

Influence of Solar Activity Cycles on Earth's Climate (ISAC)

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In order to determine the influence of mankind on climate change it is important to understand the natural causes of climate variability. A natural effect that has been hard to understand physically is an apparent link between climate and solar activity. From historical and geological records there are strong indications that the sun has played an important role in the past climate of the Earth, but the physical mechanism is currently unknown. Whatever mechanism caused those earlier changes would most likely also be operating today and may have been active throughout the history of our planet. There have been several attempts to explain the link between solar activity and climate from variations in the sun's radiative output. These have tended to rely on simulations involving Global Climate Models (GCM), which are limited by our current understanding of the fundamental physics.

The ESA funded ISAC project intends to address the general question of how solar activity influences Earth's climate, assess the likely impact of the candidate mechanisms in turn, and advise on possible methods for integrating these effects in climate simulations. There are three possible vectors between the Sun and the Earth that could lead to a solar imprint on climate; a) the electromagnetic radiation (Total Solar Irradiance) — or some component of it such as the ultra violet (UV), b) the direct solar wind through magnetosphere/atmospheric coupling and c) the galactic cosmic radiation, which, is modulated by the solar wind. The ISAC team consists of three groups that currently specialised in at least one of these research areas; a) Space and Atmospheric Physics, Imperial College, UK, b) Swedish Institute of Space Physics, Lund, Sweden and c) Center for Sun-Climate Research, Danish National Space Center, Copenhagen, Denmark.

In this talk I will give an overview of the motivation behind the ISAC project and outline the major goals we hope to achieve.