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The ESA Earth System Model (ESA ESM; Dobslaw et al., 2015) provides a synthetic data set of the time-variable global gravity field that includes realistic mass variations in atmosphere, oceans, terrestrial water storage, continental ice sheets, and the solid Earth on a wide set of spatial and temporal frequencies. For more than 10 years already, it is widely applied as a source model in end-to-end simulation studies for future gravity missions, but has been also utilized to study novel gravity observing concepts on the ground. For those purposes, the ESM needs to include a wide range of signals even at very small spatial scales which might not yet have been reliably observed by any active satellite mission.

In this contribution, we present first steps towards version 3.0 of ESA ESM. The projected changes to the ESM include the utilization of a small ensemble of co- and post-seismic earthquake signals, an updated GIA model, and additional mass balance signals from previously not considered Arctic glaciers, sub-monthly surface-mass balance changes and a more realistic representation of ice sheet dynamics. Extreme hydrometeorological events as well as climate-driven and anthropogenic impacts on continental water storage will be represented through an update of the hydrological component. Additionally, the ESM will separately include ocean bottom pressure variations along the western slope of the Atlantic, representing variations in the meridional overturning circulation as a critically important component of the interactively coupled global climate system. ESA ESM 3.0 will be available with 6 hourly resolution from January 2007 until December 2020. It will be also augmented with synthetic error time series to facilitate stochastical modelling of residual background model errors.
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