Updated centre of mass correction tables for LAGEOS, Etalon, LARES, Starlette and Ajisai

Dr José Rodríguez[1], Dr Graham Appleby[1], Prof. Toshimichi Otsubo[2]
[1]BGS SGF, , United Kingdom, [2]Hitotsubashi University, Tokyo, Japan

In pursuing millimetre-level absolute accuracy, all aspects of the space geodetic techniques contributing to the realisation of the ITRS, including data collection practices, processing methods and analysis strategies, must be scrutinised to ensure the resulting geodetic products are as free of systematic errors as possible. Progress in data collection and processing provide higher quality observations, which enable superior results that may uncover hitherto obscured details and modelling deficiencies. Previously valid models may be found at a later time unsatisfactory as techniques are developed and stricter targets set.

Of paramount importance in SLR is the computation of satellite centre of mass (CoM) offsets. Any errors in the CoM values employed to refer the range observations, realised to the optical reflection points, to the spacecraft centre of mass are interpreted as range biases in the orbital analysis, mapping almost directly to errors in station heights. In addition, CoM errors mask or distort other errors potentially present in the data, hindering their detection and eventual solution.

Building upon previous work, we have refined a number of details of the CoM computation; increased the level of detail describing the ranging systems; communicated with other stations to fill information and data gaps; employed high-precision, single-photon data from the Herstmonceux KHz system to derive target response functions; and developed a new treatment to simulate multi-photon systems. The result is the publication of new satellite-dependent CoM tables for the ILRS network. We present the main results, differences to previous values, and limitations of the approach followed.