Use of Commercial Space for EO Science

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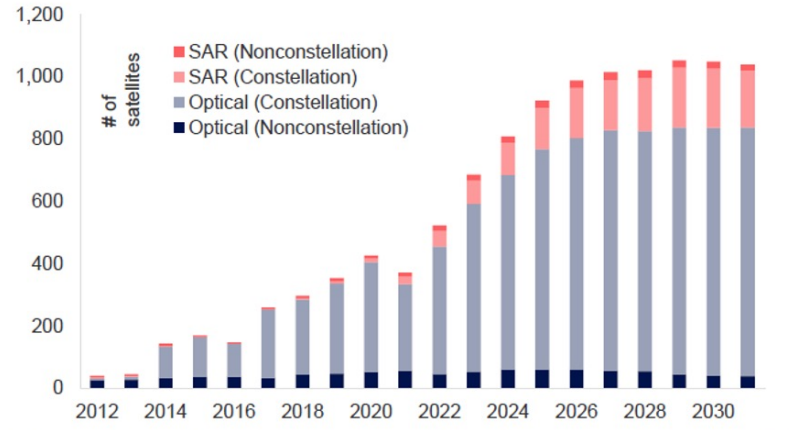
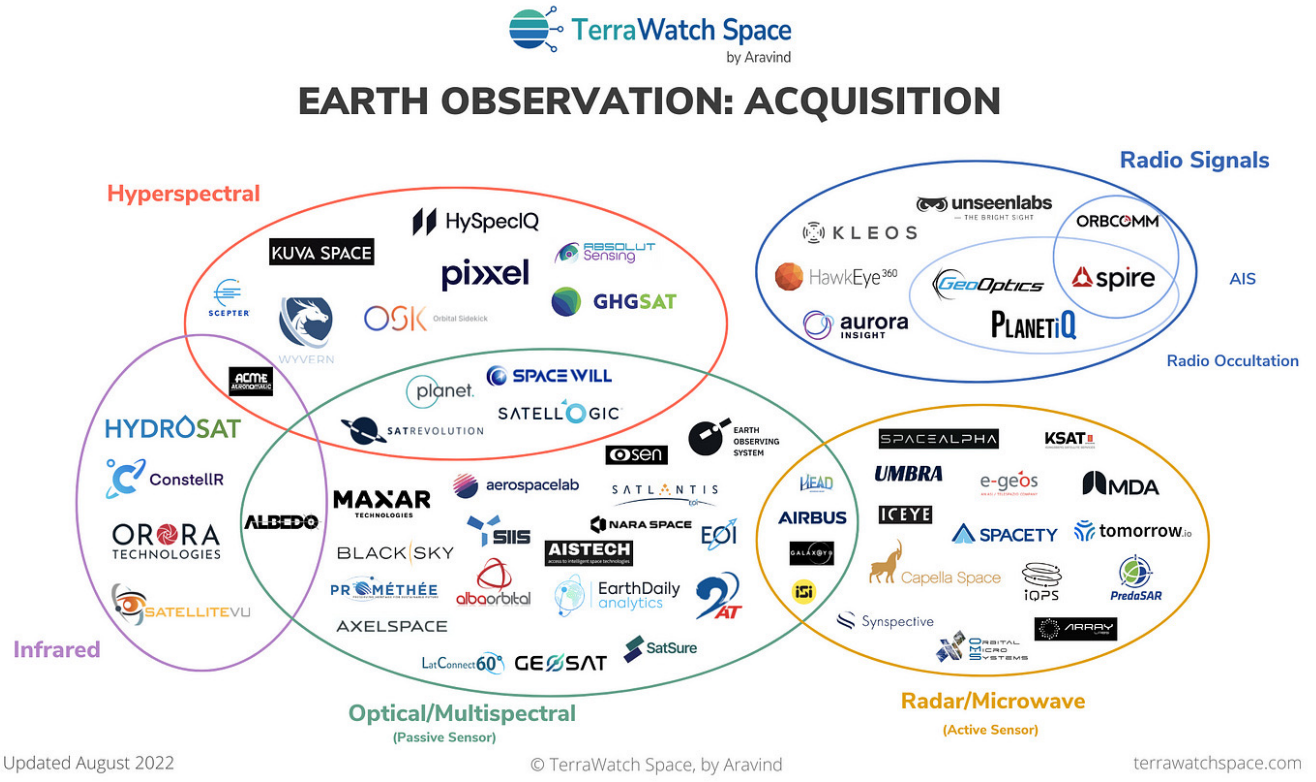
EO Upstream Evolution – Role of Commercial Space

Commercial EO satellites in operation

All satellite masses – still excluding non-dual-use military satellites



*Includes satellites from private enterprises and governments whose data are made available on a commercial basis. Excludes noncommercial satellites. HSI and GHG are part of the optical category. Meteocean, ELINT/RF and other Unknown satellites are excluded. Satellites in operation are based on reported/expected life spans.



Seed questions - Use of Commercial Space for EO Science

1. How can commercial space missions and data be best leveraged for EO Science challenges?

- What observation gaps can they fill in short-term & long-term? (e.g. bi-static SAR, HR Infrared, atmospheric composition, radio occultation)
- Where can New Space & Commercial missions make the biggest impact in EO Science?
- Do you see potential in spin-off from explorer missions to New Space capabilities?

2. How can New Space missions best create synergy with public EO missions?

- How to design and ensure complementarity?
- What is needed to best combine these different data types (technically/economically)
- How to ensure their data quality?
- How can their data be most (cost) efficiently made available/accessible?

3. How can EO Science be most relevant in multi-disciplinary research programs (e.g. economy, health)

- How can EO Science be best leveraged in the field of (scientific) economics? (e.g. Carbon pricing, food markets, values chains, green financing)
- What are the socio-economic indicators that EO science can help evaluating?
- Which would be the most promising economical challenges to be addressed with EO information?

4. How can the role of EO science in business development and commercial sector increased?

- What experience exist in EO science transfer into business innovation?
- How can university spin off & spin in be fostered?
- What is needed to stimulate “intrapreneurship” activities between science & commercialization?

Outcome Question 1 & 2

1. How can commercial space missions and data be best leveraged for EO Science challenges?

2. How can New Space missions best create synergy with public EO missions?

- Observation needs: VHR Hyperspectral, thermal (different time), GHG, radio occultation (weather)
  - Complementing in space and time
- Transparency on processing standards and specifications
- Calibration and validation process – needs to be testable (transparency)
- Trustworthy uncertainties are required – and these need to be tested to build confidence
- Use of standard data quality frame – CEOS, Fiducial reference measurements
- We need to ensure the consistency through QC and data fusion tools to enable the complementary
- Need for reliability, sustainability and continuity of data provision
- New Space data use is often purpose driven – actionable information
- Data License are essential for science – publication
- Scientific data buys should be done through large research program, avoid subsidising

Outcome Question 3

3. How can EO Science be most relevant in multi-disciplinary research programs (e.g. economy, health)

- How can EO Science be best leveraged in the field of (scientific) economics? (e.g. Carbon pricing, food markets, values chains, green financing)
- What are the socio-economic indicators that EO science can help evaluating?
- Which would be the most promising economical challenges to be addressed with EO information?

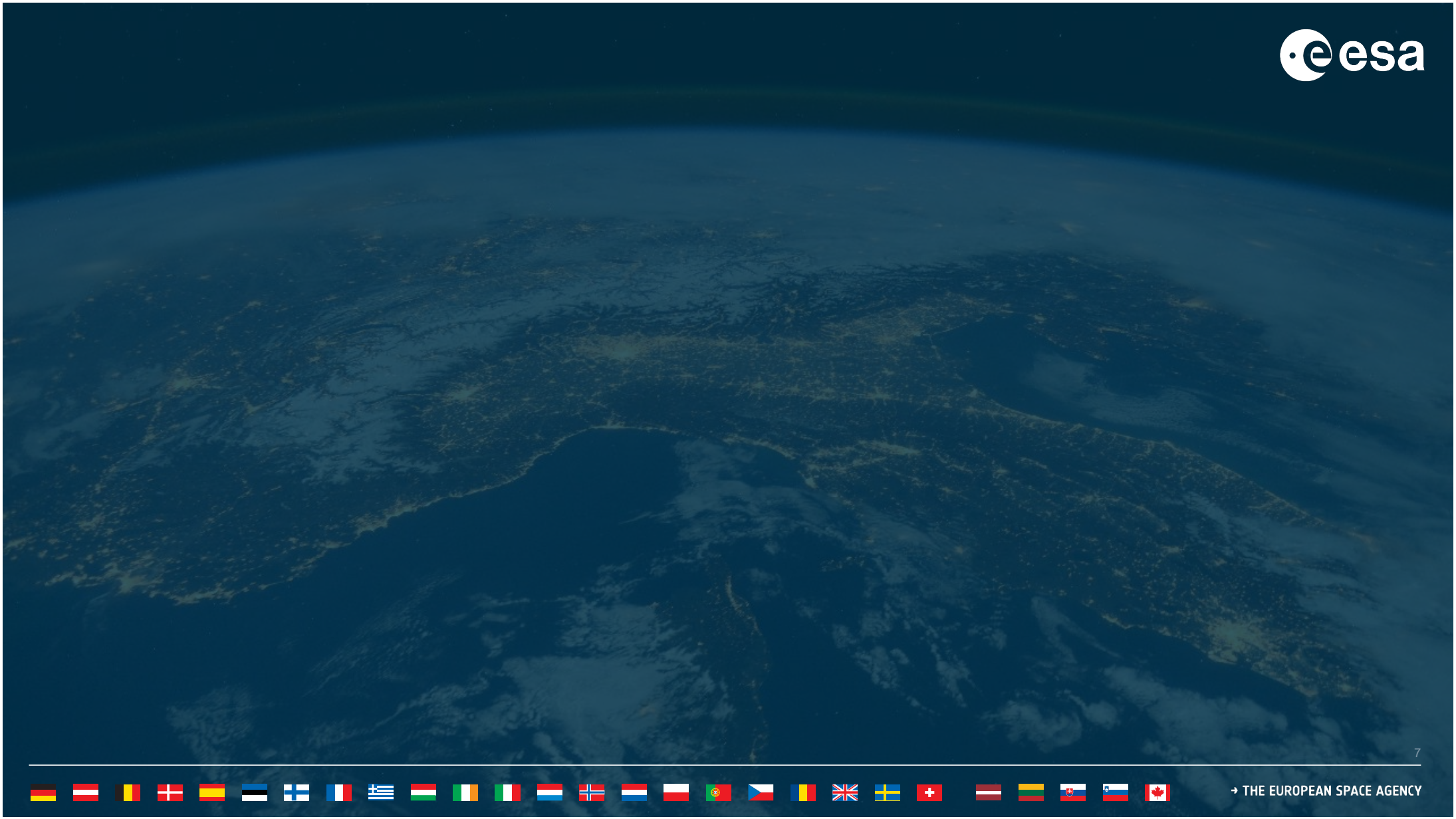
- Insurance companies are already working on modelling and economics of floods, draughts
- We need to get the communities together in order to assess the value of EO for economic science

Outcome Question 4

4. How can the role of EO science in business development and commercial sector increased?

- What experience exist in EO science transfer into business innovation?
- How can university spin off & spin in be fostered?
- What is needed to stimulate “intrapreneurship” activities between science & commercialization?

- IceEye and ConstelIR are university spin-offs – we should look at successful cases and have an LL
- In Europe we have a different culture – way to look at commercialisation and making profits – the US has a different way of looking at things
- We should look at synergy between science and commercial approaches – involve communities



Summary

Huge increase in optical sensors from ComEO. Today ~500 by 2030 we expect >1000. Some SAR/Mocrowave. Mostly US companies –

Plantet (US) and Iceye – then many newcomers – and there are some developments to complete

Commercial – there is a return on the investment. There is a wide landscape. There are two real constelations deployed – Planet and Iceye.

In EU we have some early stage players but they are going quite fast. First satelloiktes are “OK”and then the development is done on the subsequent satellites.

There are 9 new Companies now included in the Copernicus contrib. Missions (signed at LeBourget). ESA will support their QC and data provision.

Data is not everything - we need to ensure the consistency through QC and data fusion tools to enable the complementary contributions.

How can these missions work in a cross disciplinary applications landscape?

How can we leverage CommEO for Scinece?

Q: what does ESA use the NewSpace for today?

- Spire used with NWP/ECMWF for RO
- Stability of sensors and transparency of processing and quality is needed
- Time and space coverage
- Calibration and validation process – needs to be testable (transparency) – what is the quality? At what processing level? Are purchasing geophysical estimates or L1 data? Users want to provide their own algorithms – implies low level access.
- How do we build confidence in the data offers?
- Trusytworthy uncertainties are required – and these needd to be tested to build confidence in their utility and relaibility.
- EDAP assessment framework with NASA to assess the performance of a mission for a particular utility. This needs to be implemented with the tools to enable new space. The process can provide evidence that what is said on the tin is actually true.
- Partnerships are very relevant – we need to test what can be done with ComEO for a given application.
- The licensing is important – if you can't publish the data then is it worth it?
- Stated Quality is fundamental since there is a replenishment strategy to bear in mind to ensure the service (embodied in the license agreement) can be maintained
- Kschmitt: Repect the role of ESA – data buys should be through big research programes to do a job. We do not want to subsidise commercial entities.
- Commercial to deliver to specific users (RO is a good example) – these companies strive to do the best. Then there is another type of activity which is profit driven – wide user base – may or may not be useful for science. In these cases, we need to take great care in all the other issues.
- Companies may decide to change their products whenever – it is theor chooce and we as users must take this as it comes.

Seed questions - Use of Commercial Space for EO Science

- We need stability of instruments and transparency of the data processing. Planet has done a huge effort / improvement on processing
- Green house gas monitoring – challenging as from the commercial data providers the processing algorithms are not open
- By definition commercial data fill a gap as otherwise you would use public/free data! Green house gas data e.g. on methane leaks could be useful
- Land surface temp commercial data useful as very high temp and spatial data are needed
- Of interest are VHR data if they also acquire at different times (cover different times of the day complementary to public ones)
- Hyperspectral data could be of interest
- Satellites providing VHR ~ 2m they are big satellites – not cheap
- Ramp-up the spatial – temporal dimension by commercial data – however they need to have a quality check
- Challenge is the data are noisy
- Processing is not open
- Transparency – processing and cal/val – you need to be able to re-due
- Discriminate between the data and the products
- Scientists often use their own algorithms (often better) – thus they need to have access to “raw data” L1b
- Commercial satellites need to do cal/val and reference measurements as we do if they want to join the science satellite family
- We need to know the uncertainties
- Commercial companies are addressing partly the same political topics however they are also addressing other actors (industry) – providing info to industry can also drive change
- There is a framework to be implemented (e.g. CEOS) – companies should go through a process and then scientists can judge on this

Seed questions - Use of Commercial Space for EO Science

- It might be easier to partner with a commercial provider and design together the system we need – design together in partnership ➔ smart for licencing and transparency for processing
- Licencing needs to be clarified allowing scientists to publish the result
- Those small satellites constellations all have individual characteristic we need to know that – example Planet data
- We need to respect the different roles – eo science foundatations is something different than commercial providers. Data buy should be to left to national agencys. ESA should concentrate on techno, and quality. If community wants more data national actors should step in – not ESA role
- RO data providers are making an effort on quality improvement – however other commercial providers want to make buisness

Seed questions - Use of Commercial Space for EO Science

- Companies can also rapidly change their strategies – and delivery data in a different way 9 or not at all)
- The use of commercial data often comes down to the costs! You need lots of data!

What is the actual use of commercial data currently in ESA EO to address the EO scientific challenges? And for which topics – benefits?

Example is the use of RO data from Inspire – ESA/Eumetsat are evaluating if to buy or built.