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Climate feedback implied by observed radiation and precipitation changes with midlatitude storm strength and frequency

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In the present study, current climate observations are used to quantify the relationships between midlatitude storm strength and frequency and radiation and precipitation properties. Then, the derived radiation/precipitation-storm relationships along with the midlatitude storm changes with climate-warming predicted by the UKMO climate model are used to determine the radiation and precipitation changes resulting from an increase in midlatitude storm intensity and a decrease in midlatitude storm frequency. Increases in midlatitude storm intensity produce shortwave cooling and longwave warming while decreases in storm frequency produce the opposite effects. When the two changes are added together the increase in storm strength dominates producing a shortwave cooling effect of 0-3.5 W/m2 and a longwave warming effect of 0.1-2.2 W/m2. For precipitation, the increase in storm intensity also dominates the decrease in storm frequency and produces an increase in precipitation of 0.05-0.08 mm/day. The ability of the IPCC models to simulate the observed radiation and precipitation changes with midlatitude strength is tested and the model deficiencies are investigated.