

Ice core proxy measures of sea ice extent from MSA data

The instrumental record of Antarctic sea ice extent from satellite measurements is only 30 years long. During this short period, only the sector west of the Antarctic Peninsula, shows evidence of a decrease in sea ice extent. While we cannot ever obtain large scale remote sensed sea ice information prior to the 1970s, we can explore the use of various proxy records (e.g. Whaling ship positions, marine sediment records, ice core records, krill catch data, penguin population changes etc). While there may be many flaws and various assumptions associated with these proxy records, they are all that exists to perhaps provide some insight to sea ice conditions around Antarctica prior to the satellite era.

Curran et al. (2003) reported a correlation between methanesulphonic acid (MSA) concentrations from a Law Dome ice core and 22 years of satellite-derived sea ice extent. They used this correlation to apply an instrumental calibration to the longer MSA record (1841 to 1995 A.D.) producing a proxy record of sea ice extent in the East Antarctic sector 80o-140oE. The results suggested that there has been a 20% decline in sea ice extent since about 1950. The decline was not uniform, showing large cyclical variations, with periods of about 11 years, that confuse trend detection over the relatively short satellite era. The decline was in good agreement with that suggested from whaling ship positions (de la Mare, 1997).

More recently de la Mare found that Antarctic sea ice changes varied significantly between regions, with most showing a decline, however some showing increased sea ice extent or no significant change (de La Mare, 2008). This regional approach is more consistent with the regional differences we see today from the satellite data. A regional approach is currently being investigated for MSA proxy records. Consistent with the earlier work of Curran et al., (2003), positive correlations between MSA and sea ice extent have been reported in different regions around Antarctica (Foster et al., 2006 and Abram et al., 2006), although negative correlation have been found in other sites (Abram et al., 2006). Work is in progress to improve the spatial extent MSA proxy through the ITASE records and to produce sea ice proxy data covering the last 200 years.

Refs

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