



Dust and chemical impurities in polar ice cores: Have we solved the riddle of their tight correlation to the stable isotopes?

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Concentrations of insoluble microparticles (dust) along an ice core from North Greenland provided the first published seasonally resolved stratigraphic ice core profile along with the profile of stable isotopes. It was observed that dust concentrations peak in spring and have a winter low. This observation, made 36 years ago, has been confirmed in all Greenland ice cores. The chemical impurities, such as nitrate, sulphate and sodium were later shown to have seasonal variations as well. For ice core dating, dust and chemical impurities are valuable components for counting annual layers. Today, concentrations of dust and several chemical components in ice cores are relatively simple to measure. Measurements have been done in a vast number of samples in both Greenland and Antarctic ice cores, and we have long and detailed profiles from most deep ice cores in both polar regions. However, when we consider average concentrations over longer time spans, the dust and impurity contents in ice cores remain enigmatic: Why are so many concentrations so closely correlated to the stable isotopes (climate)? Can we apply the same explanations for dust and impurity profiles in the Arctic and Antarctic? Why is it so difficult to model observations? In search for some answers, we will review some of the longer profiles of dust and sodium concentrations in ice cores from Greenland and Antarctica.