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Third Revision of the Bottom-up Global Surface Seawater Dimethyl Sulphide Climatology (DMS-Rev3)

Shrivardhan Hulswar¹, George Manville⁴, Rafel Simo², Marti Gali³, Thomas G. Bell⁵, Paul Halloran⁴, Arancha Lana⁶, and Anoop S. Mahajan¹

¹Indian Institute of Tropical Meteorology, Pune, India (hulswar@gmail.com, shrivardhan@tropmet.res.in)

²Institut de Ciències del Mar (CSIC), Barcelona, Spain

³Barcelona Supercomputing Centre, Barcelona, Spain

⁴University of Exeter, Exeter, UK

⁵Plymouth Marine Laboratory (PML), Plymouth, UK

⁶Instituto Mediterráneo de Estudios Avanzados (IMEDEA), Mallorca, Spain

An updated estimation of the bottom-up global surface seawater dimethyl sulphide (DMS) climatology, DMS-Rev3, is the third of its kind and includes five significant changes from the last climatology, 'L11' (Lana et al., 2011) that was released about a decade ago. The first change is the inclusion of new observations that have become available over the last decade, i.e., the total number of observations included in DMS-Rev3 are 865,109 as compared to 47,313 data points used in the last estimation (~1728% increase in raw data). The second was significant improvements in data handling, processing, filtering, to avoid bias due to different observation frequencies. Thirdly, we incorporated the dynamic seasonal changes observed in the ocean biogeochemical provinces and their variable geographic boundaries. Fourth change was refinements in the interpolation algorithm used to fill up the missing data. And finally, an upgraded smoothing algorithm based on observed DMS variability length scales (VLS) which helped reproduce a more realistic distribution of the DMS concentration data. The results show that DMS-Rev3 estimates the global annual mean DMS concentration at 2.34 nM, 4% lower than the current bottom-up 'L11' climatology. However, significant regional differences of more than 100% are observed. The largest changes are observed in high concentration regions such as the polar oceans, although oceanic regions which were under-sampled in the past also show large differences. DMS-Rev3 reduces the previously observed patchiness in high productivity regions.