

# AUSTRIA IN SPACE

COPUOS Scientific and Technical Subcommittee  
55<sup>th</sup> Session

*29 January 2018*



## Space as an integral part of Austria's national innovation system

- *Political Value:* international cooperation and contribution to a European strategic interest ("infrastructure of the 21<sup>st</sup> century")
- *Scientific and Technical Value:* competence in a high tech sector and international visibility
- *Economic Value:* industrial competitiveness, opportunities for SMEs, employment growth
- *Humanitarian Value:* benefit for the society
- *Educational Value:* inspiring young generations and attracting best talents

# AUSTRIAN SPACE ACTIVITIES: 3 PILLARS



Austrian Space Applications Programme

- annual calls
- 16 years ASAP



ESA

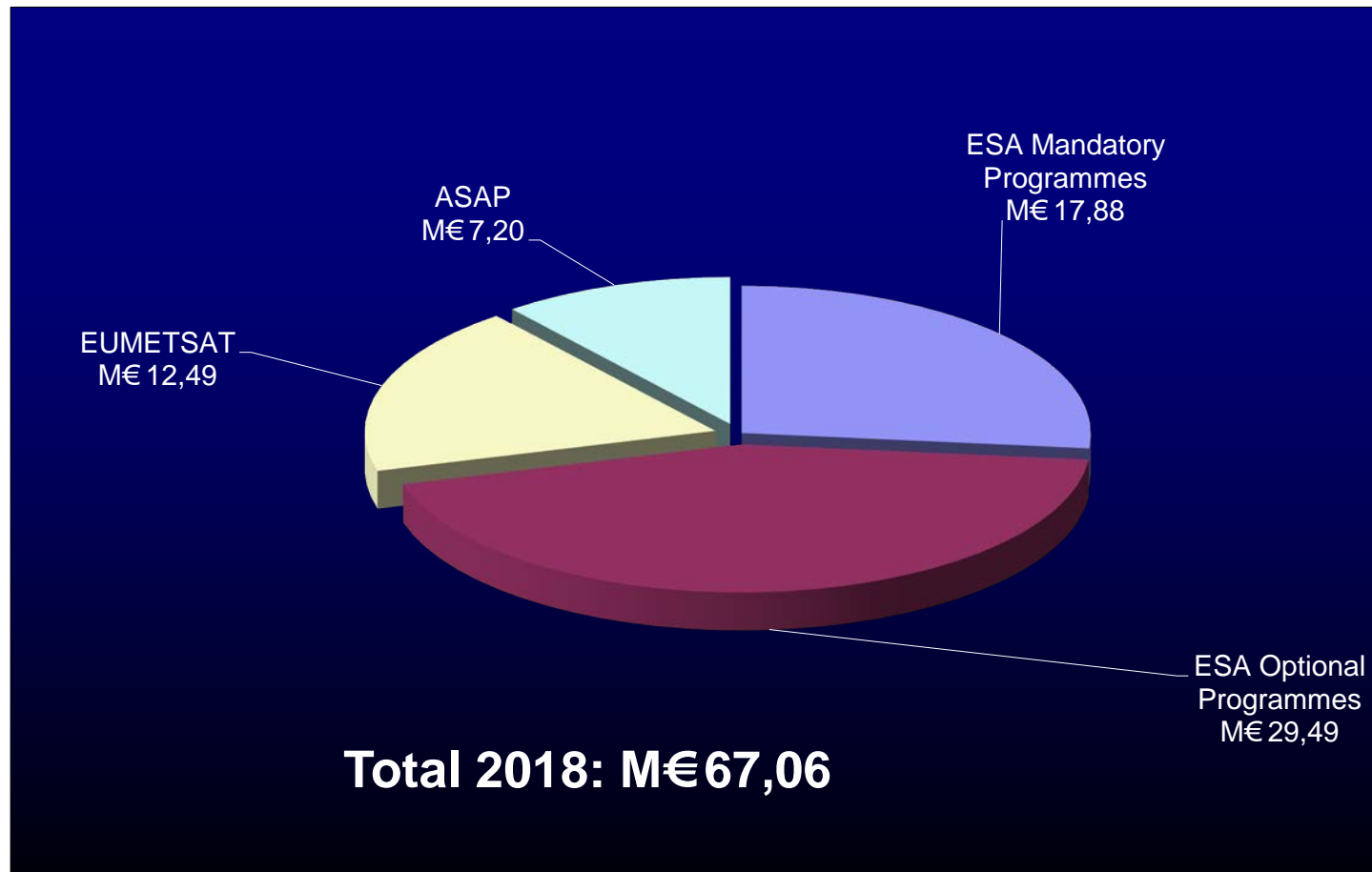
- Optional Programmes
- Mandatory Programme



EU


- COPERNICUS
- GALILEO
- Space Surveillance and Tracking

## AUSTRIAN SPACE BUDGET 2018



# ESA's Backbone: Science Instruments, Multi-Layer Insulation, Satellite Structures and Mechanisms, Electrical Ground Support Equipment



**→ ESA'S FLEET ACROSS THE SPECTRUM** 

Thanks to cutting edge technology, astronomy is unveiling a new world around us. With ESA's fleet of spacecraft, we can explore the full spectrum of light and probe the fundamental physics that underlies our entire Universe. From cool and dusty star formation revealed only at infrared wavelengths, to hot and violent high-energy phenomena, ESA missions are charting our cosmos and even looking back to the dawn of time to discover more about our place in space.

**planck** MLI  
Looking back at the dawn of time

**herschel** MLI  
Unveiling the cool and dusty Universe

**just** MLI  
Observing the first light

**cheops** MLI  
Sizing and first characterisation of exoplanets

**gaia** MLI  
Surveying a billion stars

**euclid** EGSE  
Exploring the dark Universe

**hst** MLI  
Expanding the frontiers of the visible Universe

**xmm-newton** MLI  
Seeing deeply into the hot and violent Universe

**lisa pathfinder** MLI  
Testing the technology for gravitational wave detection

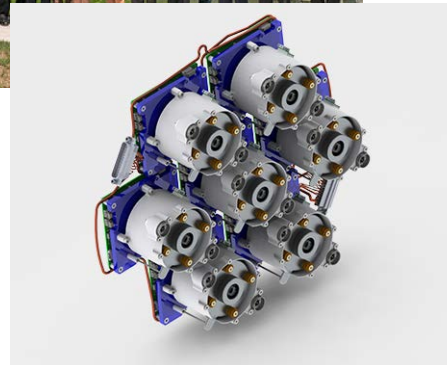
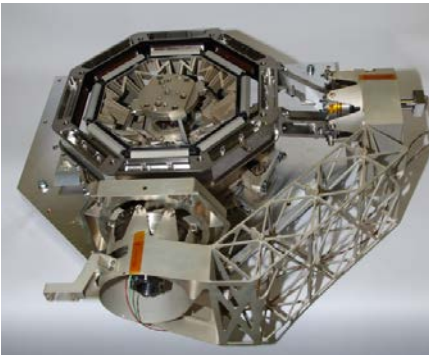
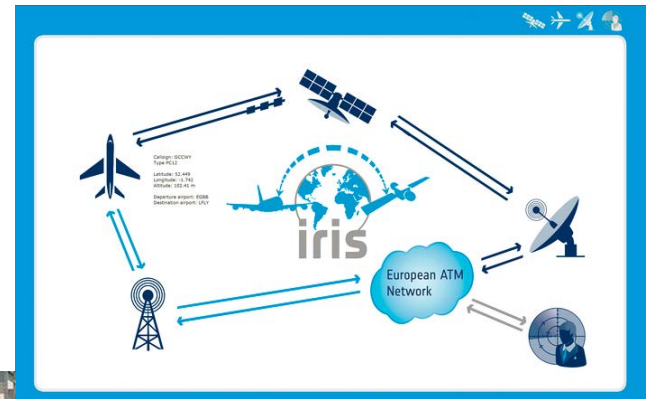
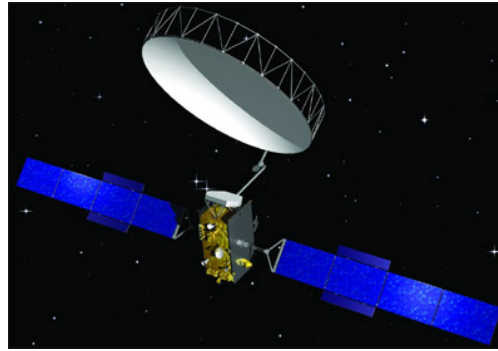
**integral** MLI  
Seeking out the extremes of the Universe

**microwaves** **sub-millimetre** **infrared** **optical** **ultraviolet** **x-rays** **gamma rays**

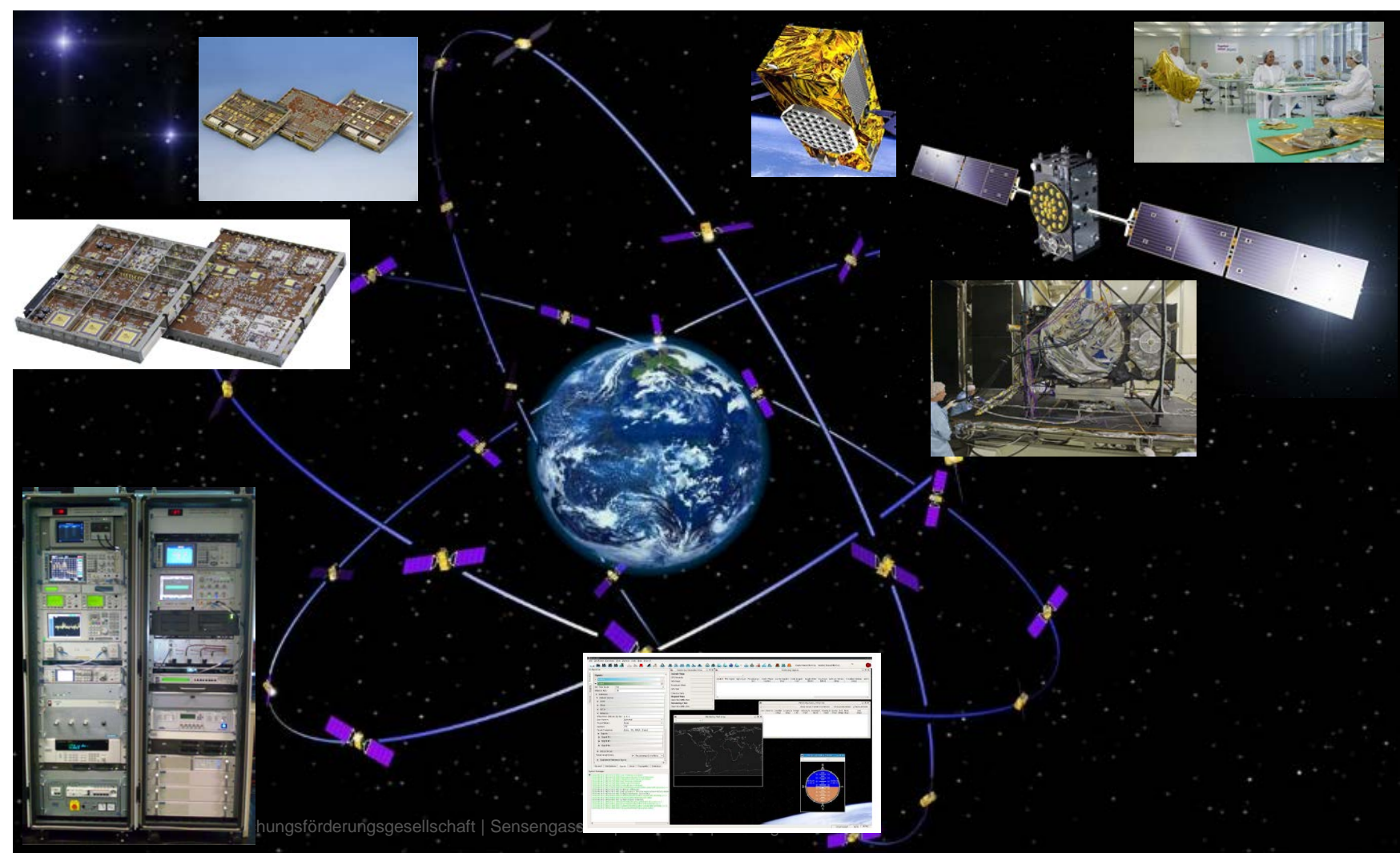
www.esa.int European Space Agency

# Technology - Telecommunications

Material Testing (ALM), Radiation Hardening, Components for Ariane (Feedlines), Microthrusters, Electric Propulsion Pointing Mechanisms, Quantum Technology for Space, Satcom for Air Traffic Management



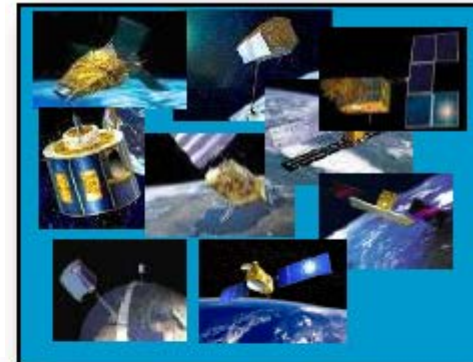
# European Space Infrastructure (1) GALILEO Thermal Insulation, EGSE, CPU Interface Electronics



# European Space Infrastructure (2) Copernicus POD GPS/GNSS Receivers, MLI, On-Board Computer, EGSE



Sentinels



Contributing missions

Services



...added-value products

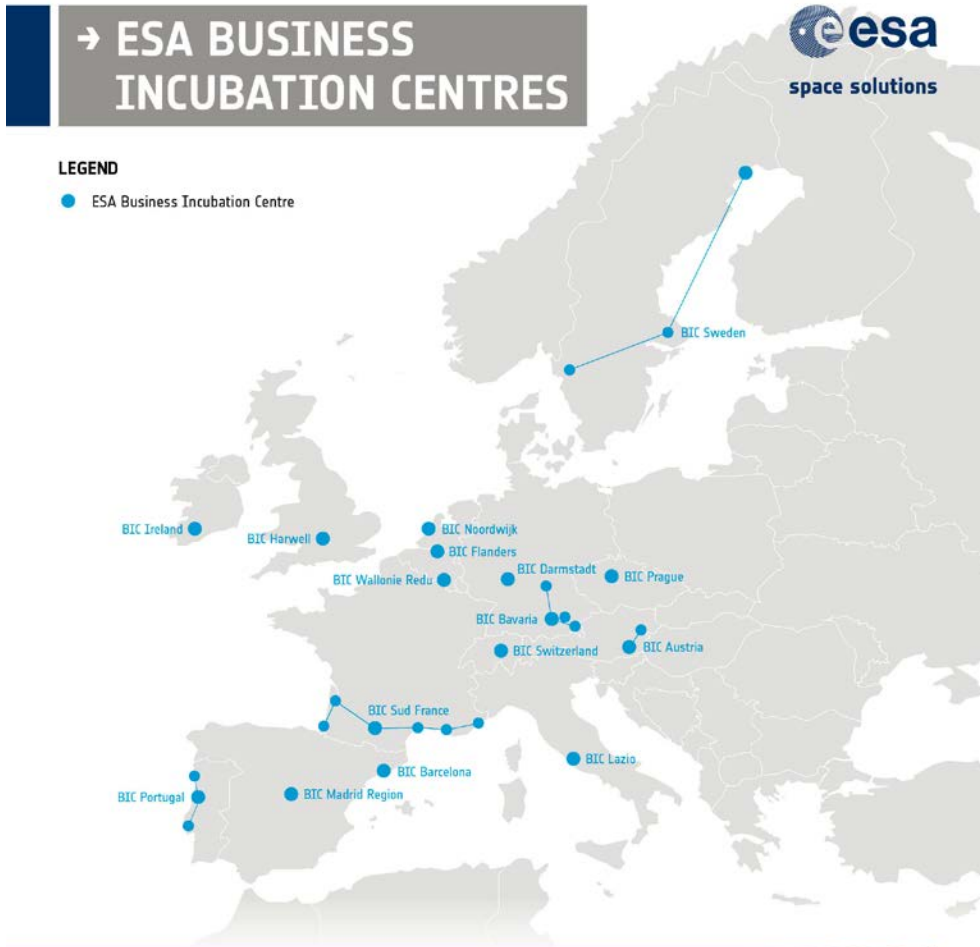


in-situ



# Space for Economic Growth

## ESA BUSINESS INCUBATION CENTRES - ESA BIC AUSTRIA



### Start-up Support, Transfer of Space Technology

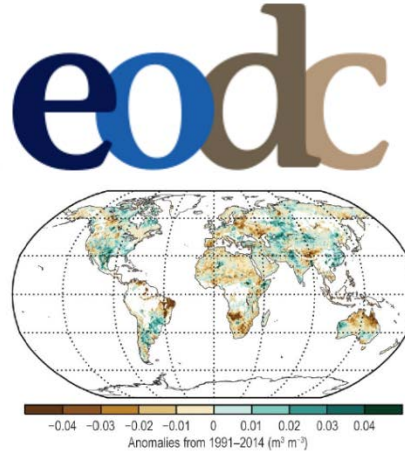
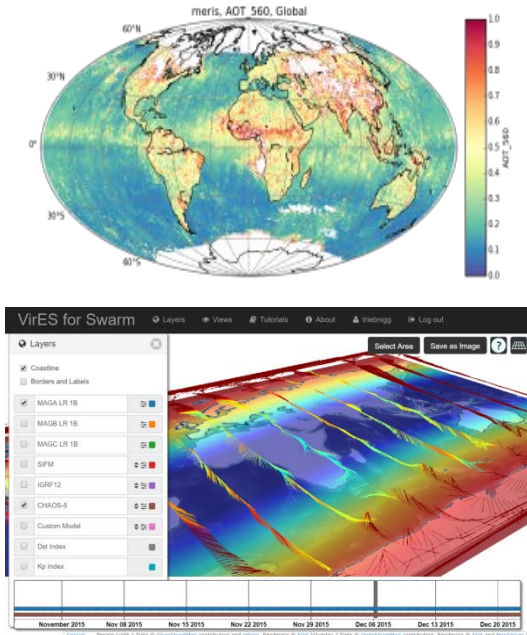




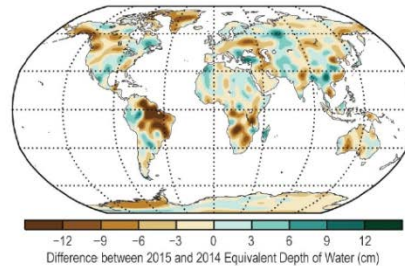
### Building up the infrastructure of the 21<sup>st</sup> century and providing services to the citizens

- Environment
- Water and Air Quality
- Land Usage
- Climate Change
- Health Services
- Education
- Innovation
- Partnerships

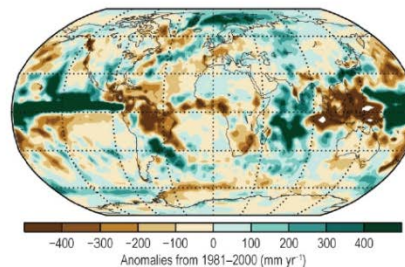




(g) Terrestrial Water Storage



(h) Precipitation



### Selected global clients

#### International Institutions

European Union, European Environment Agency, International Fund for Agricultural Development, European Space Agency, United Nations Programmes

#### International Development Banks

World Bank, European Investment Bank, EuropeAid

#### National & regional authorities

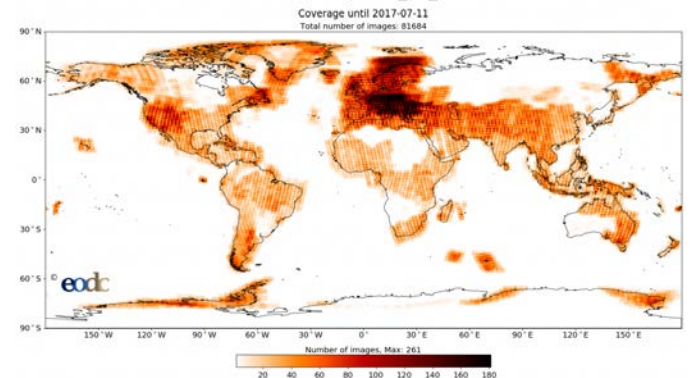
Various ministries and agencies for environment, agriculture, forestry, research and transportation worldwide

#### Private sector

Telecommunication, Consulting, Construction, Financial Sector, Oil & Gas



### Coverage Map S1A\_IW\_SLC



**EODC** is a **public-private partnership** founded in 2014

- Establish, manage and operate a joint IT infrastructure offering **Big EO Data storage**
- **Global soil moisture monitoring as part of Copernicus Climate Change Service**

## **DriDanube Drought Risk in the Danube Region**

Proactive drought management  
→ Increased culture of preparedness



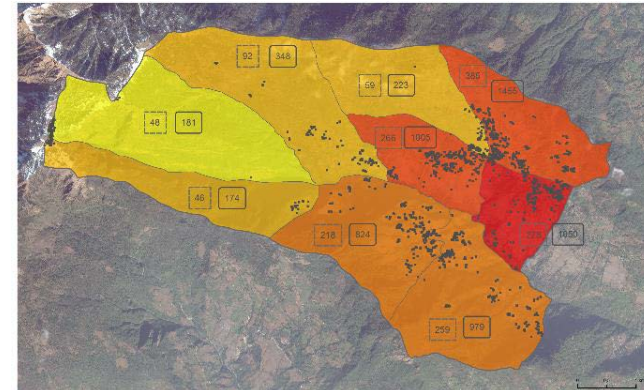
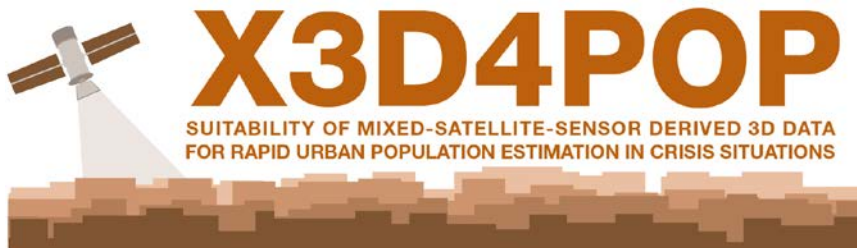
## Population monitoring

- EO-based camp monitoring
- EO-based method for population estimation in urban areas
- Methods to detect displaced people in (urban) settlements

### Users:

Red Cross, Doctors without Borders

### Follow-up Project:



Dedicated stereo satellite image pairs for 3D models

# Space Situational Awareness Space Weather



ESA Space Situational Awareness

Federated products from the Kanzelhöhe Observatory (UNIGRAZ)

Ground-based H-Alpha Solar Monitoring Service  
Kanzelhöhe Observatory

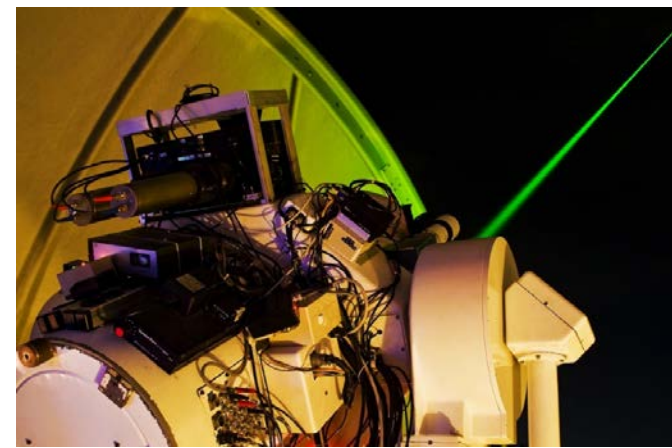
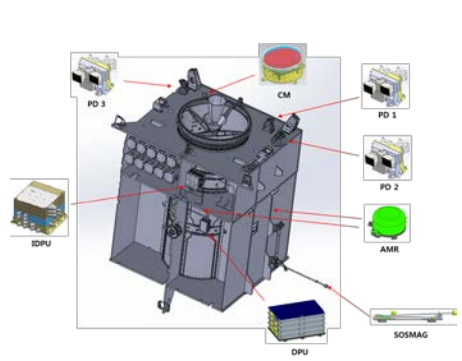
Site	Height	Max	Position	Site
Flare	1176	1210	019W481	IF
Flare	1233	1267	019W535	IF
Flare	1213	1223	019W327	DF
Flare	1258	1263	020W390	SF
Flare	1352	1102	019W338	SM
Flare	1335	1045	019W339	DF
Flare	1312	1012	019W339	SM
Flare	0930	0919	021W322	IF
Flare	0858	0803	019W374	IF
Flare	0833	0843	021W332	IF
Flare	0735	0800	021W321	2M
Flare	0721	0728	020W313	IF
Flare	0611	0618	019W338	IF

ESA space situational awareness

Federated tool from the Seibersdorf Laboratories

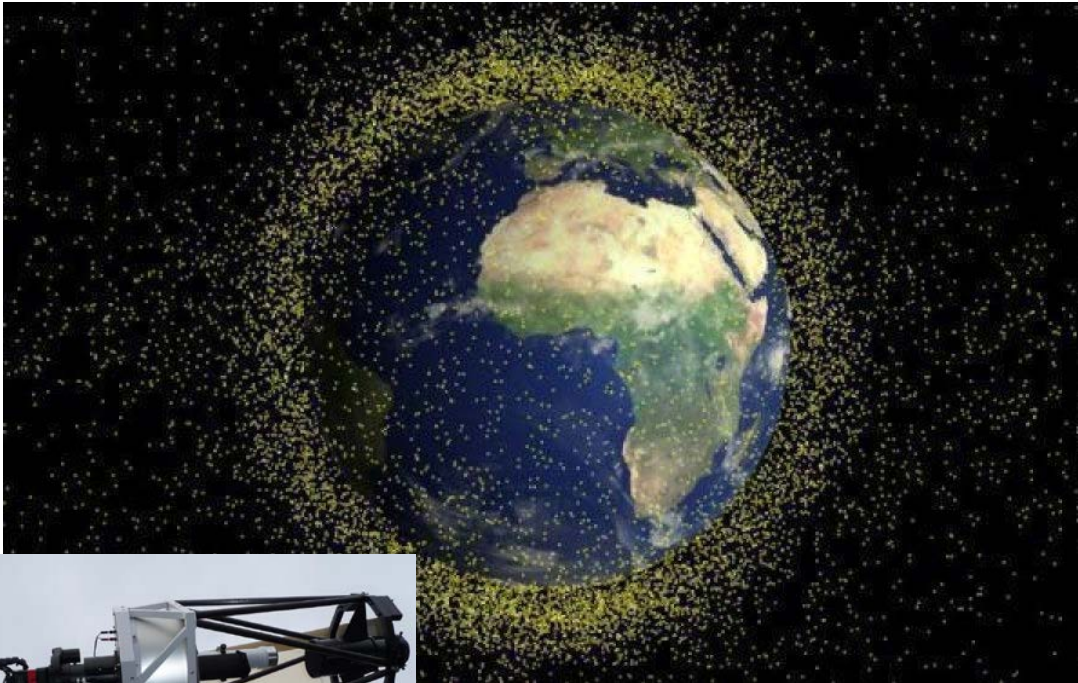
Current dose rate at 1m: 10.0 µSv/h

Site	Height	Max	Position	Site
Flare	1176	1210	019W481	IF
Flare	1233	1267	019W535	IF
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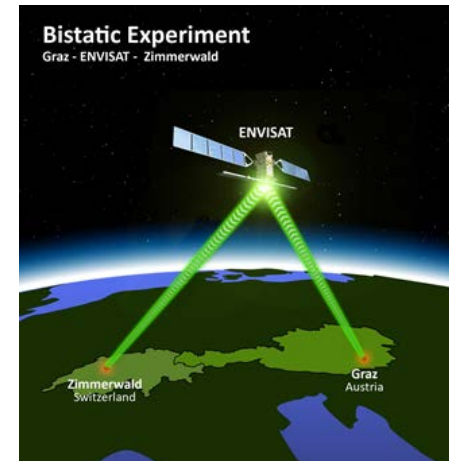


Austria contributes to  
**Expert Service  
Centres** within ESA's  
SSA Programme

## Austria plays an active role!



## Satellite Laser Ranging for Space Debris Monitoring



# CubeSats made in Austria

AUSTRIAN CUBESAT INITIATIVE,  
TUGSAT-1, UniBRITE, PEGASUS/QB50,  
OPS-SAT, PRETTY

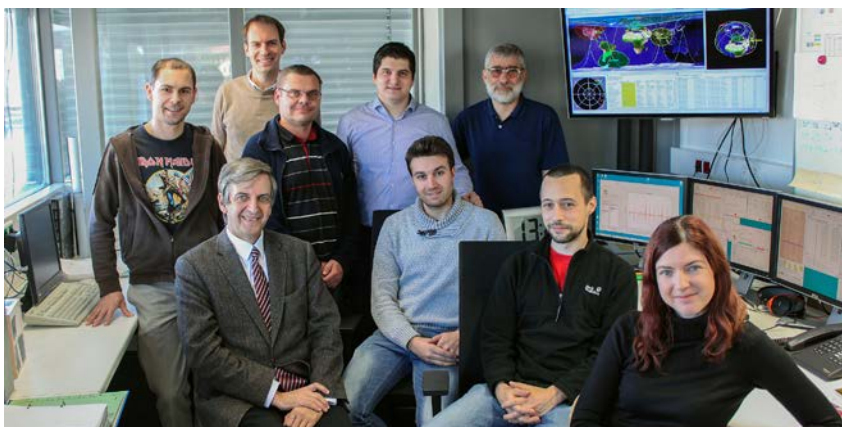
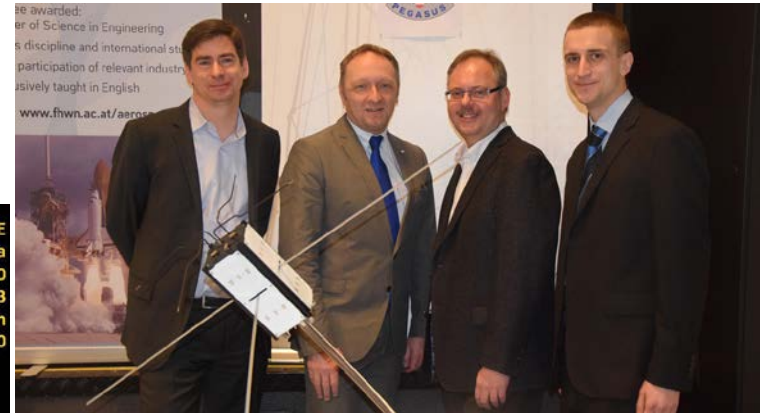
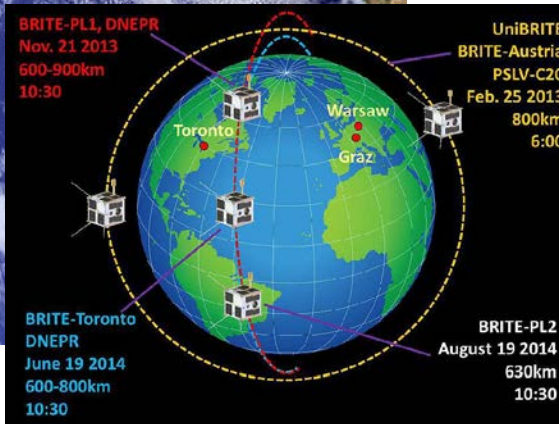
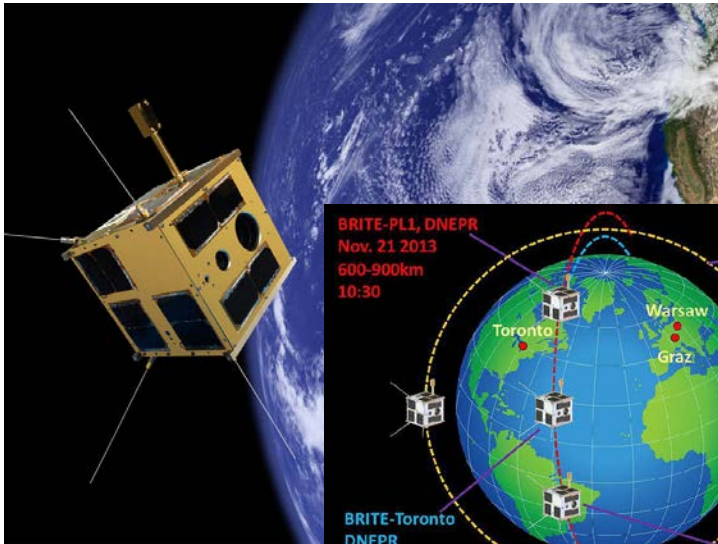
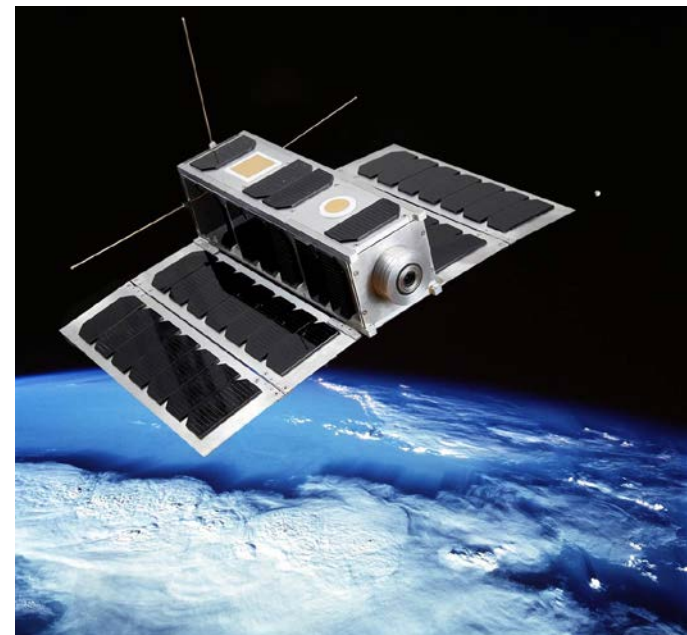
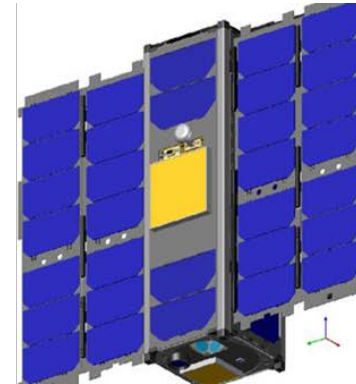


fig.at





## CubeSat History in Austria:



- **TUGSAT-1 and UniBrite-1 launched on 25 February 2013**
- **Nano-Satellite Pegasus as part of QB-50 Constellation**
- **OPS-SAT: Validation of new operational concepts**
- **PRETTY: Measurements of oceanic wave movements and glacier ices**

CubeSats have scientific, technical, environmental and educational merits



## News



**ESA „Robotics and Automation“  
Lehrerinnen Fortbildungen – Anmeldung  
jetzt möglich**

Im Jänner und Februar bietet die ESA für Lehrkräfte der Sekundarstufe Fortbildungen zum Thema Robotik und Automation an. Die Kurse finden am ESEC Standort der ESA in Belgien statt. Themen der Fortbildungen sind Robotik und Automationstechnik, sowie deren Einsatz in den MINT-Fächern. Aber auch Wege und Möglichkeiten für forschungs-basiertes Lehren und Lernen sind Teil dieser Kurse, die für alle MINT Lehrkräfte der Sekundarstufe offen sind.



**Anruf ins Weltall!**

Am 4.12.2017 bietet ESERO Austria Lehrerinnen und Lehrern eine außergewöhnliche Möglichkeit! Im Rahmen eines sogenannten In Flight Calls werden wir im Ars Electronica Center live mit der ISS verbunden sein und mittels Videokonferenz mit dem italienischen Astronauten Paolo Nespoli sprechen.



**Mission X 2018 – All Systems Go!**

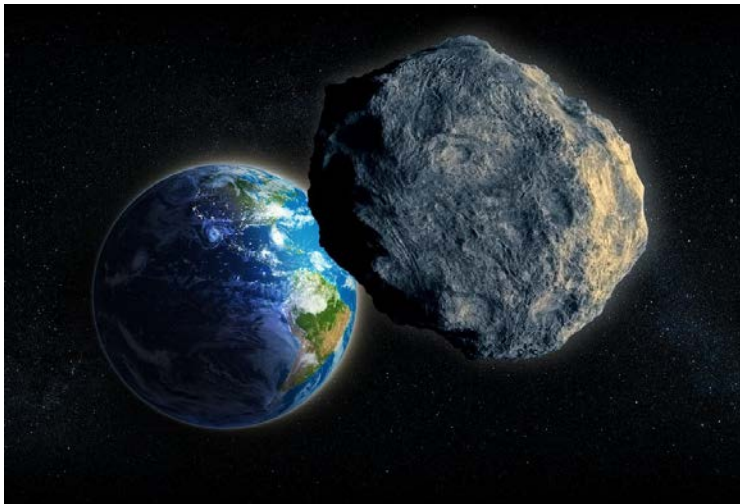
Mission X – Train Like an Astronaut ist ein internationaler Wettbewerb für Schulen, der 2017/18 zum achten Mal weltweit durchgeführt wird. Die amerikanische und europäische Weltraumorganisationen NASA und ESA haben für Mission X eine Reihe von Übungen entwickelt, die Kindern viel Spaß an Weltraumwissen, Bewegung, Sport, sowie die Bedeutung gesunder Ernährung im täglichen Leben vermitteln.



## European Space Education Resource Office

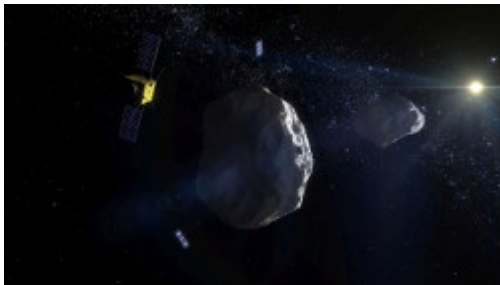
### ESERO Austria (since mid 2016)

### *CANSAT Competition in Austria in April 2018*



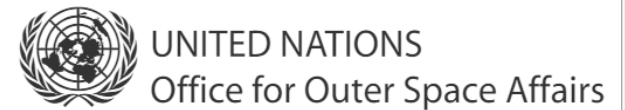
**Summer School Alpbach 2018:  
Sample Return from Small Solar  
System Bodies**

**July 17-26, Alpbach/Tyrol**





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### NEWS

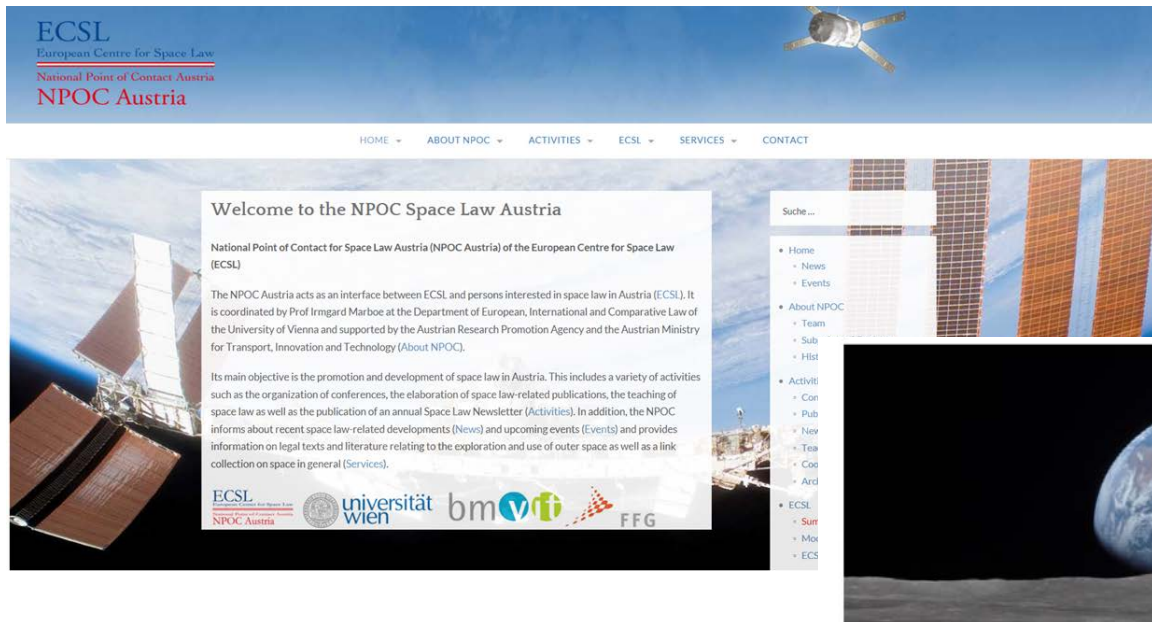
#### ESPI BRIEF 19. REIGNITING EUROPE'S LEADERSHIP IN DEBRIS MITIGATION EFFORTS

12 January 2018. In the past decade, the count of trackable debris fragments has more than doubled, driven by collisions in space, several high-profile ASAT tests, the proliferation of cubesats and growing number of upper stages left in orbit. Additional European leadership will be needed to fully respond to the emerging space traffic challenges presented by various trends including the incoming LEO mega-constellations and increased risk of collisions.

The ESPI Brief 19 provides an overview of the growing concern of orbital debris, Europe's efforts in this domain, and proposes a way to break the international deadlock in debris mitigation efforts. Download the ESPI Brief 19 [here](#).

### Yearbook on Space Policy





**United Nations/Austria Symposium on  
 "Access to Space: Holistic Capacity-Building for the 21st Century"**

GRAZ, AUSTRIA, 3 - 7 SEPTEMBER 2017

The Austrian Space Law specifically requires compliance with internationally recognised Space Debris Mitigation Guidelines.

## Thank you for your attention!



**Austria looks forward to a continued excellent cooperation with COPUOS and its Member States and to a successful UNISPACE+50!**