CWEST Seminar
Wednesday, February 21st, 2018
11-12pm
SEEC Sievers Room S228

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Remote sensing of mountain snow water resources: Recent advances with high spatial and spectral resolution imagery

Over a billion people globally depend on snowmelt runoff to meet water demands, predominantly from snow that accumulates annually in mid-latitude mountains. To understand how this resource is changing, to utilize it efficiently, and to constrain the controls it has on climate and ecology, is not enough to know the amount of snow water equivalent but also when and how fast it will melt. The two most important properties for understanding snowmelt runoff timing and magnitude are the distributions of snow water equivalent and snow albedo. Unfortunately, current spaceborne platforms lack adequate [spectral, spatial, and/or temporal] resolution to inform snow albedo or snow depth/water equivalent in mountainous terrain, and this lack of knowledge propagates as uncertainty into earth system models. To address this gap, the Airborne Snow Observatory (ASO; NASA-JPL), a lidar and imaging spectrometer platform, has been measuring snow depth and snow albedo across key mountain basins in the Western US since 2013. This dataset has proved valuable for research and operational snow hydrology at the single basin scale, but ASO active/passive concept cannot scale up to space due to limitations of lidar technology. Digital surface models, comparable to those from lidar, can be produced from imagery alone using the flexible photogrammetric method structure-from-motion (SfM), which would address this limitation. I will show robust SfM snow depth retrievals at multiple scales, compare snow depth retrievals from SfM to those from lidar, demonstrate the value added of fusing high spatial and high spectral resolution imagery, and show how these retrievals can be used to inform snow energy balance and land surface models.