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Forecasting the weather
- ensemble techniques
in probabilistic weather prediction

Prolonged solar minima in the past inferred from cosmogenic radionuclides and the link to climate change

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Cosmogenic radionuclide records from ice cores and tree rings provide information about the solar modulation of galactic cosmic rays. These records indicate that prolonged solar minima occurred on a regular basis in the past. Cosmogenic radionuclide records also point to characteristic solar cycles (such as e.g. the 88 yr and 207 yr cycle) that govern the occurrence of prolonged solar minima. For example, the Maunder Minimum (from approx. 1645 to 1715 AD), which is characterised by an almost complete lack of sunspots, fits well into the 207 yr cyclicity that is visible throughout the Holocene (the last approx. 11500 years).
Comparison to paleoclimate reconstructions suggests that the climate (e.g. Monsoon, ENSO, NAO) responds to solar forcing but clear evidence of a solar influence on global climate (e.g. global mean temperatures) is missing. On the one hand this is connected to the difficulty to obtain a reliable assessment of the global climate in the past (e.g. extending the instrumental data) but on the other hand it appears that certain regions are more susceptible to a solar influence on climate than others. This observation could provide important clues that could help to elucidate the mechanisms behind the sun-climate link.