

IPCC Report and Possible Solar Contributions to Climate Change

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With the release of the extensive 4th Assessment Report of IPCC, a new era of broad acceptance of the unusual nature of the ongoing warming has been achieved. Recent advances in the available record combined with improved understanding of the climate system have now clarified remaining conceptual uncertainties and removed most of the contentious scientific issues that the increase in greenhouse gases is the dominant cause of the ongoing changes. Natural external forcing factors, such as solar variability and explosive volcanism, can explain a substantial amount of hemispheric scale climate variability prior to the 20th century. However, since at least the mid-20th century, these natural factors have been already overwhelmed by anthropogenic forcing and their contribution to large scale mean climate will further diminish in the near future. There remain a number of highly relevant questions to be addressed by the climate change research community:

- * a need to better understand long term feedbacks in the carbon cycle and the response of polar ice sheets to the warming; and how these factors affect future sea level,
- * in order to make the science most relevant to local and regional decision makers (as well as the broad public), a more solid prediction of regional climate impacts are necessary.

What role could the sun-climate link play in these issues? While solar forcing over the recent past was non-negligible, it was probably quite small in amplitude. Nevertheless, climate variations in many areas around the world show a quasi systematic relationship with solar variability over a number of time scales. The proposition is made that past solar-induced climate variability driven by coupled atmosphere-(chemistry)-ocean dynamics could serve as benchmark for climate models to test their capability in representing the regional Earth System response to external forcing. Solar forcing lends itself particularly well because its variability at various time scales can be traced back for centuries and millennia while anthropogenic forcing is limited to a single, one sided, and relatively short trend so far. Thus, better understanding solar-induced changes in the past might help us sharpen the detection and assess the current capabilities in predicting the regional, greenhouse gas induced changes in the near future.