Ocean and Atmospheric Tide Models in SLR Precise Orbit Determination
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The achievable accuracy of SLR-based Precise Orbit Determination (POD) for low-orbiting satellites like Larets or Jason-3 is highly dependent on the applied models for ocean and atmospheric tides. In our previous work, a novel, flexible formalism for the representation of ocean and atmospheric tides that readily includes linear admittance of secondary tidal lines has been developed. Based on normalised gravity field coefficients in the ICGEM format and matrix-based admittance schemes recently implemented into DGFI-TUM's software for SLR analysis, DOGS-OC, comparisons between different combinations of the data driven ocean tide model EOT20 and the mathematical model TiME22 demonstrate that weaknesses of purely data driven approaches can be compensated for by combined approaches. For example, the arc RMS of SLR fits for Larets POD can be reduced by 2 % by switching the Sa and Ssa tides from EOT20 to TiME22. The results also demonstrate the importance of applying sophisticated atmospheric tide models, as the AOD1B RL06 atmospheric tides reduce the arc RMS of SLR fits of Larets by 12 % compared to POD without taking into account these tides.

The present study consequently aims to determine an optimum and fully consistent combination of models for individual partial lines, including tailored admittance schemes, and demonstrates their benefits with respect to the conventional approach, whereby both the direct gravitational effect on the satellites and the displacement effect of the SLR stations are applied consistently for each of the tidal lines. Recommendations on model formats and the optimum set of ocean and atmospheric tide models for SLR analysis will be provided based on a wide range of SLR analysis experiments.