Belgian funding of space research
The ESA PRODEX Programme

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BELgian Science Policy Office

an administration for science of the Belgian federal government

- ✓ Funding and management of the 10 Federal Scientific Institutes.
- ✓ Interfederal and International Coordination (EU programmes, bilateral programmes)
- ✓ Setting up and funding of federal research programmes (in coordination with regional authorities)
- ✓ collecting and publishing R&D statistics
- ✓ high bandwidth internet network for research (BELNET)
- ✓ Space

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Space Department of BELSPO

19 (highly motivated) people + 2 (equally motivated) secretaries

Belgium works in the context of the **European Space Agency (ESA)**

Belgian scientists industry administrations the public ⟷ BELSPO ⟷ ESA

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Public investment in space activities

High historic Belgian public investment in Space:

~205 million euro per year

- **Belgium = 7th in the world based on GDP**
- **Belgium = 2nd in Europe based on inhabitants**
- **Belgium = 5th absolute contributor to ESA**

~70 research teams

>50 companies

3150 FTE

330 million euros industrial turnover per year

multiplication factor in industry = ~ 3.3

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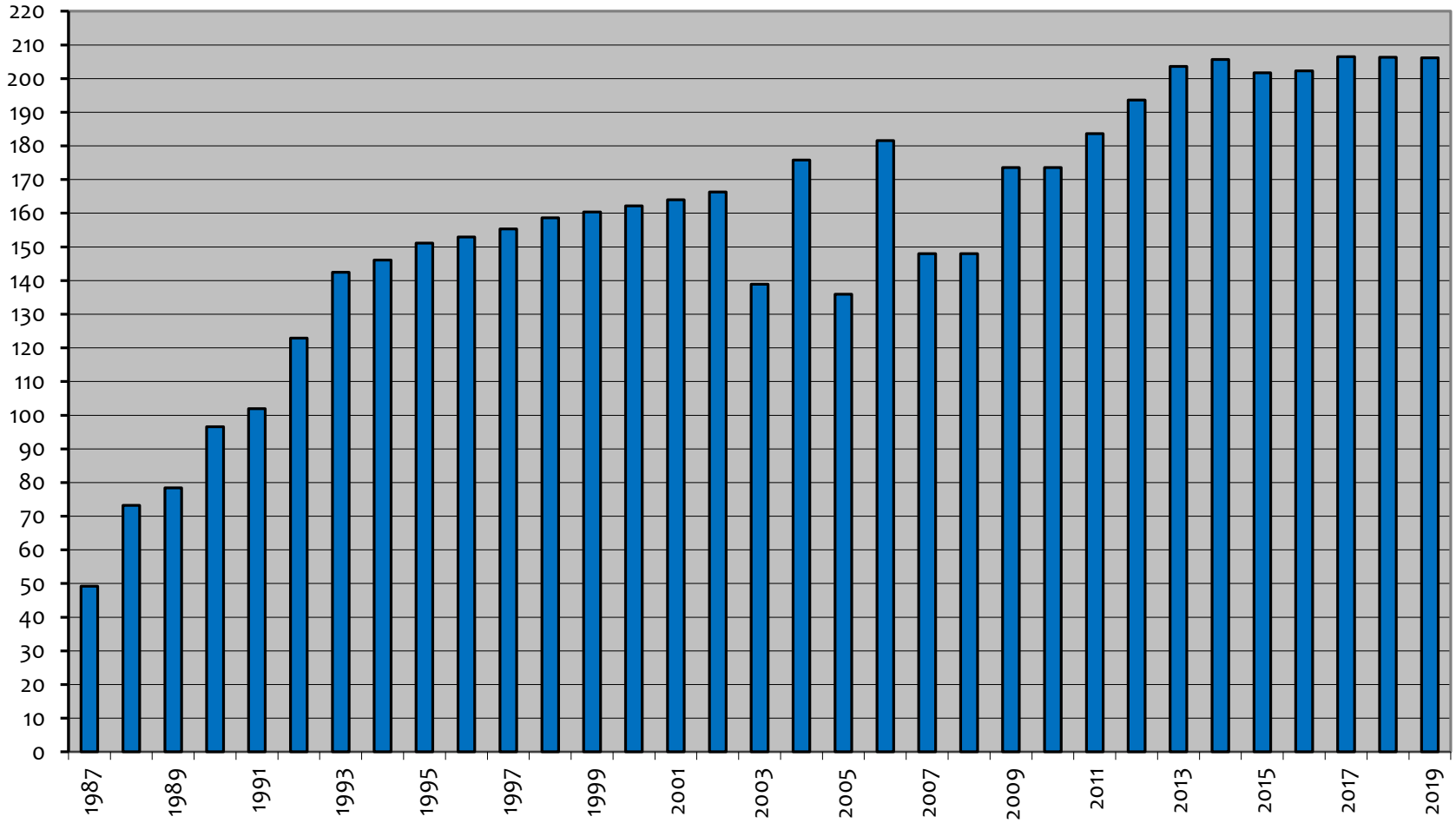
Evolution of the space budget (M€)



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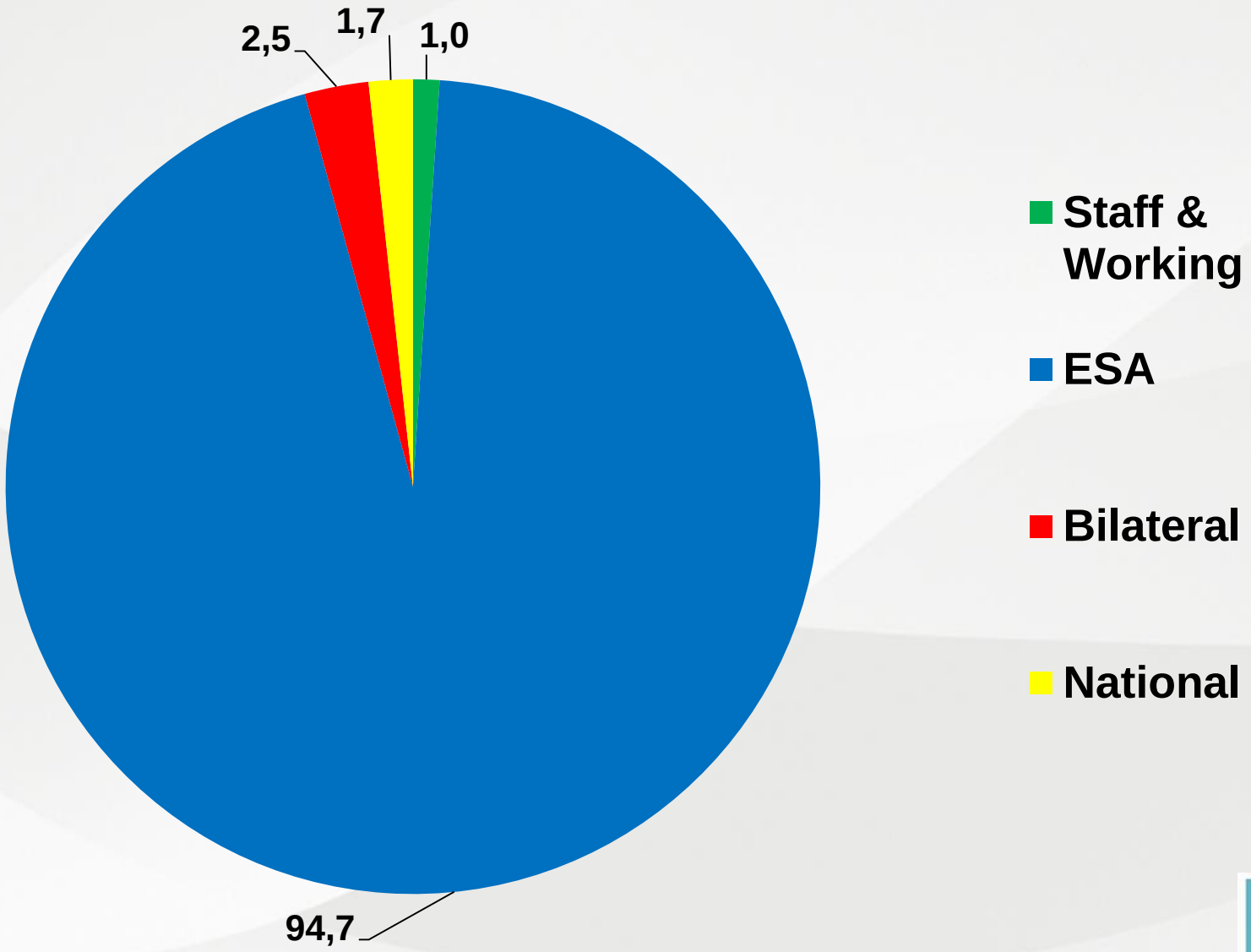
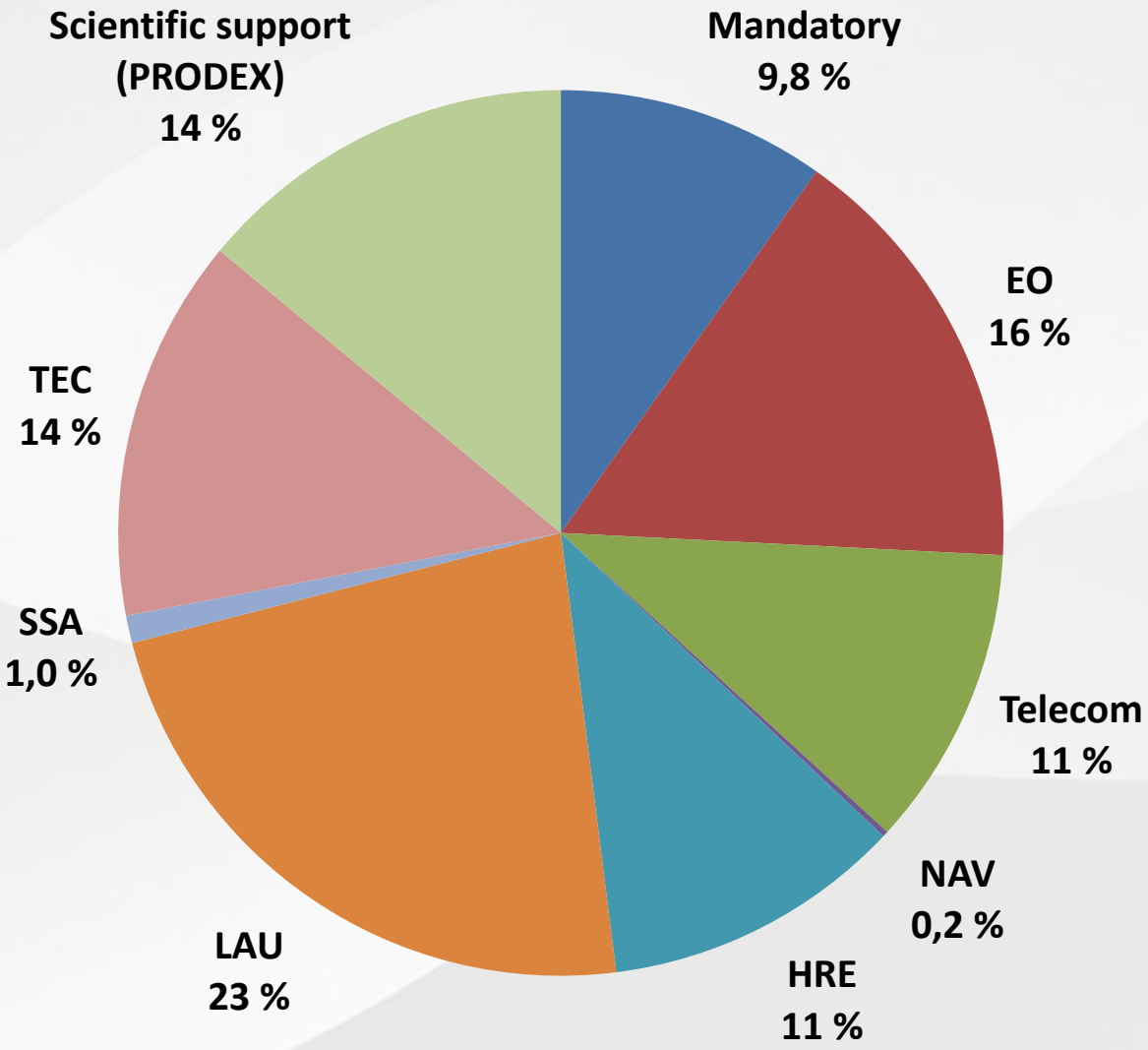
Repartition of the space budget (%)



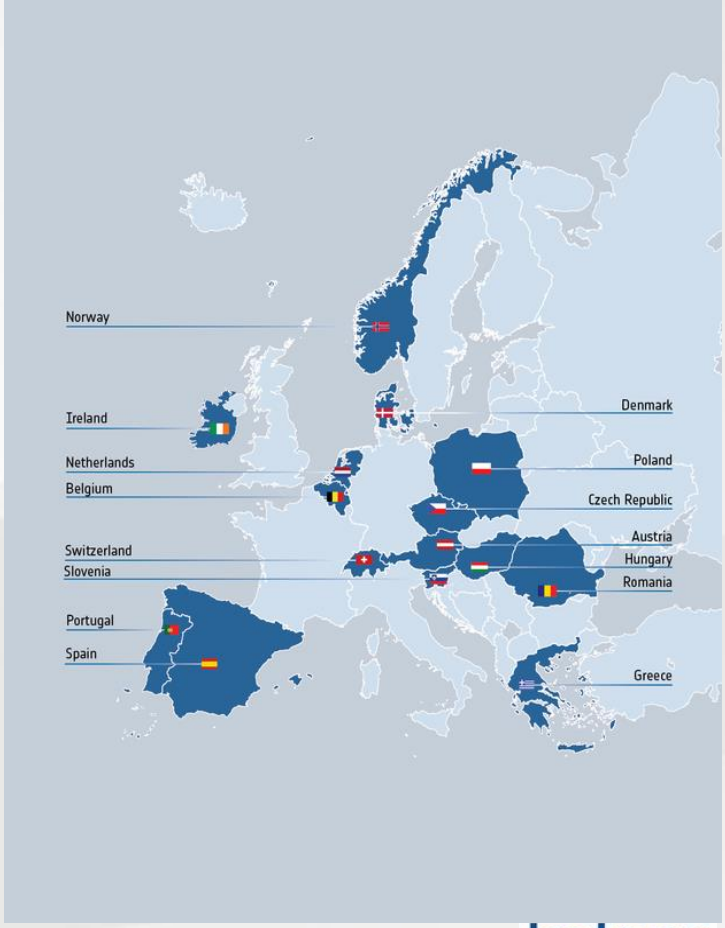
BE participation by domain 2017-2019 @ ESA



The ESA PRODEX Programme a flexible tool to fund space research

PROgramme for the Development of scientific EXperiments

- created in 1986
- at present, 15 countries participate
- allows the development of scientific instruments/experiments for countries without technical space agency
- participating States provide funds through ESA for payload
  - ✓ hardware and software development
  - ✓ operations (incl. cal/val)
  - ✓ data exploitation (research)



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- Cooperation among scientific institutes/universities and between those (in the driving seat) and industry
- Implementation:
  - ✓ ESA selects the projects
  - ✓ BELSPO determines the level of financial support
  - ✓ ESA issues the contracts with institutes and industry
  - ✓ Joint follow-up by ESA and BELSPO

  allows the use of ESA expertise (Prodex Office and experts from the relevant Directorates) for “national” projects
- Guaranteed georeturn of one
- Level of funding by BELSPO depends on:

  PI, co-PI, co-I, industrial involvement, intra-Belgian scientific cooperation, development or data exploitation, Belgian pole of expertise, performance of previous projects, etc. + affordability!

  The scientific institutes get FTE’s, not euros

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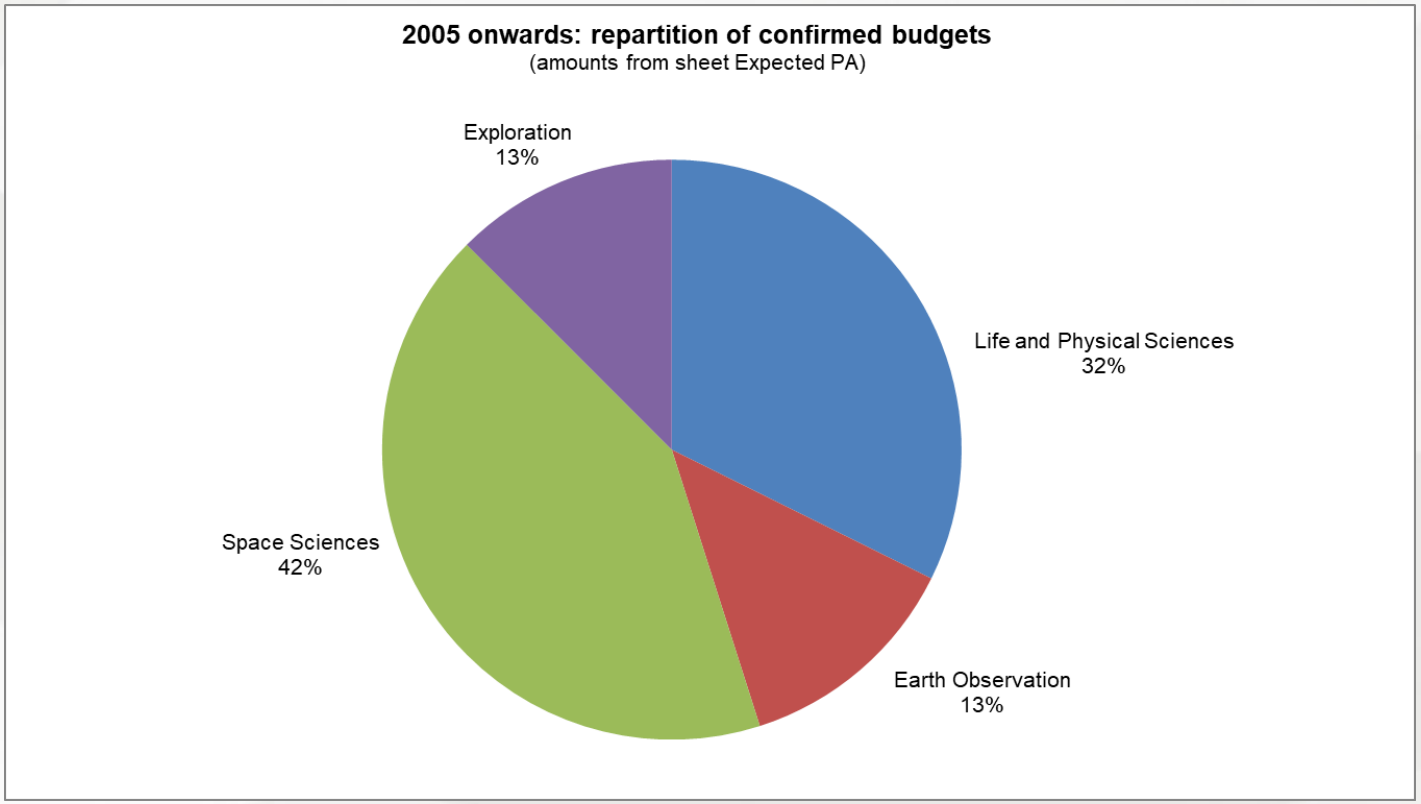
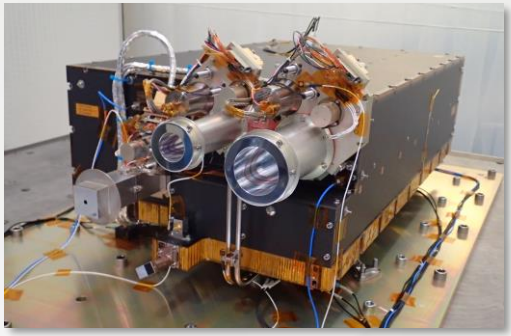
4 main areas:

- ✓ Space Sciences (~ Science Programme)
- ✓ Life and Physical Sciences (~ ISS Programmes)
- ✓ Earth Observation (~ EO Programmes)
- ✓ Space Exploration (~ Robotic Exploration Programmes)

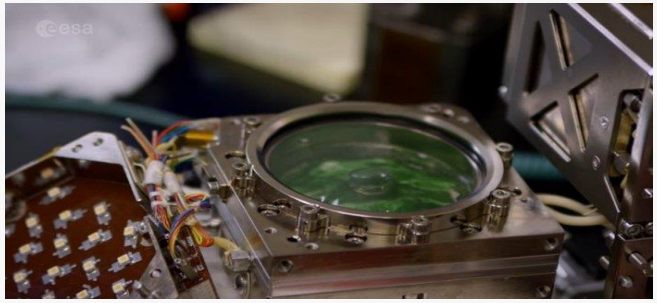


Some successful past and ongoing Belgian PRODEX projects:

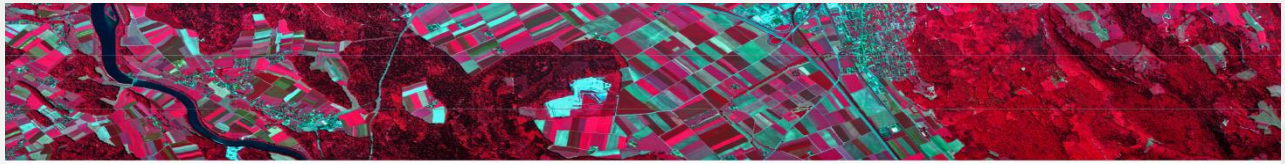


- ✓ Extreme Ultraviolet Imager (EUI) on SOLAR ORBITER

- ✓ ArtemISS: study the potential of algae for bioregenerative life support in space: the first photobioreactor in space



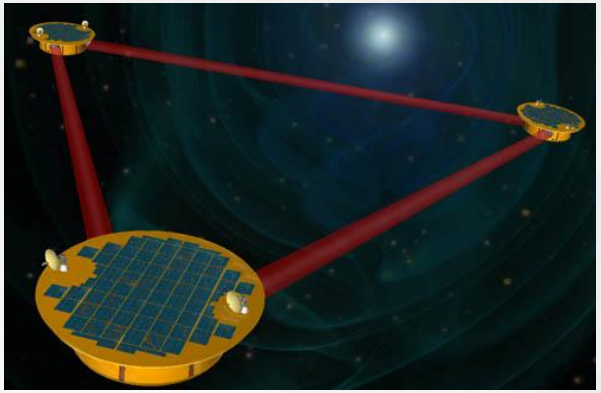
- ✓ Development of the APEX hyperspectral imager for EO cal/val activities over Belgium



- ✓ NOMAD spectrometer on EXOMARS/TGO
  ---> *Nature* **568**, 517–520 (2019)

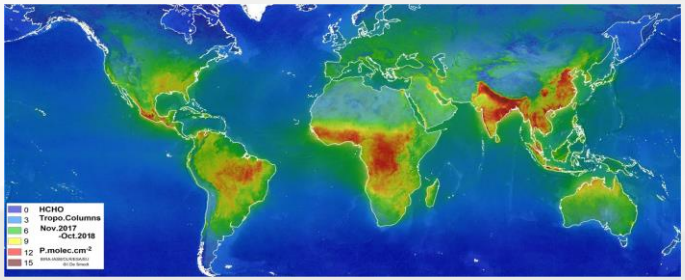
Some planned Belgian PRODEX projects for 2020-2023:

- ✓ ASIC development for the photosensors of the LISA mission, and gravitational wavefront modeling of inspiraling black holes

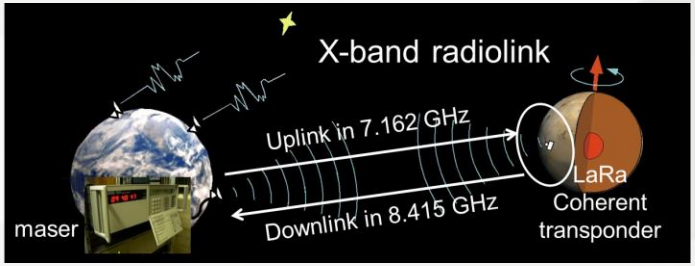


- ✓ Dexterous locomotion in microgravity

- ✓ Retrieval algorithm improvement and data processors update for HCHO and SO_2 on SENTINEL-5P



- ✓ Science Operations Centre for the LaRa instrument on EXOMARS 2020



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Budgetary erosion: constant budget (18-19 M/y)

increase of salary costs above inflation

overcosts in hardware dev. projects

more BE payload participations selected

risk for budget decrease in the future

→ Future evolution:

- ✓ significant savings needed in the period 2020-2023
- ✓ priority for ESA missions/projects
- ✓ priority for developments (pre-launch)
- ✓ new limitations for data exploitation (post-launch):
  - max 1-2 FTE
  - max 2-3 years

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