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Characterization of CO_2 and CH4 Sunglint Retrievals from CarbonSat

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The ESA Earth Explorer 8 candidate mission CarbonSat aims at determining atmospheric CO_2 and CH4 concentrations to better separate biogenic and anthropogenic fluxes with global CO_2 and CH4 data and "imaging" of strong localised CO_2 and CH4 emission. To achieve this goal, CarbonSat will measure reflected sunlight in three shortwave-infrared bands with high spatial resolution and sufficient spatial swath width. To obtain accurate measurements over the ocean CarbonSat will perform ocean sunglint measurements which provide high signal-to-noise for measurements of over ocean surfaces that are otherwise very dark.

Here, we present the results of retrieval simulations for CarbonSat sunglint observations that have been carried out to characterize the expected CO_2 and CH4 retrieval performance. An error parameterization scheme has been developed to estimate expected biases and random errors as function of key scattering and surface parameters which allows inferring the spatio-temporal distribution of errors over the ocean and to carry out observing system simulation experiments (OSSE) to determine the impact of CarbonSat observations on surface fluxes. We will also discuss the expected coverage of the sunglint observations taking into account cloud conditions and different options for pitch manoeuvres of the platform to increase the sunglint coverage.