322

SEA SALT IN ANTARCTICA: A PROXY FOR OCEAN STORMS OR SEA ICE PRODUCTION?

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Conventionally the source of sea salt in the Antarctica was considered to be the ocean surface. In simple terms, sea salt is ejected into the atmosphere as sea spray droplets, mixed in the atmosphere, and transported to Antarctica via storm activity. Recently, however, this mechanism was challenged and an alternate explanation was proposed involving sea ice as a source of sea salt. Under cold calm conditions, very high concentrations of brine are rejected up from the surface of sea ice forming frost flowers. These frost flowers contain very high levels of sea salts, but also have a specific chemical signature due to depletion of sulphate relative to other sea salt species. This signature can be detected in aerosol samples and ice cores. Studies have found that these frost flowers are the dominant source of sea salt to coastal Antarctica (e.g. Rankin et al., JGR, 2002).

We present ice core data from an iceberg, a coastal site and a high elevation inland site to estimate the contribution of frost flowers to the sea salt budget across Antarctica. These results will be used to weigh into the debate on the dominant source of sea salt to inland Antarctica (i.e. the open ocean or sea ice). This has important implications for interpretation of sea salt records in deep ice cores such as Vostok, Dome F, and Dome C.