**Sapienza PhD in ICT**

Doctoral program in Information and Communications Technologies at Sapienza Università di Roma, Rome, Italy

# Seminar Announcement

## April 4th, 2017 – DIET Room 206, 12:00 p.m.

## Retrieval of soil moisture using SAR data and surface water fraction with radiometer data from the L-band SMAP satellite

## Speaker: Dr. Seung-bum Kim

**Abstract –** We evaluate the retrieval of soil moisture in the top 5-cm layer at 3-km spatial resolution using L-band dual-copolarized Soil Moisture Active Passive (SMAP) synthetic aperture radar (SAR) data that mapped the globe every three days from mid-April to early July, 2015. Surface soil moisture retrievals using radar observations have been challenging in the past due to complicating factors of surface roughness and vegetation scattering. Here, physically-based forward models of radar scattering for individual vegetation types are inverted using a time-series approach to retrieve soil moisture while correcting for the effects of static roughness and dynamic vegetation. The retrievals are assessed at 14 core validation sites representing a wide range of global soil and vegetation conditions over grass, pasture, shrub, woody savanna, corn, wheat, and soybean fields. The predictions of the forward models used agree with SMAP measurements to within 0.5 dB unbiased-RMSE (root mean square error, ubRMSE) and -0.05 dB (bias) for both co-polarizations. Soil moisture retrievals have an accuracy of 0.052 $m^3/m^3$ ubRMSE, -0.015 $m^3/m^3$ bias, and a correlation of 0.50, as compared to in-situ measurements, thus meeting the accuracy target of 0.06 $m^3/m^3$unbiased RMSE. In the second part the surface inundation extent is derived using brightness temperature data acquired by the SMAP satellite. The fidelity of the SMAP watermask is assessed in this investigation by comparing with the 3-m resolution maps derived using Radarsat synthetic aperture radar (SAR) data in northern Canada with 5% as the mean of the difference. With respect to the multi-sensor climatology over Siberia, the SMAP results provide more realistic information in winter.

**Bio –** Seung-bum Kim received the B.Sc. degree in electrical engineering from the Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea, in 1992 and the M.S. and Ph.D. degrees in remote sensing from the University College London, London, U.K., in 1993 and 1998, respectively. He worked on spaceborne photogrammetry to generate land topography with the SPOT images and microwave radiometry with the AMSR-E data in KAIST until 2003 as a part of the national service. He conducted ocean science research of the mixed layer dynamics in the Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA, until 2006. He was a Scientist with Remote Sensing Systems,CA,studying theL-bandradiometry for the Aquarius salinity observation. Hehas beenwiththe JetPropulsionLaboratory since2009. Heis a member oftheAquarius science team. Hiscurrent research includes microwave modeling, soil moisture retrieval with the radar data from the Soil Moisture Active Passive mission, and salinity retrieval with the Aquarius data. Dr. Kim received paper awards from the U.K. and Korean remote sensing societies and the NASA group achievement awards.