# Role of space technology applications for disaster risk reduction & climate change

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# Climate Change & Risk Reduction

- Disaster Risk Reduction and Climate Change Adaptation are closely linked in reducing risks and vulnerabilities to climate-related hazards.

Sendai Framework
for Disaster Risk Reduction
2015 - 2030

⇔

United Nations
Framework Convention on
Climate Change

- Earth Observation (EO) technologies are key in providing reliable information and substantial contributions at global, regional, national and local level.

Global Exposure Mapping

Vulnerability & Multi-Risk Assessment

Disaster Mitigation & Emergency Response

Monitoring & Crisis Indicators

Early Warning Systems


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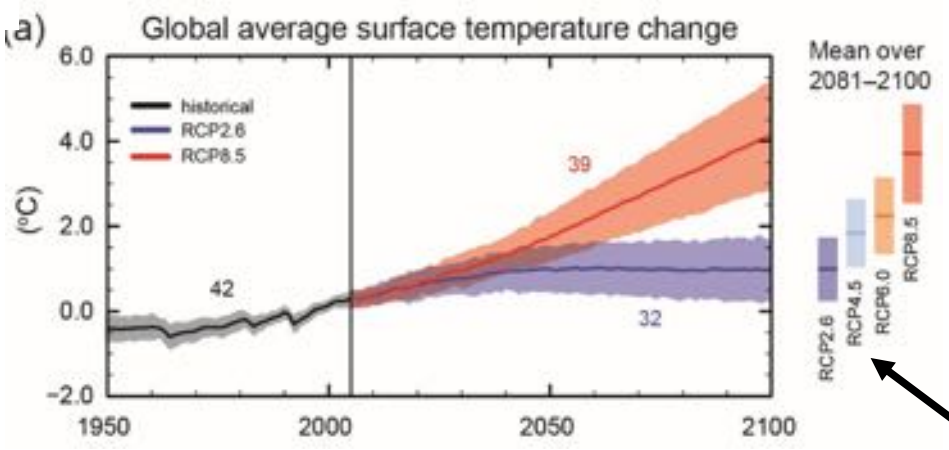
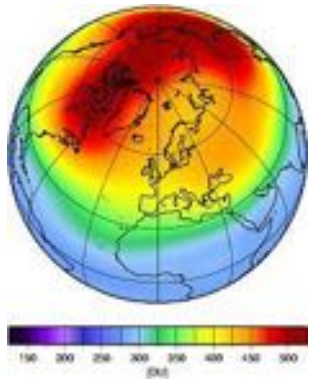
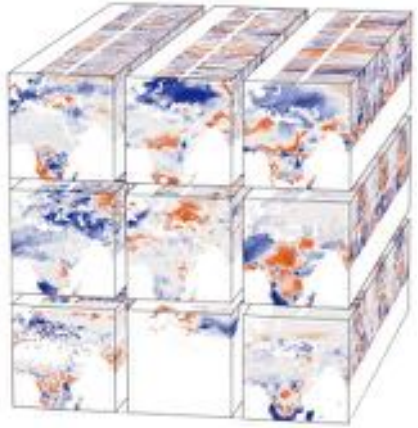
# Climate Informatics & Modeling for Disaster Risk Reduction



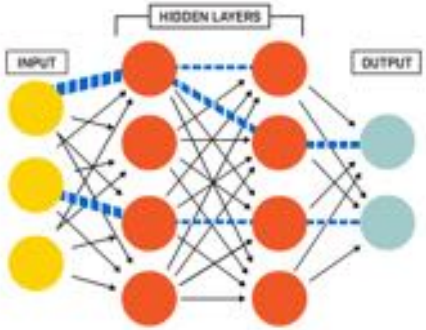

- Climate informatics utilizes machine learning on big climate data to better understand and predict the climate system
- Earth system and climate modeling simulates all relevant aspects of the Earth system, including physical, chemical and biological processes.



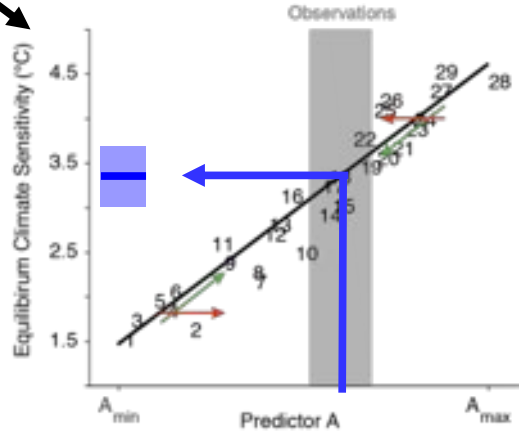
***Big Data***



***Machine Learning & Statistics***




***Constraining Climate Sensitivity***







***Science, technology and innovation are essential for sustainable development.***








# Facing Extremes – DLR Disaster Mitigation Support

**International Charter on Space and Major Disasters**, Call 598

**Forest Fires in Chile**
27. January, 2017

Source: DLR-DFD-ZKI, RapidEye image,

ZKI·DE

**ZKI Center for Satellite Based Crisis Information Center**

**International Charter on Space and Major Disasters**, Call 602

**Floods in Peru**
01. April, 2017

Source: DLR, RapidEye image

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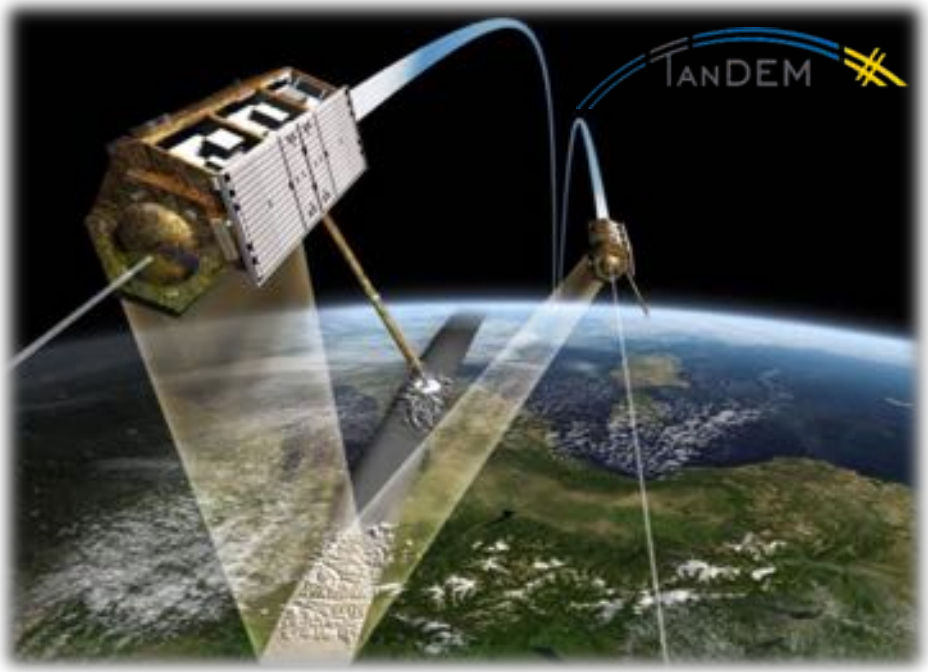
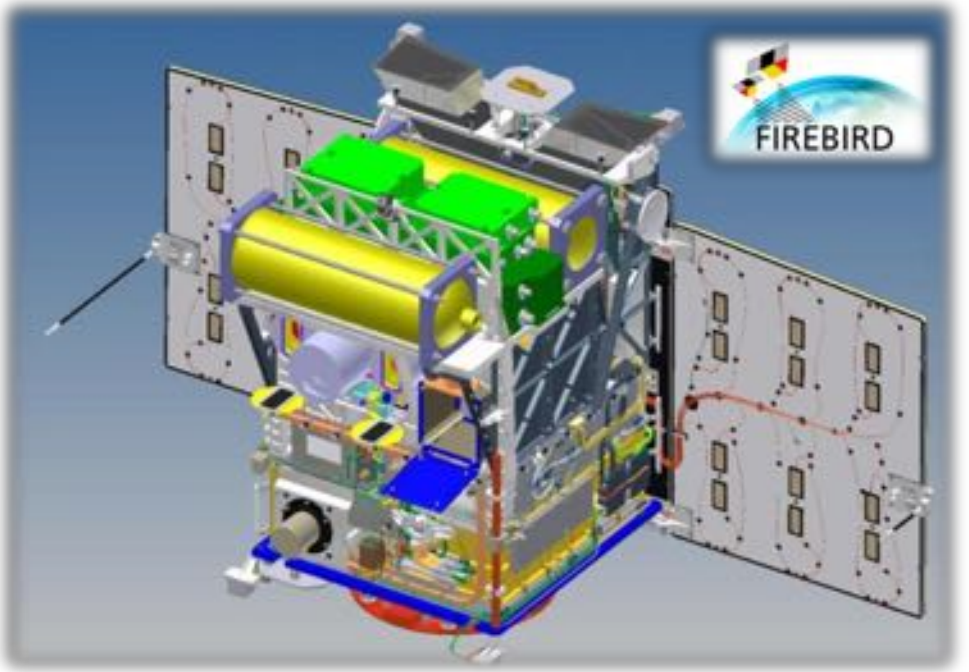
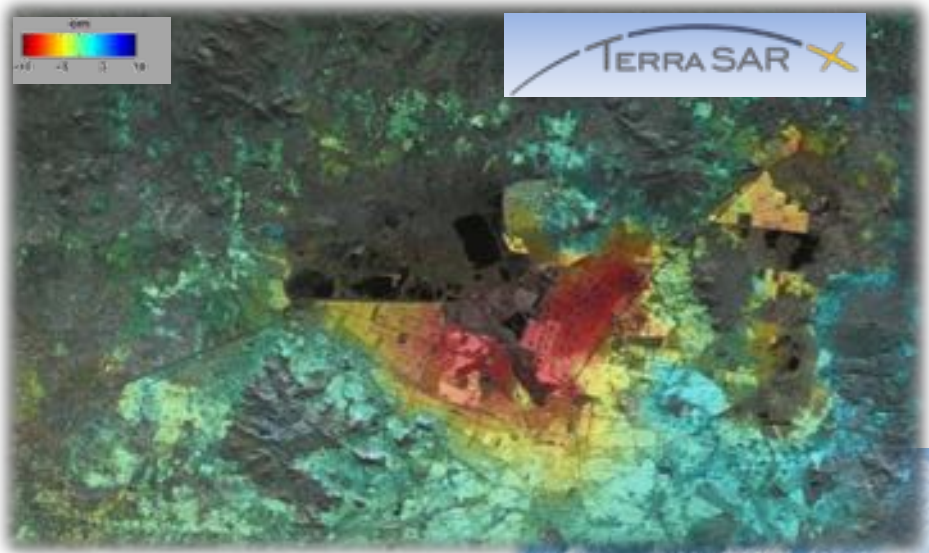
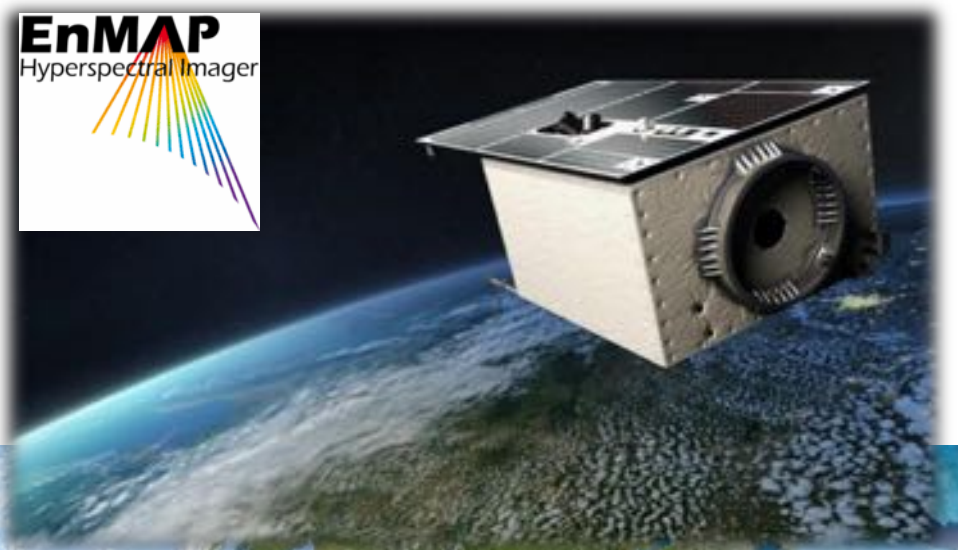
# DLR Earth Observation Satellite Technologies



# Tandem-L

# Monitoring of Dynamic Processes on the Earth Surface

## Biosphere

- Deforestation, Degradation, Fires* (REDD)
- Forest Biomasse Change*
- Biodiversity
- ...

## Geosphere

- Earthquakes
- Volcanic Activities
- Land Slides
- ...

## Cryosphere

- Sea Ice Extent*
- Permafrost*
- Glacier & Ice Cap Dynamics*
- ...

## Hydrosphere

- Soil Moisture*
- Flooding
- Ocean Currents*
- ...

*) Essential Climate Variables

Days | Weeks | Months | Years → **Observation Interval**

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# The International Space Station for Earth Observation

***Global Advantages:***

- Near global coverage (95% of the world population)
- Low orbit gives opportunity for higher spatial resolution
- Excellent potential concerning power & data transmission
- Possibility of refurbishment on sub-decadal timescale
- Easy access with human assistance
- Relatively cheap in comparison to satellites

***Practical Advantages :***

- Coverage is good if you don't need to see the North or South Pole
- Low orbit gives opportunity for higher spatial resolution
- Potential for up to 34 instruments
- Power & data rate not a real problem
- Mass is a problem as it has to get to the ISS
- Possibility of refurbishment on sub-decadal timescale


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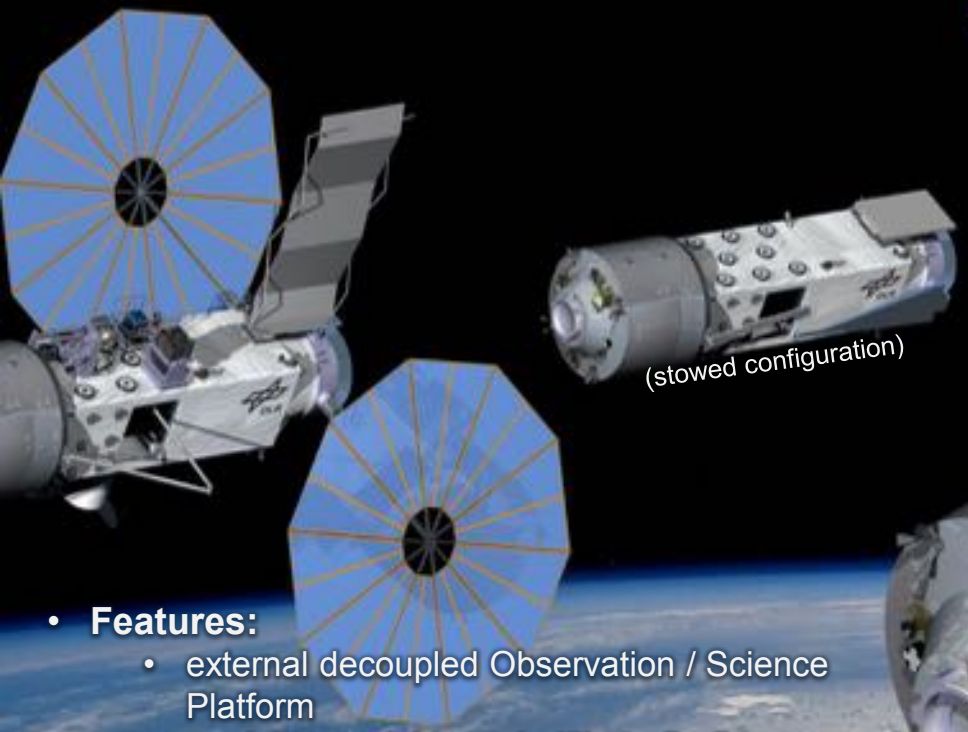
Modular Orbital-Hub
DLR Vision 2025
European Initiative

# Orbital-Hub Free-Flyer

- **Spacecraft:**
  - launch mass: 18.7 t (w/o payload)
  - propulsion: hybrid (chemical / electrical)
  - diameter: 4.5 m
  - length: 15.4 m
  - power: 20 kW average




- **Features:**
  - external decoupled Observation / Science Platform
  - modular, scalable and attitude-flexible concept
  - crew operation while docked at O-Hub / capsule / ISS
  - transport by single A64-Launch
  - feasible cost
  - to be realised within ~8 years

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# Thank You
# …and Save the Date!!!

## DLR / UNOOSA Climate Change Conference

http://www.dlr.de/ccc2018