



## **Are solar minima associated with severe winters in Europe?**

Geert Jan van Oldenborgh (1), Jos de Laat (1), Juerg Luterbacher (2), William Ingram (3), and Tim Osborn (4)

(1) KNMI, KS/MK, De Bilt, Netherlands (oldenborgh@knmi.nl, +31 30 2206711), (2) Department of Geography, Justus Liebig University Giessen, Germany, (3) Met Office Hadley Centre and Department of Physics, University of Oxford, U.K., (4) Climatic Research Unit, School of Environmental Sciences, University of East Anglia, U.K.

There have been claims recently that severe winters in Europe are associated with solar minima. We revisit this based on three sets of data sources:

- historical instrumental observations available over the last three centuries (NAO, CET, De Bilt temperature, Frankfurt temperature)
- reconstructions based on documentary evidence (in winter partly based on freezing of canals, rivers and lakes) and
- the long 20C reanalysis that is now available.

None of these data sources shows a significant correlation (linear, non-linear or lagged) between near-surface winter temperatures or atmospheric circulation over Europe and various measure of solar activity beyond common trends. We also show the origin of the differences between our analyses and other published investigations into the connection between solar activity and European winter severity.