EARSC

European Association of Remote Sensing Companies

# Exploiting the Value of EO Data


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# What is EARSC?

EARSC is a trade association (non-profit Belgian company), founded in 1989, which represents European companies: *providing services (including consultancy) or supplying equipment in the field of remote sensing.*

Our mission is:

- to foster the development of the European Geo-Information Service Industry
- to represent European geospatial-information providers, creating a sustainable network between industry, decision makers and users

Our focus is on the use of remote sensing from space-based platforms (satellites) and we have members from the full value-chain including aircraft and RPAS operators.

# Network

69 full members, 9 observers
From 22 countries in Europe

Members: any commercial company providing services (including consultancy) or supplying equipment in the field of remote sensing shall be eligible for full membership. based in a European country which contributes to the European Space Agency or which is a member of the European Union

Observer: any organisation engaged in the supply or use of Remote Sensing which does not qualify to become a full member of the Association.

# What does EARSC do?

1. Provide information to our members on programmes, policy and the sector; (business intelligence)
2. Maintain a knowledge of the industry, i.e. statistics, market information, etc.
3. Promote professional standards within the industry (certification)
4. Promote the industry and its capabilities by:
   - Creating links between EO services sector and other business sectors, e.g. oil & gas, insurance, public institutions e.g. the World Bank
   - Organising events offering networking opportunities as well as focused information
   - Advocacy towards policy makers on issues of concern
   - Awareness and media. e.g. eomag, OGEOZine, etc.

**EARSC focus is on enabling the development of new business**

# Satellites Benefiting Citizens

Study on behalf of ESA

Look at the Economic Value created through the use of Satellite data.

Bottom up approach working through the value chain

3 cases studied and reports published (see EARSC web-site).

**Geoff Sawyer & Marc de Vries**

EARSC European Association of Remote Sensing Companies

THE GREEN LAND

*From the Copernicus Economic Benefit Study performed under an assignment from the European Space Agency*

esa

# Objectives of the Work

To provide a bottom up assessment of economic value coming from the use of satellite data by analysing 3 cases where satellite EO data is being used operationally. For each:

- Identify value chains which should be mature and operational and which are benefiting from the use of EO derived geospatial information as part of their operations.
- For 3 of these value chains, a quantified economic benefit to be provided as a result of a detailed examination of the uses to which the geospatial information is being put.
- A methodology designed and tested on the selected value-chains and which can be used to extend the analysis to further chains in the future.

The key difference from previous analyses is to work through the full value chain where the benefits of using EO data can be felt.

# Case 1: Winter Navigation in the Baltic

# Winter Navigation in Finland

- *"Finland is an island!"* : over 90% of Finnish imports and exports travel by sea.
- Decision in 1971 that all major Finnish ports (25) should be kept open through the winter
- In 2003, decision to use Satellite imagery to replace helicopters on board ice-breakers
- Whilst helicopters provide an instant view; conditions change under bad weather conditions when they may not be able to fly
- Satellite imagery provides a synoptic view of the whole of the Baltic which allows icebreaker captains to plot a route right through the ice fields

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# From Satellites to Supermarkets

## The Ice Monitoring Value Chain

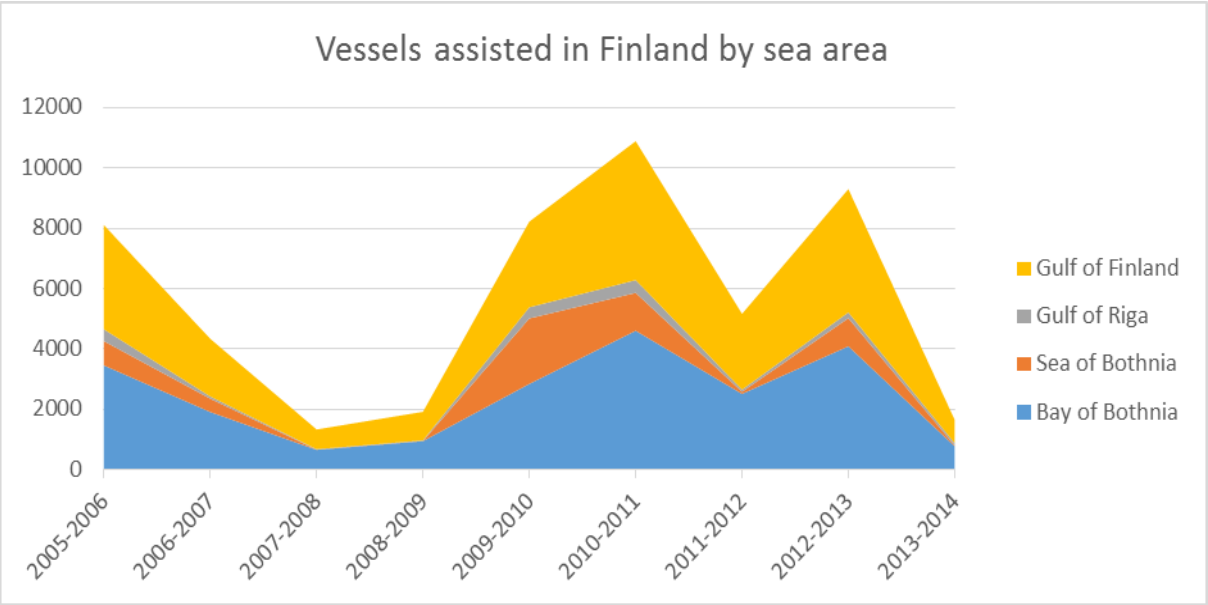
1. The Finnish Met Office (FMI) produce daily maps of the ice conditions that are used by ships, ports and media
2. Satellite imagery is used by icebreakers to keep sea-lanes and ports open; “Motorways of the Sea”.
3. Icebreakers guide ships to the ports so reducing transit time, fuel use, damages to ships (ice collisions) etc.
4. More precise arrival time allows ports to improve their planning of operations
5. Factories (paper mills / steel mills / oil refineries) can plan stock arrival and goods shipment.
6. Consumers benefit by greater assurance of the availability of food, fuel and medicines.

# Number of ships assisted by icebreakers

Variations caused by differing annual ice conditions.

Correlate directly with winter severity

Variation between years is greater than variation within a year.



# The Model

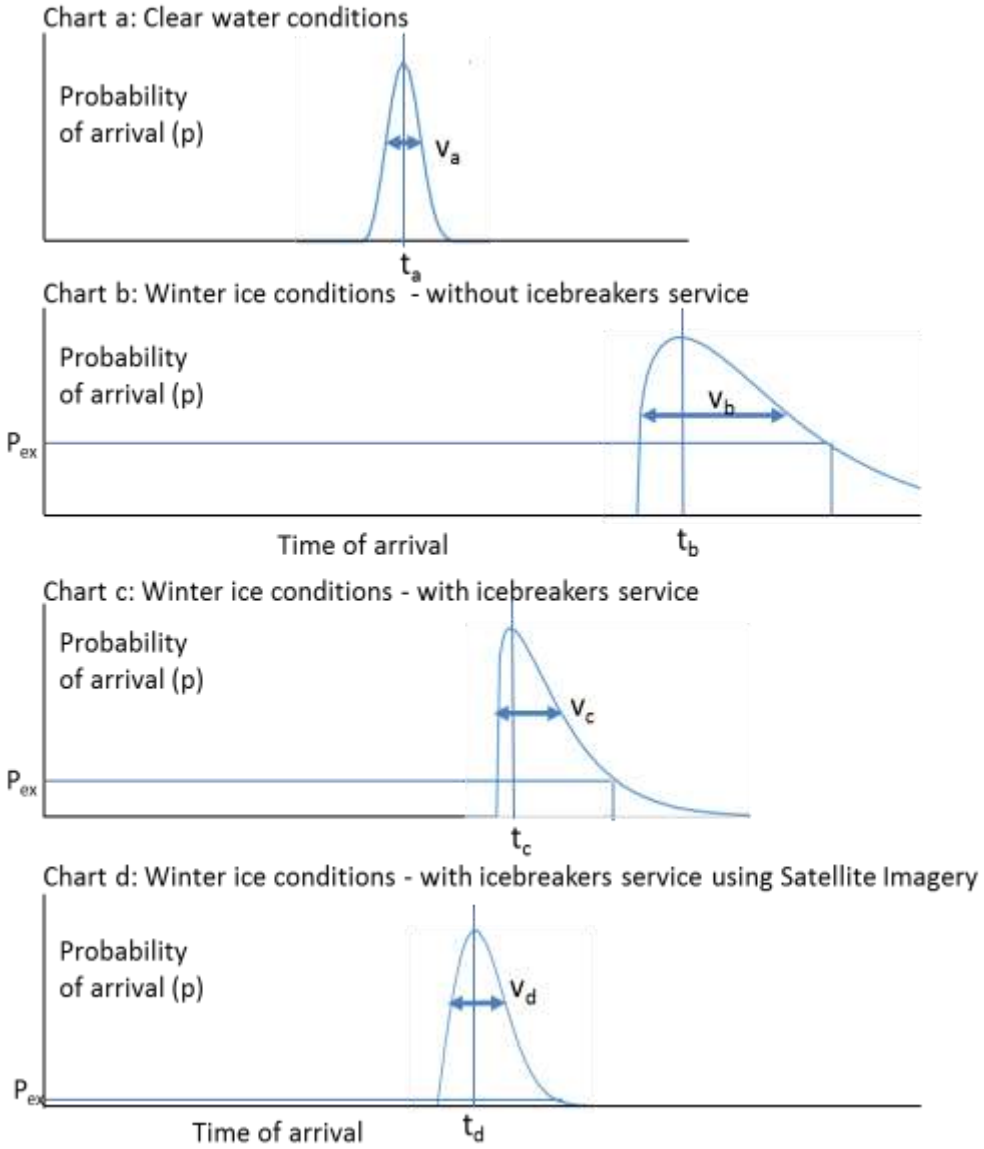
Generic model: no specific data to derive precise distributions

Three parameters:

1. Delayed arrival time
2. Uncertain arrival time
3. Probability of severe delay.

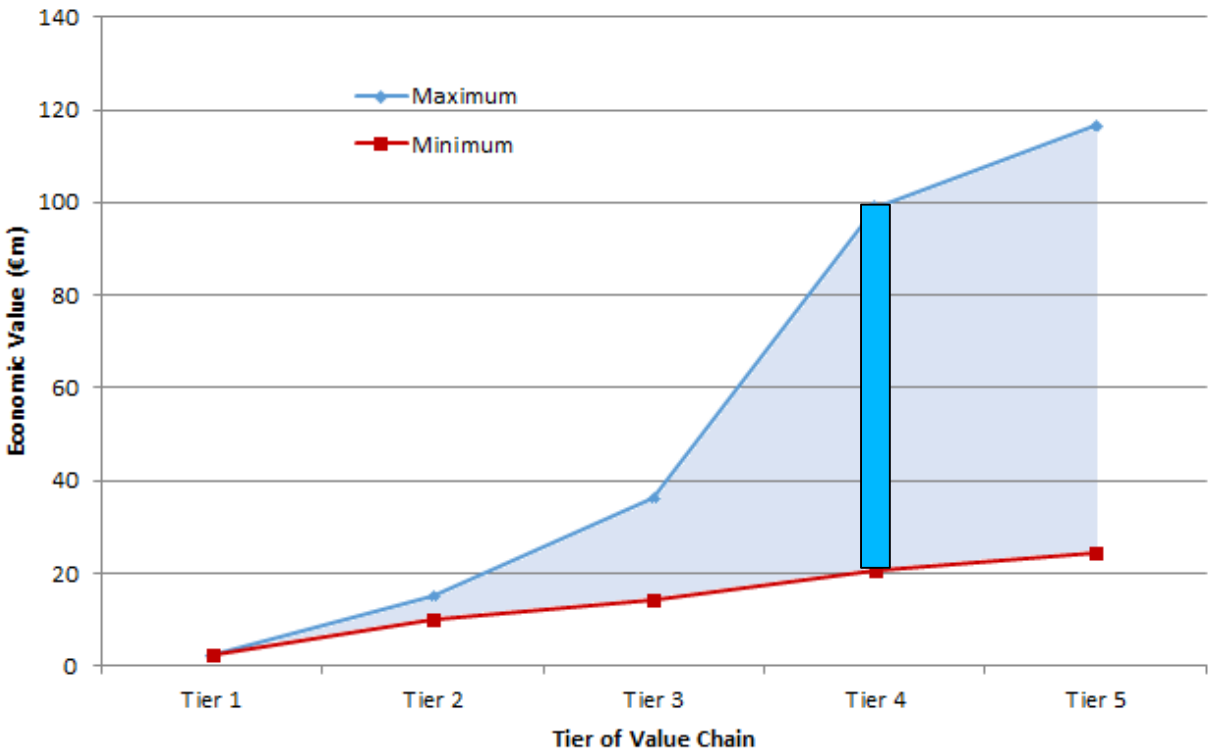
Variations between winters is greater than variation within a single year which makes precise analysis hard.

WinMOS model being constructed may help.



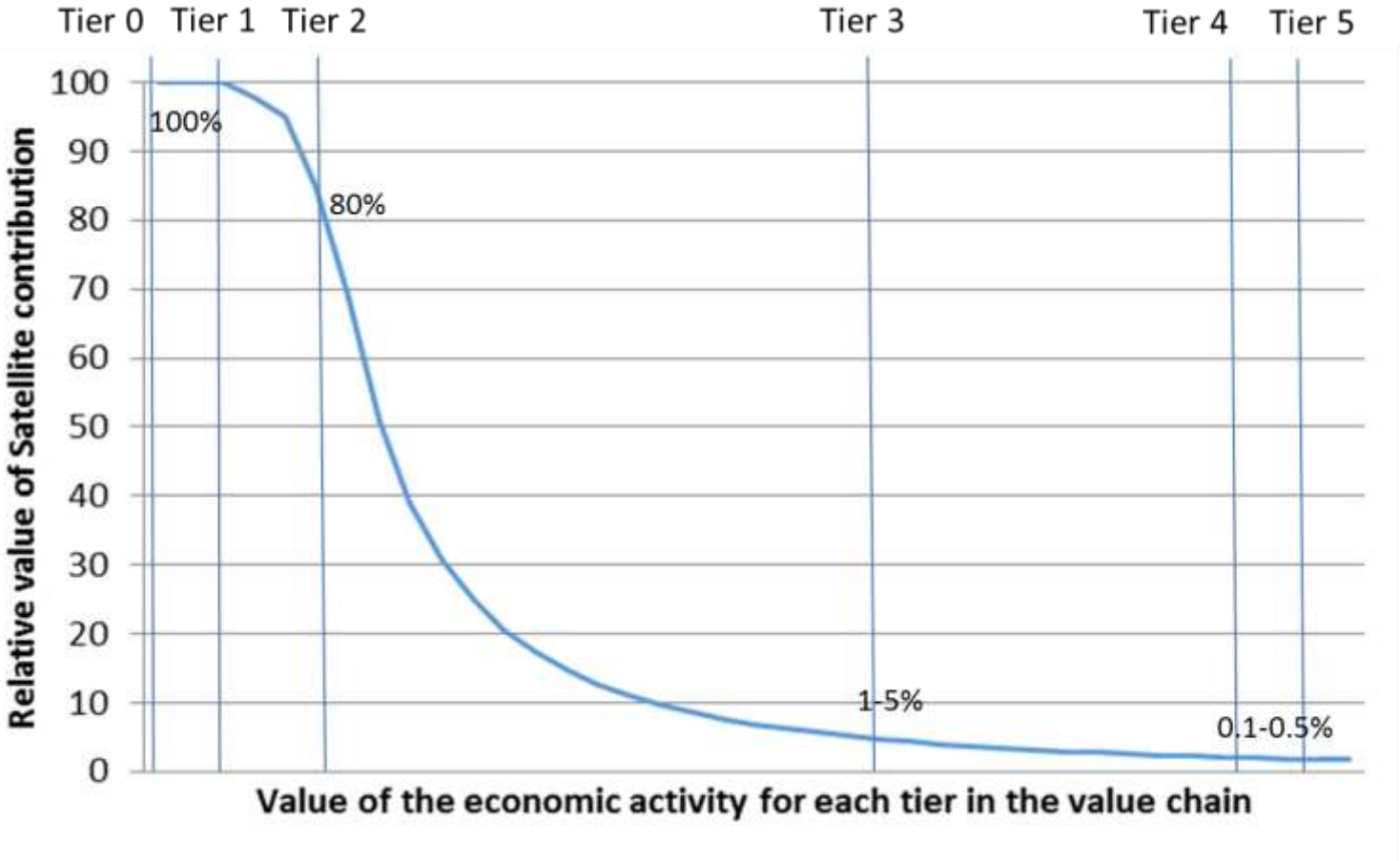
# Cumulative Benefits

Range comes as a result of using assumptions:
eg.
statistics used in the model.



# Contribution of the Imagery

## The contribution falls but the volume of activity increases.

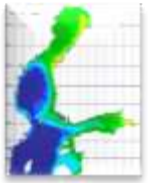


# From Satellites to Supermarkets

## The Economic Benefits

The Study shows that the Finnish & Swedish economies benefit from the use of satellite imagery like the one coming from Copernicus;

Between **€24m and €116m** of economic benefit is made each year.



Icebreakers use imagery to find the best routes through the ice

**€2.3m pa**

Ships save fuel and time

**€2.1-€3.3m pa**

Ports are able to operate more efficiently

**€5.8-€9.4m pa**

Factories are able to operate all year round

**€6.3-€63m pa**

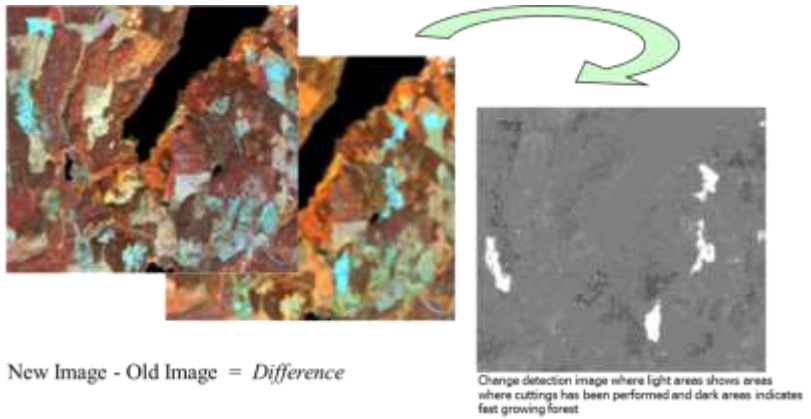
Citizens can be sure that the supermarkets (and petrol stations and pharmacies) are stocked.

**€3.5-€17 -**

# Case 2: Forest Management in Sweden

# Forest Management in Sweden

- Satellite optical imagery has been used since 2000 to monitor clear-cut mapping in Sweden.
- Swedish Forest legislation is very light
  - Keeps industry costs low; encourage competitiveness
  - Develop forest stocks as national, exploitable asset
- Swedish Forest Agency implement and monitor the act; satellite imagery is most cost-effective tool.
- Knowledge of clear cutting and forest management allows SFA to promote best practise to the 300,000 private owners of forest land.



# The Forest Management Value Chain

1.The Swedish Forest Agency purchases imagery (in co-operation with other government agencies) and processes it to detect / characterise the clear-cuts.

2. Following SFA advice, private forest owners benefit by complying with forest monitoring best practices and increase their stocks.

3.The Swedish citizens benefit from increased economic activity arising from the forest management practice and from the improved forest natural environment.

4. The clear-cut maps are used by other organisations public and private which benefit by using them either to improve their own work (PSB's) or develop additional business (private EO companies) in diverse industrial sectors (water/ telecommunications/ power)

# Managing Forest Assets

The Study shows that the Swedish economy benefit from the use of satellite imagery like the one coming from Copernicus; Between **€16m and €21m** of economic benefit is made each year.

SFA can ensure regular, country-wide monitoring of forests

**€9.5m pa**

Forest owners benefit from complying with replanting practices

**€3.07 - €6.14 m pa**

And with pre-commercial thinning practices

**€2.43 - €4.86 m pa**

Citizens enjoy increased economic activity & preserved environment

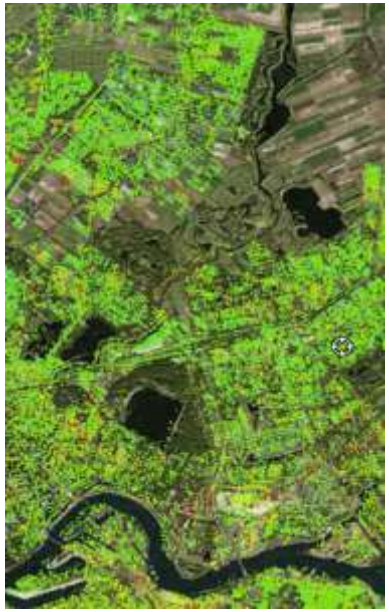
**€1m pa**

Maps of cuttings are used by public and private entities

**€0.13m pa**

# Case 3 Pipeline Infrastructure Management in the Netherlands

# Pipeline Monitoring



Ground subsidence is a particular problem in the Netherlands. Soil levels can change by as much as 1m within a few years.

Gas pipelines entering houses can be subject to very significant stress leading to a risk of rupture and threat of gas leakage and explosions.

Satellite images show hot spots where ground movement is taking place. And thus allow a targeted replacement programme: the maintenance strategy has now become focused on areas of higher risk. Instead of replacing pipes and connections in a single district pipes serving individual houses or streets can be replaced.

The result is better use of resources by the pipeline operators and less risk to consumers from gas leaks or disruption from water leaks.

# The Pipeline Infrastructure Value Chain

1.Skygeo, a private company uses satellite data to generate InSar maps which is the basis for calculating ground movement and deformation

2. The maps are supplied to Infrastructure Management Companies dealing with gas and water distribution.

3. Improved planning of pipeline maintenance work also benefits the local authorities by enabling them to co-ordinate better between the companies digging up the road.

4. The Dutch citizens and local economy benefit from risk reduction in their households and less maintenance work which leads to less disruption to businesses in terms of road closures and delays.

# Ground Deformation & Asset Management

## The Economic Benefits

The Study shows that the Dutch economy may benefit from the use of satellite imagery like the one coming from Copernicus. Between **€15m and €18m** of economic benefit could be made each year in the whole country thanks to the combined use of Sentinel imagery and commercial high resolution imagery.

The service provider using EO data creates employment and revenues

**€500k pa**

Maintenance and management of infrastructure assets

**€11.1 m pa**

Municipalities can better plan maintenance activities in their territory

**N/A**

Citizens benefit from risk reduction in their households and less maintenance work

**€3.6m-€6.6m pa**

# Case Comparisons

The three cases show very interesting contrasting characteristics:

| | Winter Navigation | Forestry | Pipelines |
|---|---|---|---|
| **Service Provider** | Public provider; Met office (FMI) | Public provider Responsible Agency (SFA) | Private, commercial service provider (SkyGeo) |
| **Value Chain** | Linear dependency | Indirect actors | Concentrated value |
| **Source of Value** | Direct relationship between the imagery and the value creation. | Indirect relationship created by light legislation | Commercial relationship driving more efficient operations. |
| **Legislative Impact** | Public decision to keep ports open through the winter. Public policy for icebreaker services. | Light legislation removes costs but brings responsibilities "freedom with responsibility" | Regulatory control of utility providers will change the beneficiaries. |

# Case Comparisons (2)

The three cases show very interesting contrasting characteristics:

| | Winter Navigation | Forestry | Pipelines |
|---|---|---|---|
| **Wider Applicability** | To rest of the Baltic<br>To other ice-bound regions | To other Boreal forests<br>Depends on legislation | To many countries where ground subsidence occurs |
| **Model** | Statistical based on ship transit time and arrival time. | Economic based on reducing transaction costs | Financial based on life cycle costing and investment returns |
| **Primary Information Type** | SAR images used directly on the ice-breaker. | Optical images processed to show forest clear-cuts ie cleared land | SAR interferometry showing ground movement to very fine degree. |
| **Copernicus applicability** | Sentinel 1 | Sentinel 2 | Sentinel 1 plus commercial TerraSAR-X imagery |

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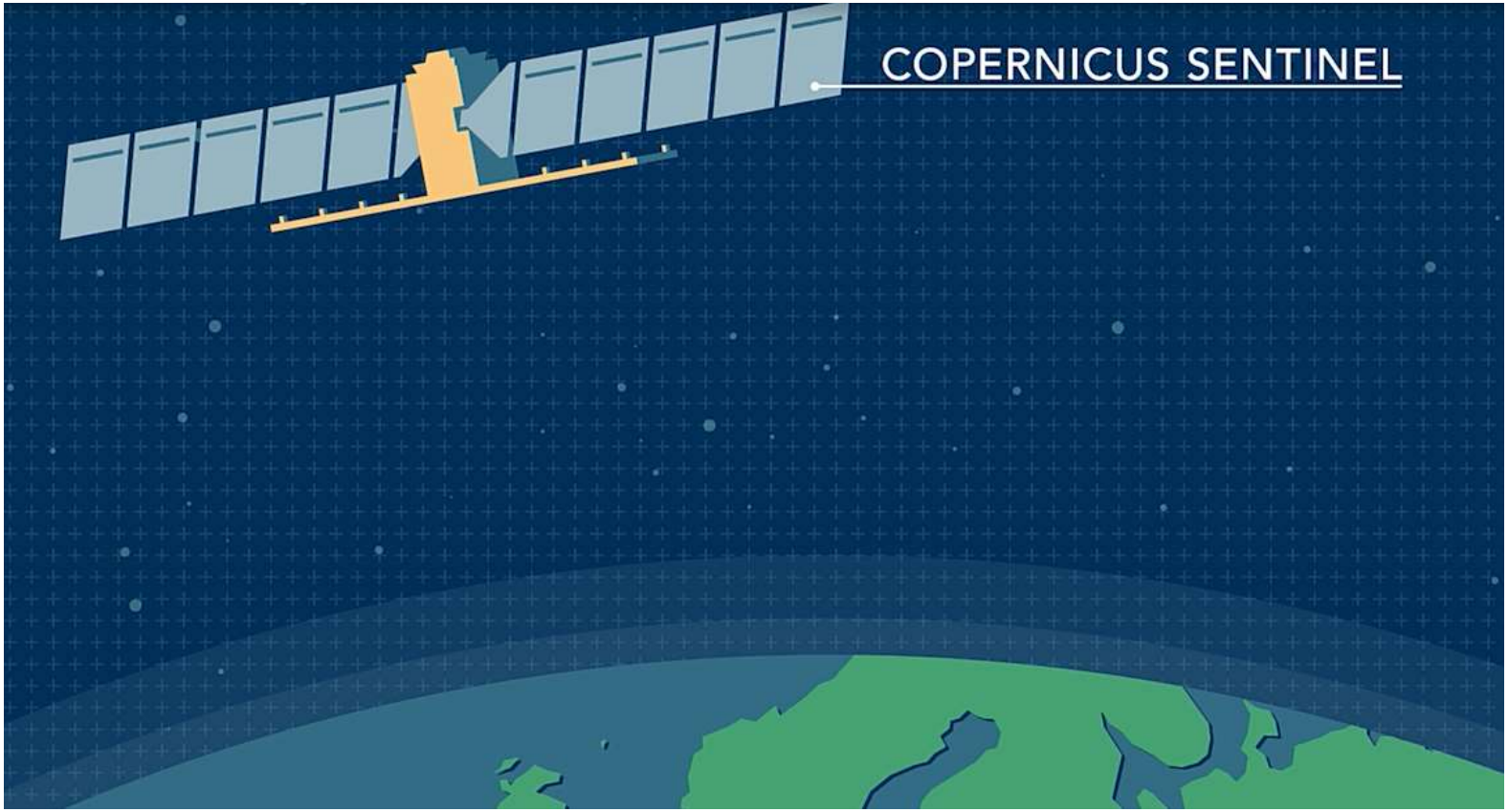
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# Thank You