14th ESPI Autumn Conference

Green Deal Session

28 Sep 2020

Simonetta Cheli, ESA

Version 0

First of all thanks for the opportunity to be part of this panel!

ESA offers a lot with regard to Climate Change and Europe's Green Deal.

ESA's **Climate Change Initiative** – provides scientific background and increases knowledge about underlying processes.

Copernicus features a dedicated **Climate Change Service**. Key information on EU key environmental policies. It informs IPCC reports – sea level rise, quantitative measurement of sea ice loss in the Arctic, land use change.

Copernicus – just like all of our other Earth observation activities – serves **high level political objectives**, such as:

- UN 2030 Agenda for Sustainable Development (linked to the Sustainable Development Goals)
- Paris Climate Agreement

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- **European Green Deal**

Following the successful Ministerial Council last year we are in the process of expanding our fleet of dedicated Sentinel missions within Copernicus. Very relevant for the **European Green Deal and its issue areas**. I will **focus on the issue of carbon** here.

Carbon neutral Europe by 2050: Copernicus Anthropogenic Carbon Dioxide Monitoring mission. More fine-grained, regular, and globally consistent data on CO_2 emissions. Defining the anthropogenic sources for these emissions at city level rather than at national level.

- Determination of emitting hot spots such as megacities or power plants
- Monitoring the hot spots to assess emission reductions

- Assessing emission changes against local reduction targets to monitor impacts of Nationally Determined Contributions
- Assessing the national emissions and changes in 5-year time steps to estimate the global stock take

Currently estimation of the human contribution to these emissions not yet feasible at global level and no network of in situ observations, space borne measurements and emission inventories can provide the required information to fulfil the Paris Agreement ambitions at the appropriate temporal and spatial scales!

So we will **support Europe in becoming carbon neutral** by monitoring

- CO_2 in the atmosphere
- Carbon on land (meaning monitoring land use – Sent-2, CHIME, …)
- Carbon and oceans (Sent-3, …)

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Carbon/CO_2: global issue, not just European. Cooperation with missions outside Europe: GOSAT, OCO-3, Tansat, GF-5, …

To show you an example of how Earth observation can provide evidence on greenhouse gas emissions, this is a **slide** showing the effect of the Covid-19 lockdown in Europe on greenhouse gas emissions. The data were gathered in the context of *Rapid Action Covid-19 Earth Observation (RACE)*. Within this initiative, ESA and the European Commission work together to monitor the impacts of the lockdown and recovery using Copernicus and other Earth Observation capabilities. RACE activities focus on monitoring and analysing environmental parameters like air and water quality changes, agriculture productivity and economic and human activities indicators such as industry, shipping, construction, trade or traffic.

But the Green Deal is not only about carbon monitoring. There are other issue areas as well:

Biodiversity Strategy for 2030: space borne hyperspectral imager for variables like species populations, community composition, ecosystem productivity and carbon stock, extent and functional type.

Renewed EU Strategy for the Arctic: Even three of the new Sentinel missions are relevant:

- The *Topography Altimeter*: sea ice thickness and land ice elevation at high resolution.
- The *Imaging Microwave Radiometer*: sea ice concentration & extent and sea surface temperature, focus on polar regions.
- *L-band Synthetic Aperture Radar* (SAR), complementing current Sentinel-1 C-band SAR mission.

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The Arctic has always been a focal point of our activities, and this **slide** shows you one the recent results our activities have produced.

S*ustainable and resilient agriculture: Land Surface Temperature Monitoring Mission*. Improved water resource management by providing information on thermal stress in crops.

It goes without saying that all of this is a **quickly evolving domain** with constantly changing boundary conditions. We all have heard that the President of the European Commission is now pushing for a **55% reduction of greenhouse gas emissions instead of the formerly envisaged 40% until 2030**. As Earth observation we can easily adapt to such modified objectives – as I said before, we are there to support political goals.

Let me add that our activities are not limited to just monitoring. **Digital Twin Earth/GAIA-ϕ** will allow to **simulate** effects of climate change (sea level rise, deforestation, change in land use, …). This

visualizes what is actually at stake and makes it tangible, in order to raise awareness and to support concrete action.

Gaia-Φ is a next generation European EO data facility deploying emerging technologies to provide rapid access data storage and advanced high performance computing (HPC) cloud data processing to maintain a land cover digital twin of our planet Earth. It will capitalise on **rapidly growing volumes of EO satellite data** to enable advanced applications for governments, citizens and commercial users. Drivers for Gaia-Φ include the rapid growth in EO data volumes and user uptake, increased processing loads, demand for up to date information and the **enhanced capabilities provided by Artificial Intelligence (AI) and Machine Learning (ML)** techniques.

So we are really there to give decision makers and the public a hand, to support the European Green Deal and other overarching political objectives. We bring the benefits of Earth observation to citizens in Europe and worldwide.

Thank you.