**Evapotranspiration Estimation:**

**Science Question:** How is the changing climate affecting the landcover, temperature, and evapotranspiration (ET) in Arctic Alaska?

**Objectives:**
1. Use MODIS, Landsat, ASTER, and potentially airborne TIR data to simulate HyspIRI data and derive landcover classification, surface brightness temperature, and ET magnitude and variability over time.
2. Collect field data for turbulent fluxes and turbulence scales to validate satellite derived summer ET estimates.

**Work Progress and Plans:**

Two level sonic anemometers installed (Fig.7) and working (Fig.8). Scintillometers to be installed in late August. Image processing and implementation of ET algorithm in progress.

**Project Collaborators:**

Anupma Prakash; Martha Anderson (USDA); Chris Wyatt; Javier Fochesatto; Doug Kane; UAF Students - Erin Trochim and John Mumm.

**Funding and Support:**

Alaska’s NASA EPScR Program; NASA ESSF; Toolik Field Station.

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**Urban Heat Island Mapping:**

**Science Question:** How does change in landcover and landuse (especially urbanization) relate to Urban Heat Island (UHI) effect?

**Objectives:**
1. Carry out a spatio-temporal analysis of UHI in Delhi National Capital Territory (NCT), India using remote sensing.
2. Derive relationship between change in Land Surface Temperature and Landuse/Landcover

**Team and Support:**

Ashis Saha (DU, India); E. Csaplovics (TU-Dresden, Germany); Anupma Prakash (UAF); DAA; NASA GeoBrain.

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**Geothermal Exploration:**

**Science Question:** How do surface temperature anomalies relate to deeper thermal sources?

**Objective:** Use subtle surface temperature anomalies associated with geothermal fields to narrow down location of potential sources for further geothermal exploration.

**Approach:** Surface temperatures over a geothermal field are often only subtly higher than the background. We use a multi-temporal stack of TIR images over the target area. A persistent anomaly signature becomes more pronounced compared to variable background thermal signatures. Repeated anomalies (see red pixels in fig. below) are declared as areas amenable to further exploration.

**Work progress and plans:**

First fieldwork planned for Aug - Sept to validate image processing results.

**Team and Support:**

Anupma Prakash; Amanda Kolker; Christian Kienholz; City of Akutan.

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**Earthquake Induced Changes:**

**Science Question:** How do changes in surface spectral signatures in VSWIR and TIR regions relate to earthquake induced liquefaction and other changes?

**Objective:** Use multisensor (MISR and Landsat) pre- and post-earthquake images to characterize associated land surface changes.

**Preliminary results:**

The three figures on the right show pre-, post earthquake images and change maps from Landsat ETM VNIR; MISR VNIR; and Landsat TIR bands, respectively. Post-earthquake the area was generally warmer. Only extreme temperature changes are shown. Detected changes corroborate well with ground observations made by Singh et al. in 2002.

**Team and Support:**

Thomas Oommen (Tufts); Laurie Baise (Tufts); Rudiger Gens (ASF); Anupma Prakash (UAF); Ravi P. Gupta (IIT-R, India). NSF and IIT-Roorkee, India.

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**Coastal Processes:**

Coastal processes in Arctic Alaska are complex with considerable influence of winds, wave action, general circulation, glacial melt, oceanic inflow, permafrost and sea-ice. Monitoring of coastal regions is important for transportation and sustainable living of coastal communities. Image: courtesy of AOOS, Okkonen et al., 2009.

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**Operational Facilities that Benefit from Direct Broadcast:**

The left side of the image above is a scene from Terra MODIS, August 6, 2009 at 2:37pm. Every summer millions of acres in Alaska are ravaged by fire and engulfed in smoke. Time series data from visible, SWIR and MIR channels is very useful for fire monitoring. Image credits: University of Alaska - GINA www.gina.alaska.edu

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