

Effects of soil moisture on a summertime convective rainfall over a mountainous area and its contiguous plain in central Japan

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Abstract In this study, two numerical experiments of convective rainfall observed on 15 August 2001, in central Japan, were conducted using a cloud-resolving, land-atmosphere coupled model to investigate the effect of initial soil moisture on short-term weather phenomena. The first experiment, called WET, used the wettest soil condition observed in August 2001 as the initial soil moisture value. The other experiment, called DRY, used the driest condition in August 2001 as its initial soil moisture value. A comparison of the results for WET and DRY showed that a drier soil-moisture condition led to higher rainfall over both the mountainous region in central Japan and Nobi Plain. Greater differences in rainfall amounts were found over the plain than over the mountainous region. The difference in near-surface convergence and atmospheric stability caused by local circulation was found to play an important role in transmitting the variation in soil moisture to rainfall.

Key words soil moisture; summertime convective rain; cloud-resolving model, land-atmosphere interaction