solution to the ITRF2000 project. ITRF2000 will be the future international standard of the terrestrial reference frame based on multiple space geodetic technologies such as VLBI, GPS, DORIS and SLR. The ITRF2000 preliminary analysis released in November 2000 indicated a consistent behaviour of our solution SSC(CRL)00L02. The final version is said to be available soon.

The definition of the datum of ITRF2000 will be revised. The origin will be defined only by SLR, and the scale is defined fifty-fifty by VLBI and SLR. The time scale is also changed from TCG to TDT(=TT) as most of its users are now based on the TDT system. The change means the scale will be shrinked by 0.7 ppb compared with the former ITRFs.