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CATREF, the software package used at IGN France to produce the well-known ITRFs, has been installed at JPL and has been used to reproduce ITRF2005. A Kalman filter and smoother algorithm has been developed and coupled to the CATREF software. This Kalman filter-based software package, KALREF, has been used to produce ITRF2005-like and ITRF2008-like reference frames that compare favorably with ITRF2005 and ITRF2008, respectively (Wu et al., 2015). It has also been used to solve for time-variable weekly coordinates, as well as a model of secular, periodical and stochastic motion components. In addition, KALREF has been used to define a nearly instantaneous reference frame by specifying constant frame parameters and combining different technique data weekly. It is currently being used to determine a solution for the IERS using the input SINEX files that were produced by the Technique Centers for ITRF2014.

A simulation tool to study the effect of network geometry on reference frame determination is being developed. The tool is based on synthetic station position and reference frame parameter (geocenter, scale) data. It has been used to study the effect of station distribution, number of stations, availability of site tie measurements, etc. on the reference frame. Preliminary conclusions indicate that reasonable TRFs can be determined from a network of about 30–40 well-distributed, co-located stations as long as accurate site ties are available at each site.

The Three Corner Hat (TCH) technique has been used to determine the uncertainties of estimates of positions of stations at co-located sites. For 16 co-located sites used in ITRF2008, the median (north, east, up) uncertainties are found to be (1.1, 1.2, 2.8) mm for the GPS stations, (2.2, 2.0, 6.2) mm for the VLBI stations, (8.5, 7.6, 9.0) mm for the SLR stations, and (9.2, 11.7, 10.6) mm for the DORIS stations (Abbondanza et al., 2015).

References

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