Session: B12 Oral presentation

Cloud, radiation, and precipitation changes with midlatitude storm strength and frequency and the resulting climate feedbacks

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Systematic changes in midlatitude storm properties, such as strength and frequency, have been occurring in the last 50 years and are predicted to intensify as climate continues to change. At the same time, observational analyses show significant changes in the distribution of cloud, radiation, and precipitation properties with midlatitude storm strength and frequency. This points to the potential for midlatitude radiation and hydrologic feedbacks with climate warming. The observational analysis results provide a useful testing ground for model skill in simulating midlatitude cloud, radiation, and precipitation changes with atmospheric dynamics. If successful, models can be used to understand and evaluate feedback processes resulting from such changes. In the present study, a new method is applied to reanalysis data in order to first identify midlatitude storm centers and tracks and then define their area of influence, using the structure of the Sea Level Pressure field. The method is then applied to satellite data in order to extract cloud, radiation , and precipitation properties in the storm centers' area of influence, and then to AR4 climate model output in order to compare relationships between cloud, radiation, and precipitation properties and storm dynamics in observations and models. Implications of the relationships for climate feedbacks are investigated, through an analysis of potential midlatitude storm changes with climate warming.