

Overview of ESA Experiences with International Financing Institutions (IFIs)

'Satellite environmental information in support of Development Aid Activities in European Aid Agencies'

Frascati, 16 January 2018

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ESA Earth Observation Programmes Directorate

Sustainable Development : SD and the SDG's

ESA addresses the challenges of the global sustainable development agenda with two complementary sets of activities:

EO for SD

- Mainstreaming the use of EO in the implementation of **Official Development Assistance (ODA)** projects
- establishing EO-based information as **'best-practice' source of environmental information** in the working processes of IFIs on Environmental Safeguards Systems (ESS) and Monitoring & Evaluation (M&E).
- Responding to the development priorities of the International Financial Institutions (WBG, ADB, EIB, IFAD)



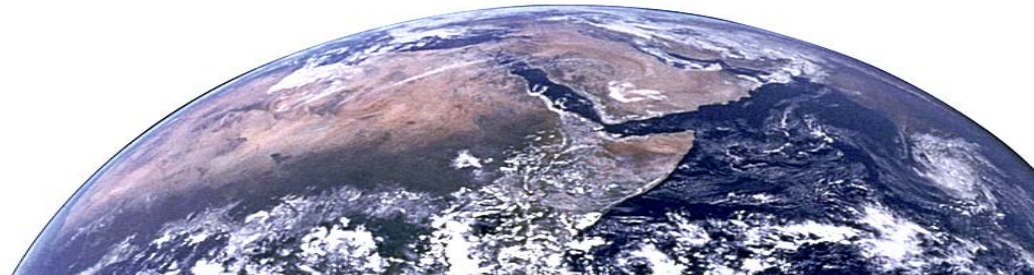
EO for SDG's

- Supporting the full realisation of EO in the **UN 2030 agenda for Sustainable Development** (17 goals – 169 targets)
- Helping the **UN Statistical Division** and the **National Statistical Offices** (and ministries) to integrate EO in their practices in order to measure, monitor and report progress towards SDG Targets, inform development policies and ensure accountability.
- With a special focus on the **SDG Global Indicator Framework** (230 indicators)

EO and SD : The Opportunity



- ‘**Mainstream**’ the use of EO-based environmental information into Official Development Assistance (ODA) working practices & financing
- i.e. **Systematic** inclusion of EO for all Aid projects and project phases : *Identification, Preparation, Appraisal, Negotiation*, and (most importantly) *Implementation*.
- **Focus on IFIs** -> driving Global/Regional ODA agenda, investing in tools & analysis to improve Aid planning & implementation, significant sphere of economic activity (*US\$ 142.6 B in 2016*).

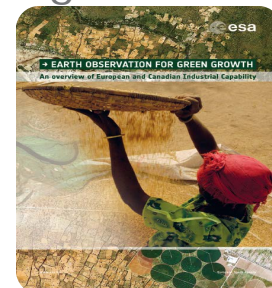


International Financing Institutions (IFIs)



Programmes & Projects

- 65+ small-scale demonstrations of EO-based environmental information in the implementation of Official Development Assistance (ODA) projects during 2010-15.

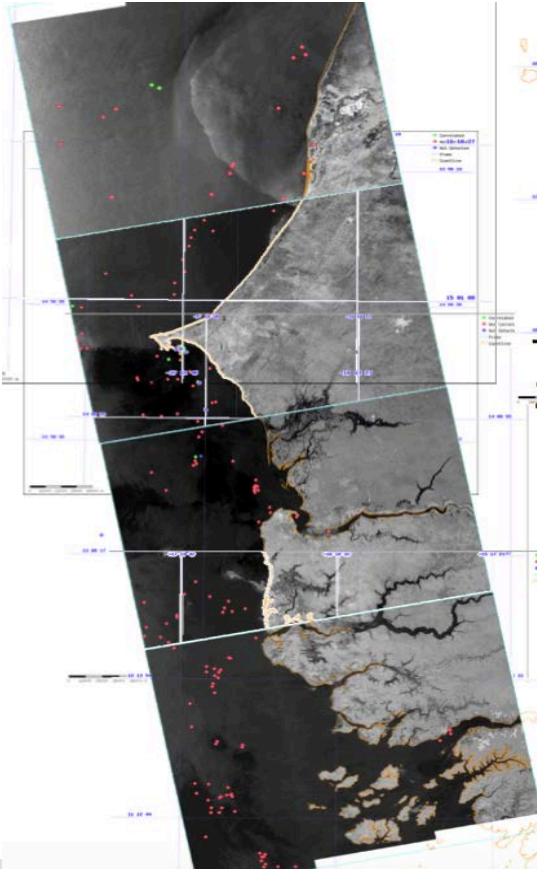


World Bank, Dec 2015

Asian Development Bank, Nov 2016



One Example : *Illegal Fishing*



First use of Sentinel 1 data for fisheries protection in developing countries (West Africa).



European Commission Gets Tough with Illegal Unreported and Unregulated Fishing, With A Little Help from Liberia

December 28, 2015



Sachiko Kondo / World Bank



International Financing Institutions (IFI):

How could they use EO ?



Information Drivers

- **Green Growth**
 - Environmental impact / sustainability of economic development investments
- **Climate Resilience / Proofing**
 - Long-term durability of development investments
- **Natural Capital Valuation**
 - Economic valuation of Ecosystems for National and Global accounting (GDP)
- **Open Development**
 - Increasing drive towards transparency in knowledge resources

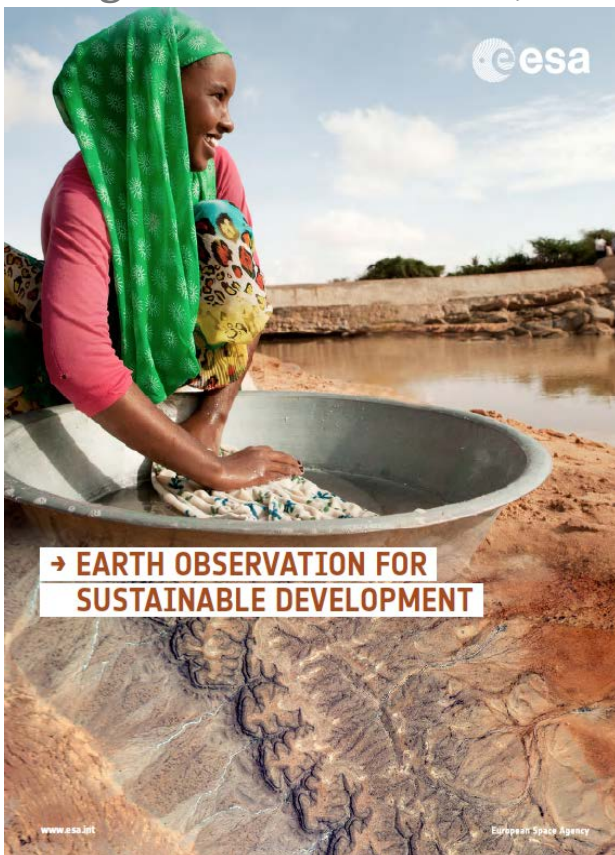
Information Uses

- **In support directly to Programs / Projects**
 - concept definition, planning, implementation
 - close-out and remission
 - as part of capacity-building in developing countries
- **In support of Monitoring & Evaluation (M&E) methodologies**
 - as *best-practice* for M&E tools : Environmental Impact Assessments (EIA), Safeguards Systems (ESS), Audits
- **In support of policy & planning**
 - sectorial analyses
 - country development planning
 - recent financial approaches to valuation of natural capital



Earth Observation for Sustainable Development

Longer-Term Vision (next ~ 8 years)



- **Phase 1** (3 years, 2016-2020):
Consolidate Requirements, engage stakeholders (IFIs & Client States) via Large-scale regional demonstrations of EO.
- **Phase 2** (TBD ~ 5 years, 2020-2024):
Mainstream & Transfer EO into operational working processes & financing of Development as 'best-practice' source of environmental information in Environmental Safeguards Systems (ESS) and Monitoring & Evaluation (M&E) methodologies, SDGs reporting.

Priority thematic areas :

2016: Agriculture, Urban Development, Water Resources,

2017: Marine & Coastal, Disaster Risk Reduction, Fragile & Conflict States, Climate Resilience & Proofing,

2018: Forestry, Ecosystems Services,

Slide 7

Phase 1 : Consolidation of Requirements



Implementation of Activities

- **Phased approach**; Set-up (1st year) followed by Large-scale regional demonstrations (next 2 years),
- **Year 1 : Strategic Planning & Stakeholder Engagement**
 - Engage IFI's and key stakeholders in IFI client states,
 - Define mechanisms for sustainable transfer of EO and define common actions to address issues across the project life-cycle,
 - Elaborate and prepare the EO demonstrations required (European data access, service specifications, support tools, capacity-building).
- **Years 2-3 : Service Demonstration & Transfer Preparation**
 - Develop EO service clusters, and execute/scale-up EO service demonstrations,
 - Connect to existing international networks and development support initiatives,
 - Implement cooperative training and capacity building, both within IFI (for project preparation) and IFI Client countries (project implementation); priorities : SE Asia, LAC, Africa,
 - Prepare the sustainable transfer of EO services into routine working practices of large scale ODA programmes and projects.



First activities : *Agriculture, Urban, Water*

(Partners, Programmes, Products)



→ EARTH OBSERVATION FOR SUSTAINABLE DEVELOPMENT
A EUROPEAN SPACE AGENCY INITIATIVE

AGRICULTURE AND RURAL DEVELOPMENT
Large-scale exploitation of satellite data in support of international development

EO4SD AGRICULTURE AND RURAL DEVELOPMENT

Main Partners

- International Fund for Agricultural Development (IFAD)
- World Bank (WB)
- International Finance Corporation (IFC)
- Inter-American Development Bank (IADB)
- Asian Development Bank (ADB)

Main Thematic Components and EO-Based Information

- Large-scale crop area and type estimate** (ie. crop cover mapping and status assessment)
- Irrigation and irrigation systems management** (ie. energy balance, water productivity and water stress)
- Agriculture productivity assessment** (ie. yield estimation, ground water, precipitation monitoring)
- Rural infrastructure investments planning and monitoring** (ie. transport networks mapping)
- Land Degradation Assessment** (ie. land use, rainfall, soil moisture, precipitation, fAPAR, NDVI indicators)
- Ecosystem services in agriculture sector** (ie. water quality assessment, nitrogen content, land surface properties)
- Environmental Impact Assessment** (ie. landscape level classification and change mapping including fragmentation, and agriculture commodities production impact on deforestation)

Preliminary List of Candidate Regions/Countries

- Africa**
 - East and Southern Africa (ie. Kenya, Tanzania, Uganda, Ethiopia)
 - Sahel and Sahara Belt (ie. Senegal, Mali, Burkina Faso)
 - West Africa (ie. Ghana)
- Latin America**
 - Southern Cone Countries (ie. Uruguay, Paraguay, Northern Provinces of Argentina)
 - Andes and Altiplano (ie. Bolivia, Peru)
- Asia**
 - Southeast Asia (ie. Bangladesh, Cambodia, Vietnam)

Main Development Programs and Initiatives

- IFAD's Adaptation for Smallholder Agriculture Programme (ASAP)
- Great Green Wall Initiative (GGWI) and the Sahel and West Africa Program (SAWAP)
- TenAfrica Program & the Comprehensive African Agricultural Development Programme (CAADP)
- Global Agriculture and Food Security Program (GASFP)
- GEF Programs on Food Security and Sustainable Forest Management
- Other regional and country-level programs to be decided in Phase I

→ EARTH OBSERVATION FOR SUSTAINABLE DEVELOPMENT
A EUROPEAN SPACE AGENCY INITIATIVE

URBAN DEVELOPMENT
Large-scale exploitation of satellite data in support of international development

EO4SD URBAN DEVELOPMENT

Main Partners

- World Bank (WB)
- Asian Development Bank (ADB)
- Inter-American Development Bank (IADB)

Main Thematic Components and EO-Based Information

<p>Primary products</p> <ul style="list-style-type: none"> Urban extent Urban and peri-urban land use/land cover Building footprints, available right-of-way, facade-to-facade space, etc. Building inventories (residential, industrial, commercial, public, etc.) Transport infrastructure inventories Waste site inventories (illegal/legal) Inventories of other important man-made features, evident property boundaries, etc. Extent of informal settlements/slums Type of informal settlements/slums Ecosystem status of urban green areas Inventories of urban green areas (related to surface imperviousness/soil sealing) Population distribution and density (either disaggregated census or building block estimates) 	<p>Secondary products</p> <ul style="list-style-type: none"> Past and present air quality: tropospheric NO₂, SO₂, O₃ Past and present air quality and the effects of long-range transport of smoke, dust and sand: optical depth (aerosol thickness) for PM₁₀, PM₅ and/or PM_{2.5} Past and present urban thermography (Urban Heat Islands and related urban public health effects) Elevation products, building heights, 3D city models Flood history, flood risk, and associated infrastructure exposure Inventories of landslides, landslide/geotechnical risk, and associated infrastructure exposure Past and present urban terrain/infrastructure motion (displacement) due to water extraction, mining, etc. and associated infrastructure exposure.
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The activity will focus on the primary products in terms of coverage and effort (indicatively 80%). The secondary products, can be offered when specific cases require such data, or as general awareness-raising demonstrators with limited coverage. The provision of well-established, off-the-shelf from ESA commercial products (e.g. elevation data) as standalone products will be avoided. Most flood and terrain-monitoring services have high operational maturity and are planned to form the basis of a dedicated EO4SD subproject on Risk Management. Efforts will be made to assist the users with higher-level analytical products using innovative geostatistical methods, addressing (especially for the primary products) e.g. fragmentation, connectivity and access, and environmental impact.

Preliminary List of Candidate Urban Areas

- At least 40 cities
- Emphasis on low-capacity environments (low- and lower-middle-income developing countries)
- Selected megacities and their hinterlands
- Secondary (emerging) cities, generally between approx. 300,000 and 3 million in population, smaller in smaller countries

Main Development Programs and Initiatives

- World Bank Global Urban Growth Data Initiative
- World Bank Resilient Cities Program
- World Bank Low-Carbon, Livable Cities Initiative
- ADB Cities Development Initiative for Asia
- ADB Urban Financing Partnership Facility
- IADB Emerging and Sustainable Cities Initiative (ESCI)
- GEF Sustainable Cities Integrated Approach Pilot: Global Platform for Sustainable Cities (GPSIC)
- Other regional and country-level programs to be decided in Phase I

→ EARTH OBSERVATION FOR SUSTAINABLE DEVELOPMENT
A EUROPEAN SPACE AGENCY INITIATIVE

WATER RESOURCES MANAGEMENT
Large-scale exploitation of satellite data in support of international development

EO4SD WATER RESOURCES MANAGEMENT

Main Partners

- World Bank (WB)
- Asian Development Bank (ADB)
- Inter-American Development Bank (IADB)
- International Fund for Agricultural Development (IFAD)

Main Thematic Components and EO-Based Information

- River basin characterization and change monitoring** (e.g. hydrological network mapping, long-term climate change analysis)
- Water supply and sanitation** (e.g. monitoring of water quality, extent and level of lakes and rivers to support management for agricultural, industrial and urban water use)
- Hydrological management** (e.g. modeling and forecasts of runoff, river discharge and groundwater abstraction)
- Water productivity** (e.g. mapping of biomass production, evapotranspiration and crop type)
- Risk management of natural hydrological hazards** (e.g. mapping and forecasting of flooding, drought, landslides)
- Industrial activity assessment** (e.g. monitoring of freshwater fisheries, aquaculture, hydropower and mining)
- Environmental Impact Assessment** (e.g. design of dams, irrigation impact on wetlands)

Preliminary List of Candidate Regions/Countries

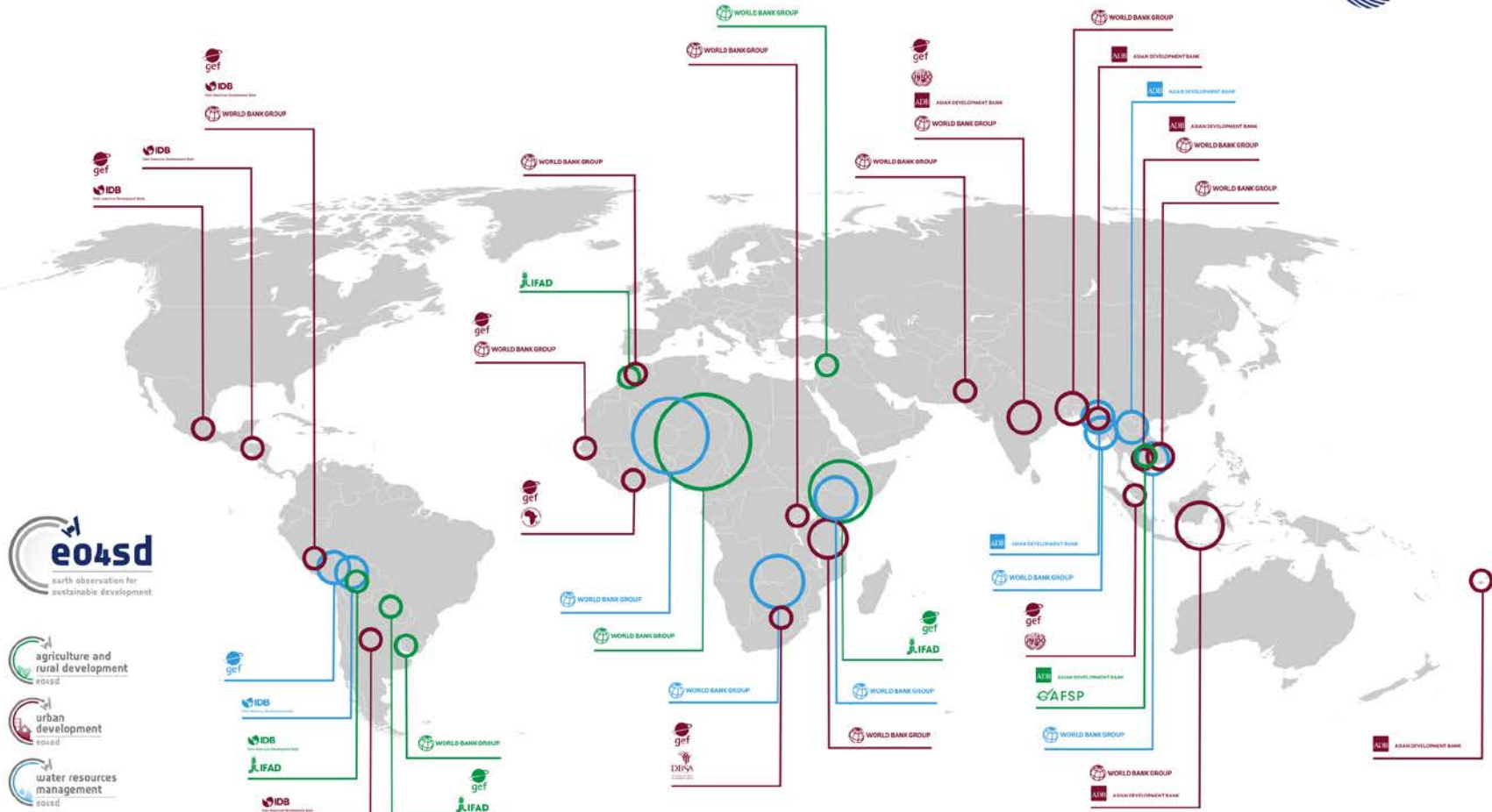
- Africa**
 - East and Southern Africa (e.g. Zambezi basin, Uganda, Kenya, Malawi)
 - West and Northern Africa (e.g. Niger basin, Lake Chad basin)
- Latin America**
 - Andes and Altiplano (e.g. Lake Titicaca basin, Bolivia, Peru)
- Asia**
 - Southeast Asia (e.g. Myanmar, Bangladesh, Lower Mekong region)

Main Development Programs and Initiatives

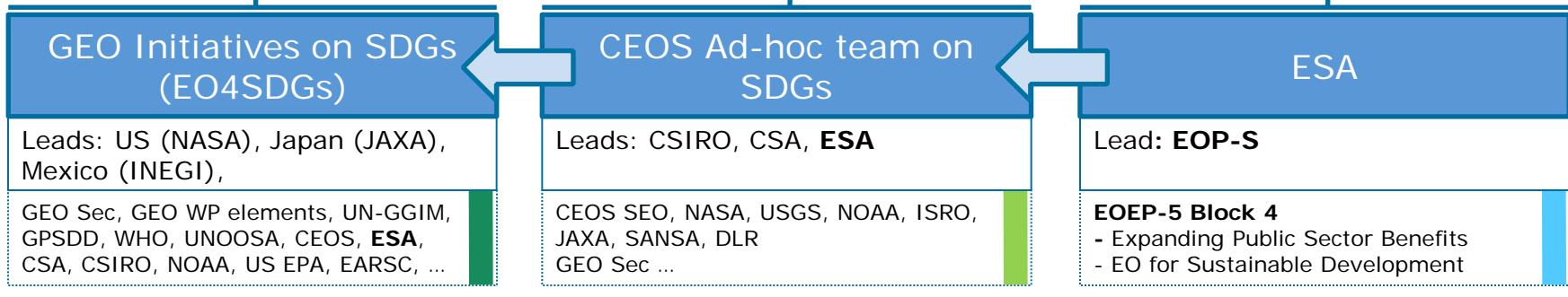
- Water Partnership Program (WPP)
- Cooperation in International Waters in Africa (CIWA)
- Pilot Program for Climate Resilience (PPCR)
- Cooperation Fund for the Water Sector (CFWS)
- GEF Programs on sustainable management of transboundary water systems
- Sahel and West Africa Programme (SAWAP)
- Other regional and country-level programs to be decided in Phase I



→ EARTH OBSERVATION FOR SUSTAINABLE DEVELOPMENT



ESA EO engagement in the SDG's



UN Statistical Division

BETTER DATA
BETTER LIVES

unstats.un.org

@UNStats

IAEG-SDGs

Inter-agency Expert Group on SDG Indicators

WG on Geo-spatial Information (WGGI)

UN
Custodian
Agencies

UN Habitat | UNCCD | UNEP

**National
Statistical
Offices**



EO Relevance for the SDG's

Earth Observations potential contribution to the SDG Targets and Indicators



SDGs with most opportunities for Copernicus data and services

Analysis performed by the GEO EO4SDGs initiative

Target		Goal	Indicator	
<i>Contribute to progress on the Target yet not the Indicator per se</i>			<i>Direct measure or indirect support</i>	
	1.5	1		
2.3	2.4	2.c	2.1	
3.3	3.4	3.d	3.1	
		4		
		5	5.1	
6.3	6.4	6.5	6.6	6.a 6.b
7.2	7.3	7.a 7.b	7.1	
		8.4		
9.1	9.4	9.5	9.a	
11.3	11.4	11.5	11.6	11.7 11.b 11.c
	12.2	12.a 12.b		
	13.1	13.3	13.b	13.1.1
14.1	14.2	14.3	14.4	14.6 14.7 14.a
15.1	15.2	15.3	15.4	15.5 15.7 15.8 15.9
	17.6	17.7	17.9	17.16 17.17

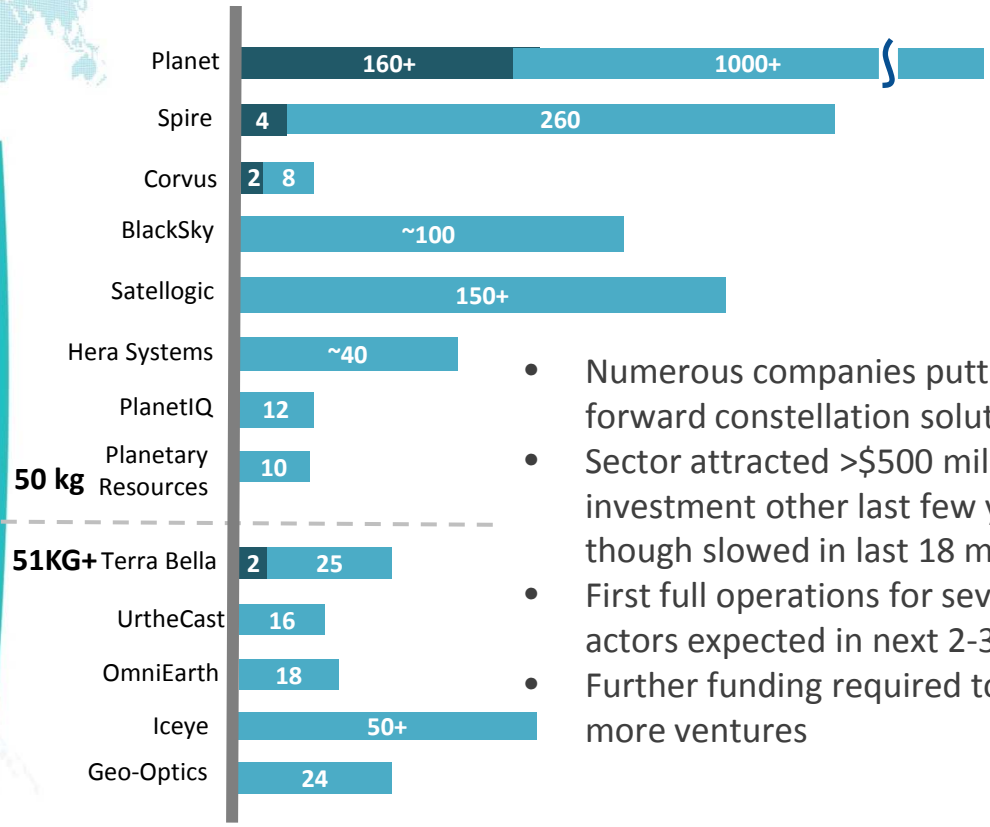


Support ESA/EC, its Member States and the European EO community
to play a leading role
in the full realisation of Earth Observations in the 2030 agenda for SD

- Analyse in depth the **Metadata Repository** of all SDG indicators (169 targets, 230 indicators) and assess the **current and potential contribution of EO/Copernicus** to the SDG Global Indicator Framework.
- Review the **Tier 2 and 3 monitoring/reporting guidelines** produced by the custodian agencies for a number of key SDG indicators and propose areas of EO improvements.
- Perform a **country demonstration**, by partnering with the NSO and the relevant national governmental authorities (for the indicators selected) to support implementation of a number of SDG indicators (**at least two**)
- Study how the **EC/ESA/MS developed platforms (DIAS) and big data initiatives (DataCube)** can serve the EO data and information needs of the large community of SDG stakeholders (UN-GGIM, Custodian Agencies, National Statistical Offices, etc.).

400 KEUR, 18 months, Starting 2018 Q1

2017 : The Advent of SmallSAT Constellations

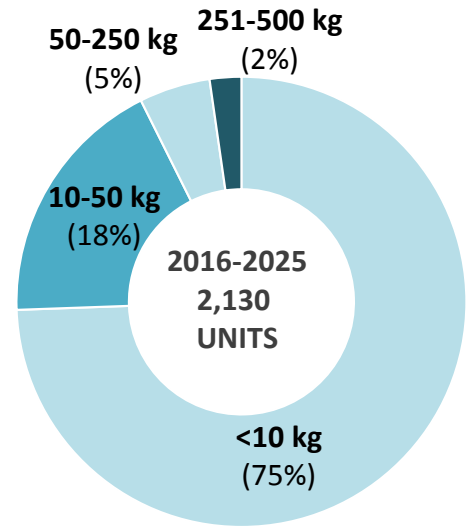


50 kg

51KG+

- Numerous companies putting forward constellation solutions
- Sector attracted >\$500 million in investment other last few years, though slowed in last 18 months
- First full operations for several actors expected in next 2-3 years
- Further funding required to support more ventures

EO SMALLSATS TO BE LAUNCHED BY MASS



Launched* To Be Launched (2016-2025)

* As of April 2016

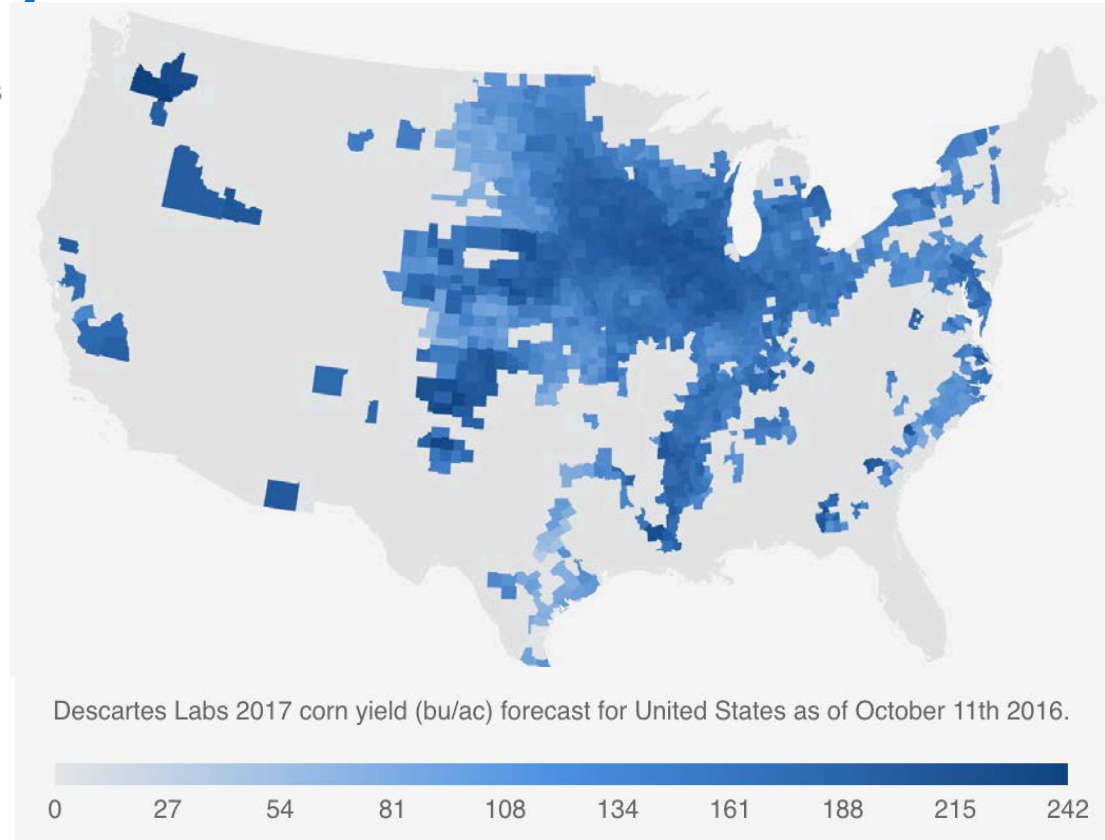
Big Data + Machine learning -> *Transforming Data Analytics*



Fully automated (weekly) end of year forecasts for every **Soy** and **Corn** producing state/county in the USA.

Unprecedented accuracy, assimilating 5 TB satellite imagery per day.

Available months ahead of USDA final January production report.



Take-Home Messages.....

- Official Development Assistance (ODA) is a sector of huge (and long-term) economic activity with increasing attention on **environmental sustainability (green growth) and climate change (resilience, proofing)** of the (mainly large infrastructure) projects undertaken in developing countries,
- Europe has **world-leading capabilities in Earth Observation** (both ESA and national EO missions) and a highly skilled and experienced EO information services industry,
- Earth Observation can deliver **key environmental information that supports** the definition, planning, implementation, monitoring and assessment of major projects happening in developing countries, ESA focus to date has been on IFIs,
- ESA is **engaged in the SDG's mostly through GEO and CEOS** and on a case by case directly with the UN specialised agencies and countries (NSOs and ministries),
- ESA could begin to look at European-level needs of National Aid Agencies, if there is interest to develop this.





Earth Observation for a Transforming Asia Pacific

A portfolio of twelve EO projects supporting Asian Development Bank activities 2014–2016
<http://esamultimedia.esa.int/multimedia/publications/EOTAP/>



**Earth Observation for Sustainable Development –
ESA-World Bank Partnership Report September 2016**

Report describing ESA's newest batch of EO support projects in partnership with the World Bank 2013–2015.
http://esamultimedia.esa.int/multimedia/publications/ESA_WB_Partnership_Report_2016/



**Earth Observation Support for the International Fund For Agricultural Development –
Final Report August 2014**

Report describing an EO support projects in partnership with UN-IFAD.
<http://esamultimedia.esa.int/multimedia/publications/IFAD/>



**Earth Observation for Sustainable Development –
ESA-World Bank Partnership Report June 2013**

Summary report of the first batch of projects in cooperation with the World Bank.
http://esamultimedia.esa.int/multimedia/publications/ESA_WB_Partnership_Report_2013_complete/



**Earth Observation Information Services for European Investment Bank Projects –
Progress Report September 2012**

Summary report of projects in cooperation with the European Investment Bank.
http://www.vae.esa.int/files/EOeuropa_progressReport.pdf



Thank You !

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For further information.