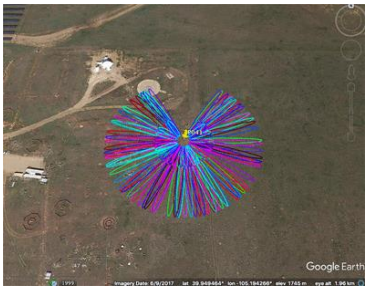
Seminar and Short Course



Environmental Sensing with Reflected GPS/GNSS Signals

Instructors: Professor Kristine M. Larson, Department of Aerospace Engineering Sciences, University of Colorado at Boulder. https://www.kristinelarson.net/
Date: Friday, October 12, 2018 from 9:00am - 4:00pm
Location: Institute of Geodesy and Geoinformation, University of Bonn, Nussallee 15, Rome 2.005

Abstract:
About 15 years ago I began working on developing methods so that GPS could be used to measure ground displacements during large earthquakes. At the time, almost all geodesists estimated station positions once per day, as this is entirely adequate for tectonic applications. Standard geodetic analysis tools (then and now) ignore the error caused by signals that reflect off the land surface. My group quickly realized that surface reflections were the largest error source in GPS seismology and developed tools to mitigate their impact. That early work in GPS seismology ultimately led us to new work in the field of GPS interferometric reflectometry - GPS-IR - where reflected GPS signals are used to turn a GPS antenna into a bi-static radar. The reflected GPS signals can be used to measure surface soil moisture, snow accumulation, water levels (tides), ice-up, permafrost melt, and vegetation water content. We were able to take advantage of the recently installed Plate Boundary Observatory (PBO) to apply these methods on a large scale, PBO H_2O http://xenon.colorado.edu/portal. In this talk I will explain how GPS interferometry works, and then share environmental results that have been derived from GPS (and increasingly, GNSS) data.

About Professor Larson:
Professor Larson received a BA in Engineering Sciences from Harvard University in 1985 and a PhD in Geophysics from Scripps Institution of Oceanography, U.C. San Diego in 1990. She was a professor of aerospace engineering sciences at the University of Colorado from 1990-2018. She has worked on a diverse set of GPS research projects, from measuring deformation across the Nepal Himalaya, to synchronizing atomic clocks, and measuring seismic waves. Most recently she led the development of GPS Interferometric Reflectometry (GPS-IR), where GPS signals that bounce on the surface below a GPS antenna are reverse engineered to measure soil moisture, snow accumulation, vegetation water content, and water levels. In 2014 her research group received the Prince Sultan Bin Abdulaziz International Water Prize for Creativity for developing GPS-IR. Larson was elected an AGU Fellow in 2011, received an Honorary Doctorate from the Chalmers University of Technology in 2017, and is currently a Humboldt Research Fellow at the GFZ.

Agenda

10:00 - 11:00	Welcome and meet with research groups	
11:00 - 12:30	Overview talk and questions	
12:30 - 13:30	Lunch	
13:30 - 14:00	Meet with Jürgen Kusche	
14:00 – 15:00 Meet with individuals	14:00-14:15	Name(s) (soil moisture / sea level)
	14:15-14:30	Name(s) (soil moisture / sea level)
	14:30-14:45	Name(s) (soil moisture / sea level)
	14:45-15	Name(s) (soil moisture / sea level)
15:00 – 15:30	Break	
15:30 – 17.00	Experience with GPS interferometry data	