



UNITED NATIONS

United Nations Statistical Commission

Global Working Group on Big Data for Official Statistics

Annual meeting

11 November 2020, 07:00 EST

Agenda item (5) – Task Teams: EO data



GWG Task Team on Earth Observations

This report from the Task Team on Earth Observation covers the activities over that past year (November 2019-November 2020). Over the past year, the TT has had the opportunity to re-set its priorities by actively engaging with the FAO and focussing a few deliverables. The report presents the following achievements and ongoing work:

1. Training programme
2. Research project
3. UN Big Data Conference: Use of Satellite Data for Agriculture, Environmental and Ocean Statistics
4. Leveraging the UN Global Platform – Collaboration between FAO and UN-GP
5. New Joint Task Team

1. Training Programme

The task team on agricultural statistics using earth observation group has created a training sub-task team for the use earth observation data for agricultural statistics, which is deemed to be a training priority by member countries.

The training task team is led by Australia's Queensland University of Technology and the FAO who provide expertise in training and the use of earth observation data for agricultural statistics. The assignment is backed by many task team members who have provided material and links, fundamental to the creation of the courses. To date, the team has developed a three stage curriculum which is meant to lead students from introductory remote sensing knowledge to advanced courses with up-to-date data and training sources. The curriculum has been created with the overall goal to teach the fundamentals of using satellite imagery, and provide programming skills with relevant use cases for its users.

Further developments of the task team are planned to include the integration of the material onto the UN Global Platform, in addition to a special project with partner the FAORAP. The project is designed to develop a national project in Afghanistan on crop monitoring with the National Statistics Office.

2. Research Project

The research sub-task team led by Canada is providing expertise in research and remote sensing science to investigate the minimum in-situ data necessary to interpret satellite or other types of earth observation data to produce crop estimations classification in producing official statistics. The research agenda aims to gather experts who practice various methods of remote sensing estimations and classifications.

A research paper is meant to be used in a handbook to demonstrate methods to reduce the need for in-situ data, which are often expensive and timely to collect; and provide expertise in data collection and use of EO data for crop statistics. The sub-task team has identified experts to potentially contribute to the following topics: collection of data, supervised and unsupervised classification techniques, and the use of machine learning methods. Further developments of the task team include collection of the references and sources to piece together methods and recommendations. The final product will be openly available the UN Global Platform.

3. UN Big Data Conference: Use of Satellite Data for Agriculture, Environmental and Ocean Statistics

On September 1, 2020 the Task Team organized a session on the use of satellite for agriculture, environmental and ocean statistics at the 6th International Conference on Big Data for Official Statistics. The session had seven presentations from experts in the field of remote sensing to show case how this technology has transformed production of statistics for agriculture, environment and ocean science across the globe.

The first presentation from Australia's Queensland University of Technology (QUT) discussed the research on the use of random forest classifiers for classifying missing data from phenomenon such as cloud cover in satellite imagery for land cover mapping. The innovation is meant to be used in changed forest clearing events, and land cover classifications where cloud cover is more frequent.

The second presenter from QUT gave an overview the earth observation analysis work done for official statistics within the EO task team, and its overarching goals to align with the sustainable development goals of 2050.

The third presenter from the USGS provided an overview of ecosystem accounting through the joint efforts with the UN's ARIES (Artificial Intelligence for Environment and Sustainability).

NBS from China outlined the past, current and future projects using planes and drones to capture EO data with a goal to provide country wide land cover and household data sets, in addition to their use of EO data for agricultural statistics.

The FAO demonstrated the use of EO data and development of crop statistics to developing countries, such as the current work in Senegal. The FAO has leveraged the use of the UN Global Platform for development of essential programs and sharing of data for production of crop statistics.

The Vietnam Academy of Forest Science, presented a case study of Vietnams' Quang Ninh area oceans. Ocean pollution data, coral reefs maps and hydrology raster's were used with EO data over time to map changes in the ocean environment in this area, which led to environmental protection policies.

Microsoft presented developments in AI focusing on providing education for environmental and ecological changes in response to human impacts, which to date has been collaborative with 90 countries.

4. Leveraging the UN Global Platform – Collaboration between FAO and UN-GP

In April 2020, the FAO and the UNSD have established a joint research and development collaboration on the UN Global Platform using Earth Observation (EO) based tools for producing improved agricultural statistics in countries, and for advancing methodological research on EO applications for crop monitoring and land cover.

The joint workplan for 2020 has focused primarily on the development of an EO cloud computing environment that could support the implementation of the FAO EOSTAT project. The project seeks to build in-country capacity in Senegal and Uganda in the operational use of EO data for the production of official crop statistics employing established methods and tools. Specifically, the Sen2Agri tool box developed by the European Space Agency, in collaboration with FAO, has been identified as the tools box of choice as it allows for the semi-automatic EO data preprocessing and provides a user friendly graphic interface allowing for the actual classification of the EO data into crop type maps.

The Sen2Agri tool box requires specialized IT skills for the deployment, and deep knowledge of the workflow for the proper set up. The actually running of the application requires high storage and high computing power. As a result of the joint collaboration, it was possible to overcome such barriers by deploying the Sent2Agri tool box on the UNGP on one end, and by developing Lambda scripts on the other end to automatize further deployment of the Sent2Agri tool box for other projects.

Achievements

April-June 2020: the design of the EOSTAT solution was finalized and a technical document was produced. This was a major milestone. The requirements of the Sen2Agri workflows and the data requirements for the two countries (Senegal and Uganda – e.g. number of Sentinel 2 Tiles to acquire and process) allowed to design a solution that provides enough storage and computing power, optimizes performance/costs, and allows for automatic deployment through Amazon Lambda scripts. The final solution is therefore easy to scale up for more countries.

5. New Joint Task Team

At the September 25, 2020 meeting of UN Committee of Experts on Food Security, Agricultural and Rural Statistics (UN-CEAG), the creation of a joint task team on the use of earth observation for land cover mapping and agriculture statistics between UN-CEAG and UN-GWG on Big Data was approved, given the overlap identified between the work programmes of the two task teams.

As a result, an official communication between UN-CEAG and GWG-Big Data task team has been prepared, and the inclusion of the UN-CEAG members interested in this topic (i.e. Egypt, Indonesia, Mexico, Senegal, USA (USDA-NASS), ADB, FAO, UNSD and the World Bank) will become members of this task team. Under this arrangement, the joint task team will develop and implement joint programme of work that would be monitored by both Experts groups and reported on separately to the UN Statistical Commission. The Committee approved this proposal and elected Canada as the chair of the joint TT since Canada she is already leading the TT of the Global Working Group on Big Data for Official Statistics.