Sentinel data on steroids!

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Belgium has its own Collaborative Ground Segment:

signed with ESA in September 2017

Other Collaborative Ground Segments

ESA signed Agreements

- with Member States:

Greece, Norway, Italy, Germany, Finland, France, UK, Sweden, Canada, Portugal, Austria, Estonia, Luxembourg and Belgium

- also with:

NASA, NOAA, USGS, GSA

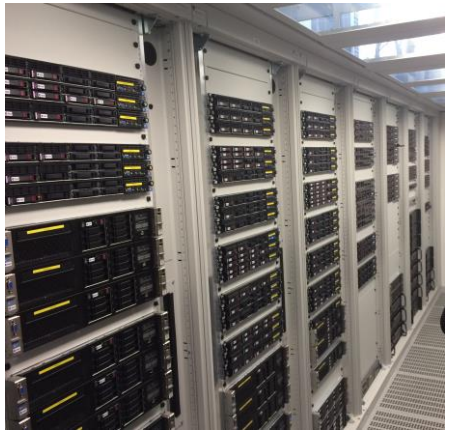
(Iterations on-going with Brazil and African institutions)

Collaborative Ground Segment

Maximize the user uptake of Sentinel data by:

- Data dissemination and access
- Complementary products and algorithms
- Development of innovative tools and applications
- Complementary support to CAL/VAL activities

BE Collaborative Ground Segment



- Make use of existing infrastructure related to Remote sensing in Belgium: PROBA-V groundsegment
- The collaborative Ground Segment will evolve depending on the needs of the Belgian users

BE Collaborative Ground Segment

belspo National Contact Point

vito remote sensing Designated Entity

Copernicus Relays

Questionnaire on EO needs in Belgium

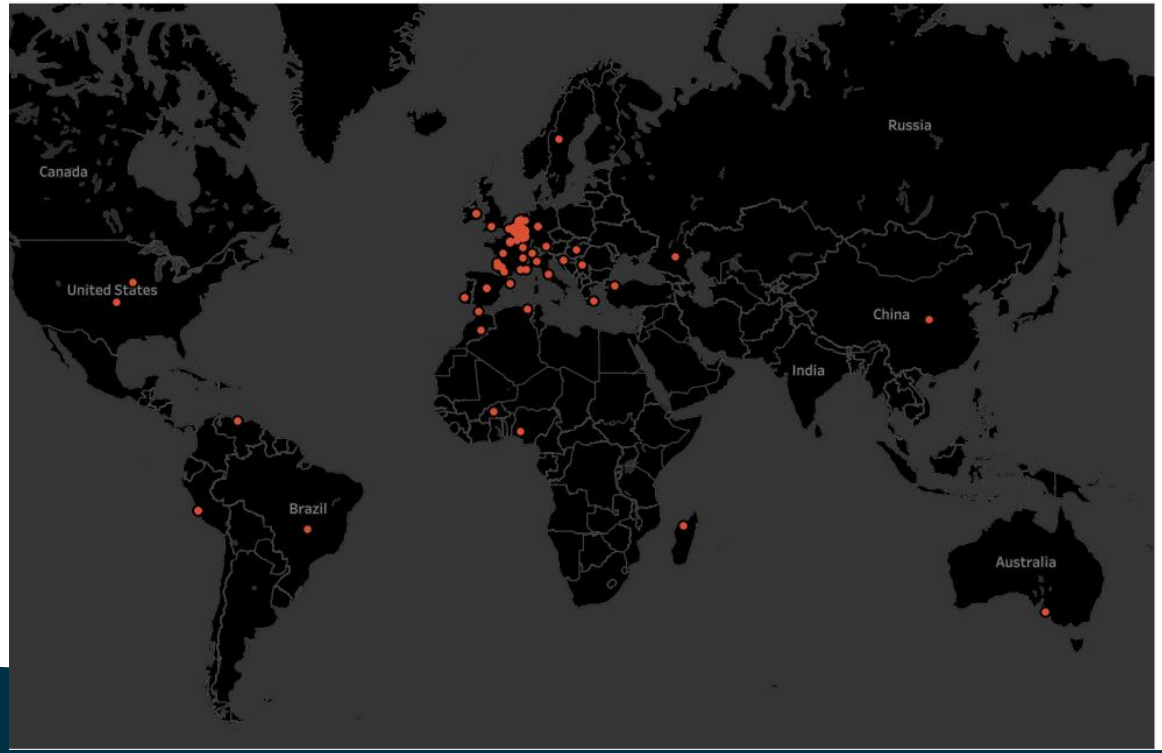
October – December 2017

ISSeP Institut scientifique de service public

Copernicus Relays

Terrascope survey results

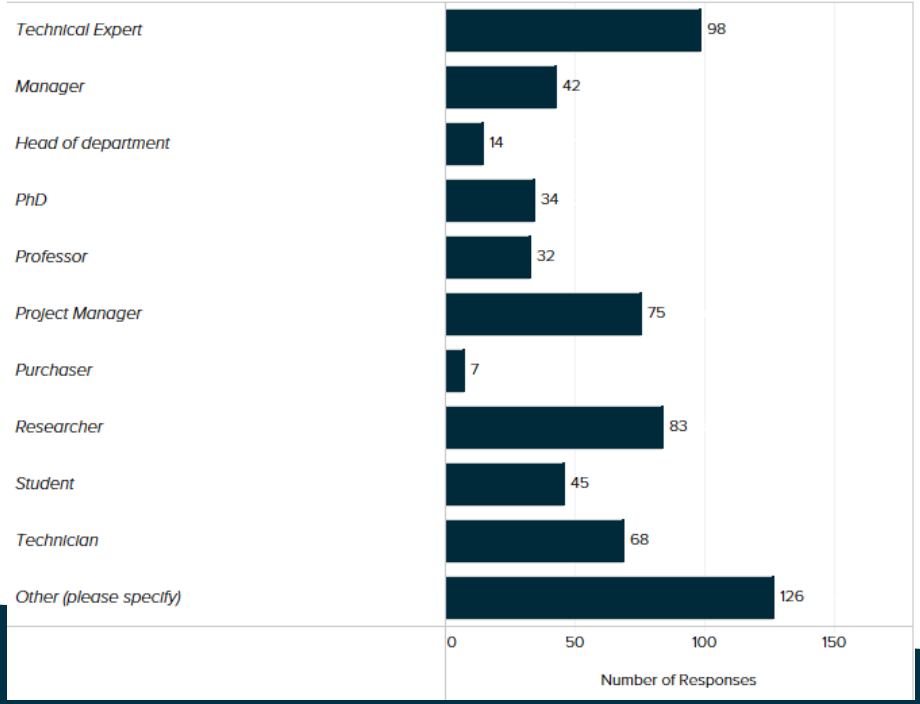
Origin of the responses (based on IP address)



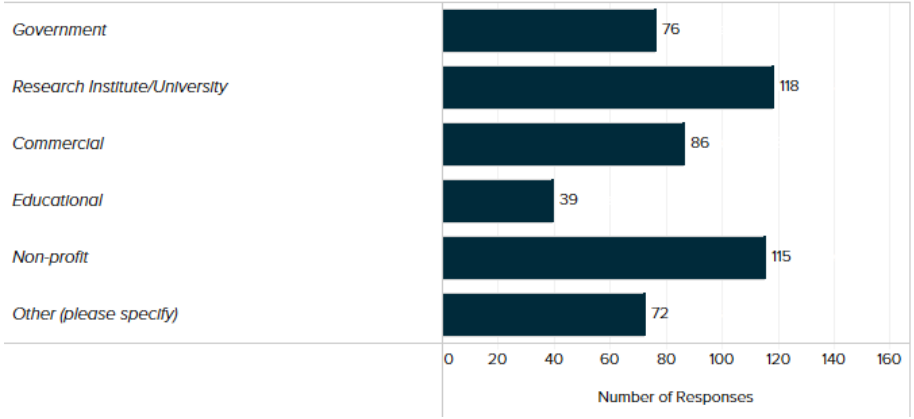
Algeria	1
Australia	1
Belgium	478
Brazil	1
Burkina Faso	1
China	1
Croatia	1
France	21
Germany	3
Greece	1
Hungary	1
Ireland	2
Italy	2
Luxembourg	8
Madagascar	1
Morocco	2
Netherlands	5
Nigeria	1
Peru	2
Portugal	1
Russian Federation	1
Serbia	1
Spain	3
Sweden	1
Turkey	1
United Kingdom	1
United States	3
Venezuela	1

Survey results

1 - What is your profile? (multiple responses possible)

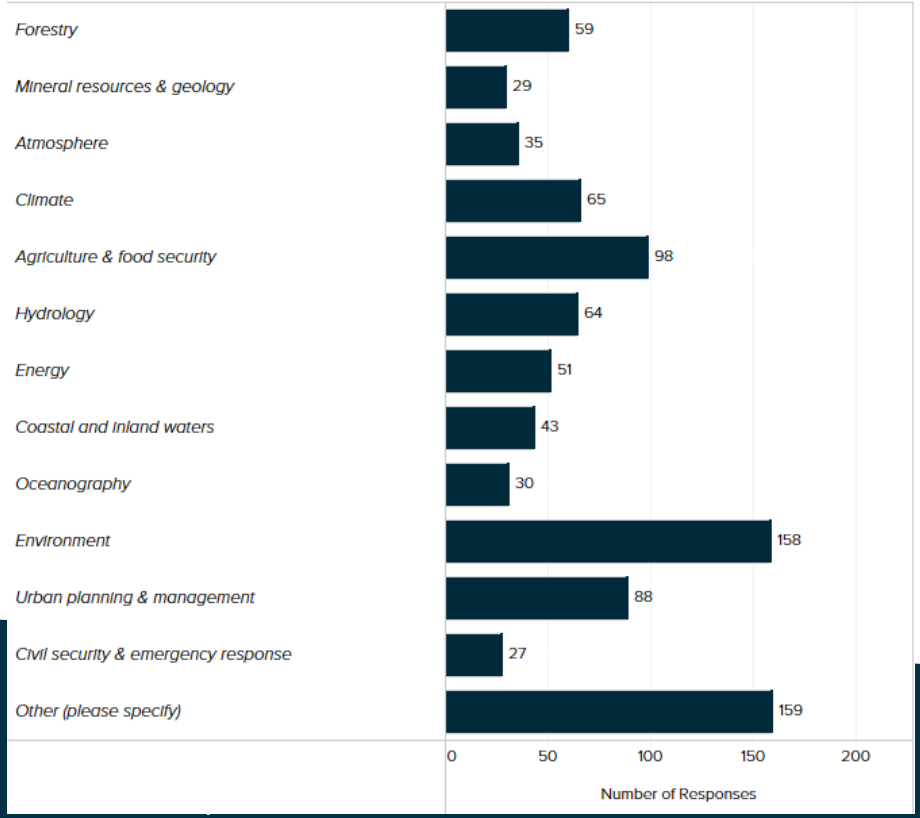


2 - What is your affiliation?

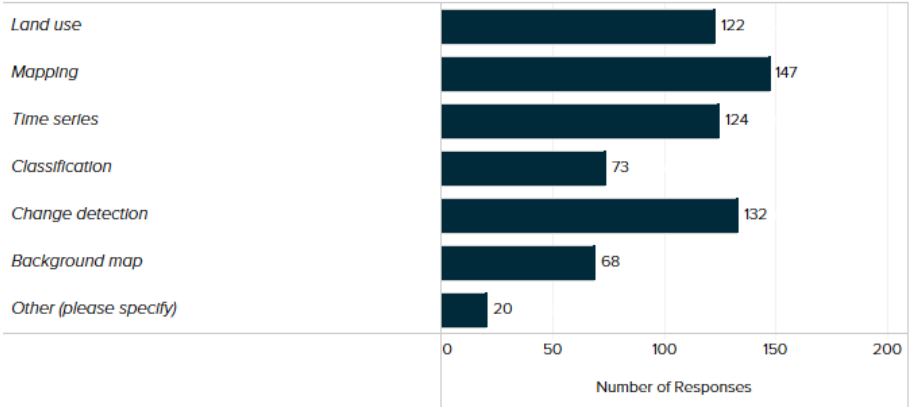


Survey results

4 - What is your activity domain? (multiple responses responsible)

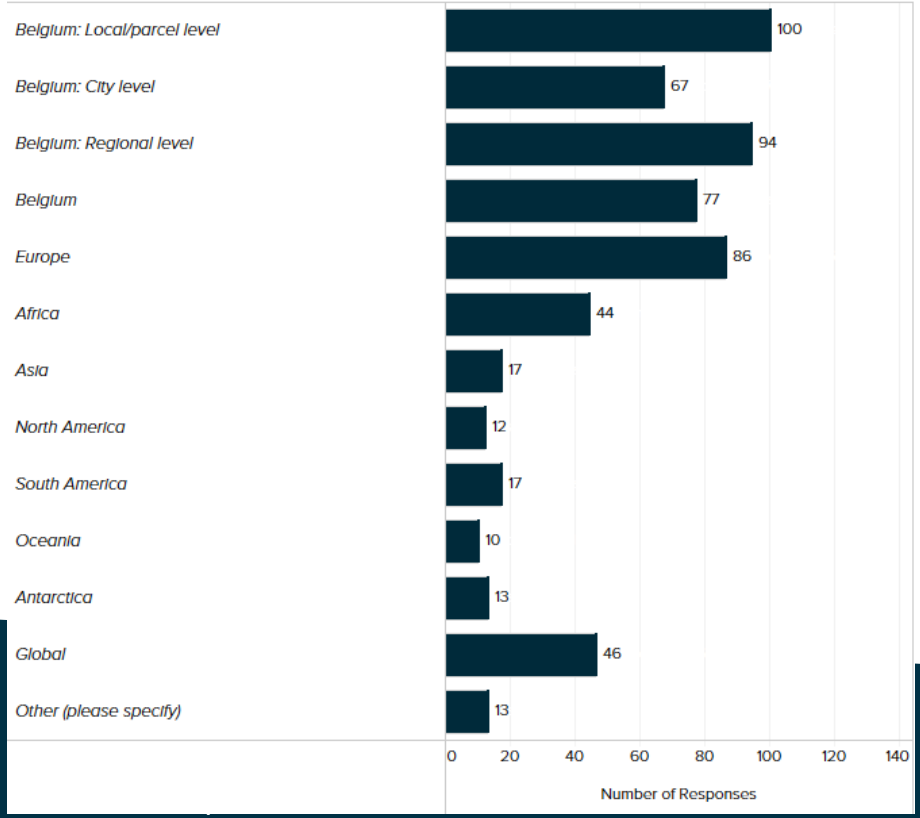


11 - What field of applications are you interested in? (multiple responses responsible)

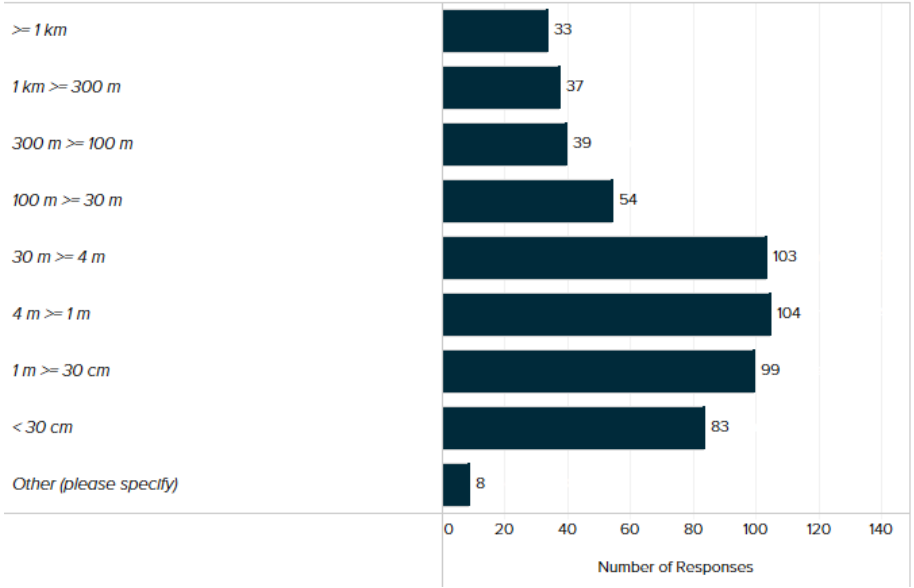


Survey results

14 - What area are you interested in? (multiple responses possible)

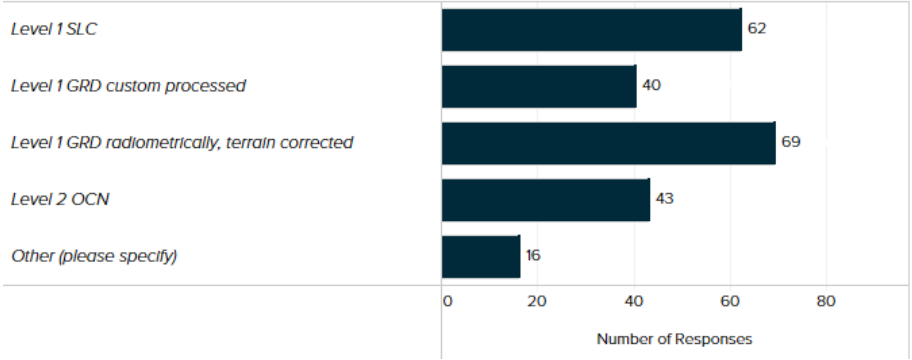


15 - What spatial resolution is of interest to you? (multiple responses possible)

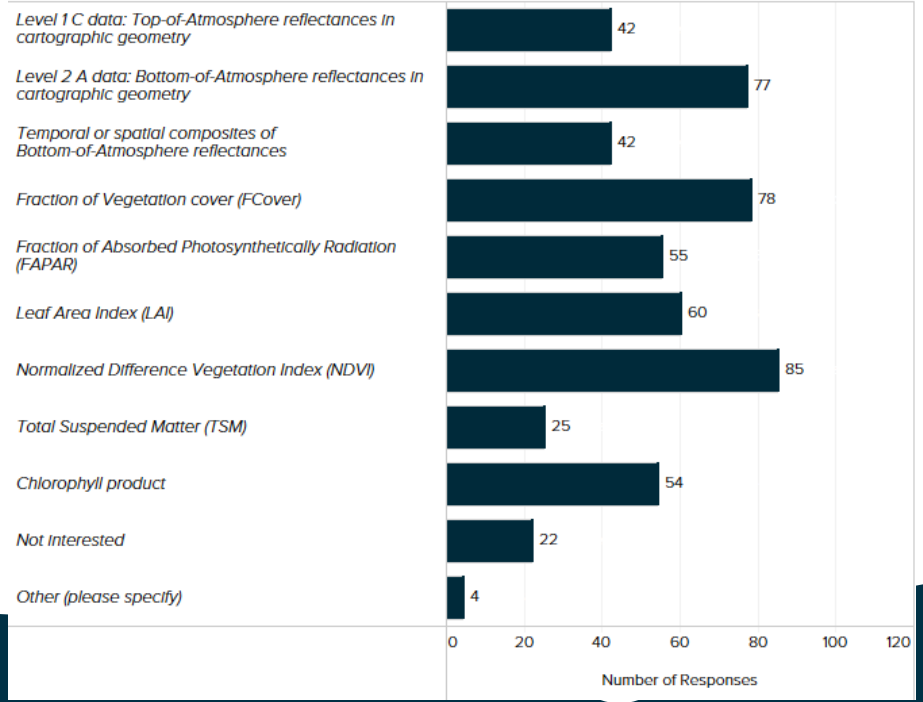


Survey results

18 - Sentinel 1: Which data or product are you interested in? Sentinel 1 (multiple responses possible)

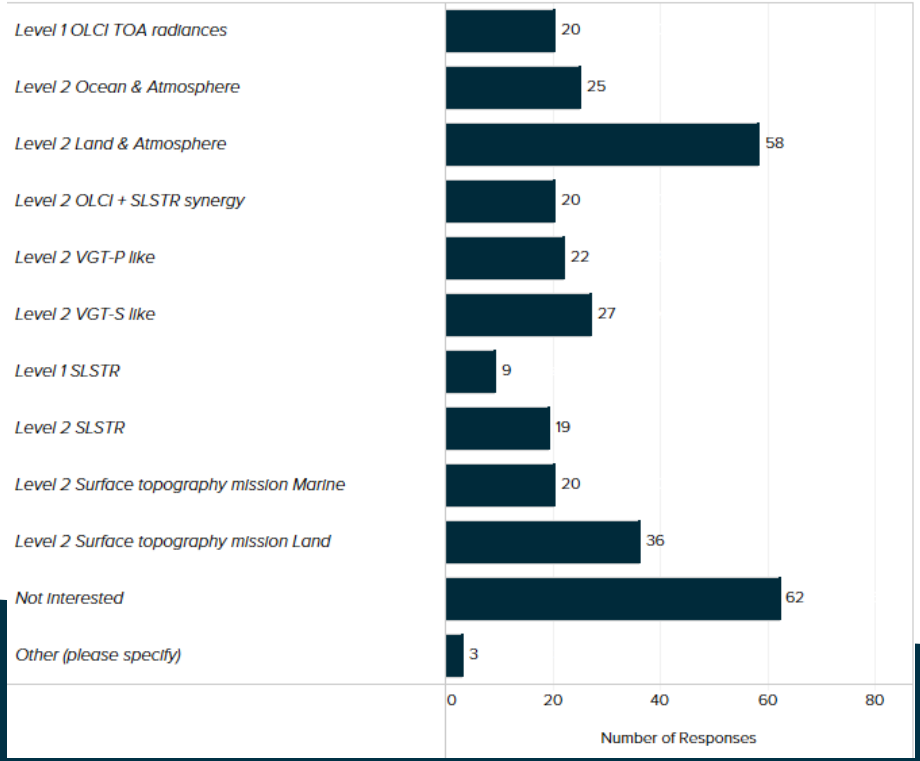


19 - Sentinel 2: Which data or product are you interested in? Sentinel 2 (multiple responses possible)

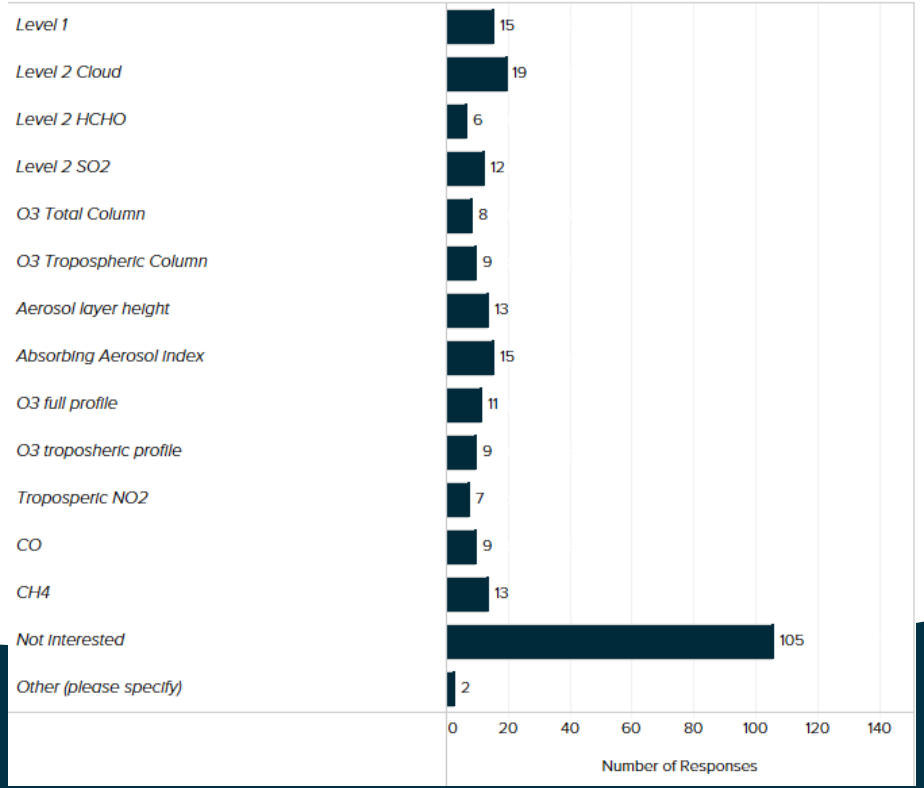


Survey results

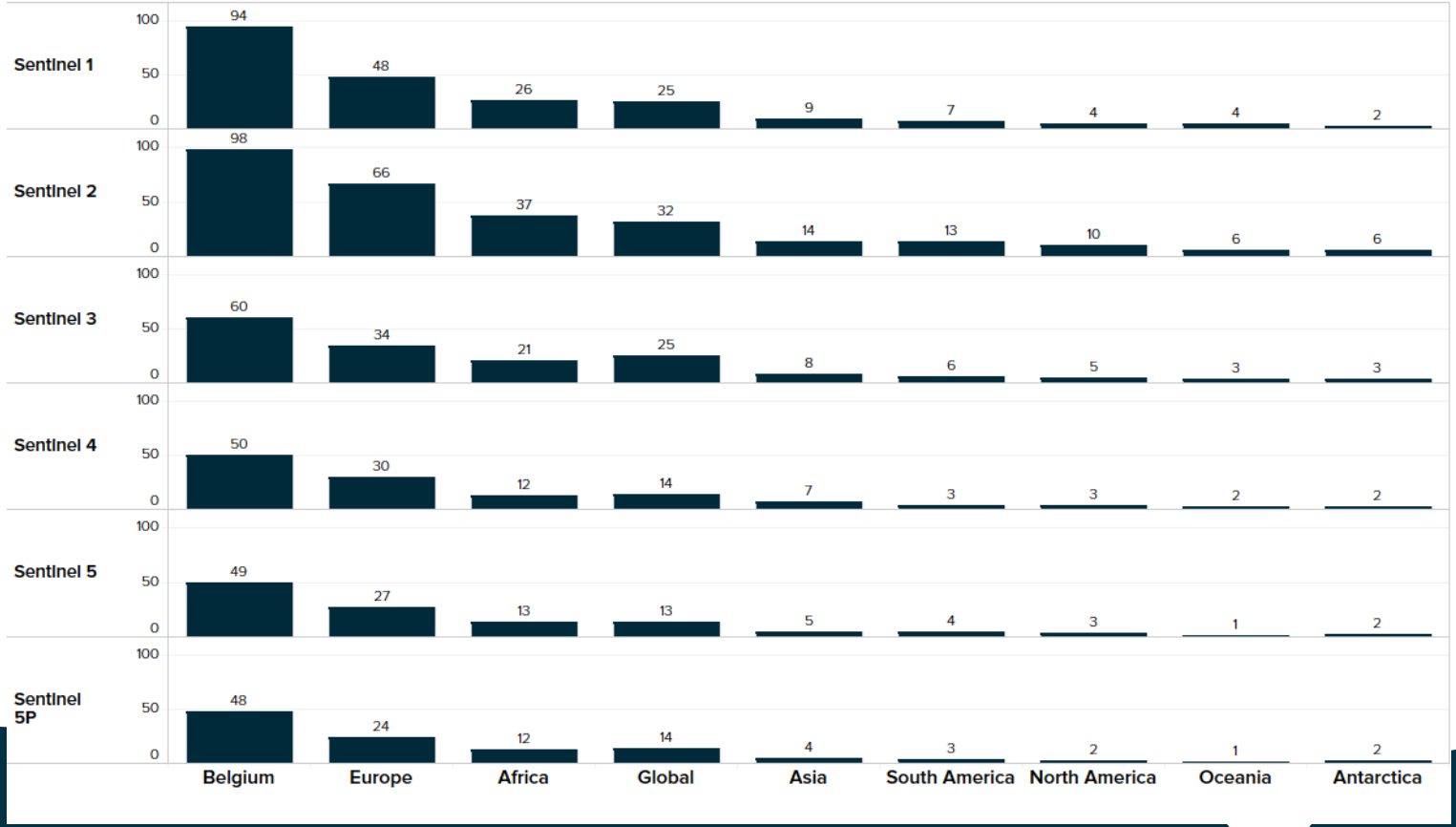
20 - Sentinel 3: What product families are you interested in? Sentinel 3 (multiple responses possible)



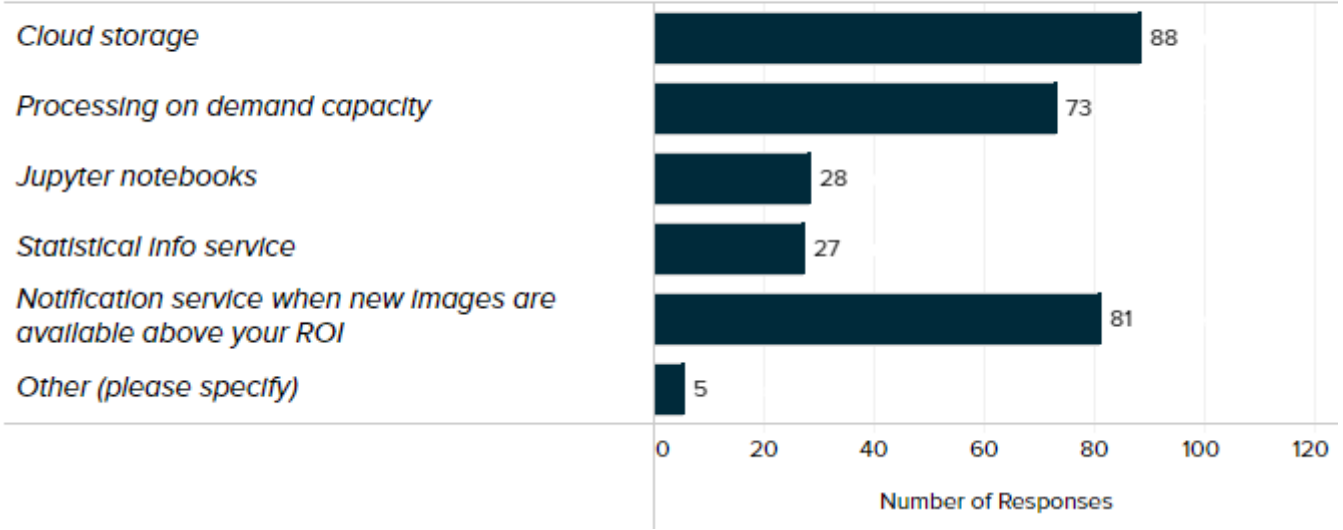
23 - Sentinel 5P: What product families are you interested in? Sentinel 5 P datasheet (multiple responses possible)



24 - What area are you interested in? (multiple responses possible)

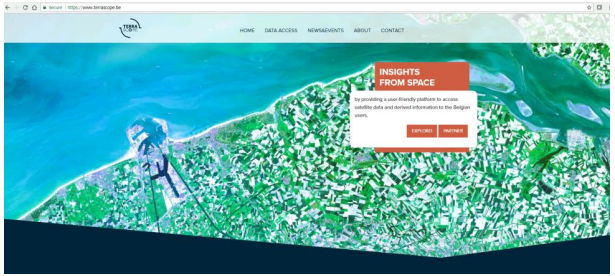


32 - Which facilities would help to expedite your activities (multiple responses possible)



Survey Conclusion

- Good representation of Belgian EO users
- Sentinel satellites cover HR needs, not VHR
- Region of intererest Belgian users on:
  - Belgium, Europe, Africa
- Priority for people using EO data:
  - Freely available
  - Intuitive interface
  - Cloud storage & processing facilities
  - Precision of data



Complete insight on questionnaire:

www.terrascope.be

For whom?

What?

How?

When?

What is our target group?

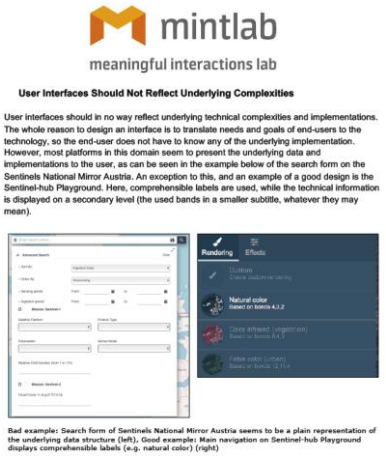
- Public authorities
- Industry
- Scientific institutions & universities
- Educators & students
- Citizens

Another platform ???

Copernicus Open Access Hub

How do we like to stand out ?

- Visually attractive
- Great and performant viewer/web services
- Scientifically correct data (eg accurate geometry)
- Create a Virtual Research Environment
- Multilingual support NL/FR/ENG
- Active user support
- Guaranteed service levels
- Outreach



How to reach our target group?

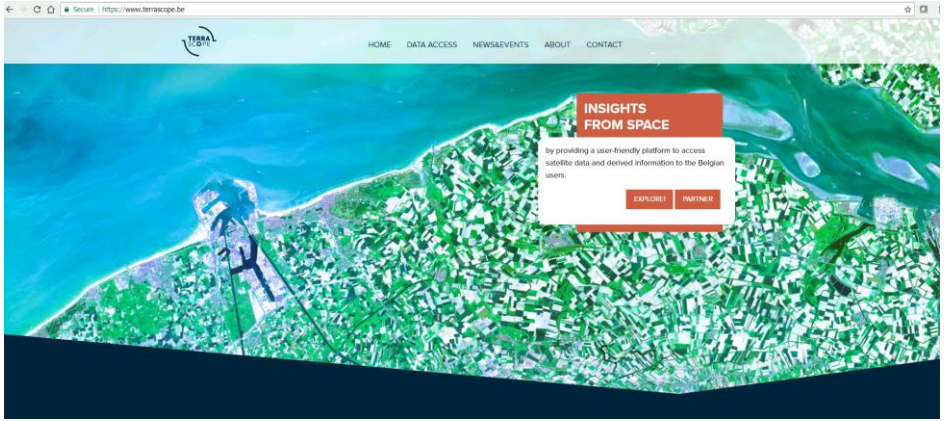
- Roadshow
- Training sessions
- Copernicus Relays
- Roll-up, flyers…
- Digital:
  - Twitter
  - LinkedIn
  - User forum
  - Tutorials/webinars
  - Sample code

User-centric approach

Terrascope development approach

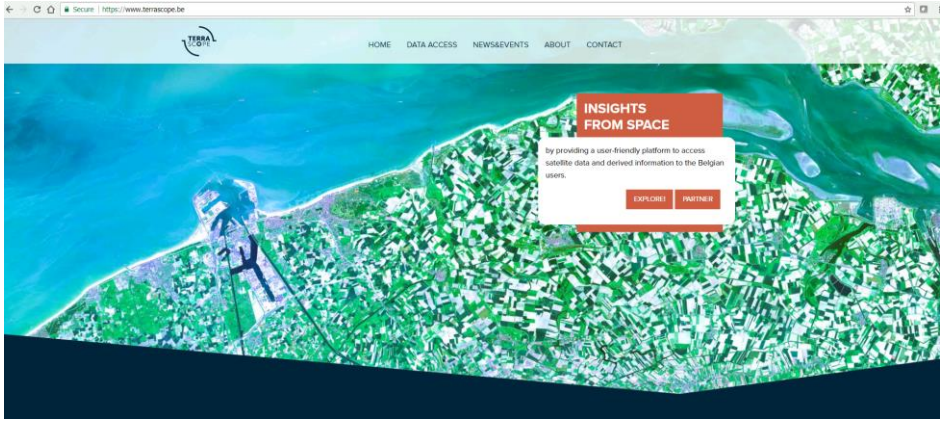
- Short development cycles (3 months)
- Dynamic **feature list** is basis for content per cycle
- Version control
  - Communication
  - Offer old & new products together for a limited time
- Validation
- Regression testing

Platform today



- Landing page online
- S2 products over Belgium via www.vito-eodata.be
- Web services WMS/WMTS
- Virtual Machine with access to S2/PROBA-V/SPOT-VGT data

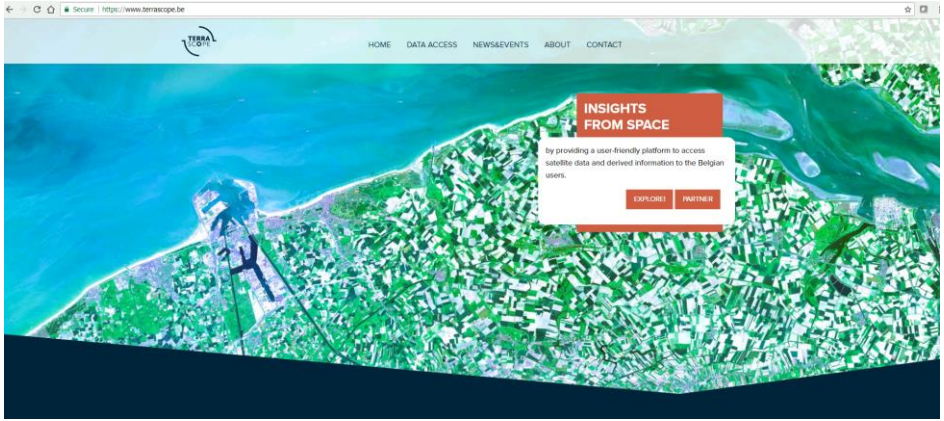
Platform cycle 1



- S1 products over Belgium
- S2 products over Belgium
- S2 Geo viewing application

Release March 2018

Platform cycle 2 – 3 – 4



- S2 products over EU/AFR
- S3 products global
- Advanced Geo viewer
- Access to all data in Virtual Machine
- Access to Jupyter Notebooks
- Access to computing resources

Release Q2 – Q3 – Q4 2018

Next cycles

- Fusion products (S1/S2, S2/S3, …)
- On-the-fly
  - E.g. SAR interferometry
  - E.g. tailor-made syntheses
  - E.g. time series (based on orginal data)

- User driven approach in collaboration with BELSPO
- Integrate research results where possible/useful
- Cooperation with Belgian entities

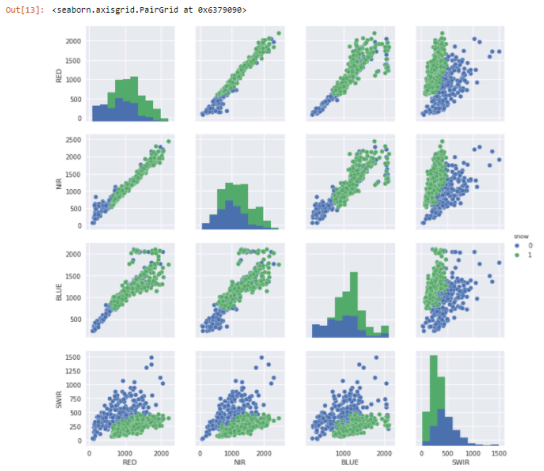
Belgian platform: Can you contribute ?

Jupyter Notebooks?

"Jupyter Notebooks are interactive web applications that allow users to create and share documents that contain live code, equations, visualizations, and explanatory text."

- Direct access to Sentinel data
- Share code/research/comment
- Publish results

! Library for Belgian users !



Building the classifier

First, we need to do some preprocessing before we can build our classifier.

1. SVM works better when the data is rescaled
2. We need to introduce interaction variables, e.g. by building a polynomial expansion
3. SVM generally requires the dataset to be balanced (or use class weights). Since we have so many available positive samples, we will simply balance our dataset by undersampling our negative class.

So let's do just that, as follows:

In [14]:
```
from pyspark.ml.feature import PolynomialExpansion
from pyspark.ml.feature import StandardScaler
from pyspark.mllib.classification import SVMWithSGD, SVMModel
from pyspark.ml import Pipeline

def transform(data):
    polyExpansion = PolynomialExpansion(
        inputCol="features",
        outputCol="polyFeatures",
        degree=2
    )

    scaler = StandardScaler(
```

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