New atmospheric delay correction for satellite laser ranging and its evaluation with Lageos orbit determination

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http://www2.nict.go.jp/w/w114/

Atmospheric propagation correction for satellite laser ranging has been used a popular model developed by J.W Marini and C.W Murray. SLR stations generally use a wavelength 532 nm generated from SHG of Nd-YAG laser, some stations use a multi-color laser. The Marini-Murray model works well with a wavelength 532 nm, however, introduce some errors with other wavelengths. For this reason, V.B. Mendes proposed a mapping function method as a new propagation model. The observations of SLR are less than those of GPS, estimation of zenith-path delay is difficult with other parameters in the same time when MF is used. Therefore, precise zenith-path delay of each station is necessary for the accurate correction.

We implemented Mendes MF in our orbit determination software 'concerto', and evaluated the model performance by Lageos orbit determination. We also evaluated the precision of zenith-path delays, Mendes-Pavlis model and Saastamoinen model.