Biological consumption of dimethylsulfide (DMS) and its importance in DMS dynamics in the Ross Sea, Antarctica

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ABSTRACT: We studied the biological consumption of dimethylsulfide (DMS) and its role in controlling DMS concentrations in the Ross Sea, Antarctica, during the spring (Nov) and summer (Jan) of 2005. Surface DMS concentrations, measured with a technique that minimized DMS release from *Phaeocystis antarctica*, increased rapidly in the spring from 0.3 nmol L^{-1} to 67.7 nmol L^{-1}, paralleling increases in chlorophyll a and bacterial biomass production. Biological DMS consumption (BDMSC) rates were low (0.02 nmol L^{-1} d^{-1}) at the start of the bloom, but increased to 8.8 nmol L^{-1} d^{-1} at the peak of the bloom. Rate constants for BDMSC (kbc) remained relatively low throughout the spring (0.05-0.21 d^{-1}) and this slow biological turnover contributed to the buildup of DMS during the early bloom. DMS concentrations in the summer (3.2-16.8 nmol L^{-1}) were much lower than peak springtime concentrations, partly due to the higher BDMSC rate constants (0.22-0.98 d^{-1}; i.e., faster biological turnover) in the summer. Kinetic analysis suggested that BDMSC rates were nearly saturated at ambient DMS concentrations in the spring but not in summer. BDMSC was mostly carried out in the size fractions <1 μm and >8 μm, except in the early spring when the <1-μm fraction (likely free-living bacteria) dominated BDMSC. BDMSC was the main removal pathway for DMS in the surface mixed layer during both the spring and summer, except during the prebloom, when photolysis dominated. BDMSC exerts a major control on DMS concentrations in the Ross Sea throughout the *Phaeocystis antarctica* bloom.

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