Spatial and Temporal Remote Sensing Data Fusion for Vegetation Monitoring

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Abstract

The suite of available remote sensing instruments varies widely in terms of sensor characteristics, spatial resolution and acquisition frequency. For example, the Moderate-resolution Imaging Spectroradiometer (MODIS) provides daily global observations at 250m to 1km spatial resolution. While imagery from coarse resolution sensors such as MODIS are typically superior to finer resolution data in terms of their revisit frequency, they lack spatial detail to capture surface features for many applications. The Landsat satellite series provides medium spatial resolution (30m) imagery which is well suited to capturing surface details, but a long revisit cycle (16-day) has limited its use in describing daily surface changes. Data fusion approaches provide an alternative way to utilize observations from multiple sensors so that the fused results can provide higher value than can an individual sensor alone. In this presentation, I will review data fusion models built based on the Spatial and Temporal Adaptive Reflectance Fusion Model (STARFM) concept. Applications in vegetation phenology mapping and crop water use monitoring at 30-m spatial resolution will be presented and discussed. Limitations for satellite data fusion will be discussed.

Biography

Dr. Feng Gao is a Physical Scientist with the Hydrology and Remote Sensing Laboratory, Agricultural Research Service, U.S. Department of Agriculture (USDA). He received his B.S. in geology and the M.E. in remote sensing from Zhejiang University, Hangzhou, China on 1989 and 1992 respectively, the M.S. in computer science from Boston University, Boston, MA in 2003, and his Ph.D. degree in geography from Beijing Normal University in Beijing, China, in 1998. From 1992 to 1998, he was a Research Associate Professor with the Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences. From 1998 to 2004, he was a Research Associate Professor at the Department of Geography and Center for Remote Sensing, Boston University. From 2004 to 2011, he was a Research Scientist with the NASA Goddard Space Flight Center and Earth Resources Technology, Inc. Since 2011, he has been a Physical Scientist with USDA. His current research interests in USDA include vegetation phenology mapping, crop condition and water use monitoring, and crop yield estimation at field scale using multi-satellite data fusion approach. He has authored or co-authored over 90 publications in peer-reviewed journals with h-index of 46. He has been a principal investigator or co-investigator on 15 funded research proposals supported by NASA, US Geological Survey, and NOAA. He has been a member of the Landsat Science Team since 2006 and a member of the MODIS Science Team since 2014.