

HRRR Analysis and Prediction of Regional Conditions Associated with Flash Floods Across Southern Utah

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The extension of the North American monsoon into southern Utah leads to enhanced flash flooding risks to residents and millions of visitors to national parks and monuments during summer. Flash flood reports and Multi-Radar Multi-Sensor (MRMS) lightning analyses across southern Utah are related to atmospheric moisture content, moisture flux, and instability analyses and forecasts from the High-Resolution Rapid Refresh (HRRR) model during the 2021–24 monsoon seasons. Machine learning techniques are applied to time-lagged ensembles of HRRR forecasts (initialization times from 0300 to 0600 UTC) that are 13–18 h prior to the afternoon period when convection is initiating (1800–2100 UTC). Such HRRR predictions of precipitable water and convective available potential energy may be useful for forecasters at the Salt Lake City and Grand Junction National Weather Service Forecast Offices to assist in issuing flash flood potential statements for visitors to national parks and other recreational areas in the region.