A novel approach to quantify global oceanic emissions of carbonyl sulfide (COS)

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The atmosphere contains small amounts of sulfur gases and the most abundant one is carbonyl sulfide (COS). COS influences the climate, because it reacts to form aerosols in high altitudes, that reflect sunlight back to space and cool the Earth's surface. In addition, COS is structurally very similar to CO2. This similarity can be exploited to understand an important process in the carbon cycle that affects our climate: global CO2 uptake by plants during photosynthesis. Both scientific questions can only be answered if we understand how much COS is introduced to the atmosphere. However, there is large uncertainty how much COS is emitted by the ocean. Here will propose to improve the oceanic emission estimate using a novel technique to measure small mass variations in COS molecules (isotopes), that provide information on the magnitude of the oceanic source relative to other sources. Secondly, the scientists we will identify the molecular composition of organic material in seawater that forms COS, which is needed for predicting surface COS concentration in the ocean with a computer model. They will perform seagoing expeditions and laboratory experiment to quantify the marine source of COS to the atmosphere. The results will ultimately make an impact for assessing how the climate will change in the future, because better knowledge of how COS is produced, consumed and emitted to the atmosphere is needed to understand the influence of COS on aerosol formation and to provide information on the global carbon cycle.

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