

4.007 The influence of dimethyl sulfide produced by global coral reefs on the climate.

Early Career Scientist

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Abstract:

Dimethyl sulfide (DMS), a chemical produced by marine organisms, contributes approximately one fifth of the global sulfur budget, providing an important precursor gas for aerosol formation. The current DMS climatology is predominantly made up of observations from phytoplankton and algae. Recent literature has suggested that coral reefs are able to produce as much or more DMS as some of the most highly productive regions in the ocean. Furthermore, there are suggestions that coral reefs may play a role in protecting their local environment via cloud formation. Coral reef derived DMS is currently unaccounted for in climate modelling. In this study, the Australian Community Climate and Earth System Simulator (ACCESS) - United Kingdom Chemistry and Aerosol (UKCA) global climate-chemistry model is used to determine if the contribution of coral reef derived DMS has an influence on global climate. Several simulations have been performed, comparing the current DMS climatology to one with enhanced coral reef DMS. The enhanced climatology was produced by adding an amount of DMS, constrained by observations, to the current DMS climatology. Results indicate that including coral reef derived DMS may influence cloud condensation nuclei, cloud droplet number concentrations, low cloud fraction and radiation fields in regions removed from the coral reefs. On a global scale, little impact is found. These results imply that whilst coral reefs may produce enough DMS to have an effect on cloud formation in some regions, these effects are not experienced locally. Whether corals are able to modify their local environment is an area of ongoing research.