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A first appraisal of ocean DMS models and prospects for their use in climate models (SOLAS-CODIM)

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Dimethylsulfide (DMS) is a volatile biogenic sulfur compound produced in the surface ocean and implicated in the Earth radiative balance and climate. The production of marine DMS is subject to complex physical, biogeochemical and ecological interactions. The refinement of the current global climate models requires a dynamical representation of the DMS emission from the ocean, hence the need for an international workshop on the comparison of oceanic DMS models gathering both experimentalists and modellers. We report here on a first comparison of process-based DMS cycling models (CODiM for Comparison of Oceanic Dimethylsulfide Models). We compared both one-dimensional (1D) models against time series at specific ocean sites and three-dimensional (3D) models against global data sets. Although most models were performing reasonably well in general, we found that most of them - whether 1D or 3D - had difficulty reproducing the so-called ‘summer paradox‘’, i.e. summer DMS maxima occurring much later than the winter-spring phytoplankton maxima. Model experiments confirm that irradiance is the key environmental driver behind this de-

coupling of algal biomass and DMS but the models do not agree on the mechanisms involved. This decoupling, originally described for one subtropical regime, appears widespread over the global ocean. Given the implications for climate models, it is clear that a focus on improving this aspect of process-based DMS cycling models is warranted.