Legal regimes for space data

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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 quantative 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
Examples of different missions
Examples of space science missions

- Juice: Jupiter icy moons explorer
- Euclid: Exploring the dark universe
- Webb: Seeing farther
- Solar Orbiter: Facing the sun
- Cheops: Characterising exoplanets
- Bepicolombo: Investigating Mercury's mysteries
- Exomars: Europe's new era of Mars exploration
- Gaia: Surveying a billion stars
ESA Rules on Information, Data and IPR

• 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 Terms and Conditions**

- **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**
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
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

  - Supplemented by Regulations

- **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

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

- 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

<table>
<thead>
<tr>
<th>Service Mode</th>
<th>Necessary Operating Licenses</th>
<th>Legal Basis for License for the use of radio frequencies</th>
<th>Radio station license</th>
<th>Launching License</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide MOBILE-SATELLITE SERVICE with domestic satellites set up by a domestic satellite network data</td>
<td>A13-1 license</td>
<td>Article 24 of Regulation of the People's Republic of China</td>
<td>Space station license is necessary</td>
<td>If launching satellites in China, Launching License is necessary</td>
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<tr>
<td>Provide MOBILE-SATELLITE SERVICE with domestic satellites set up by a foreign satellite network data</td>
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</tr>
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- Different rules for operators
- Use of most data requires a license
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
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

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Further information to be found in the full bibliography by clicking here: https://www.lyyti.fi/att/c2245967422b94/5e6c6408621fac88245b13588a321ff1238af8d95a8dca0b