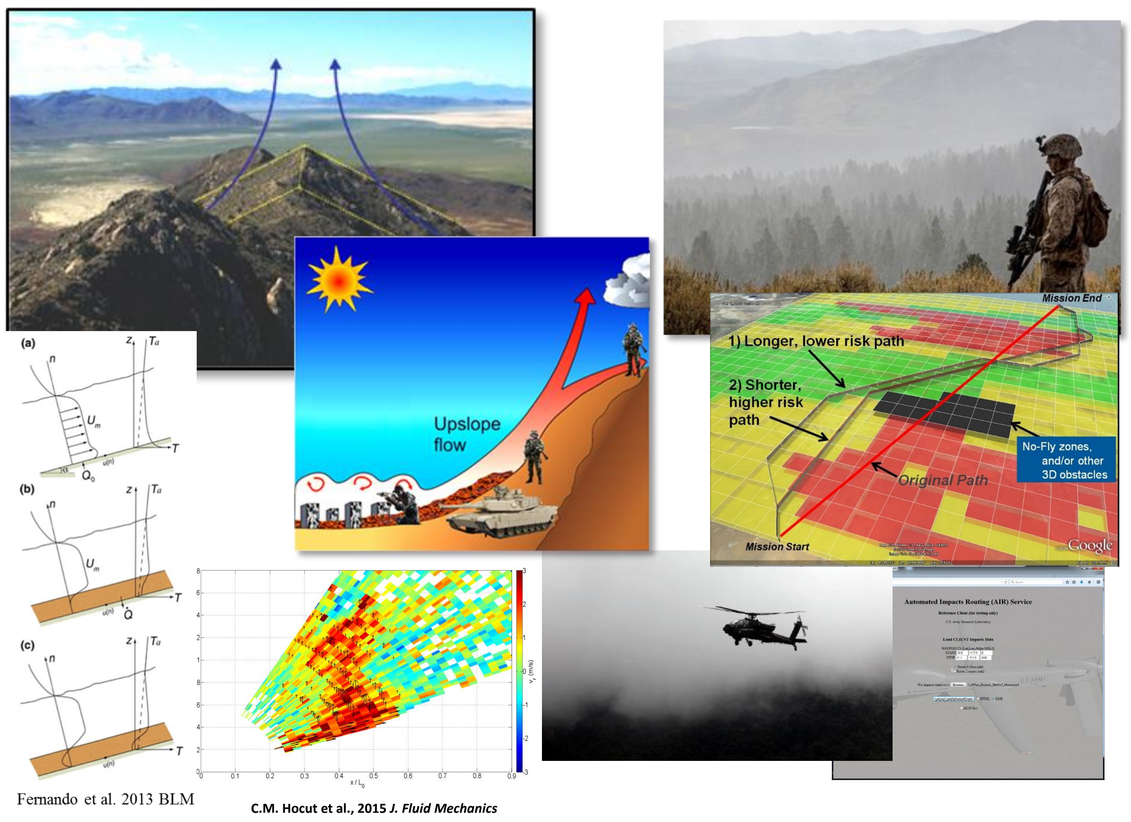
Atmospheric Boundary Layer Characterization, Analysis and Decision Aids

S&T Campaign: Information Sciences
Sensing and Effecting

Robb M Randall, (575) 678-3123
robb.m.randall.civ@mail.mil

Research Objective

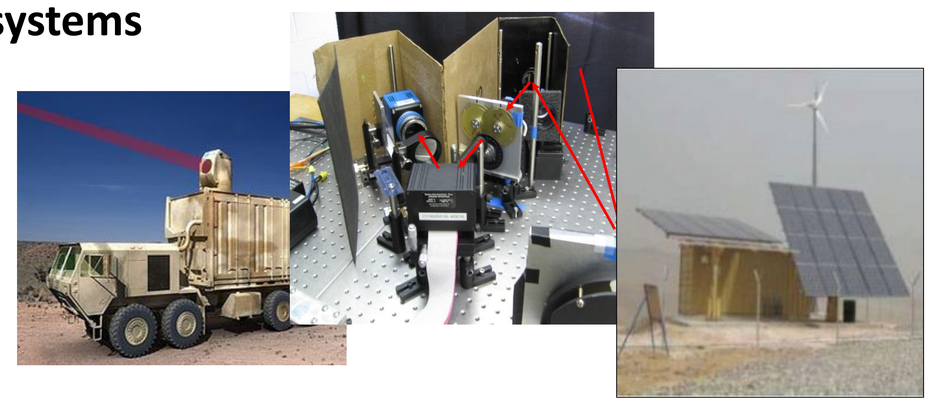
- **Basic research to determine boundary layer (BL) processes and characterizing of complex urban and mountainous terrain at high resolution (≤ 1km).**
- **Achieve the most accurate high-resolution decision aids in the world to provide battlefield commanders with readily-actionable intelligence information**



Fernando et al. 2013 BLM

C.M. Hocut et al., 2015 *J. Fluid Mechanics*

- **Characterize and understand atmospheric and climatic effects on Army operations, infrastructure and weapon systems to include renewable energy production systems**



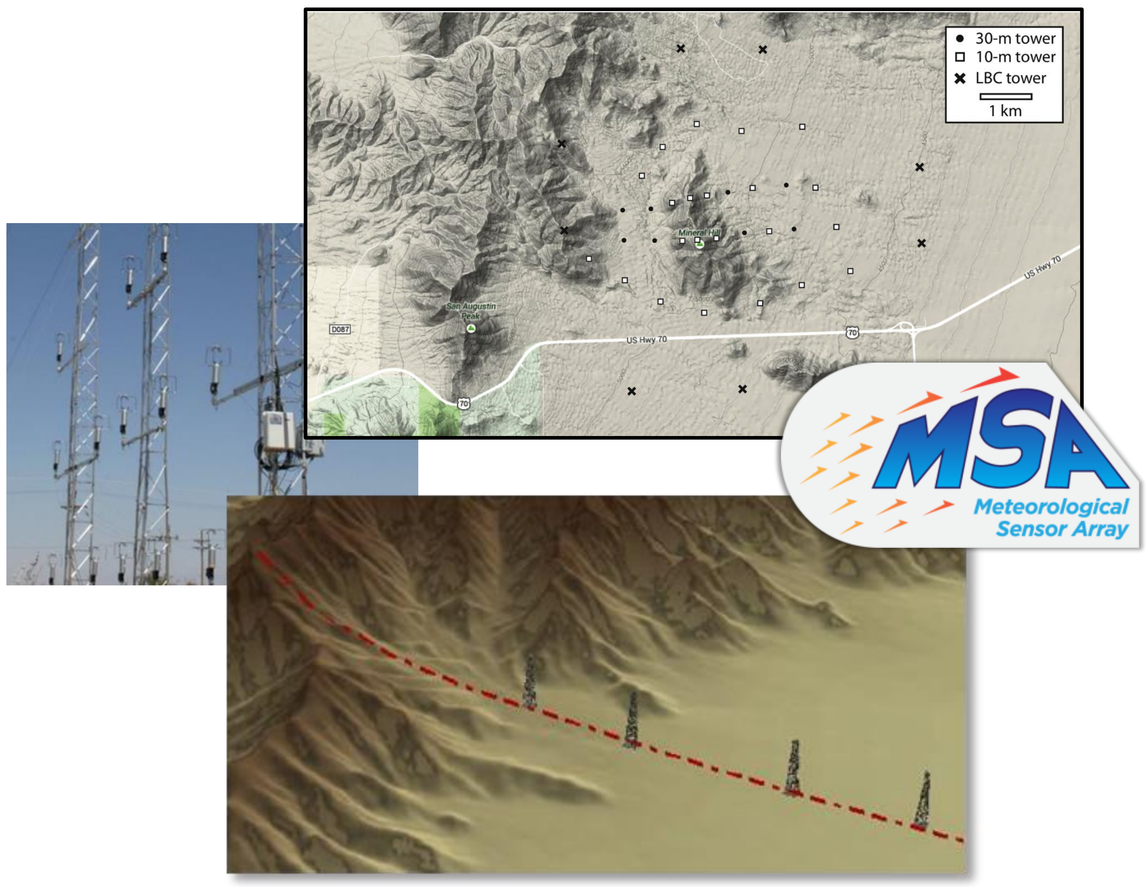
Challenges

- **Need Persistent observational databases at high resolutions (≤1km) over the full gamut of meteorological conditions over complex terrain**
- **Need unprecedented high resolution observations in complex terrain to probe highly dynamic atmospheric spatial and temporal processes.**

Organized under the US Army Research Laboratory Atmospheric Sciences Center

ARL Facilities and Capabilities Available to Support Collaborative Research

- **ARL will provide the Meteorological Sensor Array asset that will directly support researchers at microscale and meso-gamma resolutions.**
- **ARL and the WSMR community will provide a persistent observational database, replete with multiple sensors**
- **ARL high-performance computing resources in support of modeling and data analysis.**
- **ARL/CISD expertise in BL physics, dynamics and characterization.**
- **ARL/CISD expertise in innovative technologies.**



Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- **Expertise in BL flow and land-surface processes in complex mountainous and urban terrain.**
- **Expertise in atmospheric and climatic effects on Army operations, infrastructure and weapon systems**
- **Supplemental instrumentation and technologies to attain more intricate measurements or capture related processes**
- **Supplemental laboratory facilities to compliment research**

References:
Hocut, C.M., D. Liberzon, and H.J.S. Fernando. 2015: Separation of upslope flow over a uniform slope. *J. Fluid Mechanics*, doi:10.1017/jfm.2015.298.
Fernando, H.J.S., B. Verhoef, S. Di Sabatino, L.S. Leo, and S. Park. 2013: The Phoenix evening transition flow experiment (TRANSFLEX). *Boundary-Layer Meteorology*, 147:443.