



## **The Influence of Time variable Effects on the Terrestrial Reference Frame**

**B. Meisel**, D. Angermann, H. Drewes, M. Krügel, H. Müller, V. Tesmer

Deutsches Geodätisches Forschungsinstitut, Munich, Germany (meisel@dgfi.badw.de)

Terrestrial reference frames provide the basis for all research and applications that require accurate positions. Recent realisations of the ITRS such as ITRF2000 parameterize station coordinates as a station position at a reference epoch and constant velocities. Analysis of time series have shown that the geodetic space techniques have reached a level of accuracy that allows to detect time variable effects such as seasonal variations or non-linear relaxation processes after earthquakes. In order to achieve the next ITRF with the highest possible accuracy and reliability it is necessary to handle these effects in an optimal way.

To study the effect of time variations on multi-year technique solutions we use epoch (weekly/session) data sets of the geodetic space techniques SLR, GPS, VLBI and DORIS. They are provided by the Technique Services or individual Analysis Centres. In a first step we analyse the time series of station positions to detect remaining jumps and non-linear effects that need to be considered in the combination. This information is used to accumulate epoch normal equations to obtain multi-year technique solutions using different approaches. We compare the traditional parameterisation of station positions and velocities to solutions with additional seasonal signals to investigate the influence of annual variations on the velocity estimation. Additionally we compare the results of different techniques among each other and with results from geophysical models to separate systematic errors from the real geophysical signal.