



Pecora 21/ISRSE 38

Organized Special Presentation (SP) Sessions

When submitting an abstract for a proposed special session, please include the session ID (e.g. SP1, SP2) as a Keyword.

SP1

Open Data Cube: A new data technology for enhancing the use of satellite data to address sustainable development goals

Brian Killough, NASA

The Open Data Cube (ODC), created and facilitated by the Committee on Earth Observation Satellites (CEOS), is an open source software architecture that allows analysis-ready satellite data to be packaged in "cubes" to minimize data preparation complexity and take advantage of modern computing for increased value and impact of Earth observation data. This session will summarize the ODC progress, discuss the advancements of country-based implementation and present the status of several new open source ODC applications and their potential to address society and the UN Sustainable Development Goals.

SP2

An overview of the current Analysis Ready Data products, tools, applications and impacts

Andreia Siqueira, Geoscience Australia

Public and private agencies have been committed to address the big data challenge by producing Analysis Ready Data products (ARD) for their users. The ARD products are enabling users to get first hand satellite data that are ready to use for a wide range of applications, including time-series analysis and the way forward to multi-sensor interoperability. The Analysis Ready Data session has as its main objective to present the current state of knowledge on global efforts towards producing Analysis Ready Data (ARD). It is expected that topics across the maturity of ARD products, including validation and calibration, the overall CEOS Analysis Ready Data for Land (CARD4L) framework as well as the Product Family Specifications (PFS) and the Product Alignment Assessment process (PAA) will be presented and discussed. Further, presentations are foreseen on the comparison of multi-sensor ARD products and ARD harmonized products.

SP3

New Technology and Techniques to Increase Scientific and Applications Access to Satellite Earth Observations

Sara Lubkin, NASA Earth Science Data Systems

The ever-growing repository of Earth observations offers unique opportunities for research and applications. For example, NASA's data archives currently contain more than 26 petabytes (PBs) of remotely sensed Earth observations. With the launch of new missions, this archive is expected to grow at a rate of more than 50 PB per year. While remotely sensed data is providing us with a better understanding of Earth systems, accessing and processing large volumes of data stored in a variety of data formats presents significant challenges for both scientists and decision makers. This session will focus on technologies and modern techniques that address the challenges of managing, discovering, integrating and utilizing the growing archive of Earth data for science research, policy and applications. Topics may include, but are not limited to:

- Advanced search capabilities
- Software applications
- Cloud-based data processing and transformations
- Applications of machine learning
- Data access services
- Analysis ready data
- Citizen science

Presentations should be directed towards science and applications users.

SP4

Lidar Vegetation Canopy Metrics - towards developing standards

Jim Ellenwood, US Forest Service

Common vegetation metrics derived from Lidar and photogrammetrically derived high-resolution imagery can help to unify regional and national datasets for greater utility for large area applications.

SP5

High-Resolution Land Cover using NAIP

Michael Norton, Chesapeake Conservancy

Recent years have seen more interest in high-resolution land cover mapping using imagery from the National Agricultural Imagery Program, and land cover datasets have been produced at the 1-m scale for places like the Chesapeake Bay watershed and the state of West Virginia. These datasets represent an opportunity to gain finely-tuned information about the current state of land in each area, and make additional analysis possible, such as identifying conservation opportunities. However, despite the promise of additional avenues of inquiry, high-resolution land cover data also has a few drawbacks. For one, NAIP imagery has a high spatial resolution, but smaller spectral resolution (4 bands) and temporal resolution. Thus, additional contextual information like Lidar is often helpful, which may or may not have been collected at the same time as the NAIP imagery. As a result, even the most accurate classification algorithms require significant quality control to achieve reasonable levels of accuracy (85-

90%). In this session, we will present at least 4 sessions that cover some of the opportunities and pitfalls inherent in using NAIP imagery to produce high-resolution land cover.

SP6

SAR for agriculture and perspective applications

Dr. Amine Merzouki, Science and Technology Branch, Agriculture and Agri-Food Canada

The increasingly detailed and available land information from SAR sensors opens up new possibilities for efficient agricultural monitoring. The ability to produce accurate field scale information was improved significantly over the past decade thanks to the increased availability of consistent time series of RADARSAT, Sentinel and TerraSAR-X SAR data. Furthermore, the forthcoming launch of new SAR systems, e.g. RCM, SAOCOM constellation, ALOS-Next/Tandem-L, NISAR, etc., will likely support the combined use of SAR data from various sensors with better imaging capabilities. This will enable the scientific community to further improve SAR-based approaches to assist national, regional and international efforts to monitor soil conditions and crop production. The proposed session will focus on recent advances on new concepts, algorithms and products using SAR data in agriculture. The goal is to bring together experts working on applications related to several disciplines such as soil moisture retrieval, crop identification and mapping, crop phenology identification and biomass biophysical parameters estimation.

SP7

Water Colour: The Canadian Perspective

Emmanuel Devred, Canadian Department of Fisheries and Oceans

Canada borders three oceans with the longest coastline in the world, and have more than 30 000 lakes with a surface area greater than 3 square-kilometer (among, which, 561 have a surface area greater than 100 square-kilometer). These aquatic bodies provide services and are a notable source of economical revenue in term of food resources, transport, and tourism. The changing environment and increased anthropic pressures, for instance, warming Arctic and harmful algal bloom in lakes, require adapted tools to monitor and quantify the health of our aquatic ecosystems, specifically in remote areas with difficult access. For decades, Canada has relied on water color to observe and study the aquatic environment and has developed a strong community of developers and users of water color products. This current session aims at presenting activities related to theory and measurements of aquatic color in Canada, including development of algorithms, validation of satellite products and applications including water quality, monitoring of ecosystems, fisheries and quantifying the impact of climate change in a variety of environments.

SP8**Applications of NASA Earth Observations for Local Decision Making: 20 Years of the NASA DEVELOP Program**

Kenton Ross, NASA Langley Research Center

NASA's DEVELOP National Program takes a unique approach to cultivating the next generation of geographers and enhancing environmental management and public policy decision making around the globe. The program conducts rapid, interdisciplinary feasibility studies that apply NASA's Earth observing satellites and airborne missions to address real-world community concerns. This advances environmental understanding by improving the ability of the future geoscience workforce to recognize, understand, and address environmental issues facing communities. This session highlights projects that apply NASA's Earth observations, GIS, and remote sensing techniques to a broad range of decision-making processes related to themes such as agriculture & food security, disasters, ecological forecasting, health & air quality, and water resources.

SP9**How no-cost Landsat data is reshaping college-level remote sensing courses**

Ramesh Sivanpillai, University of Wyoming & AmericaView

The availability of no-cost Landsat data allows instructors to integrate an abundance of imagery data into their classroom instruction and laboratory exercises. Laboratory exercises can be kept relevant with current and up-to-date images. Advances in computing and data processing have created opportunities for incorporating no-cost Landsat and other satellite data in these courses. This short presentation session will showcase how instructors in colleges and universities are leveraging these valuable resources in their remote sensing courses. We welcome submissions describing techniques and tools for downloading and integrating large volumes of imagery data for monitoring, classification, and visualization purposes.

SP10**Societal Benefits of Earth Observations in Natural Resource Management Decision Making**

Carl Shapiro, USGS

We propose a 90-minute standard presentation session on the State of the Science and Practice for Assessing Societal Benefits of Earth Observations in Natural Resource Decision Making Accomplishments, Challenges, and Next Steps. The session would explore recent advances in quantifying benefits from earth observations and assess the challenges that we are facing in more routinely and more uniformly determining these benefits. Importantly, discussion in the session will identify potential next steps that are needed to advance the science and practice. There has been much recent interest and attention concerning efforts to effectively identify and quantify societal benefits of earth observations in natural resource decision making. Communities of practice such as GEOValue have convened international workshops focusing on methods for quantifying societal benefits, development of value chains, and data accessibility and availability. In 2017, GEOValue, in collaboration with the USGS, NOAA, the European Space Agency, and the European Association of Remote Sensing Companies convened a side event on value chains and the benefits of earth observations at the GEO Plenary in Washington, DC. In 2016, GEOValue in collaboration with the USGS, NASA, and OECD

convened an international workshop in Paris, France focusing on use cases for determining societal benefits from earth observations for natural resource and natural hazard management decisions. There are visible studies on this topic that are ongoing including the NASA - RFF Valuables effort, and complementary studies by the USGS and NOAA.

SP11

So What, Who Cares: Linking Natural and Social Science to Understand Societal Impact and Improve Decision Making

Valerie Were, NOAA Center for Earth System Sciences and Remote Sensing Technologies

This session will be a collection of presentations on how the NOAA Center for Earth System Science and Remote Sensing Technologies integrates natural and social science to improve decision making and affect meaningful change. Earth observations are at the heart of the education, research, and training conducted at the NOAA Center for Earth System Sciences and Remote Sensing Technologies. Recently, the Center committed to integrating social sciences to better link its activities to societal benefit and decision making. This collection of talks provides examples and lessons from that integration process.

SP12

Importance of System Calibration and Data Quality on Earth Observation

Greg Stensaas, USGS

This session will discuss the importance of remote sensing data quality and the need for system calibration and product validation to support integrated long-term remote sensing.

SP13

UAS: Changing the Future of Remote Sensing

Greg Stensaas, USGS

The session is designed to show value and importance of UAS in the remote sensing environment and the need for common process and guidelines

SP14

Satellite Interoperability

Jon Christopherson, KBRwyle Inc., Contractor to USGS EROS

With the growing number of satellite data streams available to users it becomes necessary to understand how datasets can be used together to support global monitoring. This session will discuss methods and results of using multiple datasets together.

SP15**Land imaging capabilities and user needs**

Zhuoting Wu, USGS NLI

Since the launch of the first Earth Resources Technology Satellite 1 in 1972, land imaging technology has evolved rapidly and transformed science research innovation. The USGS is partnering with U.S. Federal agencies, incorporating input from state/local, academic, industry, and international communities, to document current usage and benefits, and improvement needs for future land imaging observation data and products. These activities promote a needs-driven, prioritized investment decision process for land imaging systems, products, and services to better serve the broad land imaging community. This session will provide an overview of the current landscape of land imaging capabilities, applications, user needs for future systems, and the future landscape of land imaging including the rapidly expanding commercial sector. This session will highlight activities within U.S. Federal agencies, academic, state/local, and international communities. We also invite submissions showcasing new and emerging multi-disciplinary land imaging applications, technology trends, and future needs and opportunities.

SP16**Air quality monitoring with Earth observations for enhanced decision making and regulatory support**

Nathan Pavlovic, Sonoma Technology, Inc.

Advances in Earth observation programs are providing new tools for understanding drivers of air pollution trends that support policy and action to improve air quality. New sensors, such as TROPOMI or the planned TEMPO mission, provide higher resolution data that can retrieve a broader range of pollutants than earlier sensors. In addition, new retrieval algorithms such as MAIAC promise to provide higher resolution or improved accuracy information using data from existing sensors. Combined with growing ground monitoring data driven by the proliferation of low-cost sensors, these new Earth observation tools offer decision makers and the public an enhanced view of the state of air quality. This session invites presentations that examine how advances in remote sensing of air pollutants are enabling air agencies and decision makers to better understand and act on air quality information. Potential topics include new and innovative uses of Earth observations of air quality for regulatory applications, decision support, and public communication.

SP17**Transitional by nature: leveraging remote sensing technology for continuous monitoring of dynamic wetland ecosystems**

Kate Fickas, University of Massachusetts

Ben DeVries, University of Maryland

Here we propose a session that aims to present and discuss the advantages of different remote sensing technologies and algorithms and their application in conservation, restoration and utilization of wetlands through continuous mapping and monitoring of wetland hydroecological dynamics. As key ecosystems across the planet, wetlands are found on every continent except Antarctica. Providing a wide variety of ecosystem services, wetlands are known to cleanse polluted waters, protect shorelines, recharge groundwater aquifers, buffer flood and drought severity, and provide unique habitat to a wide variety of plants and animals. Wetland ecosystems are also increasingly being recognized in their role in

carbon storage and sequestration and socio-economic progress. Bridging the gap between terrestrial and aquatic ecosystems, wetlands have both coastal (saltwater) and interior (freshwater) areas. The transitional nature and spatio-temporal ecological variability of wetlands makes them difficult to detect and classify with remote sensing imagery and challenging to discriminate the boundaries between vegetation habitat types. In this session, we propose to invite speakers who have leveraged remote sensing observations from satellite and airborne (optical, radar and/or lidar) data to augment continuous monitoring of diverse wetland ecosystems across the globe. Specifically, our session intends to provide insight into characterization of past states and distributions of wetlands and subsequently understand how continuous monitoring can inform on future wetland response to human-induced activities, natural events and processes, and climatic fluctuations. From freshwater hydrology to coastal vegetation, we propose to invite contributors who exemplify the diversity of global wetland ecosystems and dynamics.

SP18

Connecting people and pixels through citizen science to enhance global monitoring

Peder Nelson, Oregon State University

In this session, we will highlight projects that are using participatory science to increase the quantity of in-situ reference and validation data. In addition to simply collecting data for others to analyze, citizen science has the opportunity to increase scientific literacy, provide pathways for under-represented scientific voices, and create a new type of global monitoring network.

SP19

Open Civil Applications Committee Meetings

Dan Opstal, USGS/NGA

Since 1975, the Civil Applications Committee has worked to facilitate access and appropriate use of military and IC remote sensing systems and data by the Federal Civil Community for the use in a diverse range of scientific and research missions. Normally, monthly CAC meetings are held at a classified security level to encourage free-ranging discussion by those who hold the proper clearances. However, this session would focus on the emerging rise of commercial imagery applications and the algorithms that now encompass the revolution of Geospatial Intelligence.

SP20

The Next Generation of the Landsat Archive

Christopher Barnes, SGT, a KBRwyle Business Unit

For the past 47 years, the joint NASA-USGS Landsat program has collected and archived over 8 million scenes and represents the world's longest continuous remotely sensed global record of the Earth's surface. Improvements to the quality and usability of the USGS Landsat archive have greatly reduced the preparatory work necessary for application scientists, land managers, and policymakers to do time-series investigative analysis tied to monitoring and assessing landscape change. This session includes

topics that have leveraged these Landsat archive improvements as well as the availability of new science products to improve our understanding of a changing Earth.

SP21

Space Agencies Outlook

Peter Schaadt, DLR German Space Administration

Invited Session in the tradition of the ISRSE symposia with presentations of the plans of the large space agencies with own major Earth Observation programs. Heads of EO departments will be invited to present outstanding scientific achievements of EO activities and an outlook of their future EO programs.

SP22

NASA Harvest and other recent advances in remote sensing of agricultural applications and food security

Michael Humber and Chris Justice, University of Maryland, NASA Harvest

One of the first applications areas for satellite remote sensing was agriculture. However, until recently, limitations of data availability and data policy prevented the realization of its real potential in this area. With recent advances in sensor technology and high-performance computing, we are seeing a renaissance in agricultural remote sensing. Significant advances in the science quality and coarse resolution measurements established in the MODIS era with near-daily global data have been transitioned to the operational JPSS program with the launch of NOAA-20. Geostationary data (e.g. GOES-17) are providing data (500m and 1km) at 15-minute intervals. Global moderate resolution (30m) products are now being generated and a combination of Landsat and Sentinel-2 data is now providing c. 3-5 day temporal coverage. Freely available Sentinel-1 Synthetic Aperture Radar data provide surface observations regardless of cloud cover and the NASA ISRO SAR (NISAR) is in the design phase. Microwave sensors are also providing regional soil moisture conditions and a growing number of commercial fine resolution (<5m) sensors are capable of providing detailed imaging at the farm level. Individually and in concert, these sensing systems are being applied to cropland and crop type mapping, crop condition and yield estimation, within season production forecasting, monitoring of irrigation, agricultural land use and management change and a number of other applications. Given these enhanced capabilities, NASA has established the Harvest program on agriculture and food security, focused on decision support. The Harvest Consortium, led by the University of Maryland, has 40 partners and collaborators with both national and international activities. The international activities are making significant contributions to the GEO Global Agricultural Monitoring (GEOGLAM) program, helping provide coordination across national and international programs to enhance the operational uptake of remote sensing and articulate the requirements for future observations. This session will include presentations from the community on recent developments in agriculture and food security decision-support.

SP23

Sustainable Land Imaging and the Future of Moderate-Resolution Land Observation

Jeffrey Masek, NASA GSFC

Nearly 50 years after the start of the Landsat program, the NASA/USGS Sustained Land Imaging initiative offers an opportunity to evolve US land imaging for the 2030's. At the same time, international and commercial platforms are providing a wide range of new capabilities. Coordination and harmonization of these assets will be paramount in forging strong national and international imaging programs. This session will explore future directions for global land monitoring from both US and International Programs, focusing on evolving user needs, advanced technologies, and multi-source coordination.

SP24

Geospatial Fusion: Observations, Features, Decisions

George Percivall, Open Geospatial Consortium

Geospatial fusion provides methods to get the most value from geospatial information. Geospatial fusion includes analytical processes applied to observations, features/objects and decisions. Geospatial fusion is not a new topic but new technology provides opportunities to enhance this ubiquitous process, including big data, cloud technologies, linked data and new sources of geospatial observations. Geospatial fusion in distributed information environments with interoperability based on open standards is radically changing the classical domains of data fusion while inventing entirely new ways to discern new insights.

SP25

The Challenges of Integration for Arctic Monitoring

Yves Crevier, Canadian Space Agency

Donald McLellan, Polar Knowledge Canada

The effects of climate change are having significant impacts on the Arctic environment and its people. Climate-induced changes occurring much faster than in lower latitudes include, but are not limited to, glacier retreat, sea-ice and lake-ice thinning, permafrost thawing, coastal erosion, changes in ocean currents, enhanced 'greening' of tundra, and shifting ranges of plant and animal species. Monitoring the Arctic has always been a challenge with its vast area, difficult access, inclement weather, and limited number of actors. Several powerful examples of satellite-based measurements are contributing to a better understanding of changes at local to continental scales, but linking satellite measurements to the decision-making process remains full of challenges. This session seeks to stimulate discussion around the pragmatic use of space-based technology to understand environmental change and support proactive adaptation by Arctic communities and governments. In the context of the Arctic, this session will focus on: a) R&D challenges related to the integration and interoperability/complementarity of multisource/multi-scale data (from in situ to drones to airborne to satellite); and b) the scaling factor - tackling the challenges related to scaling up (integrating local-scale, process-based earth studies to regional scales) and scaling down (moving from regional-based measurements and modeling to local information products useful for adaptation and decision making processes).

SP26

Remote Sensing Applications for Water Resources Management, Including Droughts, Floods and Associated Water Cycle Extremes

Brad Doorn, NASA Applied Sciences Water Resources Program

Water resources management can benefit from applications of remote sensing and hydrologic models. These tools can be especially valuable during extreme events and in data-sparse regions. Observational assets include the GPM, SMAP, Terra, Aqua, Landsat, GRACE, and Sentinel satellites, and other satellite and airborne platforms. They can support the operational water resources management community in responding to climate change, increases in climate variability and the frequency of extreme events. This session will highlight advances in the use of satellite, airborne and ground-based sensor networks to: measure the quantity/quality of hydrologic resources in the U.S. and internationally; provide information to water managers to improve water resources management; and support risk-based decision making. Topics of interest include (1) extreme events such as floods and droughts; (2) water supply and snow water resource monitoring and forecasting; (3) evapotranspiration, soil moisture, groundwater, and agricultural water management; and (4) water quality.

SP27

Communicating Science Across the Earth Observation Life Cycle

Ana I. Prados, University of Maryland Baltimore County and NASA

A key factor to the successful adoption of Earth Observations is knowledge sharing between researchers and non-experts. Non-experts need information regarding the generation, access to, and utility of data and tools developed by the scientific community, while scientists need information regarding user needs. Yet researchers don't have many opportunities to learn effective communication skills. In this session we discuss successes and challenges in knowledge sharing and communication between remote sensing scientists and non-experts. The session includes various aspects of oral and written communication such as language, contextualization, venues, storytelling, and opportunities to effectively communicate with decision-makers and the public. Speakers will provide tips for effective scientist-to-non-expert communication throughout the entire Earth Observation life cycle, from technology development, to monitoring, to applications for societal benefit. We will also hear directly from current and potential users and their perspective on science communication. Finally, the session will also highlight how remote sensing scientists are uniquely positioned to improve decision makers' understanding of earth processes.

SP28

New Generation of NOAA Operational Satellites to support Land, Arctic, and Coastal Waters Applications

Mitch Goldberg, (NOAA)

Ivan Csiszar (NOAA)

The new generation NOAA operational weather satellites, the JPSS (low-earth polar-orbiting) and GOES-R (geostationary) series will provide continuous observations for the next two decades. The satellites have multispectral visible, near infrared, mid-wave infrared and thermal infrared imagers with at least twice per day global observations from JPSS (upwards of 28 passes per day over the Arctic) and high temporal, at least every 15 minutes over hemispheric regions and as high as every 30 seconds for smaller regions from GOES-R. For traditional land imagery requirements, these imagers are coarse resolution – 375 – 750 meters for JPSS, and 500 meters to two kilometers depending on the spectral band for GOES-R. However, their large area spatial coverage and unsurpassed temporal resolution have many advantages for larger scale land applications, including agriculture, flood mapping, coastal water quality, snow and sea ice, and fire detection and burn scars. JPSS can provide continuity of long term datasets and real-time applications generated from MODIS especially from the early afternoon orbit. The JPSS imager includes a unique band which can be used to observe light sources from the surface (cities, lava flows, gas flares, fires) that have been used in population studies, monitoring power outages and recovery, for search and rescue, and other applications such as monitoring ice and snow. The new NOAA satellites can provide early detection and continuous monitoring of land features, which are then significantly sharpened in detail by the existing constellation of high and moderate spatial resolution land imagers. This session will introduce the relatively new NOAA satellites and their applications, including blended low earth and geostationary products to the PECORA and ISRSE communities.

SP29

Global 30-m Landsat-derived Rainfed and Irrigated Croplands for Food and Water Security Studies

Prasad S. Thenkabail (USGS)

The overarching goal of this special session is to present and discuss global 30m Landsat-derived rainfed and irrigated cropland products of the world (<https://www.usgs.gov/WGSC/gfsad30>). First, the session will discuss global croplands (www.croplands.org) produced from Landsat 30-m time-series data from multiple-years utilizing a suite of machine learning algorithms on the Google Earth Engine (GEE) cloud computing platform. Second, rainfed and irrigated cropland nominal 30-m products delineated from the baseline global cropland product as well as other existing product using multi-pronged methods, approaches, and datasets will be presented and discussed. Third, reference training and validation data sourcing as well as accuracy assessments of the products will be discussed. Fourth, national and sub-national irrigated and rainfed cropland area computations and their comparisons with the National and/or Internationally available statistics (e.g., UN FAO) statistics will be established. Fifth, utilization of these high-resolution cropland products in crop water use and crop water productivity studies will be discussed. Finally, availability of these data and products to public through The Land Processes Distributed Active Archive Center (LP DAAC) of USGS and NASA will be highlighted. Implications of these highest resolution global products for food and water.

SP30**Global Hyperspectral Imaging Spectral-library of Agricultural-Crops (GHISA) in Support of NASA's Surface Biology and Geology (SBG) mission**

Prasad S. Thenkabail (USGS)

Itiya Aneece (USGS)

The overarching goal of this special session is to present and discuss the novel concept of Global Hyperspectral Imaging Spectral-library of Agricultural-Crops (GHISA; <https://www.usgs.gov/WGSC/GHISA>). Developed by the United States Geological Survey Researchers, GHISA is a platform for sharing the most advanced past, present, and the next-generation hyperspectral remote sensing data which is acquired in the spectral domain in the form of hyperspectral spectral signatures for every pixel observed as opposed to data in form of few spectral data points of the current generation of multispectral sensors. First, the sessions will present GHISA hyperspectral libraries of some of the leading world crops (e.g., wheat, rice, corn, soybeans, cotton) from different agroecological zones (AEZ's) of conterminous United States (CONUS) as well as from few other parts of the world derived from spaceborne, airborne, and ground-based platforms. Second, the process of analysing GHISA hyperspectral data on the Google Earth Engine (GEE) cloud to understand, model, map, and monitor agricultural crops within and across agroecological zones will be presented and discussed. GHISA will make a significant contribution to existing spaceborne hyperspectral sensors such as the recently launched HysIS (Hyperspectral Imaging Satellite of India with 55 bands in 400-950 nm VNIR and 165 bands in 900-2500 nm SWIR) by India, and the planned NASA's Surface Biology and Geology (SBG) mission.

SP31**National Land Cover Database 2016, Offering New Change Insights Across the Conterminous United States**

Collin Homer

This session will overview the products, change results and applications for various data themes from the National Land Cover Database (NLCD) 2016. This recently released suite of products includes land cover and urban imperviousness for 2001-2016, tree canopy for 2011 – 2016 and new shrub/grass products for 1984-2016 across the conterminous U.S. NLCD 2016 offers users an unprecedented set of land cover and land cover change products which have been designed to further expand and advance NLCD applications. Examples of database results, change analysis and application potential will be given and discussed.

SP32**Earth Observations for International Development**

Douglas Muchoney, UN Food and Agriculture Organization (UN FAO)

Earth Observations have increasingly been employed by international development institutions including UN agencies, international development banks and NGOs. Geospatial technology plays a fundamental supporting role in the quest for food security by identifying and monitoring natural

resource use and propose adequate information for policy relevant solutions. Through remote sensing, we define: standards and indicators for the regular qualitative and quantitative monitoring of natural resources methodologies and tools that support governments and institutions in the study and assessment of innovative and effective plans for production, management, safeguarding and building resilience of human and natural resources.

This session will highlight current and emerging EO technologies in international development.