

### **Sun-Climate Variations on Centennial Time Scale**

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The recent extended minimum of solar variability covered by the SORCE mission mirrors the minima in the 19th and 20th centuries: 1810-1830 and 1900-1910. We argue that these minima are caused by the Centennial Gleissberg Cycle (CGC), a 90-100 year variation observed on the Sun, in the solar wind, at the Earth and throughout the Heliosphere. The occurrence of the extended minimum during the SORCE mission confirms the existence of the CGC. Evidence of the CGC is provided by the multi-century sunspot record, by longer records of the aa index of geomagnetic activity, auroras and radio nuclear isotopes. To explain the centennial solar variability in the framework of the mean-field solar dynamo the back action of the mean helicity and differential rotation on the mean magnetic field must be taken into account. We advocate that the best way to see the response of the Earth's climate to the CGC forcing is to investigate the climate patterns, not the global temperature. We will discuss the observational evidence of extreme low temperatures in the climate patterns at the CGC minima. Numerical modeling indicates a patterned response of the ocean to the CGC forcing.