



European Commission

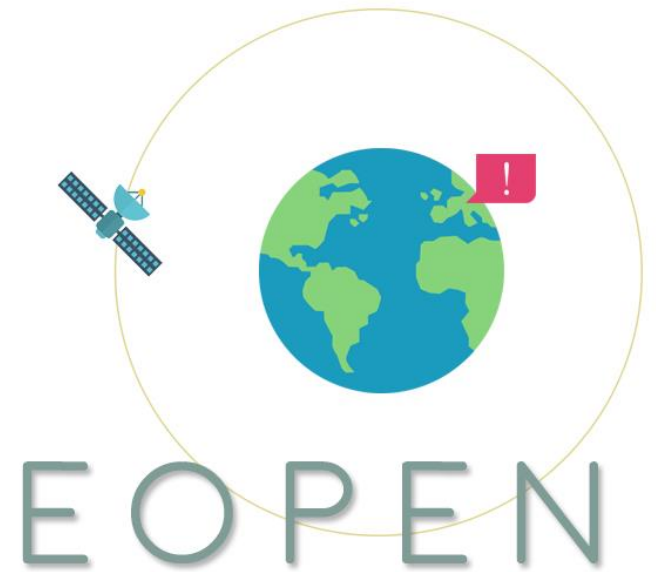
## EOPEN Session

40<sup>th</sup> Asian Conference on Remote Sensing,  
Daejeon, Korea, 2019

# Continuous and Transparent EO, Meteo and Social Media Data Access

Ioannis Papoutsis

National Observatory of Athens





# Earth Observation Data Access

## ▷ Problem

Fragmented access to Copernicus Sentinel data

Performance variability of Copernicus Data Access Hubs

## ▷ Goal

Link federated Copernicus Sentinels Hubs to ease and accelerate access to data

## ▷ Solution

Umbrella application to federate access to Sentinel data



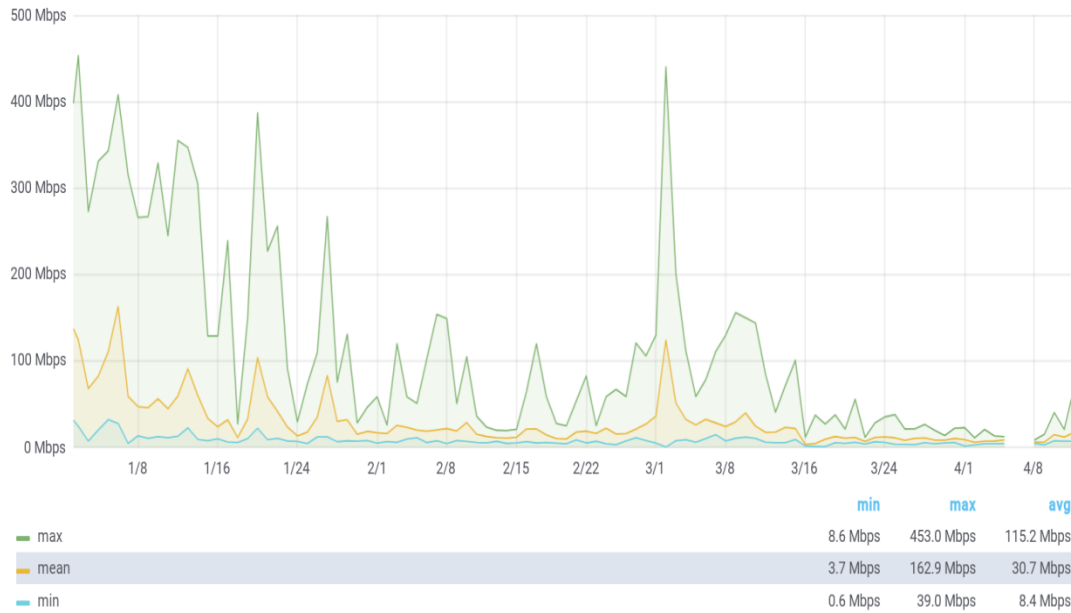


# Earth Observation Data Access

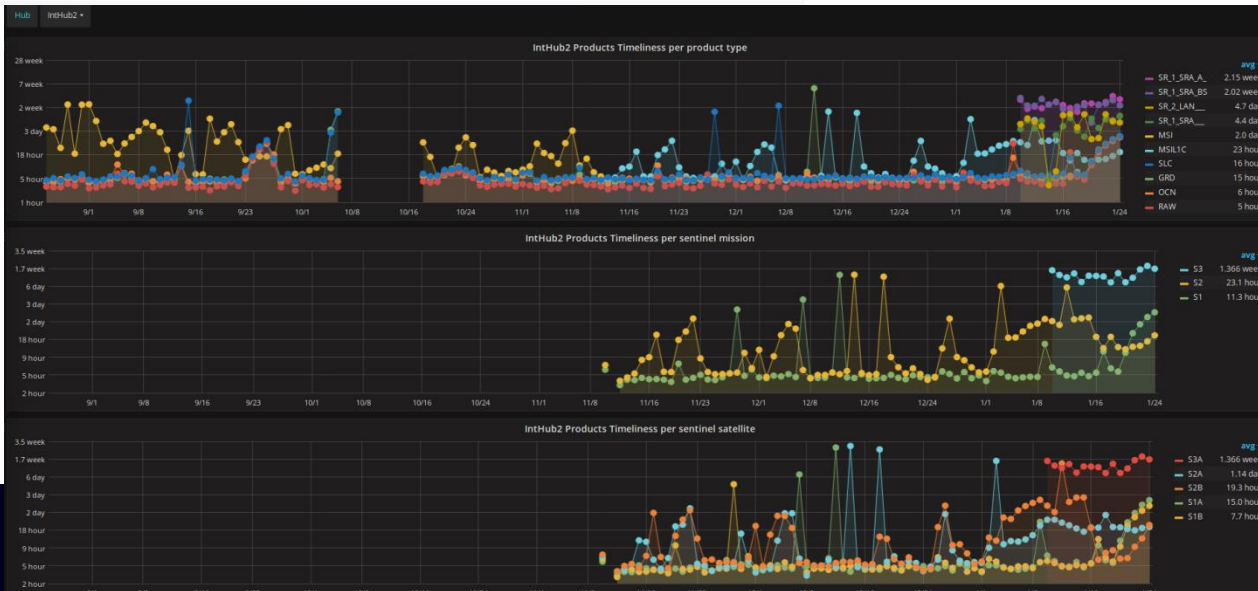
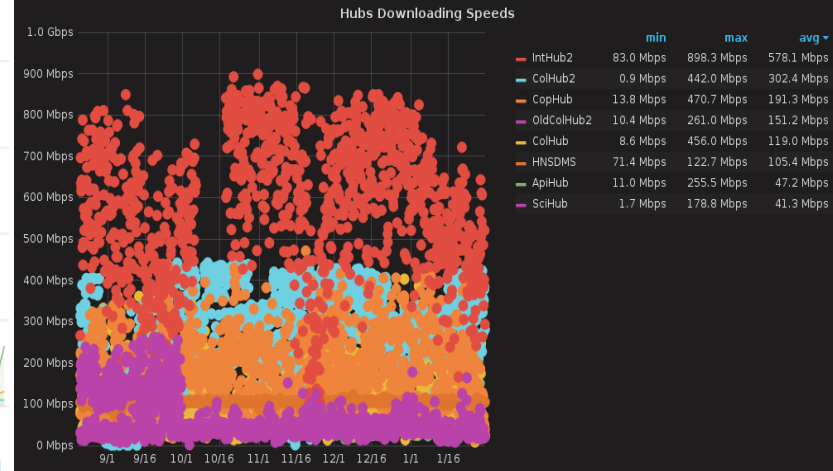
- ▷ Details on the problem
  - There are several Copernicus Hubs out there to access Sentinel data!
    - Core Hubs: Open Access Hub (formerly SciHub), 4 DIAS Hubs, ApiHub, Copernicus Hub
    - **23** National Collaborative Ground Segments. Indicatively: HNSDMS (Greece), CODE-DE (Germany), FinHub (Finland), PEPS (France)
  - The hubs have different data offer
    - Availability of different missions and different products per sensor
    - Geographic coverage within which Sentinel products are available
    - Maximum concurrent downloads allowed
    - Data rolling policy
  - The hubs experience different performances
    - Downloading speed, number of published products, response times, availability, product latency
  - Even for the same hub there is intra-day, and intra-product variability in terms of KPIs



### SciHub



### Hubs Downloading Speeds





# Earth Observation Data Access

	Archive Policy	Deletion Policy	Missions	Performance	Geographic Coverage
<b>Copernicus Open Access Hub</b>	Products from January 2018 (online archive of at least the latest year of products)	Corrupted and duplicate products are deleted every 24 hours	Sentinel-1 Sentinel-2 Sentinel-3	Slow response and variant download speed	Global
<b>Hellenic National Sentinel Data Mirror Site.</b>	Products from last 50 days	No deletion list	Sentinel-1 Sentinel-2 Sentinel-3	Very fast response and high download speed	South & South-eastern Europe, Middle East & North Africa
<b>Finnish Mirror Site</b>	Products from February 2017	No deletion list	Sentinel-1 Sentinel-2 Sentinel-3	Fast response and high download speed	Sentinel-1,2: Scandinavia and Baltic areas, Shaksgam valley, Kyagar glacier lake, Kirgisia, Tazdikistan, Iceland strait, Bolshevik island, Tiksi  Seninel-3: SLSTR Northern hemisphere
<b>Sentinel 5P Pre-Ops Hub</b>	Products from April 2018		Sentinel-5	Fast response and high download speed	



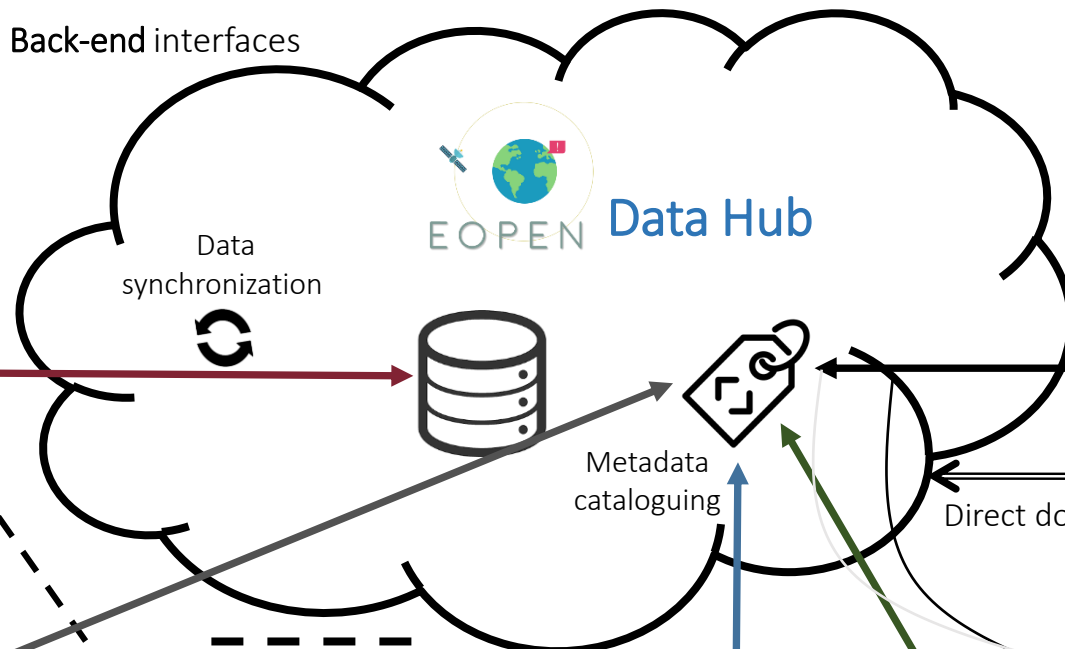


# Earth Observation Data Access

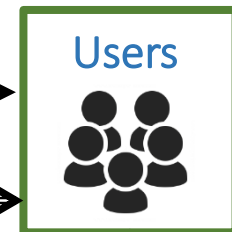
Collaborative Data Hubs



Back-end interfaces



Front-end interfaces



Redirection: secondary download service

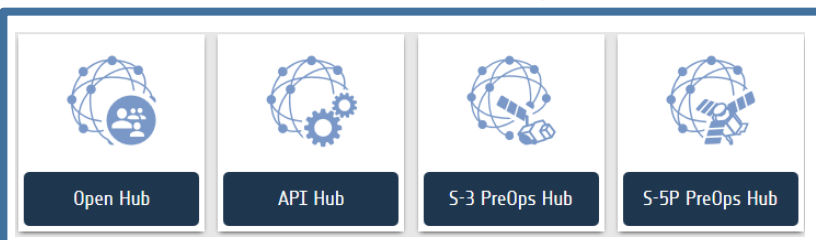
DIAS providers



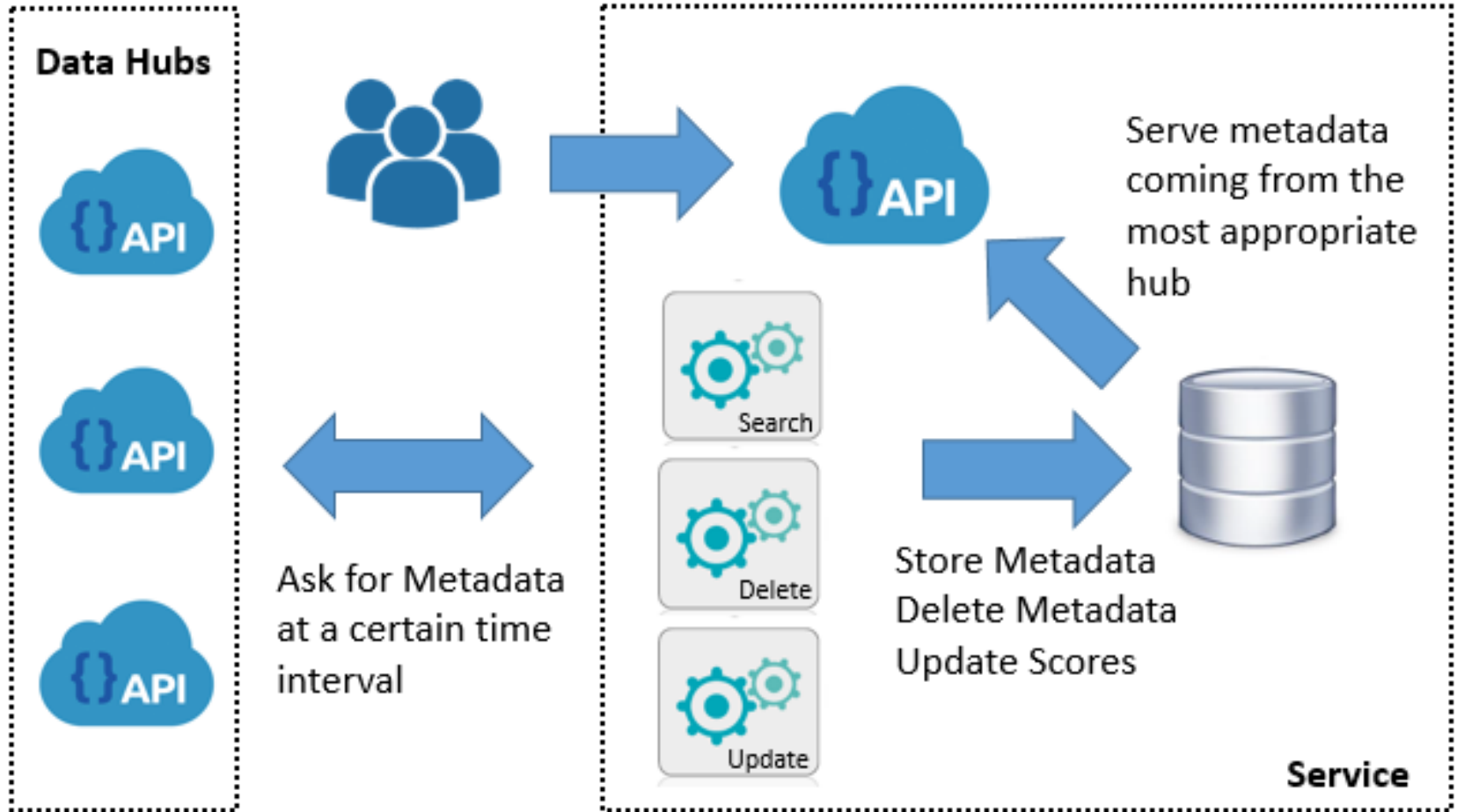
National Collaborative GS



Core Copernicus Hubs



# Earth Observation Data Access





# Earth Observation Data Access

## ▷ Details on the solution

- The application acts as a broker of these distributed resources, linking federated Copernicus Sentinels Hubs to a single data hub, instead of searching for the appropriate one for the user's needs;
- This application gives the potential for accessing to all Sentinel mission data and providing better performance on downloading products
- API application
  - API for searching and downloading Sentinel data
  - REST API via Django views module and allows users to make GET requests to it
  - Users are able to define their parameters based on their needs
  - Result set that contains metadata from the most efficient source to download from







# Earth Observation Data Access

## ▷ Advantages

- Access to a single hub instead of looking across several Sentinel Hubs to find the appropriate products.
- Access to all Sentinel mission data
- No geographic restrictions
- Better performance/download variability by exploiting Hub diversity
- Better timeliness and reduced lead times for accessing Sentinel products -----> more important for disaster management applications
- No delays due to maintenance of a hub

# Social Media Data Access

## ▷ Problem

Obtain valuable information out of millions of social media posts (6,000 tweets per second, 500m tweets per day) in the actual time of events

## ▷ Goal

Real-time access to tweets that concern topics of interest and analysis for additional knowledge

## ▷ Solution

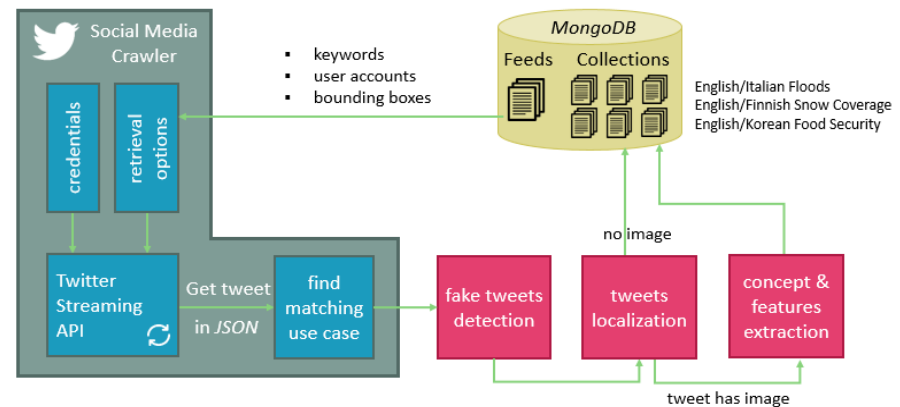
A continuous crawling of tweets based on predefined search criteria and a multitude of services to further filter the incoming information and get more insights



# Social Media Data Access

## ▷ Details on the solution

- Real-time crawling of tweets exploiting Twitter's Streaming API, always compliant with Twitter's Privacy Policy and GDPR
- Retrieval options are a combination of keywords, user accounts and bounding boxes  
e.g., #flooding in north-eastern Italy or posts by @DPCgov
- Analysis techniques:
  - Verification, to avoid fake tweets
  - Image and text classification, to filter out irrelevant material
  - Tweets localisation, to place them on a map
  - Concept extraction, to get description of accompanying images
- A user interface to show and search the collected tweets



# Social Media Data Access

Search options

Tweets Filter

Food Security

English tweets  
 Korean tweets in S. Korea

From: 21/02/2017


To: 26/07/2019

Find word in tweet ...

Show only geo-localised tweets  
 Show only tweets with images  
 Show only original tweets  
 Hide fake tweets

Search

Tweets Refresh Map All


 A cluster of Severe storms have sprung in Northwestern Oklahoma, and are moving Northeast at 20mph. Hazards with these storms: 60mph wind gusts, quarter sized hail, and localized flooding. Be #WeatherAware and #WeatherReady if you're in Woods or Harper counties #OKwx <https://t.co/vaLLjtF97d>


Posted by hK3wCl6 Tue, 20 Aug 2019 23:56

Maps Charts Junk Frame Text Graphic

Animation Cartoon Synthetic Images

Northwestern Oklahoma State University, 709, Oklahoma Boulevard, Alva, Woods County, Oklahoma, 73717, USA [-98.67, 36.8]  
 Nebraska, USA [-99.59, 41.74]  
 Harper County, Kansas, USA [-98.08, 37.19]

Real 70%


 Conservation authorities provide a wide variety of watershed management programs in partnership with all levels of government. These programs help to reduce or prevent the costly and devastating damages of flooding and protect water resources. <https://t.co/DiicBOMABg>

Pseudonymisation

Concepts

Localisation

Verification



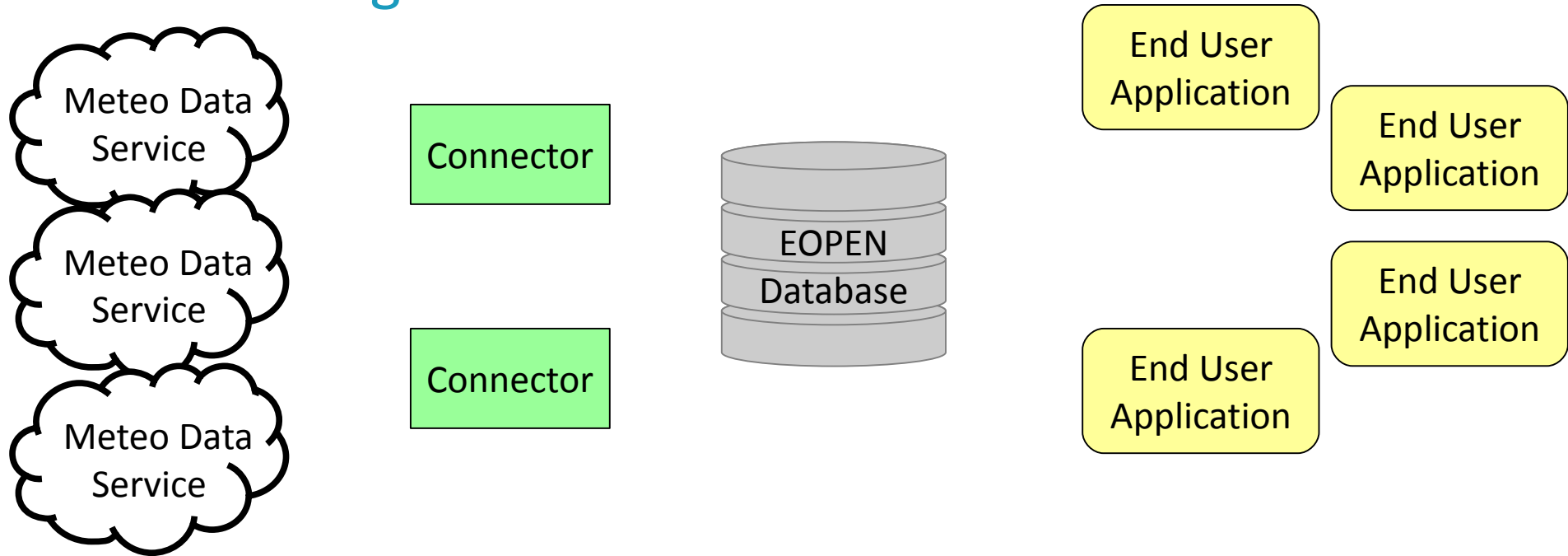
# Meteorological Data Access

- Problem
  - Meteorological data resides behind different services and APIs, which often require expert knowledge to access the data
- Goal
  - Enable easy access to meteorological data and allow data fusion with EO and Social Media data
- Solution
  - EOPEN provides ready-to-use tools for obtaining and accessing the data in unified format





# Meteorological Data Access

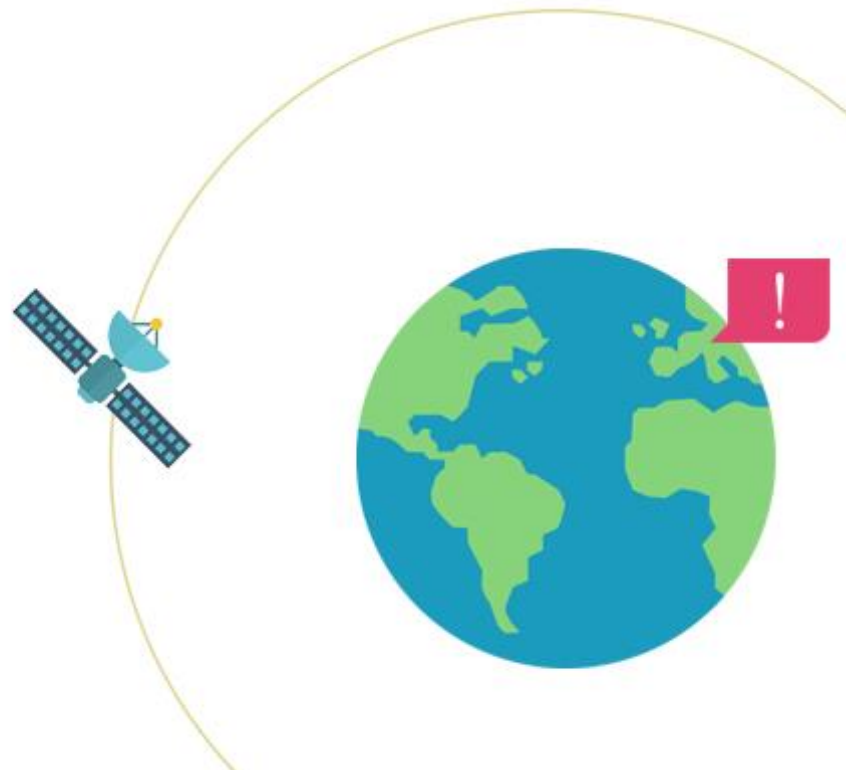


- Connectors request data from data services and store the data in EOPEN database
- Connectors are based on standard protocols and can be reused

- EOPEN database provides applications a unified access to meteo data

# Thanks!

## Any questions?



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 776019