A PLATFORM FOR MAPPING TERRITORIES BY SATELLITE IN THE INDIAN OCEAN

Led by the Regional Council, the programme CACAOS aims to develop an infrastructure for obtaining a reliable, shared and up-to-date cartographic database.

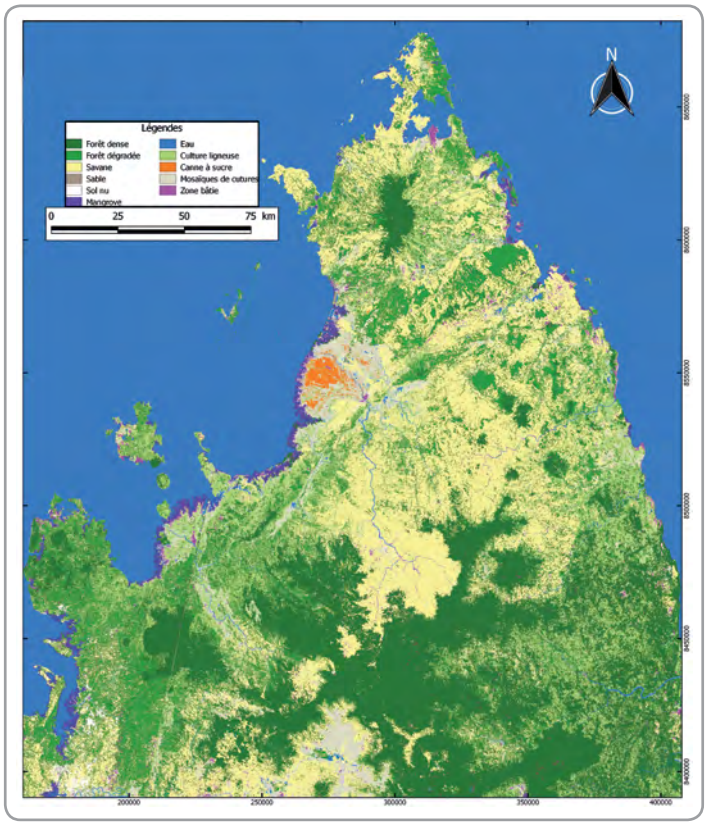
The challenge

The use and benefit of land-use data in Geographic Information Systems is complicated by: often limited coverage; random updating; geographical incompatibility of data due to the different repositories used; and non-compatible typology that does not allow a temporal spatial comparison of the classes. In addition, producers of this data sometimes restrict access to it, thus limiting its valorisation. The European Copernicus programme offers a new perspective for producing reliable, shared and up-to-date land use maps of the Indian Ocean territories from Sentinel-2 images and remote sensing. With a high spatial resolution (10m) and high temporal repetitively (one image every 5 days), this data is very useful for monitoring land with great responsiveness.

The space based solution

The CACAOS programme led by the Regional Council of Reunion allows for computer-assisted processing of Sentinel-2 satellite images from the Copernicus programme over large territories to obtain land use maps. The CACAOS chain is based on free software (MAJA, IOTA²) developed by the French National Centre for Space Studies (CNES) and notably by the Centre for the Spatial Studies of the Biosphere from Space (CESBIO). A first pilot phase was carried out on the Diana region in Madagascar (20,000 km²) during the first half of 2017 in partnership with the Regional Council of Diana and the National Geographic and Hydrographic Institute of Madagascar (FTM) with co-financing from the French State and the Regional Council of Reunion. This area was mapped into 13 different land use classes at a scale of 1:50,000 to 1:100,000. The processing of spatial data initially requires the collection of referenced data.

All data were processed at the Regional Council's data processing centre on Reunion Island within the SEAS-OI station (Survey of the Environment Assisted by Satellite in the Indian Ocean). This mapping allows the delimitation of different kinds of forest (primary, degraded, mangrove,...) and the urban areas. The second phase in progress co-financed by the French Development Agency (AFD) and the Regional Council of Reunion aims to generalise the CACAOS tool throughout Madagascar (587,000 km²) in order to produce a complete land cover over the country in 2017.



Land-use maps of the north of Madagascar produced from CACAOS in 2017.
Credit: Contains modified Copernicus Sentinel data [2017]

Thematic Area: TERRITORIAL MANAGEMENT AND URBAN PLANNING

Region of Application: MADAGASKAR

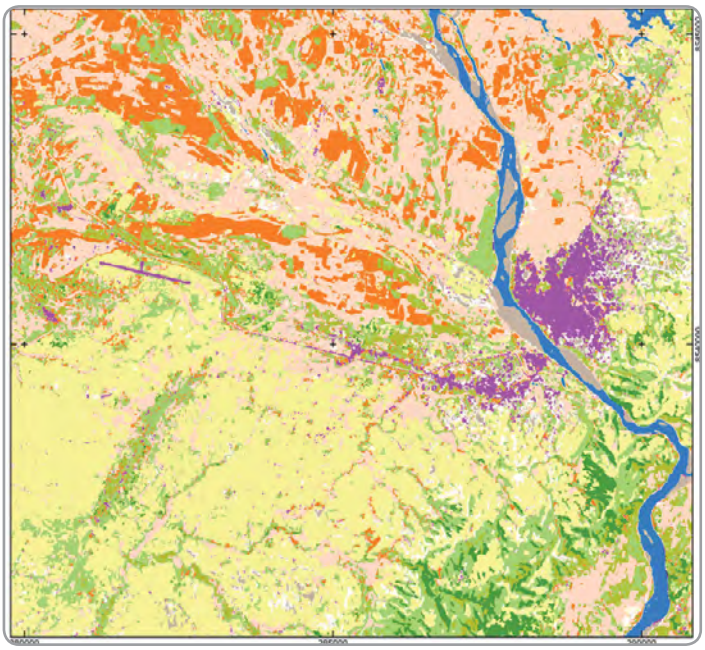
Sentinel mission used: S2

Copernicus Service used: –

Usage Maturity Level: 3

Benefits to Citizens

The CACAOS programme allows free and open distribution of land use mapping products. These data make it possible to manage various problems at regional and sub-regional scales: environment (protected area, natural risks, etc.), agricultural and urban areas. In Madagascar, land use mapping is essential to establish a baseline survey and to monitor territorial planning documents. The land use indicators (frequency at least once a year) are essential for the strategic management of territories but also for monitoring and control of public policies. This map was used by the Regional Council of Diana of Madagascar to update the regional land use and development plan.



Land-use maps on a scale of 1:50 000 produced from CACAOS.
Credit: Contains modified Copernicus Sentinel data [2017]

> "The free access to satellite imagery through the Copernicus programme and the development of free and open remote sensing processing tools are opening up new perspectives in territorial mapping."

Jean-Désiré Rajaonarison National Geographic and Hydrographic Institute of Madagascar

Outlook to the future

A capacity building and skills transfer approach is planned with local authorities to avoid any digital divide and democratise access to spatial information from the Copernicus programme. In addition to the tool itself, the CACAOS programme aims to develop a strategic partnership with technical and financial operators, government departments, Non-Governmental Organisations, research organisations,... to make it a shared technical reference platform for sustainable development first in Madagascar, and then to extend it to other countries. The Regional Council of Reunion is thus planning to develop a remote sensing resource centre in Reunion Island.

Acknowledgements

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ABOUT COPERNICUS4REGIONS

This Copernicus User Story is extracted from the publication "**The Ever Growing use of Copernicus across Europe's Regions: a selection of 99 user stories by local and regional authorities**", 2018, Edited by NEREUS, the European Space Agency and the European Commission.
The model cases focus on local and regional authorities who successfully applied Copernicus data in 8 major public policy domains.
The views expressed in the Copernicus User Stories are those of the Authors and can in no way be taken to reflect the official opinion of the European Space Agency or of the European Commission.
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