Observational constraints on the cloud feedback pattern effect

Historically, the response of clouds to planetary warming has been among the most uncertain of all climate feedbacks. In this seminar, I highlight advances in observational methods that have substantially reduced this uncertainty. Recent observational evidence stemming from the framework of cloud-controlling factor analysis suggests that, in response to increasing CO₂, low clouds over the global oceans exert a positive feedback to warming. I also provide observational evidence for a strong time-dependence of the marine cloud feedback over the last ~100 years, driven by fluctuating sea-surface temperature patterns and associated meteorological perturbations. From 1980 to near-present, increasing estimated inversion strength produced a negative cloud feedback to planetary warming, opposite to the positive feedback expected from increasing CO₂. This indicates that the processes responsible for marine cloud changes in recent decades are distinct from those associated with an increase in CO₂.

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