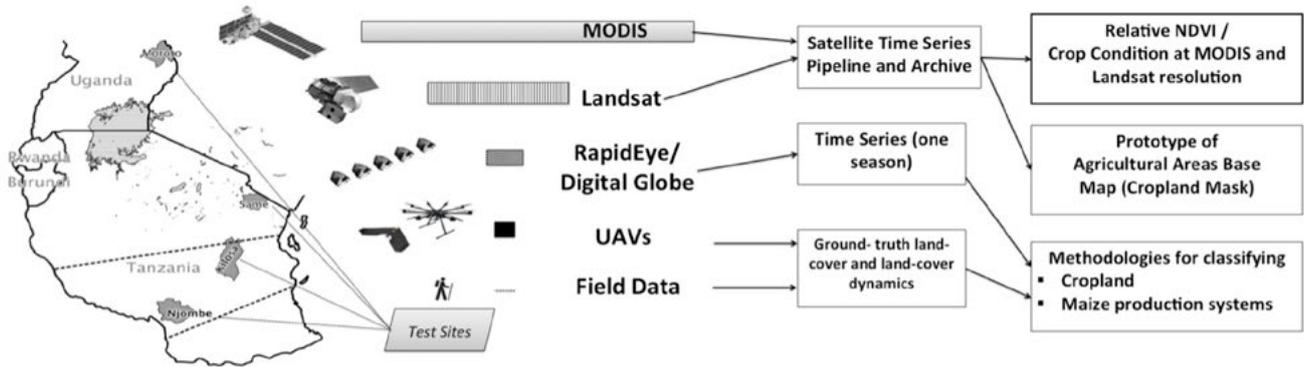


AgriSense



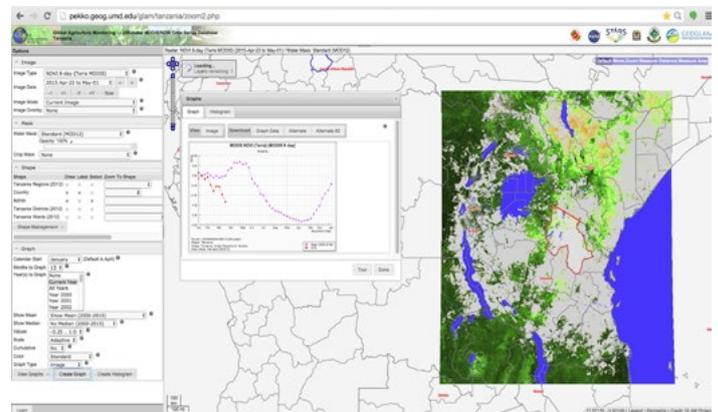
AgriSense-STARS works as part of STARS in Tanzania and Uganda and is led by the University of Maryland (UMD) in partnership with Sokoine University of Agriculture (SUA). AgriSense is piloting methods and tools to improve crop condition monitoring, production forecasting accuracy and timeliness. AgriSense tools include: the GLAM-East Africa portal for satellite data time series interpretation, GeoODK for fast and efficient electronic field data collection and the Crop Monitor for collaborative assessments of the current crop condition and food security. Depicted above are AgriSense's operation-

al and experimental remote sensing systems in support national food security monitoring and agricultural statistics in Tanzania. The anchor geographies are located in Tanzania (Njombe, Kilosa, and Same districts) and Uganda (Moroto district).

Overall Goal: Improve Food Security and smallholder farmers' livelihoods in Tanzania and Uganda by improving agricultural information base for better decision making.

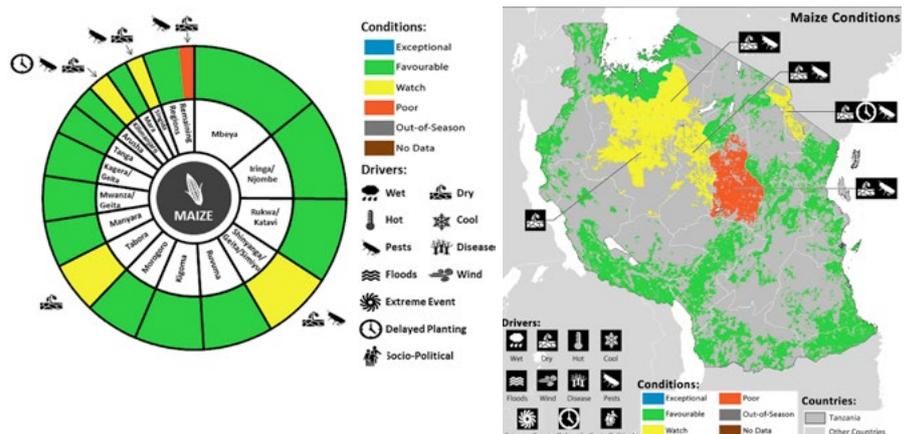
Objectives of the project include: Enhancing tools for monitoring of agriculture for food security using remote sensing in Tanzania and Uganda, evaluating satellite and UAV remote sensing methodologies for characterizing cropland, designing and testing an area frame for agricultural statistics and monitoring, building a database of ground reference data and exploring private sector use and applications of remote sensing data for agriculture.

GLAM-East Africa is the core technology used by AgriSense. GLAM is an online system for the automated processing of MODIS satellite image time series and the production of NDVI time series graphs for the detection of low and high production areas in the country. GLAM East Africa is a user-friendly, automated portal for MODIS and Landsat time series analysis to support reporting and crop condition monitoring. The portal can be used to track crop condition



throughout the growing season. Analysts including MAFC staff can generate NDVI time-series graphs and maps that give an overview of the crop conditions on the ground.

The Tanzania Crop Monitor Portal allows regional and district analysts enter and submit their summary observations and reports on local crop conditions. The system facilitates the development of national monthly bulletins that provide timely, coordinated national information on crop conditions as the season develops in a format that is straight forward for uptake and usable to inform agricultural policies and planning to inform decisions, including: export restrictions, distribution of grains and stocks, mobilization of food aid, targeted agricultural programs that have direct implications on small holder farmers.



Electronic Field Data Collection with GeoODK: AgriSense is piloting the GeoODK (www.GeoODK.com), an Android Application to representatives of the Food Security Department at MAFC, agricultural officers from the regional and district offices, and selected agricultural extension agents from within the Morogoro region. The cell-phone based electronic field data collection system GeoODK allows the fast and efficient submission of field data to intermediate and end users of the information. The GeoODK system significantly increases the efficiency of data collection and delivery by directly submitting the data from the tablet to the online database. The data are instantaneously accessible to any authorized entity within the government and can be used to integrate with other data sources and satellite remote sensing information. Field Extension officers in the Morogoro region are currently submitting electronic



forms that give a general overview of the field conditions including pest and diseases.

Above: MAFC Officers, District and Village Extension Officers at GeoODK Training in Kilosa, District (January 2015)

Area Sampling Frame for Agriculture Monitoring: Agri-Sense Africa is designing a pilot Area Frame, for Kilosa district in Morogoro region for agriculture monitoring for food security and crop statistics generation. Area sampling frames establish representative sample segments for field data collection using probability sampling techniques minimizing errors common in surveys and censuses that require extensive field work. The field data collection is more precise and better controlled, providing information that is credible, accurate and timely at a reduced cost. The area frame is based on very high resolution satellite imagery of the WorldView-2 and Ikonos satellites provided by DigitalGlobe. Data on crop type, cropped area and production are collected within each sample segment during field campaigns carried out at the end of the growing season. The



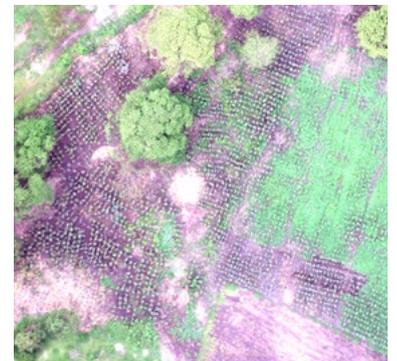
same area frame lends itself for the collection of other parameters important for food security including household data and data on food storage from previous growing seasons.

Above left: Area Frame Segment in Kilosa district, Morogoro region

Above right: Area Frame Design Workshop at MAFC Dar es Salaam (March 2015)

AgriSense uses UAVs to complement the field data collection by acquiring time series of extremely high resolution remote sensing imagery (4 cm resolution) over a number of 1x1 km test sites. The UAV imagery supports the satellite image interpretation. The project also explores the use of UAVs for cropping system mapping and crop condition assessments from multi-spectral UAV imagery. Both fixed-wing (small airplanes) and rotary wing (helicopter-type) UAVs are being used.

Right: professor Siza Tumbo launching the eBee UAV at SUA campus, Morogoro
Second right: UAV image of study site Rudewa, Mbuyuni



The Landsat derived cropland mask for Tanzania showing agriculture areas in orange (*bottom right*), is a classification product created through Agrisense-Africa. This nation-wide cropland mask at 30 m Landsat resolution was developed using composited Landsat tiles from 2010 to 2013 using decision tree classifier methods. Representative training areas were then collected for agricultural and non agricultural areas using appropriate indices to separate these classes. Validation was done using a random sample and Google Earth ®. This agriculture mask allows analyst to focus on agricultural areas while using GLAM- East Africa NDVI data.

Anticipated Benefits:

- 1 Near Real-time monitoring of crop conditions: Consistent and timely reporting of crop conditions based on satellite data from the GLAM East Africa portal. Decision makers and all interested entities will have access to free ground truthed information critical for planning and decision making
- 2 Timely, coordinated national information, on crop conditions from all regions.
- 3 Instantaneous access to field data on crop conditions: Increased efficiency of data collection and delivery through the GeoODK System. Information of field conditions will be instantaneously accessible to any authorized entity within the government and can be used to integrate with other data sources and satellite remote sensing information.
- 4 Increased efficiency of resource use for data collection.

