Dear Participants:

During the two-day field experiment in the Colloquium, you are expected to conduct a experiment as part of a small group (3-4 participants). Please look at the following list and during the first week of the colloquium, we will ask you what are your preferences so we can group you with other participants with similar interests. You are also encouraged to come up with your own scientific objectives.

During the week two of the colloquium, mentors will assist you to analyze your data. At the end of the colloquium, you will be giving a short presentation on your results.

Professor Vanda Grubisic will coordinate the field projects.

Colloquium Steering Committee

Suggestions for small projects:

1. Cumulus entrainment using thermodynamic tracers. From an aircraft vertical sounding, flight leg below cloud base and penetration of cloud at several levels. Determine the sources and amounts of entrained air in a cumulus cloud. Radar gives context for the measurements. KA+WCR
2. Precipitation particle initiation (aircraft and/or radar/lidar). Examine airflow, cloud droplet, and precipitation development by flying through a cumulus cloud. Look for evidence of vertical recycling of air. KA+WCR
3. Development of boundary-layer (morning to afternoon, maybe even 24-hour). Evaluate the thermodynamic energy budget for a box defined by the boundary-layer capping inversion. Evaluate the entrainment flux at the top of the boundary layer. Involves analysis of the thermodynamic profiles and fluxes at various levels. MISS+GAUS+KA+ISFS+CSUC
4. Gravity waves. Use a combination of pressure altitude and GPS altitude measurements to map gravity waves. Calculate the gravity wave momentum flux. KA+GPS+MISS+GAUS
5. Flux-profile relationships. Comparison of vertical gradients of heat, momentum, water vapor, and carbon dioxide with their fluxes in the surface layer. May investigate other flux parameterizations as well. ISFS
6. Surface heterogeneity – how do the fluxes (emission/destruction) of heat, momentum, water, and carbon dioxide change with spatial location? Evaluated by observing the vertical flux divergence from towers (with different areal footprints) and point-to-aircraft measurements. ISFS+KA
7. Scalar similarity in the surface layer – are heat, water vapor, and carbon dioxide transported similarly by turbulence? Evaluation of Bowen and Modified Bowen ratios as a function of time of day. ISFS
8. Surface energy balance (sensible heat, latent heat, soil heating, net radiation) as a function of time of day and surface type. ISFS
9. Comparison of surface-based radiation sensors. Hemispheric infrared surface radiation to point surface temperature. Net radiation to sum of all four

components. ISFS

10. Dual-Doppler and polarimetric observations by CHILL and Pawnee radars of convective storms, including convective initiation. Use King Air to do pre-storm boundary layer sampling. Refractivity measurements would be made from CHILL as well. Alternatively, storms triggered by colliding outflows could also be investigated. Compare to ISFS and other surface-based precipitation amounts. CSUC+KA+ISFS
11. Polarimetric radar identification of precipitation type. CHILL would be used to collect high-resolution data on hail storms, emphasizing low altitude measurements. CSUC.
12. Other projects, suggested by student participants, can also be considered.

Abbreviations:
KA- University of Wyoming King-Air (flight level)
GPS – Satellite receiver at Jeffco Airport
WCR – University of Wyoming Cloud Radar (on King-Air)
CSUC – Colorado State University CHILL radar (fixed site)
MISS – Mobile Integrated Sounding System (radar wind profiler)
GAUS – GPS Sounding System (balloon-borne radiosonde)
ISFS – Integrated Surface Flux System (flux towers and more!)