

## Pressemitteilung

Potsdam-Institut für Klimafolgenforschung

Jonas Viering

01.09.2011

<http://idw-online.de/de/news438602>

Forschungsergebnisse  
Meer / Klima, Physik / Astronomie, Umwelt / Ökologie  
überregional

## Study on the Little Ice Age: Low solar activity just marginally cools the climate

**The weakening sun was not the determinant factor for the Little Ice Age. Strong volcanic eruptions in particular, but also a smaller amount of greenhouse gases in the atmosphere were important factors during this period of cooler climate in the 16th and 17th century, a new study shows. This implies that low solar activity, which is expected by some researchers for the coming decades, cannot considerably slow down global warming caused by humankind's greenhouse gas emissions.**

"The impact of variations in solar activity on the climate is often overestimated," says Georg Feulner of the Potsdam Institute for Climate Impact Research (PIK). He is the author of the article just published in Geophysical Research Letters. "This is what our new analysis shows for the past – and we can learn from this to understand future climate change."

Sun spots are a visible sign of solar activity. When their number is small, solar radiation intensity is measurably lower. In the late 17th century, after a slow decrease of solar activity that started around 1600, the sun entered an extended period of rest, the Maunder Minimum. This is often considered to be the dominant cause of the cooling of the Earth's climate during the Little Ice Age.

Two studies published earlier this year found two very different estimates for solar radiation during the Maunder Minimum. One concludes that radiation intensity at that time was substantially lower than today. The other one says that solar activity was just as low as during the extraordinary solar minimum in the years 2008/09.

The impact of these two estimates of solar radiation on temperatures in the Northern hemisphere during the last 1000 years has now been determined for the first time. Feulner fed the data on solar intensity into a climate model – a computer-based complex system of equations simulating the most important climatic processes in the oceans and the atmosphere. Changes in greenhouse gas concentrations and the cooling effect of sulfate aerosols from volcanic eruptions are also considered. The temperature computed by the model was then compared to temperatures reconstructed from natural climate archives like ice cores, tree rings, sediments and corals.

The result is unequivocal. In the model's calculations, the estimates from the study concluding that solar radiation in the Little Ice Age was extremely low result in temperatures which are significantly below observed temperatures in periods of low solar activity. The estimates of the other study which did not show big differences between radiation intensity during the Maunder Minimum and the recent solar minimum yield realistic temperatures. So the climatic data from natural archives support the second study. "To understand climate history, we certainly have to take into account all possibly relevant factors," Feulner says. "However, the impact of solar activity on the climate is comparatively small. That is what the new study confirms."

Now what do these findings mean for our century in case the sun enters a quiet period comparable to the Maunder minimum as some experts suggest? "This would bring a cooling effect of at most 0.3 degrees," Feulner says. This could decrease anthropogenic global warming by roughly 10 percent or less. "Regrettably, this is too little to considerably slow down anthropogenic climate change."

Article: Feulner, G. (2011): Are the most recent estimates for Maunder Minimum solar irradiance in agreement with temperature reconstructions? Geophysical Research Letters, Vol. 38, L16706 [doi:10.1029/2011GL048529]

For further information please contact the PIK press office:

Phone: +49 331 288 25 07

E-mail: [press@pik-potsdam.de](mailto:press@pik-potsdam.de)

URL zur Pressemitteilung: <http://www.agu.org/pubs/crossref/2011/2011GL048529.shtml> (weblink to the article)

URL zur Pressemitteilung: <http://www.agu.org/pubs/crossref/2010/2010GL042710.shtml> (weblink to another study on the effect of solar activity on the future climate on Earth published 2010)

URL zur Pressemitteilung: <http://soho.esac.esa.int/> (weblink to the Solar and Heliospheric Observatory of ESA and NASA)