

Legal regimes for space data

ESA Labs – Space Data Management Workshop

8 May 2023
Venice, Italy

Dr. Marco Ferrazzani
ESA Senior Legal Counsel

General classification of space data (I)

- Data produced by space probes, satellites and their instruments launched into outer space.
- All data are **received, processed** and **distributed** on Earth
- Data can be collected through **electronic transmissions** or stored in various **storage** devices, with increasing trend to store on **remote cloud** services

General classification of space data (II)

- Information \neq data
- **Data**: raw, unanalysed facts, observations or statistics
 - Meaningless without analysis or interpretation
- **Information analysis**: derived from data through qualitative or quantitative processes
- **Enhanced** data – through analysis – becomes **“analysed” information**, depending on the **levels** of data processing under UN Principles
- Data as a **service**
- Information as a **service**

The four stages of the data value chain

1. Data Generation

Raw data generated from primary systems

2. Data Storage

Raw data stored and combined with other sources

3. Data Analytics

Analytic methods applied to data

4. Data Exploitation

Output is refined, formatted and converted to a useful product

Typologies of space data

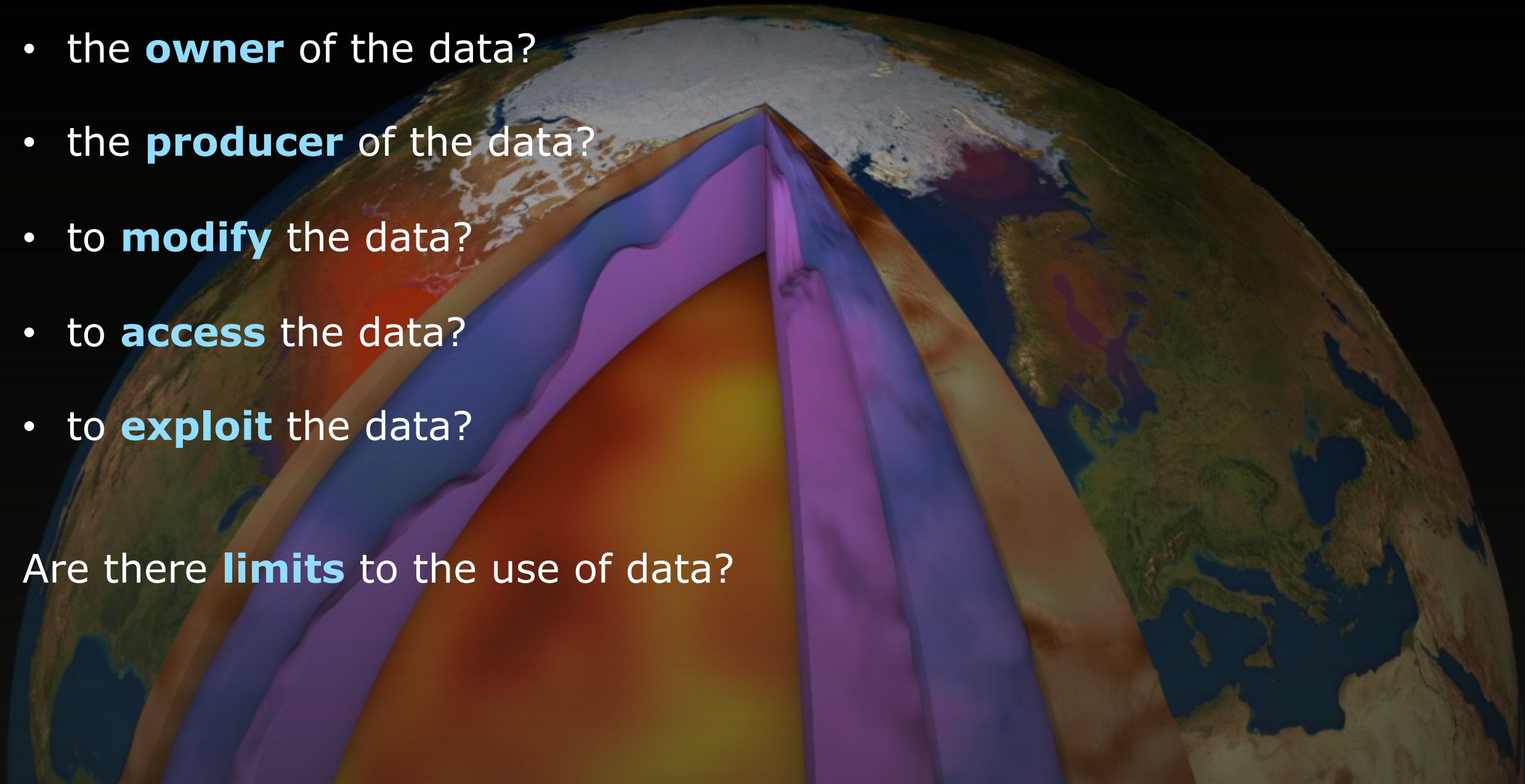
- **Earth observation data**
- **Payload** data from **scientific** missions observing the Universe
- Data produced by human **exploration** missions: ISS or the Moon
- Geolocation data for Earth **navigation** PNT (Galileo, GPS, ...)
- **Meteorological** data (Meteosat, ...)
- **Climate** change data

UN ECOSOC 2015: Big data as “new, renewable natural resource”

Who is..

- the **owner** of the data?
- the **producer** of the data?
- to **modify** the data?
- to **access** the data?
- to **exploit** the data?

Are there **limits** to the use of data?



The rules of the game

- **No** universal rules for data access and usage
- Division of data per
 - **Sector:** space weather, disaster management, geopositioning
 - **Operator:** space agencies, private companies, governments
- Contracts between operators and final users: diverse licensing schemes
- UN Principles and Resolutions:
 - **Remote Sensing Principles** 1986 (UNGA Resolution 41/65)

Remote sensing data for sustainable development

- UNGA Resolution 41/65: **Remote Sensing Principles**
 - Principle II: For the benefit and in the interests of all countries
 - Principle X: Protection of Earth's **environment**
 - Principle XI: Protection from **natural disasters**
 - Principle XII: **Access** to information “on a non-discriminatory basis and on reasonable cost terms”
- Underlying principles of **cooperation** and **due regard** contained within the Outer Space Treaty

Pyramid of Space Law

UN Level

UN Charter

5 Treaties
+ UN principles

International Institutions:
UN, ITU, ESA, COSPAR

Programme Agreements:
ISS IGA, SARSAT, EUMETSAT,
Lunar Gateway, Artemis Accords

National laws on space activities:
Liability, National agencies, licensing,
registration, technical regulations

Spacefaring Nations

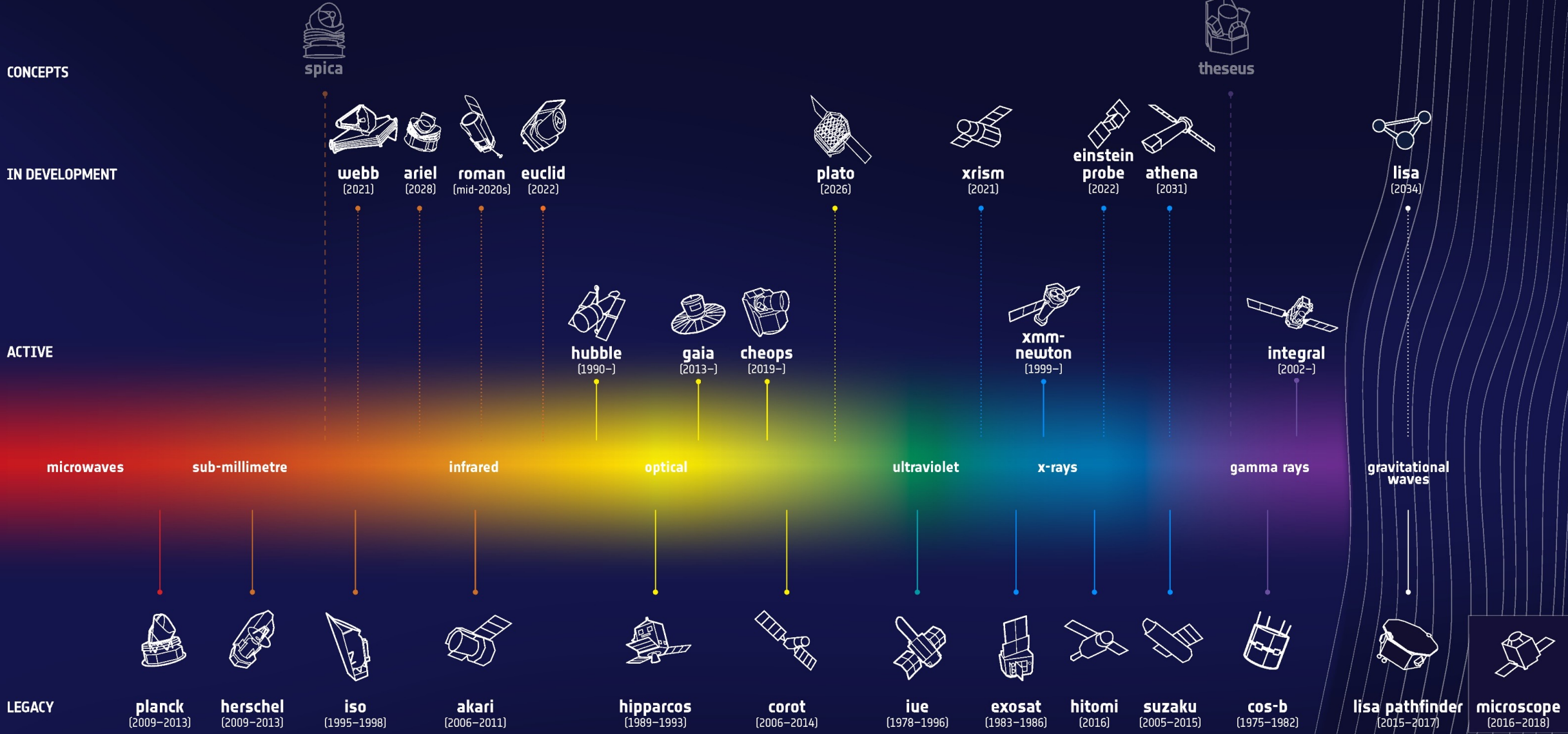
National Jurisdiction

Public procurement, Export control, Technical
compliance, Public Private Partnerships, Intellectual
Property Rights, space assets guarantees, Industrial
contracts

Examples of different missions



→ COSMIC OBSERVERS



Examples of space science missions

MISSION

SCIENCE & EXPLORATION

juice: jupiter icy moons explorer

MISSION

SCIENCE & EXPLORATION

euclid: exploring the dark universe

MISSION

SCIENCE & EXPLORATION

webb: seeing farther

MISSION

SCIENCE & EXPLORATION

solar orbiter: facing the sun

MISSION

SCIENCE & EXPLORATION

cheops: characterising exoplanets

MISSION

SCIENCE & EXPLORATION

bepicolombo: investigating mercury's mysteries

MISSION

SCIENCE & EXPLORATION

exomars: europe's new era of mars exploration

MISSION

SCIENCE & EXPLORATION

gaia: surveying a billion stars

- Designed to promote access to Information, Data and IPR resulting from Agency activities
- Taking into account the provisions of the ESA Convention and interests of ESA Member States
- Chapter III – Raw, calibrated, analysed and other data resulting from payloads flown in the framework of an Agency programme including third parties' flight opportunities

Available here: <https://esamultimedia.esa.int/docs/LEX-L/Contracts/ESA-REG-008-EN.pdf>

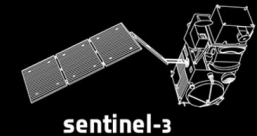
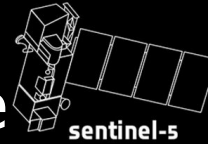
Copernicus Programme

- ERS-1, Envisat, SPOT Image → specific
- **EU-ESA** Earth observation programme
 - EU, ESA, EUMETSAT, JRC, EMSA, ...

→ Sentinel Series

- **Acquisition** and **distribution** of big-data
- EU Regulation No 377/2014:
Copernicus as the milestone of a decade-long trend towards providing **full free open access to data**
- Copernicus expansion missions

Terms and Conditions



Meteosat **essential** data collected by EUMETSAT:

- Hourly Meteosat data
- Derived products
- Advance image products

Meteosat **essential** data are **freely available to all users**

- World Meteorological Organisation (WMO) Resolution 40 (Cg-XII)

EUMETSAT – Non-essential (“licensed”) data



Meteosat **non-essential** data collected by EUMETSAT:

- For National Meteorological Services (**NMS**) of Member States:
free of charge for **official use and duties**
responsible for further licensing subject to fees and conditions
- Outside of Member States:
Licensing agreement subject to conditions – cost

EUMETSAT data policy

Accessible here : <https://www.eumetsat.int/data-policy/eumetsat-data-policy.pdf>

Commercial operators

- Increased number of commercial operators
 - Airbus, Maxar, ICEYE, Planet, ...
- Increased number of data **collected** and **disseminated**
 - Rapid development of technology
- Amount of data **received from** and **sent to** space is expected to **grow** to more than 500 exabytes from 2020 to 2030 (**14x increase**)
- Open access to data vs commercial purposes of data

National governmental systems of remote sensing data

- United States
- Canada
- Germany
- Japan
- China



US Distribution System for Earth Remote Sensing Data

Public scientific research missions for data distribution

- LANDSAT Programme
- EOS Programme

Remote sensing data providers

- NASA
- NOAA (National Oceanic and Atmospheric Administration)
- EOSAT (Earth Observation Satellite Company)

Quasi-commercialisation of EOSAT

US Distribution System for Earth Remote Sensing Data

- Land Remote Sensing Policy Act 1992 → Return to the public sector
 - Supplemented by Regulations
 - 2020: US Department of Commerce – Licensing of Private Remote Sensing Space Systems
- **General public interest** justifies the access to those data at minimal cost
- Investment made by taxpayer's money
 - Profits accrue to the public

Canadian Commercial Distribution System for Earth Observation Satellite Data



- RADARSAT Programme of Canadian Space Agency
 - RADARSAT-1, RADARSAT-2, RADARSAT "Constellation" (2019)
- RADARSAT International (RSI) – now Maxar
 - Worldwide consortium of multiple private sector companies
 - Data provider
 - Information provider
- Multiple processors of data (for instance Canadian Ice Service CIS)

Japanese Distribution System for Earth Observation Satellite Data

Multiple earth observation satellites

- MOS, JERS, ADEOS
- JAXA data policy for **research** purposes
 - Free of charge/marginal costs of reproduction
- Distinction between data with **low** or **middle** resolution and data with **high** resolution

Chinese Distribution System for Earth Observation Satellite Data

	A13-1 Operator	A13-2 Operator	A23-1 Operator
Clients	A13-1 operators can offer mobile-satellite service directly to customers.	A13-2 operators can offer fixed-satellite service directly to customers.	A23-1 operators can offer satellite transponder resources to A13-1 operators or A13-2 operators.
Service Mode	A13-1 operators can use their satellite networks to provide mobile-satellite service or use other operators' satellite networks.	A13-2 operators can use their satellite networks to provide fixed-satellite service or use other operators' satellite networks.	A23-1 operators can use their satellite networks to provide transponder rental and sale service or use other operators' satellite networks.
Service area	A13-2 operators can provide international MOBILE-SATELLITE SERVICE.	A13-2 operators can provide satellite-based international private line service.	The service area of the A23-1 Operator is restricted to China's territory.

- Meteorological satellites in LEO and GEO
- Remote sensing for
 - Marine safety
 - Disaster monitoring
 - Environmental monitoring

Chinese Distribution System for Earth Observation Satellite Data

Table 2. Compliance guideline for A13-1 Operators

Service Mode	Necessary Operating Licenses	Legal Basis for License for the use of radio frequencies	Radio station license	Launching License
Provide MOBILE-SATELLITE SERVICE with domestic satellites set up by a domestic satellite network data	A13-1 license License for the use of radio frequencies TA	Article 23 of Regulation of the People's Republic of China	Space station license is necessary	If launching satellites in China, Launching License is necessary
Provide MOBILE-SATELLITE SERVICE with domestic satellites set up by a foreign satellite network data			If TT&C at China, Earth station radio license is necessary	
		Article 24 of Regulation of the People's Republic of China	Space station license is necessary	If launching satellites in China, Launching License is necessary
			If TT&C at China, Earth station radio license is necessary	

- Different rules for operators
- Use of most data requires a license

Provide MOBILE-SATELLITE SERVICE with foreign satellites	Article 24 of Regulation of the People's Republic of China	If TT&C at China, Earth station radio license is necessary	If launching satellites in China, Launching License with a permit for launching service contract is necessary
--	--	--	---

German Act on Remote Sensing & Data Security

2007: Act to give Protection against the Security Risk to the Federal Republic of Germany by the Dissemination of High-Grade Earth Remote Sensing Data

- **Operation** of high-grade earth remote sensing systems
- **Handling** of data generated by a high-grade earth remote sensing system... until the moment of their dissemination
- Operator **license requirements** in the law
- Obligations for the operators to provide notification, information,...

Applying copyright to a space remote sensing image?

1988: ESA sues a private company using a Meteosat **satellite image** for commercial advertisement **without** making **reference** to ESA's copyright.

- ESA claims copyright of the image
- Private company claims image was not taken by ESA

1989: *Landesgerichtshof Berlin* rules impossibility to apply intellectual property law in the field of satellite observation data

→ lack of “**sufficient personal intellectuality**” of the image

Collaboration efforts

- Joint ESA, NASA and JAXA “**Earth Observation Dashboard**”
- Open source platform using Earth Observation data for documenting worldwide changes to society and environment
- Atmosphere, oceans, biomass, cryosphere, agriculture, and the economy

ESA UNCLASSIFIED - For Official Use



Fragmentation and contrasts? (I)

- Several legal regimes for systems producing large amount of data that are **not homogenous**
- More **actors**, more **data**, distinct **models**
 - Models are distinct due to difference in **funding** and **mandates**
- **Private** operators (NewSpace) vs **governmental** operators
- Data technology and NewSpace accelerate the amount of data produced

Fragmentation and contrasts? (II)

- Access to data **without** a license or fee?
 - US Landsat: 40 years of data free for use, over 3 million images
 - Copernicus: largest source of geoinformation in the world
- Space situational awareness (SSA) data sold as a service
 - Look up Space, COM SPOC, LEO Lab,...
 - **Liability** considerations?
- Satellite images for **disaster management** or **humanitarian aid**
 - Risk of misinterpretation?
 - Liability considerations

Open questions for you

- Could there be an “**ideal uniform**” system for data usage?
- If **not**, would **harmonisation** be better than identifying only one “**ideal uniform**” regime?
- What is more relevant: data or **exploitation** of the data?
- Should data be used for increased **sustainable** development?

Bibliography

Selected works:

Ulrike Bohlmann and Alexander Soucek, From “shutter control” to “big data”: trends in the legal treatment of earth observation data, in Satellite-based earth observation. Trends and challenges for economy and society, 2018

Martha Mejía Kaiser, The 1989 Berlin court decision on copyright to a space remote sensing image, 2004

Huxiao Yang, A compliance guide for satellite network operators who plan to conduct business in China, 2020

Maria Elena de Maestri, Big data flow from space to the EU: open access and open dissemination policy vs. the common European data space, 2018

Brendan Cohen, Remote sensing and the new European general data protection regulation

Further information to be found in the full bibliography by clicking here:

<https://www.lyyti.fi/att/c2245967422b94/5e6c6408621faç88245b13588a321ff1238af8d95a8dca0b>