How can remote sensing support food security in Sub-Saharan Africa?

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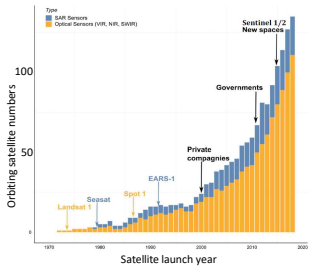
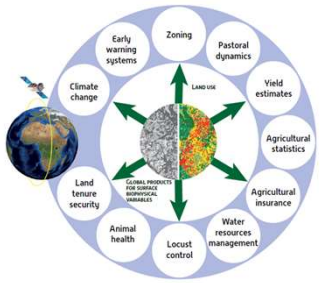
To face the number of people in structural food insecurity situation in Sub-Saharan Africa, agricultural policies have been designed in the last decade to reform land and resources access. However, to be set up these reforms need up-to-date spatial information about the land use and the agricultural issues. Earth observation (EO) technologies, through the use of satellite images, are certainly part of the solution.

40 years of research in remote sensing data to produce land information…





A large panel of Earth observations (EO) data, EO-derived products (vegetation indices, land use maps, biophysical variables, … see Copernicus products for example), and application demonstrations in the domain of food security (Tonneau et al. 2020).

… but still few geoinformation services in Africa, why?

1. Interactions with end users are lacking. The technology resource strategy, largely driven by the institutions of the Global North, is aimed at transferring data and products that only partially respond to African demand. The methods used are ill-adapted to African agricultural systems, which are more diversified and far less documented than agriculture in the Global North.

ILLUSTRATION OF THE AGRICULTURAL SYSTEMS DIVERSITY. From left to right: Agroforestry (Kenya), Rainfed cereals (Senegal), Irrigated rice (Madagascar), Oasis (Marocco), Sugarcane (Senegal). Each image represents 1km² of land © 2015 Digital Globe ; 2015 CNES Astrium, Google Earth, 2015

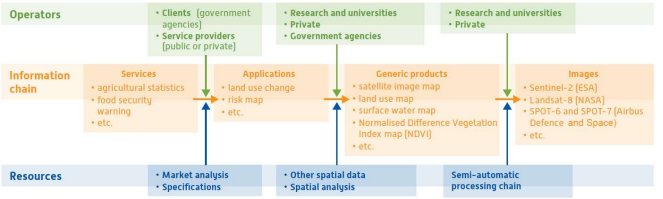
2. Geospatial science is a young science that still requires applied research. But geospatial information in Africa is hampered by dispersed activities, mainly conducted through one-off projects, often in competition and uncoordinated when implemented, due to donor preferences and gaps between the national and regional levels. The R&D projects have equipped centers, trained managers and technicians, and launched applications, but the limited duration of projects has not always guaranteed the maintenance of equipment, the preservation of human resources and the upgrading of skills.

3. Geospatial domain is very dynamic, and the data offer and technologies change very quickly. Organizations and people are not always able to keep up with them, due to cost constraints to purchase or update the equipment, or to insufficient networking and training. Furthermore, the technicians and scientists who were trained abroad on novel methods, and high-spec equipment are sometimes assigned to unrelated tasks and cannot use or transfer the knowledge gained (UNECA, 2017).

4. The need for governance and coordination is mentioned by all actors for equipment, infrastructure, data and training aspects. The importance of pooling resources, through a national and regional (major continental regions) geospatial information strategy is obvious.

3 fundamentals to ensure the development of sustainable geoinformation services

Component 1.
The co-construction of geospatial information services: structuring a community of practitioners and users



"[…] a satellite image is not a map, let alone a dashboard, and there are substantial technical and knowledge gaps between satellite images and their derived products; the latter implies the use of and mixes physical, computer, thematic and social sciences » (Bégué et al., 2019)

Component 2.
Organization of the ecosystem necessary to the co-construction of the informational services

Component 3.
Contribution to the strategies and initiatives of national coordination

Tonneau J-P, Bégué A, Leroux L, Augusseau X, Faure J-F, Mertens B, Pinet C, Tomasini L, 2019. Geospatial information for African agriculture: a key investment for agricultural policies. ***CIRAD, Montpellier, Perspective 51.*** https://doi.org/10.19182/agritrop/00068

Bégué A, Leroux L, Soumaré M, Faure JF, Diouf AA, Augusseau X, Touré L, Tonneau J-P, 2020. Remote Sensing Products and Services in Support of Agricultural Public Policies in Africa: Overview and Challenges. ***Front. Sustain. Food Syst. 4:58*** https://doi.org/10.3389/fsufs.2020.00058

Tonneau J-P, Bégué A, Leroux L, Augusseau X, Faure J-F, Mertens B, Pinet C, Tomasini L, 2020. Geospatial information for African agriculture: a key investment for agricultural land policies. ***Land and Poverty Conference, Washington D.C. (US), 16-20 March 2020.*** https://www.conftool.com/landandpoverty2020/index.php?page=browseSessions&form_session=592&presentations=show