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Observational and Modeling Analysis of Land–Atmopshere Coupling over Adjacent Irrigated and Rainfed Cropland during the GRAINEX Field Campaign

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- 4B.3: Observational and Modeling Analysis of Land–Atmopshere Coupling over Adjacent Irrigated and Rainfed Cropland during the GRAINEX Field Campaign

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  - Boston Convention and Exhibition Center- 259B

The Great Plains Irrigation Experiment (GRAINEX) was conducted in the spring and summer of 2018 to investigate Land-Atmosphere (L-A) coupling just prior to and through the growing season across adjacent, but distinctly unique, soil moisture regimes (contrasting irrigated and rainfed fields). GRAINEX was uniquely designed for the development and analysis of an extensive observational dataset for comprehensive process studies of L-A coupling, by focusing on irrigated and rainfed croplands in a ~100 x 100 *km* domain in southeastern Nebraska. Observation platforms included multiple NCAR EOL Integrated Surface Flux Systems and Integrated Sounding Systems, NCAR CSWR Doppler Radar on Wheels, 1200 radiosonde balloon launches from 5 sites, the NASA GREX airborne L-Band radiometer, and 75 University of Alabama-Huntsville Environmental Monitoring Economic Monitoring Sensor Hubs (EMESH mesonet stations).

An integrated observational and modeling approach to advance knowledge of L-A coupling processes and precipitation impacts in regions of heterogeneous soil moisture will be presented. Specifically, through observation of land surface states, surface fluxes, near surface meteorology, and properties of the atmospheric column, an examination of the diurnal planetary boundary layer evolving characteristics will be presented. Results from a hierarchy of modeling platforms (e.g. single column, large-eddy, and mesoscale simulations) will also be presented to complement the observational findings. The modeling effort will generate high spatiotemporal resolution datasets to: 1) generate a multi-physics ensemble to test the robustness and potentially advance physical parameterizations in high resolution weather and climate models, 2) comparison of prescribed forcing from observations and those from offline land surface model simulations and high resolution operational analyses, 3) determine the ability of model simulations to reproduce observed boundary layer evolution, with particular attention to the processes that compose the L-A coupling chain and metrics (e.g. mixing ratio diagrams), and 4) in combination with observations, isolate the impacts of soil moisture heterogeneity on planetary boundary layer characteristics, cloud development, precipitation, mesoscale circulation patters and boundary layer development. Initial results from the observational and modeling analysis will be presented.

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- https://ams.confex.com/ams/2020Annual/meetingapp.cgi/Paper/369326
        - **Recorded Presentation**: https://ams.confex.com/ams/2020Annual/videogateway.cgi/id/516368?recordingid=516368