

# AUSTRIA IN SPACE

*13 June 2017*



## 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

## SPACE FUNDING - 3 PILLARS



Austrian Space Applications Programme

- annual calls
- 15 years ASAP



ESA

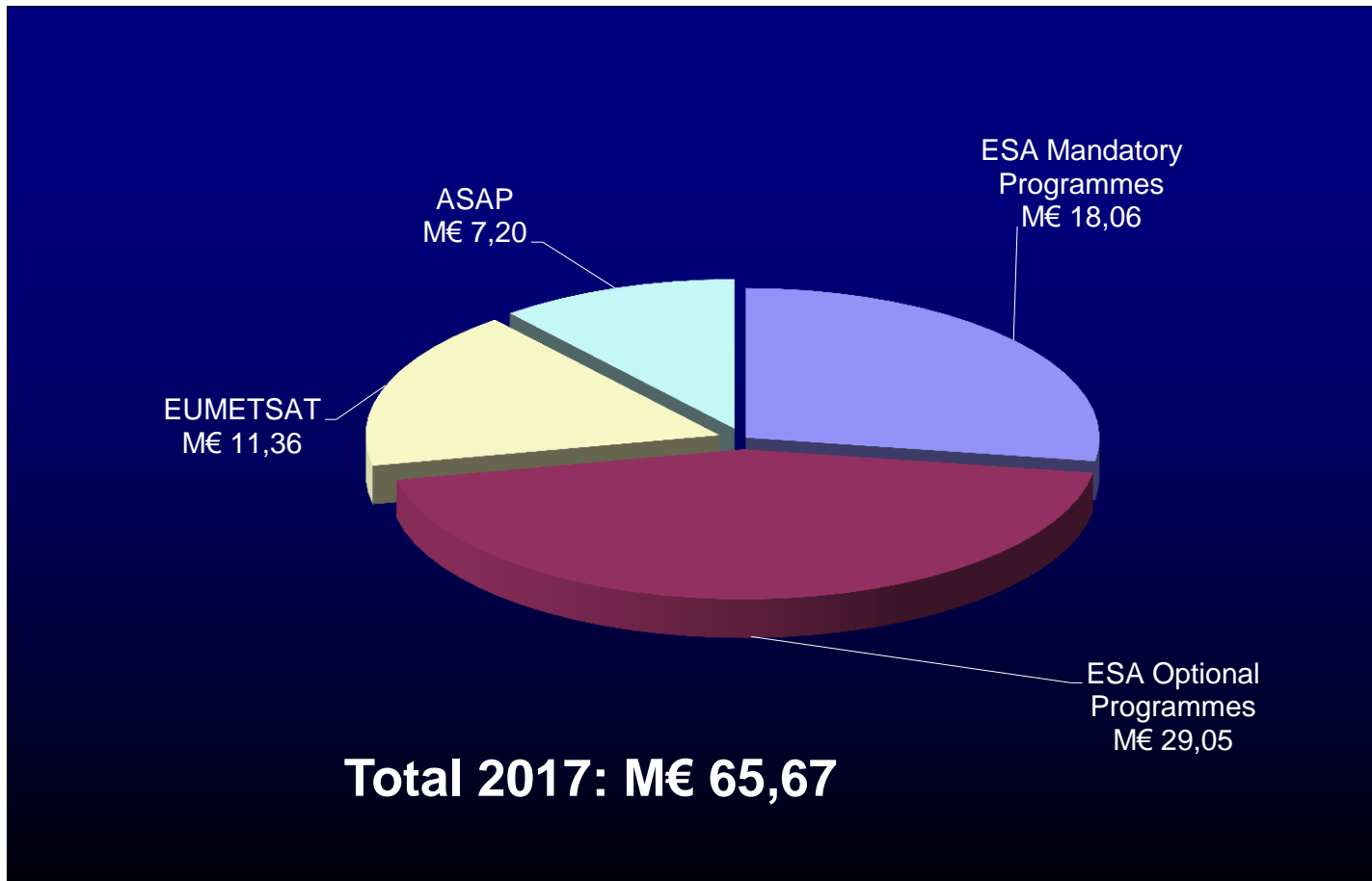
- Optional Programmes
- Mandatory Programme



EU


- COPERNICUS
- GALILEO
- Space Surveillance and Tracking

## AUSTRIAN SPACE BUDGET 2017



# 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.

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

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

**MLI** **just**  
Observing the first light

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

**MLI** **gaia**  
Surveying a billion stars

**EGSE** **euclid**  
Exploring the dark Universe

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

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

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

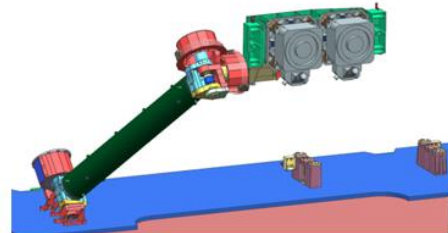
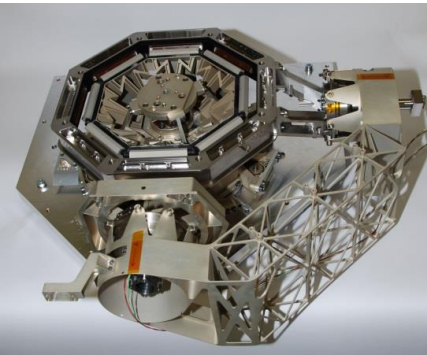
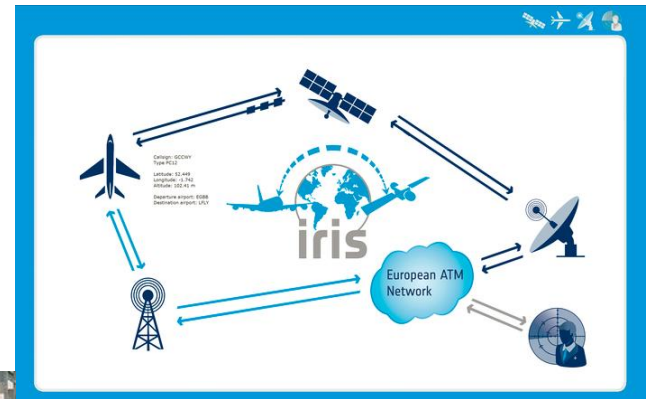
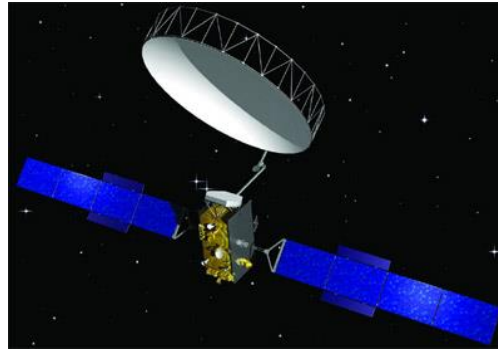
**MLI** **integral**  
Seeking out the extremes of the Universe

**Spectrum:** microwaves, submillimetre, infrared, optical, ultraviolet, x-rays, gamma rays

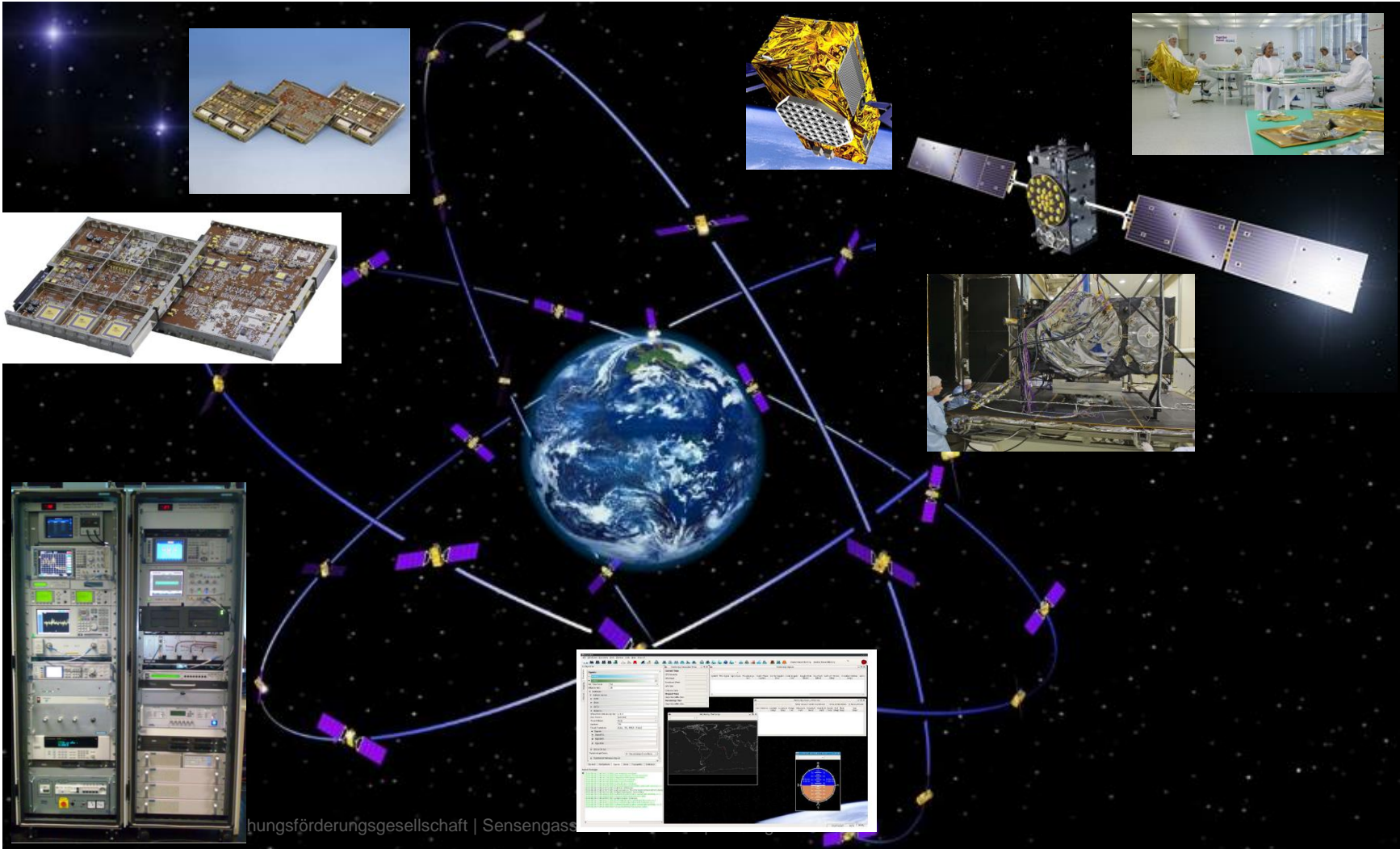
www.esa.int European Space Agency

# 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

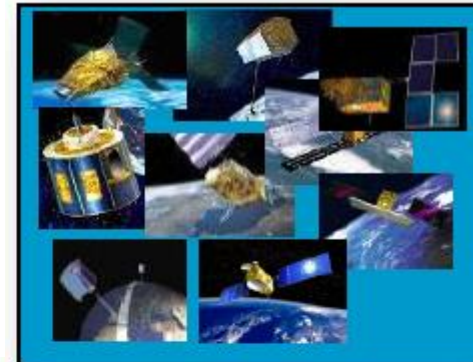


# European Space Infrastructure (1) GALILEO Thermal Insulation, EGSE, CPU Interface Electronics





Sentinels



Contributing missions

Services



in-situ



...added-value products

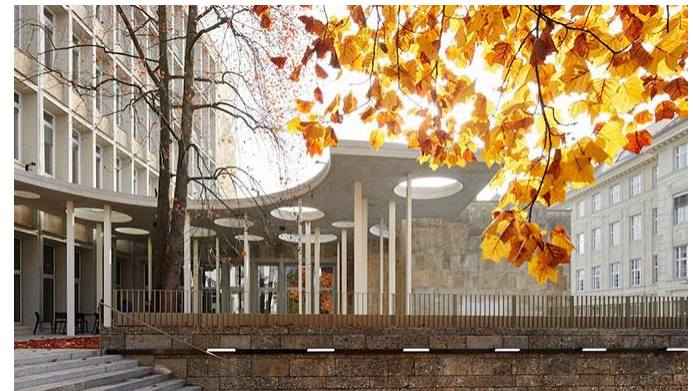


# Space for Economic Growth

## ESA BUSINESS INCUBATION CENTRES - ESA BIC AUSTRIA

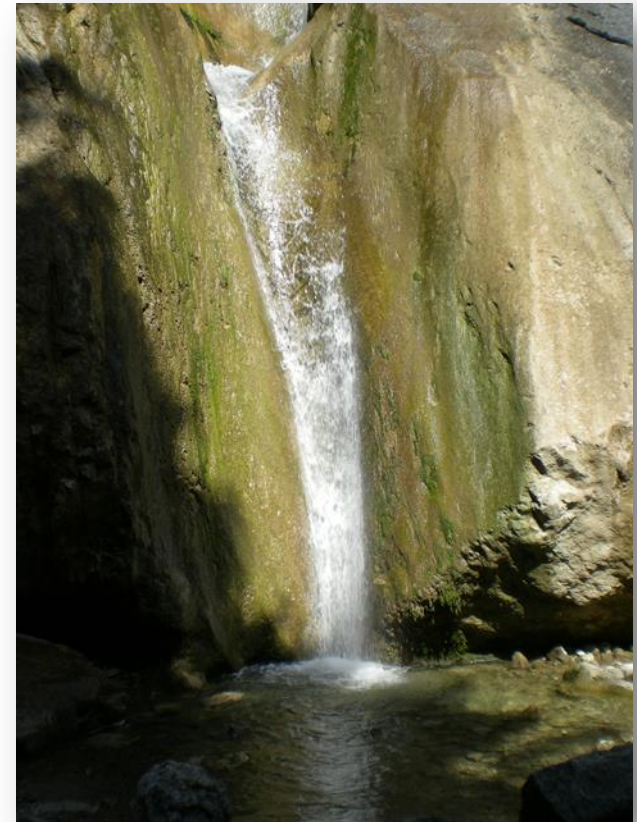


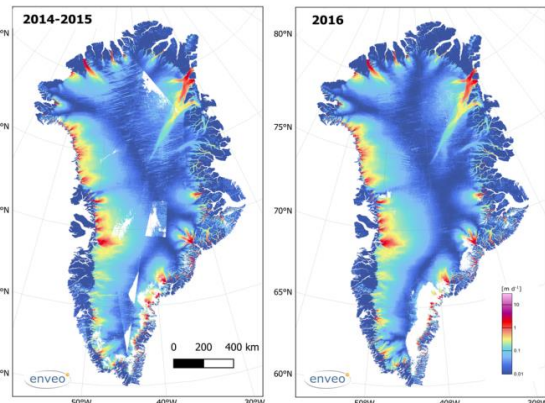
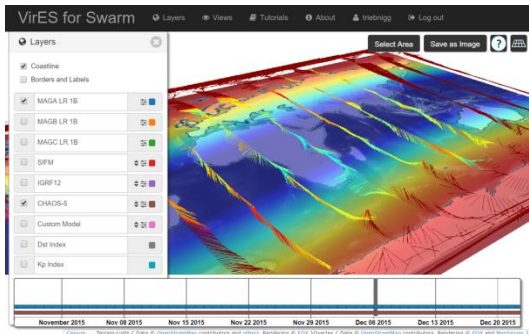
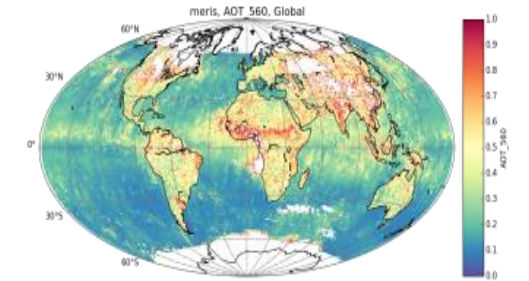
### Start-up Support, Transfer of Space Technology



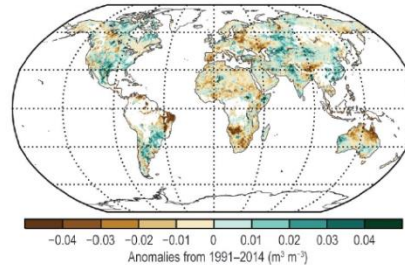
## Building up the infrastructure of the 21<sup>st</sup> century and providing services to the citizens

- Water
- Land Usage
- Weather and Climate Change
- Emergency Management
- Alpine Regions
- Environment
- Space Weather
- ....

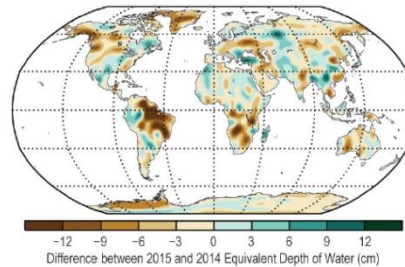




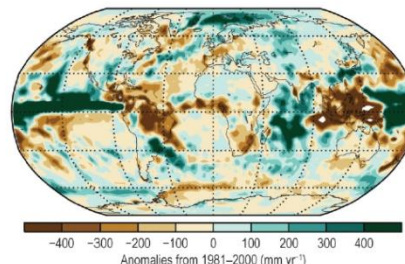
# eodc



(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



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

EODC serves as **community facilitator** for **collaboration** between **public and private partners** with the aim to

- Establish, manage and operate a joint IT infrastructure offering **Big EO Data storage** and high performance computing (HPC)
- Provide data, processing chains and value-added products/services (**global soil moisture monitoring as part of Copernicus Climate Change Service**)

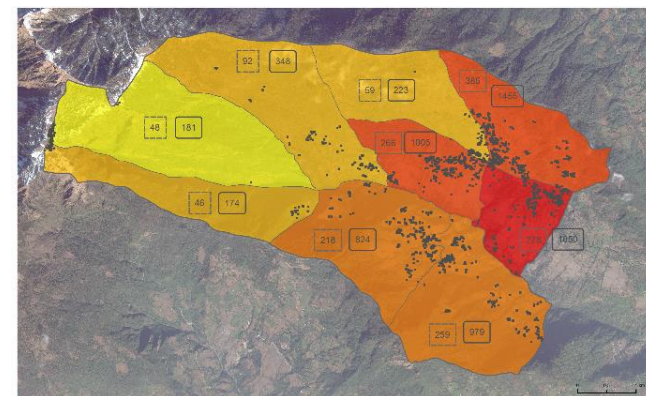
## Population monitoring

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

## Monitoring of environmental resources

- Water
- Landuse

University of Salzburg, Department of Geoinformatics Z\_GIS



Population density / ward



**Users:**  
**Red Cross**  
**Doctors without Borders**

# 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

Type	Begin	Max	Position	Size
Flare	1216	1217	S19W41	1F
Flare	1230	1307	S19W53	1F
Flare	1213	1223	S19W37	5F
Flare	1206	1207	S20W36	5F
Flare	1052	1112	S19W39	5N
Flare	1035	1045	S19W39	5F
Flare	1012	1012	S19W38	5N
Flare	0908	0918	S21W32	1N
Flare	0858	0903	S18W34	1F
Flare	0830	0843	S21W32	1N
Flare	0735	0800	S21W31	2N
Flare	0721	0726	S20W33	1F
Flare	0611	0618	S19W38	1B

Click on images for full size

page refresh each 50 seconds

Last update: 20100209 15:50:17

ESA space situational awareness

Federated tool from the Seibersdorf Laboratories

Current dose rate at lat. 48.50° N

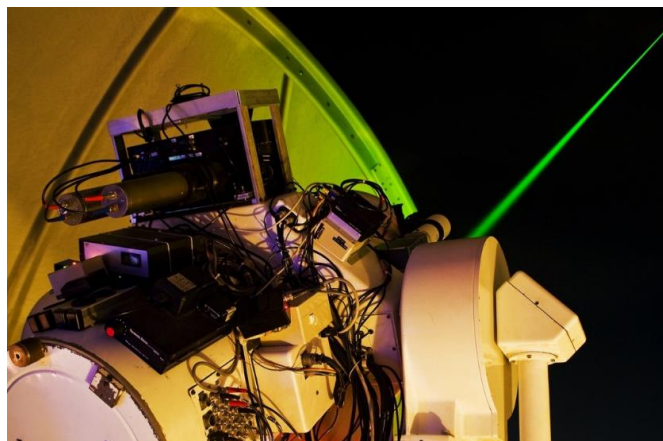
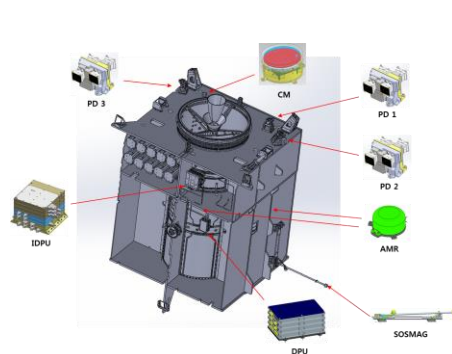
2005-01-20 (GLE69) Bombardment

Time	A (km2/m2/s)	S	S <sub>0</sub>
2005-01-20 06:50	2244.2	0.5	0.245
2005-01-20 06:55	2451.4	0.2	0.072
2005-01-20 07:00	4184.3	7.7	0.9
2005-01-20 07:05	3933.3	7.4	0.9

883.KFPO-LFPG

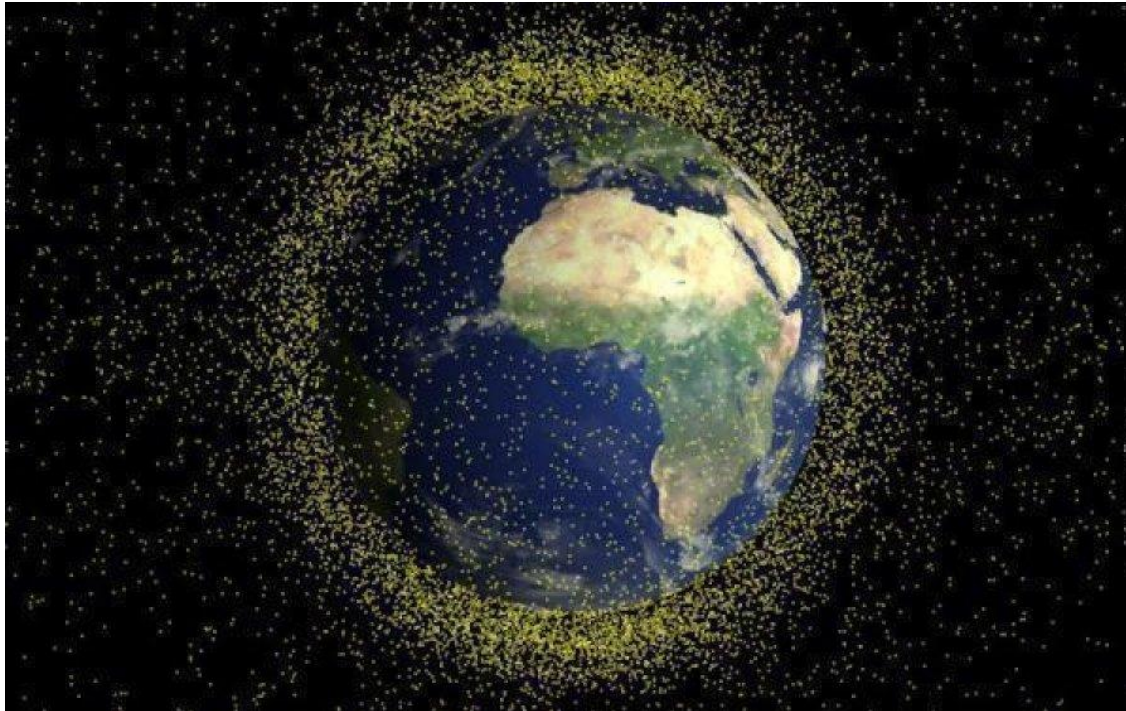
#	Time	DO (km2/m2/s)	DO (MM SS WE)	DO (MM SS WE)	DO (MM SS WE)	DO (MM SS WE)	DO (MM SS WE)	
1	2005-01-20 06:45	37	37	11 N	122	24	00 W	
2	2005-01-20 06:50	300	39	22	48 N	119	53	50 W
3	2005-01-20 06:55	300	39	27	50 N	119	47	59 W
4	2005-01-20 06:58	330	39	31	48 N	119	42	00 W
5	2005-01-20 07:00	330	40	41	23 N	117	54	00 W
6	2005-01-20 07:05	330	42	03	11 N	114	29	59 W
7	2005-01-20 07:10	370	44	05	24 N	112	11	00 W
8	2005-01-20 07:15	370	44	38	24 N	111	05	59 W
9	2005-01-20 07:20	370	45	33	36 N	107	39	00 W
10	2005-01-20 07:40	370	48	37	48 N	104	05	59 W
11	2005-01-20 08:00	370	50	38	24 N	100	38	00 W

SCR Total effective dose 67 µSv  
GCR + SCR Total effective dose 261 µSv

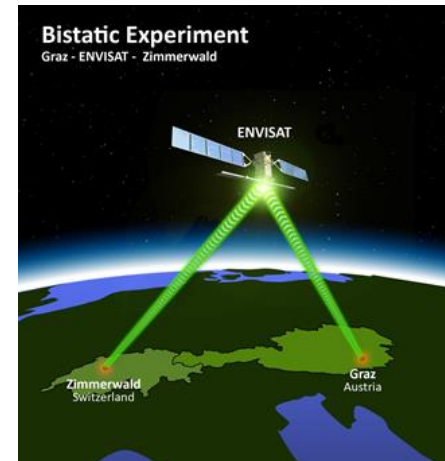


Austria contributes to  
**Expert Service  
Centres** within ESA's  
SSA Programme

## 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

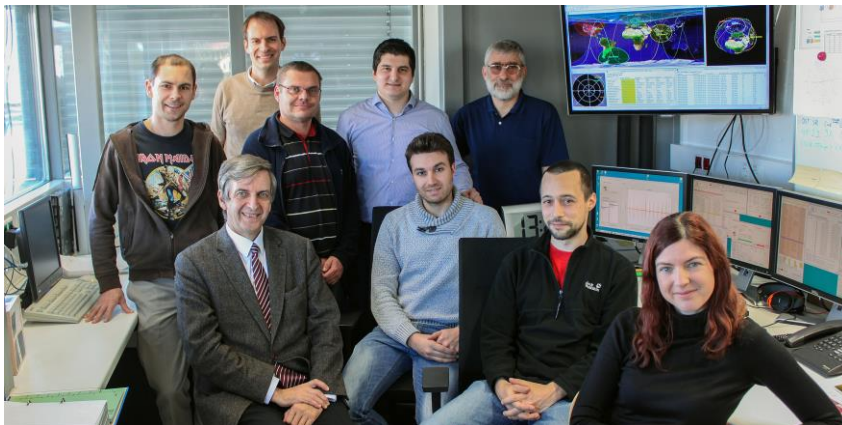
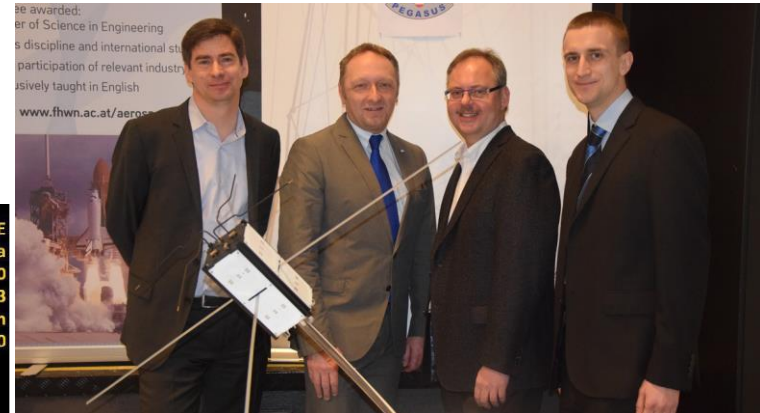
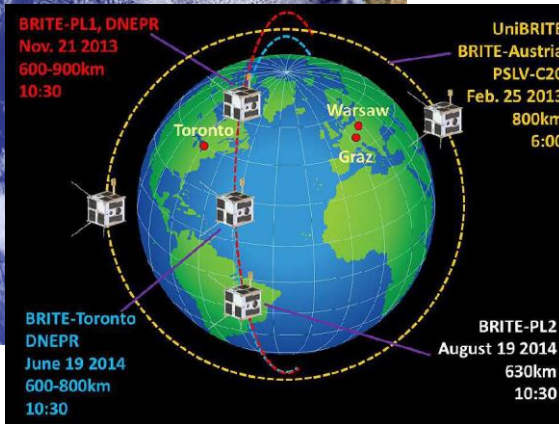
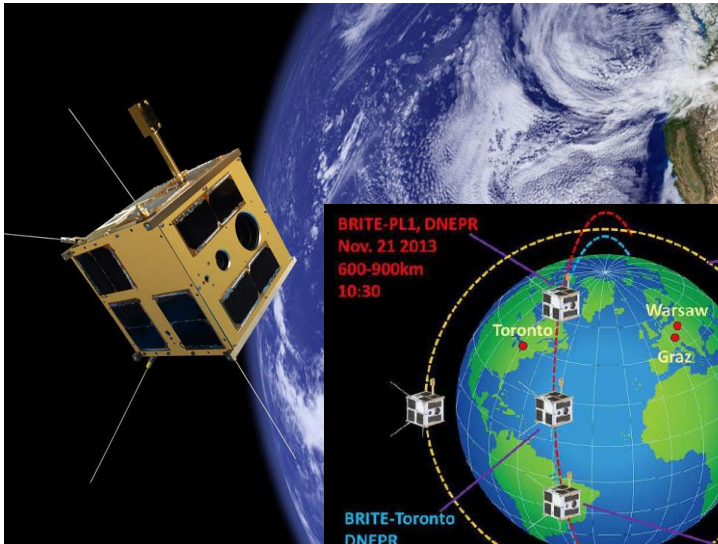
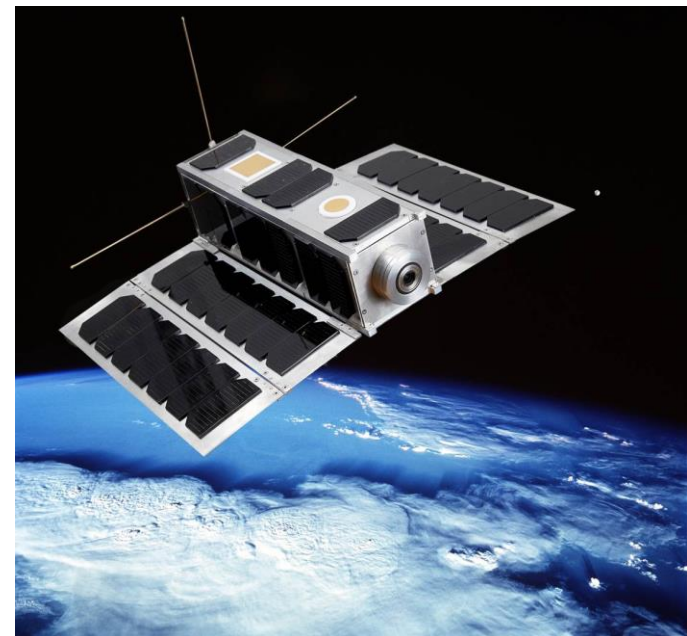
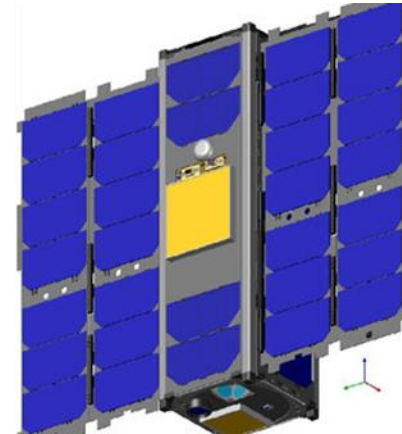


fig.at





## 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**

CubeSats have scientific, technical, environmental and educational merit



## News



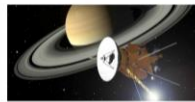
### ESA LehrerInnen Kurse – die Teilnehmer stehen fest.

Jedes Jahr lädt die ESA LehrerInnen aus ganz Europa zu Teacher Workshops in die Niederlande ein. In den 4-tägigen Trainings stellt die Weltraum- und die MINT-Unterricht im Zentrum. Auch heuer sind wieder österreichische Lehrkräfte dabei.



### International Space Camp – Österreich ist dabei!

Auch heuer wird wieder eine Crew aus Österreich am International Space Camp in Huntsville, Alabama teilnehmen. Aus vielen tollen Bewerbungen konnten sich 2 Schülerinnen und ein Lehrer durchsetzen und werden im Juli in die USA reisen.



### Cassini Scientist – Die Sieger aus Österreich stehen fest!

Die GewinnerInnen des diesjährigen Cassini Scientist Wettbewerbs der ESA stehen fest. Auch österreichische Schülerinnen waren heuer zum ersten Mal beteiligt und haben mit tollen Einreichungen überzeugt.



## European Space Education Resource Office

## ESERO Austria (since mid 2016)





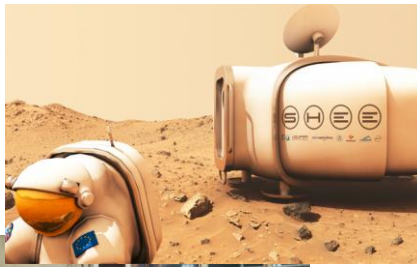
## Summer School Alpbach 2017 The Dusty Universe

July 18-27, Alpbach/Tyrol



# Human Spaceflight - The Austrian Way

## Analog Missions and Space Architecture

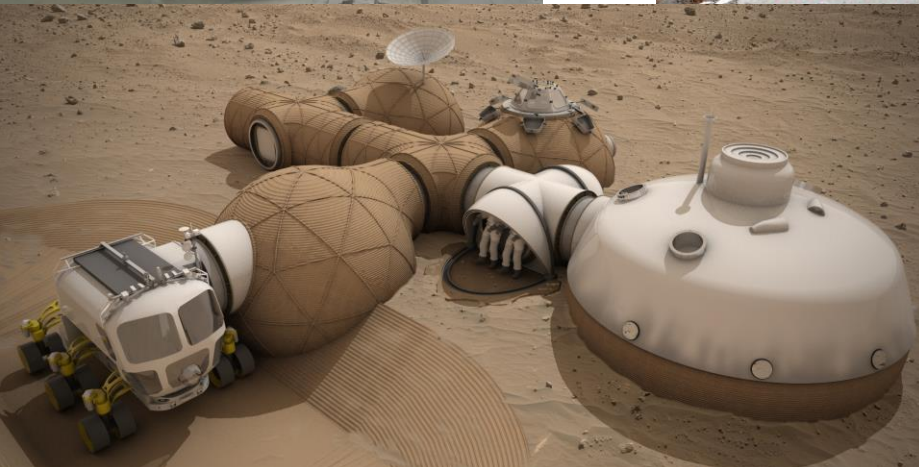


**AMADEE-15**  
Rock Glacier Mars Simulation  
Kauertal, Austria / Aug. 2015

**Industrial Partners**

- T-Mobile Austria
- LANCOM Systems
- AGROTEL
- THE SPACE
- BÖHLER EDELSTAHL
- MED<sup>9</sup>EL
- Together ahead. RUAG

The poster features a central image of an astronaut in a silver space suit standing on a snowy mountain slope. In the background, a large red planet (Mars) is visible against a blue sky. A small flag with multiple national symbols is flying from a pole. The overall design is clean and professional, with a mix of blue, white, and red colors.



3<sup>rd</sup> Prize in competition: NASA 3D Printed Habitat Challenge, awarded at the 2015 World Maker Faire in New York City, 26-27 September 2015

Consortium: ESA European Astronaut Centre in Cologne, LIQUIFER Systems Group



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**11th ESPI Autumn Conference "Innovation in the New Space Economy"**  
 12-13 September 2017, ESPI, Vienna,  
[Click here for the Programme](#)



### NEWS

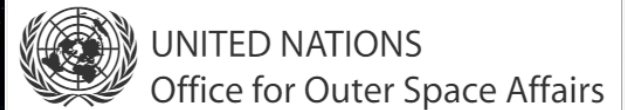
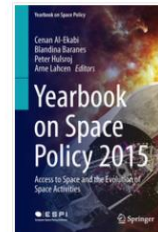
#### [COPUOS 60th session, presentation on ESPI international cooperation projects](#)

9 June 2017. At the 60th session of the UNCOPUOS, Dr. Annette Froehlich presented on-going international cooperation projects of ESPI, especially activities with other regional groups and the recently issued Call for Papers for a Global Space Law Competition on "Fresh view on the Outer Space Treaty".

► [Read More: COPUOS 60th Session, Presentation On ESPI International Cooperation Projects](#)

#### [Save the Date: ESPI Evening Event on 13th June 2017](#)

#### [Yearbook on Space Policy](#)





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!