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How do observed albedo changes affect land-atmosphere feedback mechanisms during drought?

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Significant albedo changes were observed in south-east Australia through the 2002 drought. Using the Weather Research and Forecasting (WRF) model we investigate the impact of using the observed albedo, compared to the standard climatological albedo, on the regional climate. It was found that the modelled regional climate generally improved in terms of temperature and produced a drier simulation overall.

We also investigate the role played by theorized land-atmosphere feedback mechanisms and how they are affected by the observed albedo changes. Two feedback mechanisms that lead to a reduction in the moist static energy in the planetary boundary layer (PBL) are investigated. One causes this through a reduction in the turbulent heat flux, the other invokes a deeper PBL that entrains more of the free atmosphere. Results indicate that when both mechanisms are active the second mechanism tends to dominate. Inclusion of the observed albedo changes enhances the first mechanism and weakens the second mechanism during the onset of the drought.