

# Open-source software developer position for large scale continental surface monitoring

TOSCA CNES PARCELLE

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## 1 Context

Satellite remote sensing is an active field of research, with application in environmental, agricultural and climate change science. Several satellite missions have been launched in the last decades, such as the European Copernicus program, and provide massive Earth observation open access data.

Among the various products obtained from these missions, large scale land cover mapping is surely the most operational. Nowadays, such mapping is used for a large range of environmental applications and of primarily importance in the context of climate change. Several open and private achievements were announced recently (e.g., <https://www.theia-land.fr/en/ceslist/land-cover-sec/> or <https://viewer.esa-worldcover.org/worldcover>) but this topic is still an important active field of research and engineering. One of the main limiting problems is the ability to efficiently process the very large amount of data that researchers and engineers are faced with.

In this context, the open-source software *iota2* (source: <https://framagit.org/iota2-project/iota2>, documentation: <https://docs.iota2.net/develop/>) has been initiated by the CESBIO-Lab as a generic processing chain to fully process recent satellite time series, such as SENTINEL-1 and SENTINEL-2 or Landsat-8. It allowed to produce the first map of the land cover over the metropolitan French territory (e.g., <https://theia.cnes.fr/atdistrib/rocket/#/collections/OS0/21b3e29b-d6de-5d3b-9a45-6068b9cfe77a>).

To extend the development of the software, outside of the CESBIO lab, the PARCELLE project was set up to foster the applicability of *iota2* to other large scale mapping problems. Three main topics are considered in the project.

1. A quantitative and qualitative assessment of the performances of *iota2* for different types of landscapes (e.g., South-Africa or South-America) and/or different land cover types.
2. The methodological integration of *state-of-the-art* algorithms from the project partners.
3. Promote the usage of *iota2* through training and scientific meeting.

Ultimately, the improvements of the chain will be used to enrich several *Centre d'Expertise Scientifique (CES)* of the national data center *Theia*.

## 2 Objectives

The first mission of the recruit is to work on the development of new features for *iota2*, such as deep learning algorithms applied at large scale (super-resolution, classification, inversion ...). Applicant could check the project repository for more details (<https://framagit.org/iota2-project/iota2/-/issues>).

The second mission is related to give training for others members of the project and institutional users (e.g. <https://docs.iota2.net/formation/> and its repository <https://gitlab.cesbio.omp.eu/fauvelm/formation-iota2>). Also, some times will be devoted to answer users questions (mainly through the issues interface of the gitlab repository).

The third mission of the recruit will be to coordinate the different developments carried out by the partners. As such, other issues may emerge during the project.

## 2.1 Additional information

The position is at the CESBIO-Lab, in Toulouse for 12 months. The salary is approximately 2000 euros per month, depending on the experience of the recruit. Remote work is allowed after 6 months of services, two days per week.

The position is open now and will remain open until the selection of a recruit.

The recruit will benefit of the scientific life at the CESBIO lab (<https://www.cesbio.cnrs.fr/>), such as the Data Science seminars (<https://src.koda.cnrs.fr/activites-ia-cesbio/ds-cb/-/blob/master/README.md>) and internal laboratory seminars (<https://gitlab.cesbio.omp.eu/conferences/midipile>).

For additional information about the activity, applicant could check the following resources:

- Laboratory blog: <https://labo.obs-mip.fr/multitemp/>.
- General documentation about the OSO products: <https://artificialisation.developpement-durable.gouv.fr/bases-donnees/oso-theia> and <https://www.theia-land.fr/product/carte-doccupation-des-sols-de-la-france-metropolitaine/>.
- Scientific publication about the OSO products: <https://www.mdpi.com/2072-4292/9/1/95>.

## 3 Requirements

The applicant must have a solid background in python (numpy, pandas, scikit learn, pytorch), scientific computing, linux, and distributed version control system (git). Experience in software documentation (docstrings, sphinx) will be appreciated, as well as some knowledge in remote sensing image processing, geomatics, geographic information systems and data bases.

The applicant should send a detailed CV, motivation letter, reference letters and, if possible, links to developed software to the contacts.

## 4 Contact

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