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Belgian Institute for Space Aeronomy (BIRA-IASB)

Institut d'Aéronomie Spatiale de Belgique (IASB)

Belgisch Instituut voor Ruimte-Aeronomie (BIRA)

# BIRA-IASB, an (inter)nationally renowned partner in atmospheric research

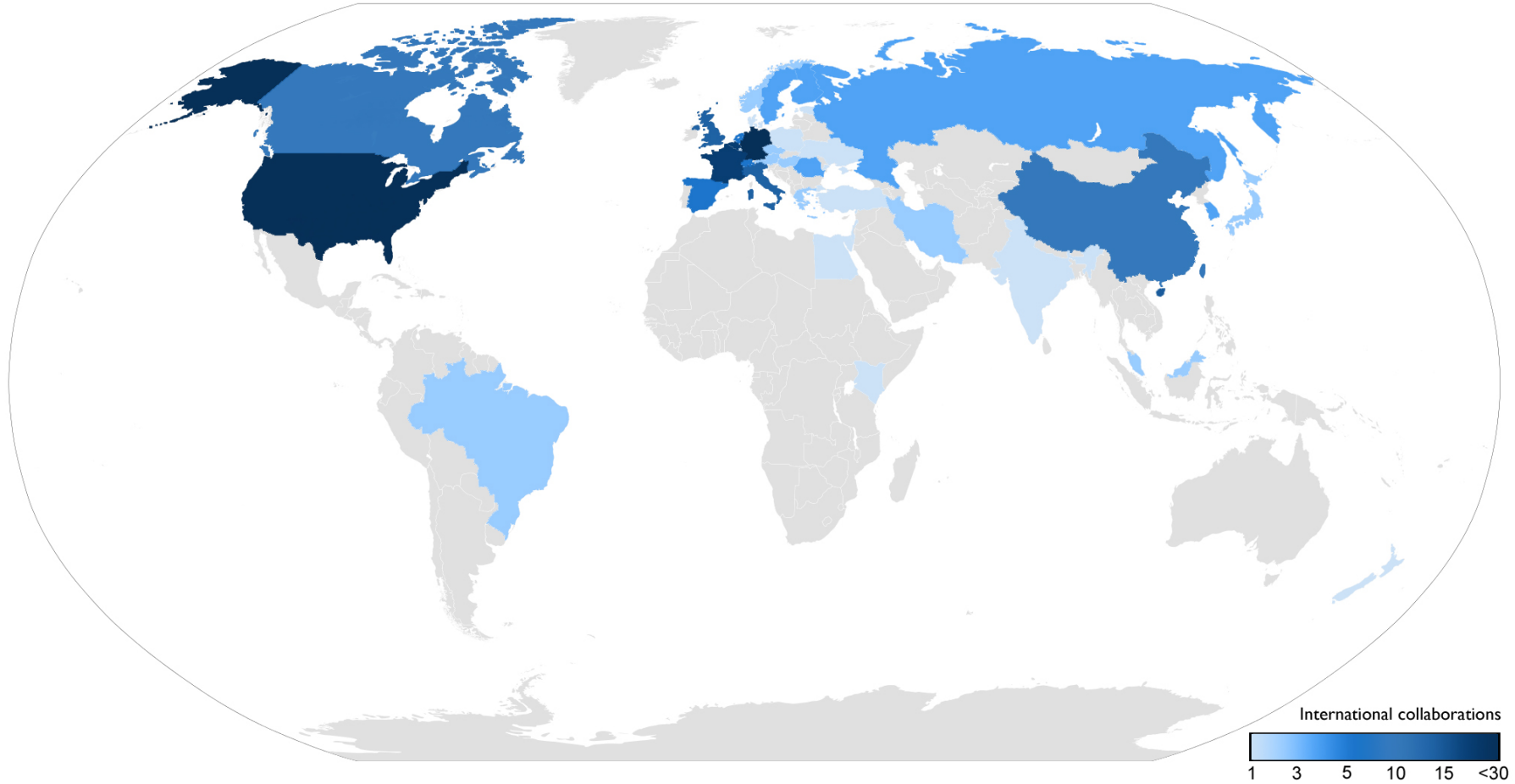
Jean-Claude Gérard

Université de Liège

Chairman of the Science Committee of the Belgian Institute for Space Aeronomy

# International collaborations

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# Colleagues with non-Belgian nationality

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Current legislation limits hiring foreign colleagues speaking no French nor Dutch

Jean-Claude Gérard, Academic session "50 years of BIRA-IASB"

Brussels, 25 November 2014

# A few major achievements

Major advances in the fields of aeronomy and space physics were and are being accomplished by scientists of the institute. To quote only a few (non-exhaustive list):

Photochemistry of stratospheric ozone and elucidation of the source of OH nightside IR emission

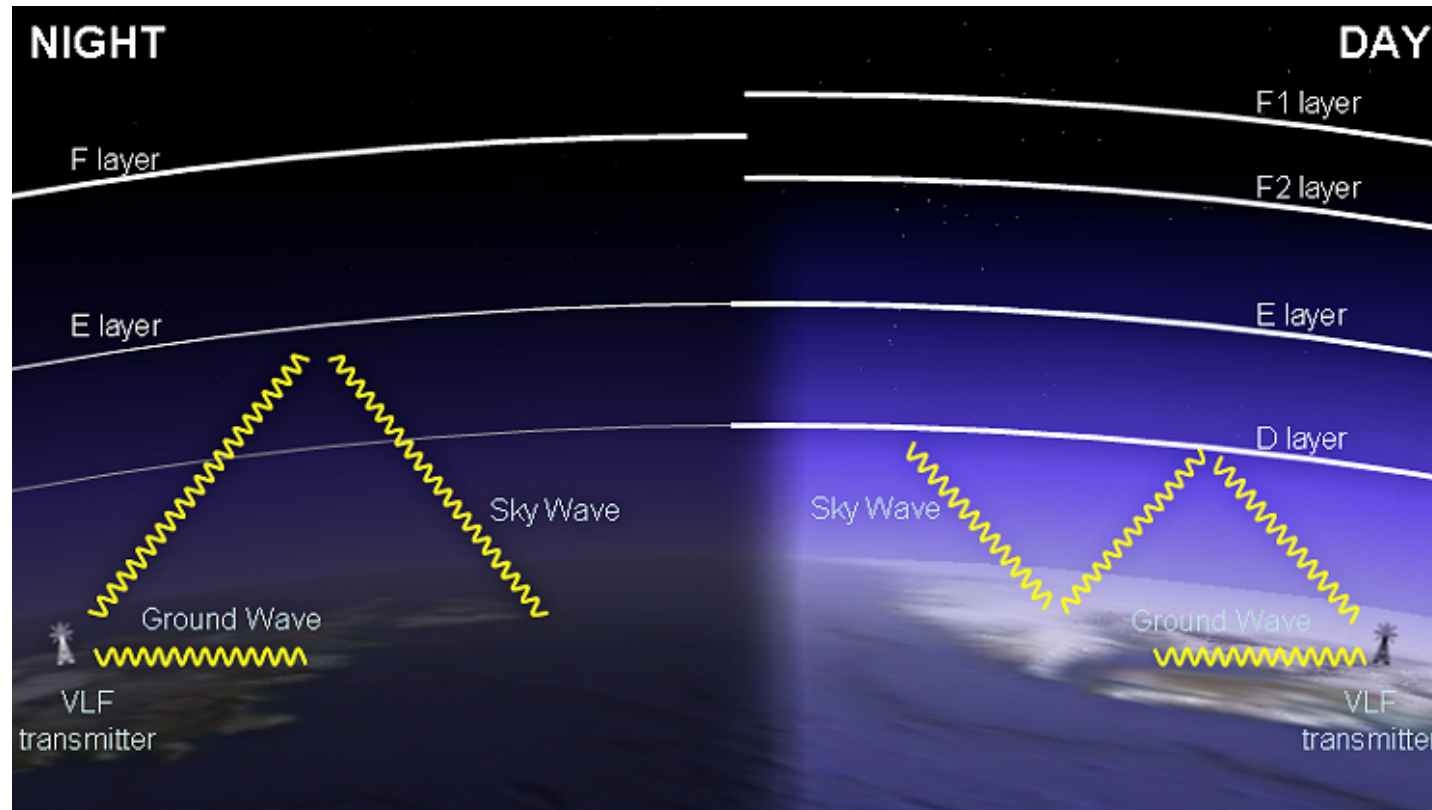
Airglow layer



Bates-Nicolet mechanism

# A few major achievements

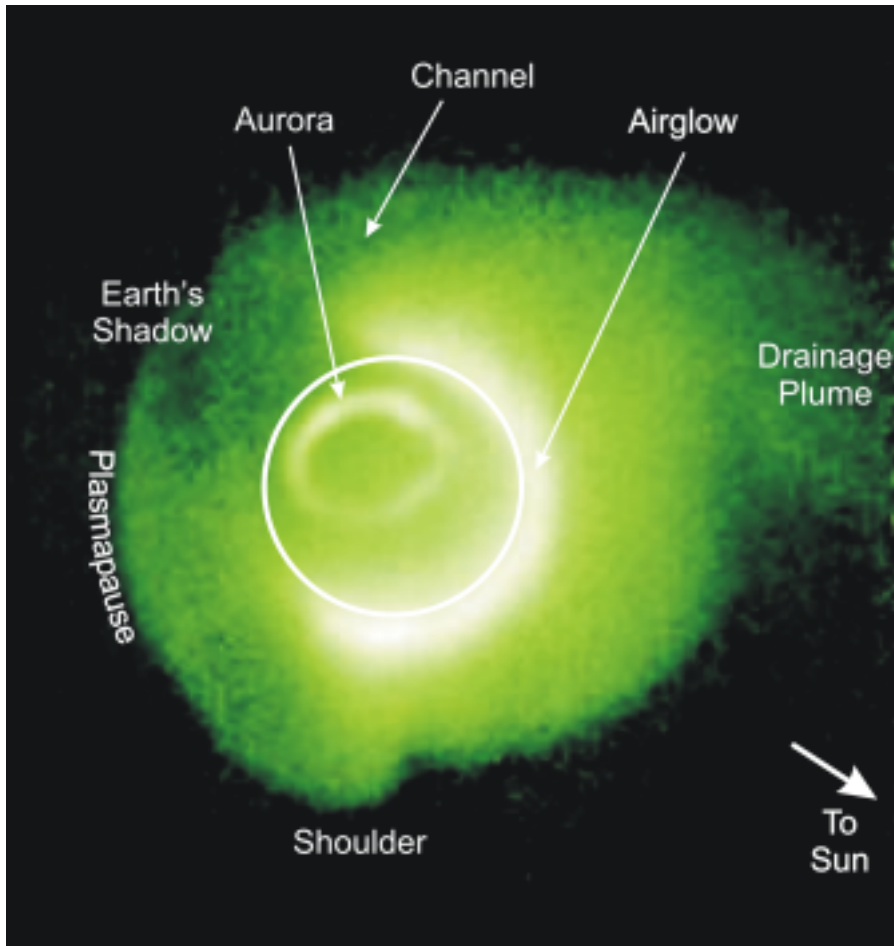
## Production and loss processes of electrons and ions in the ionosphere



The presence of free electrons in the upper atmosphere plays a key role in the propagation of radio signals

# A few major achievements

## Structure of and processes occurring in the solar solar and at the plasmopause

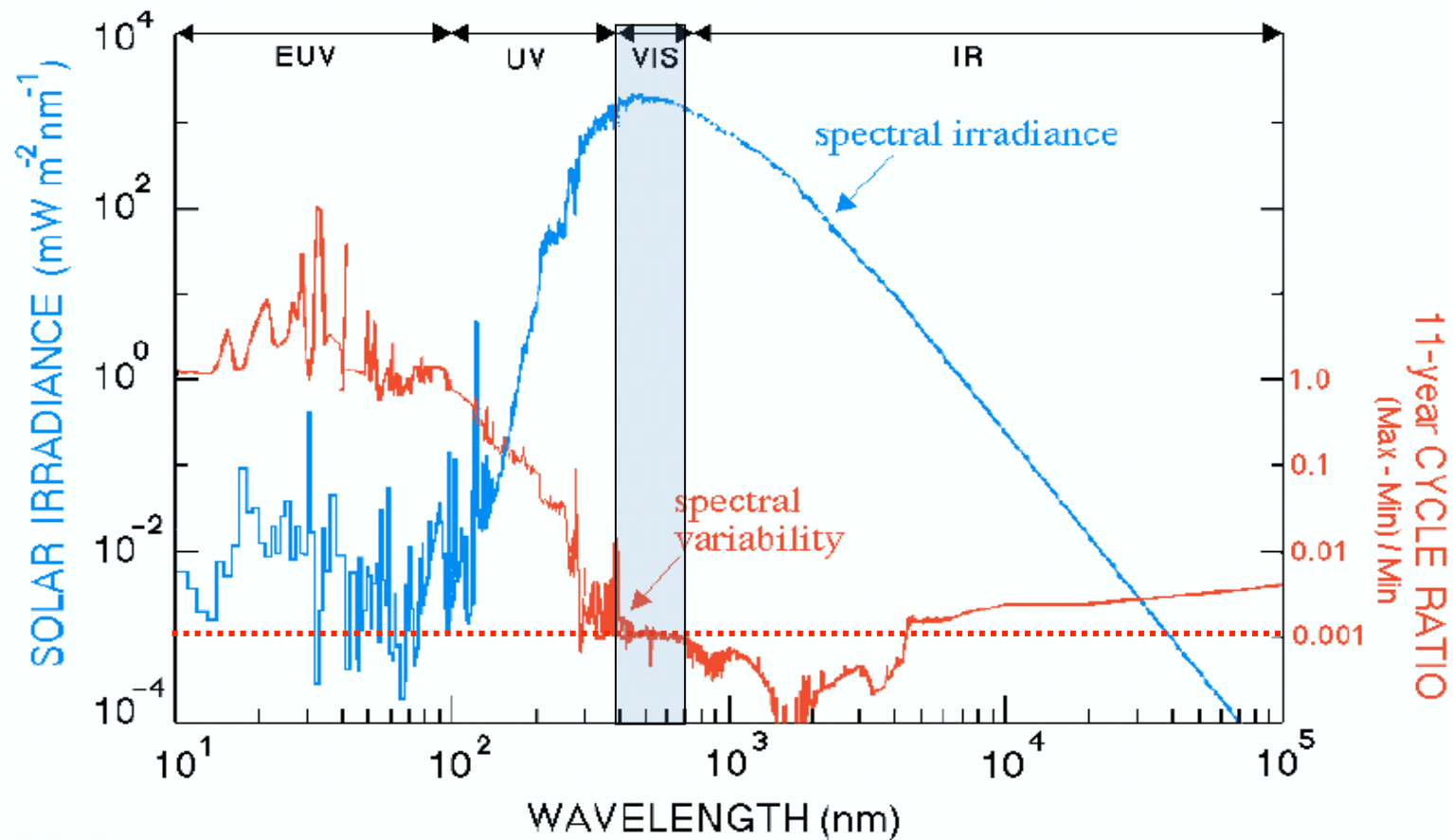


He<sup>+</sup> ions in EUV solar radiation made visible

The existence of a helium layer was predicted at BIRA-IASB and later confirmed by satellite measurements

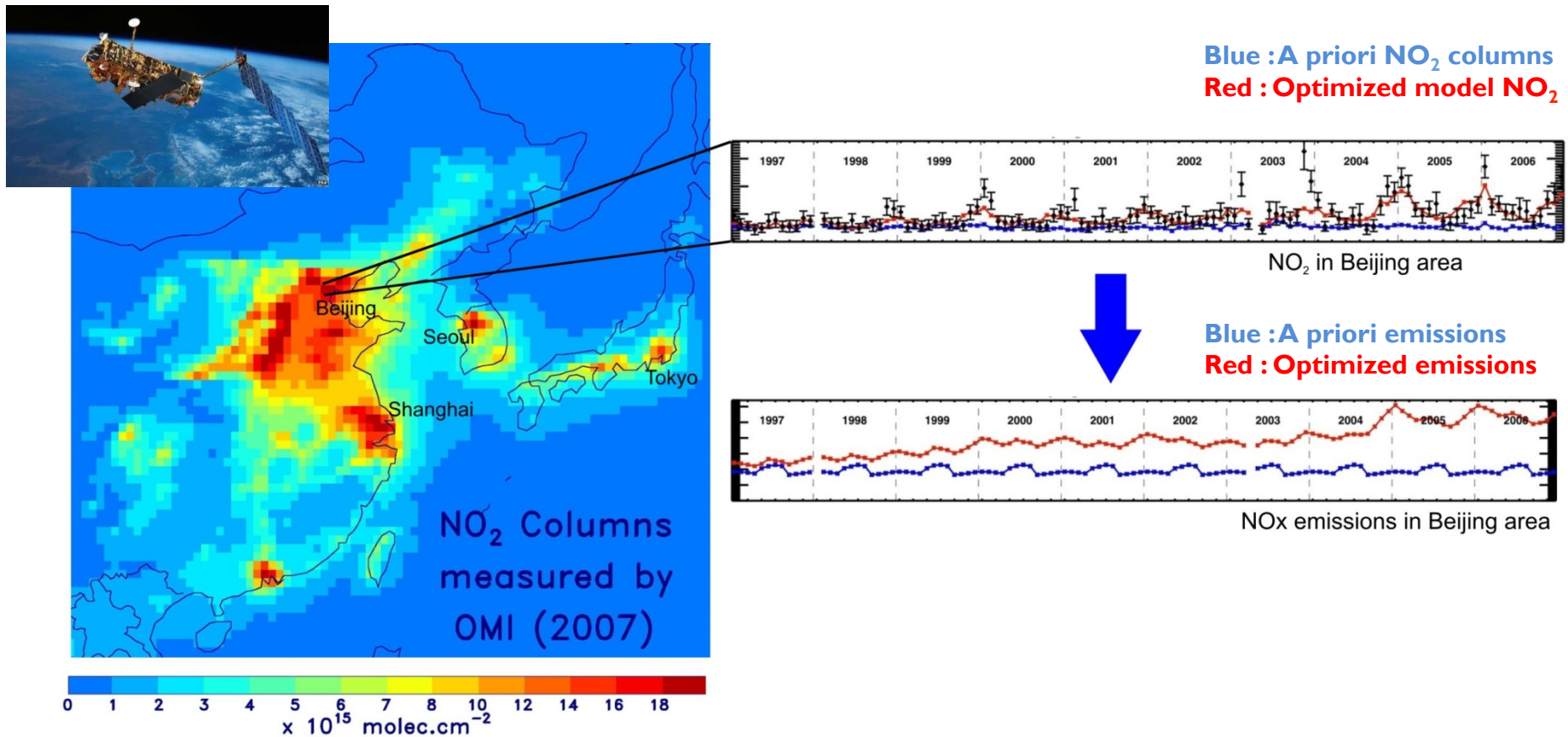
# A few major achievements

## Variability of the solar radiation reaching the Earth's upper atmosphere (SOLSPEC instrument)



# A few major achievements

## Observations and modeling of minor constituents in the lower atmosphere



Long-term datasets of satellite NO<sub>2</sub> abundances to determine NO<sub>x</sub> emissions over industrialized areas



# A few major achievements

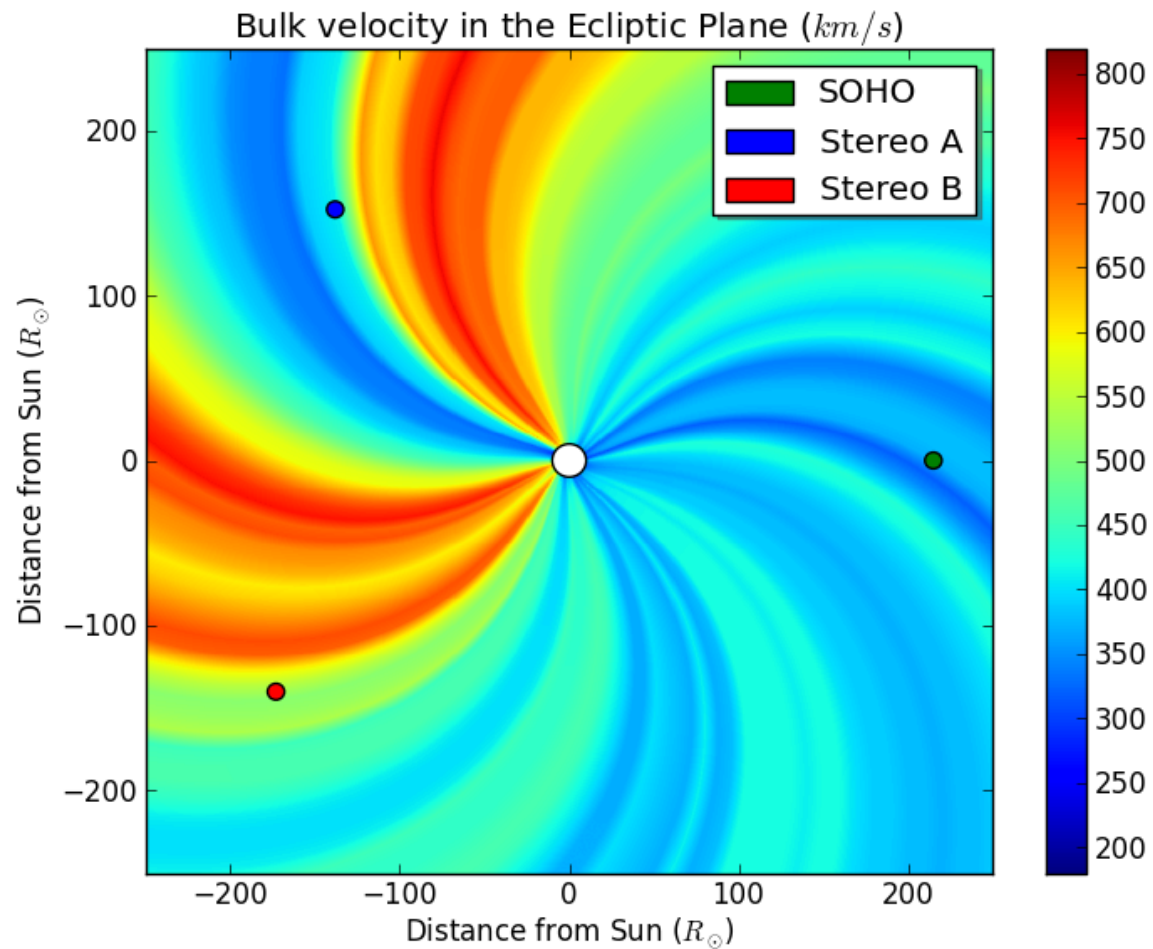
## Characterization and importance of aerosols in the Earth's and terrestrial atmospheres



The properties and role of aerosols in atmospheres may be determined from observations of their interaction with solar radiation

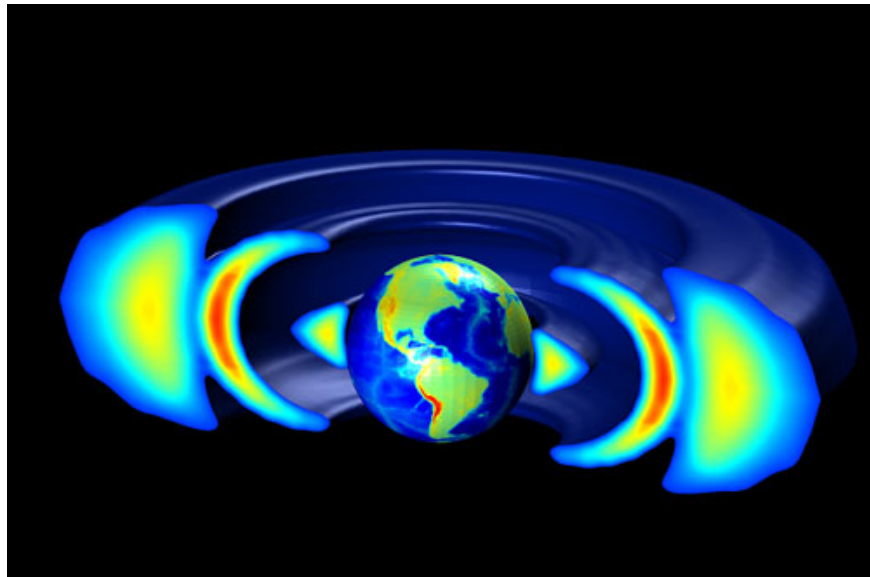
# A few major achievements

Solar wind and exosphere : where gas and plasma leave the Sun and the Earth's atmosphere

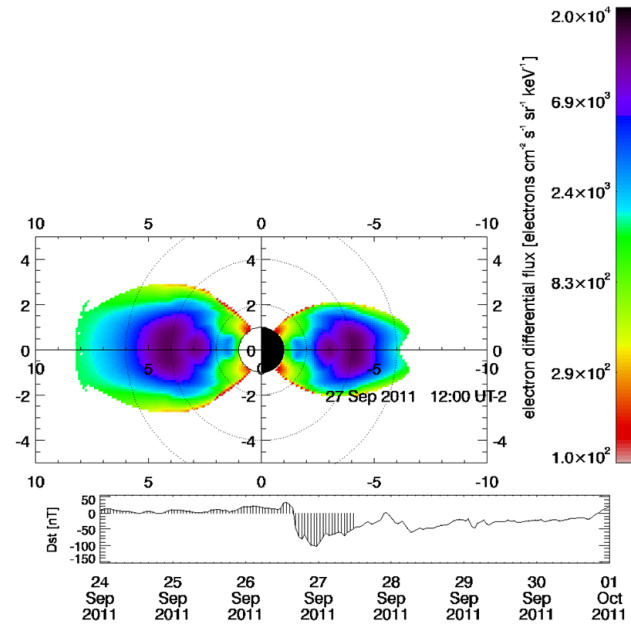


# A few major achievements

Radiation belts surrounding the Earth: a threat for humans and instruments flying in the Earth's environment



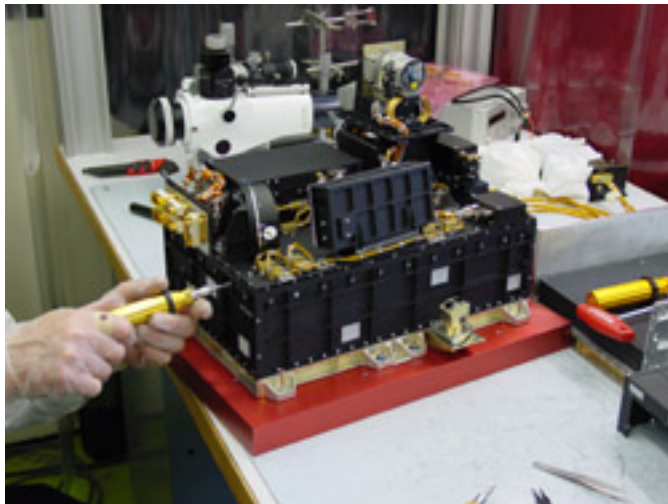
Artist view



Cluster observations

# A few major achievements

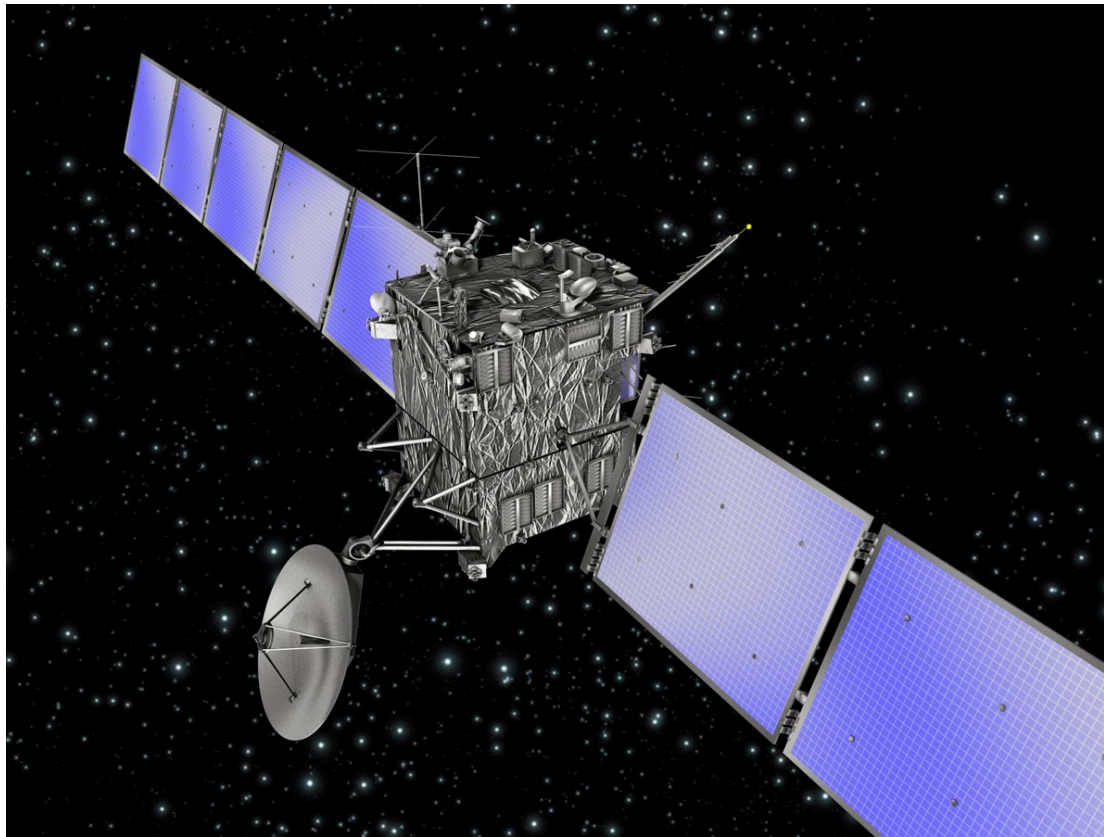
## Development of new high-performance instruments for space platforms



SOIR instrument currently measuring constituents on board ESA's Venus Express spacecraft

# A few major achievements

High-precision measurements of the chemical composition of the Venus and comet atmospheres

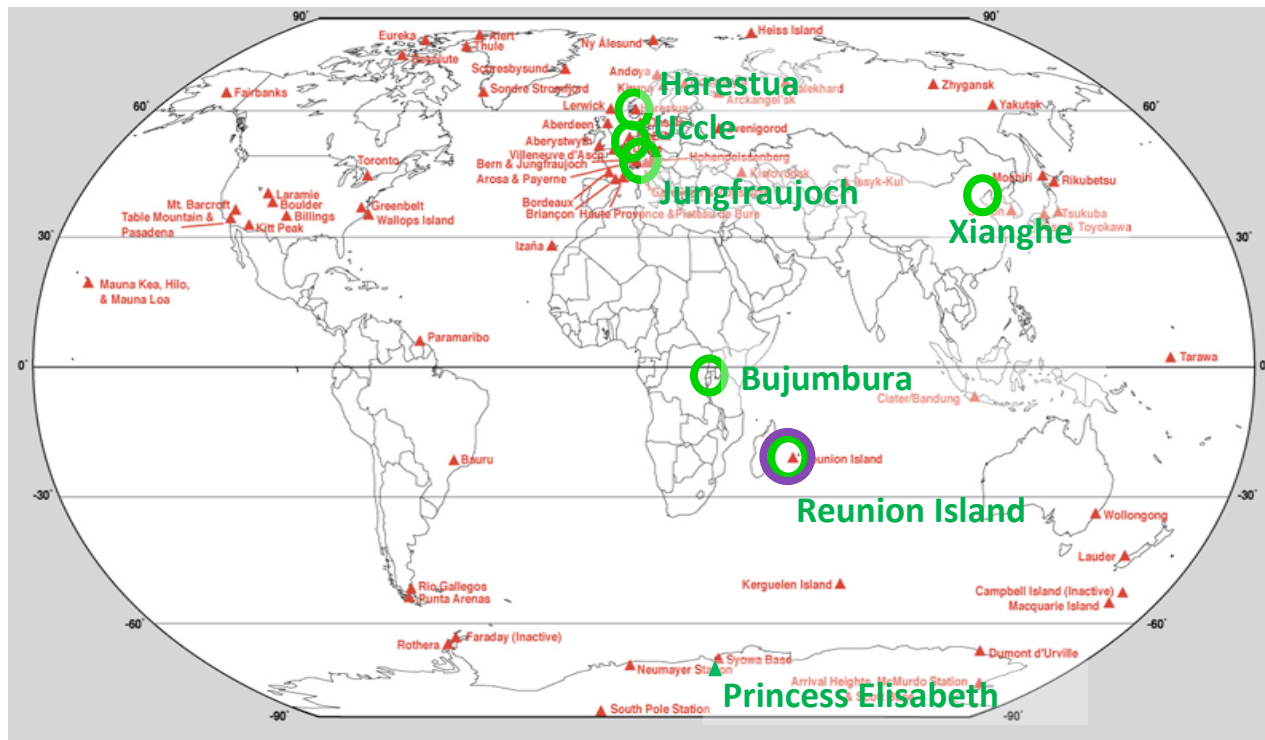


Rosina mass spectrometer  
on board Rosetta

# Participation to global networks

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## NDACC - Network for the Detection of Atmospheric Composition Change



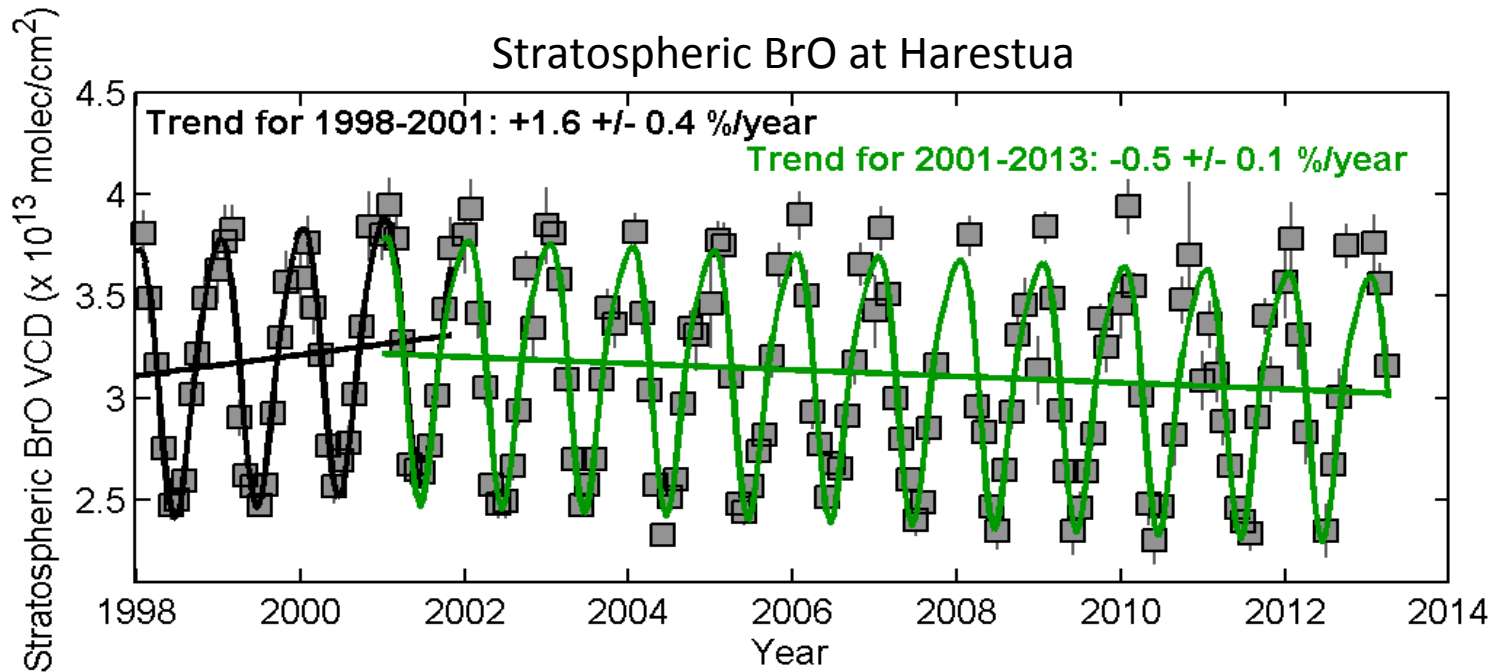
Co-chairmanship:  
2003-2004  
2013-

Working groups  
co-chaimanship:

- UV-Vis
- IR
- Satellites

# Participation to global networks

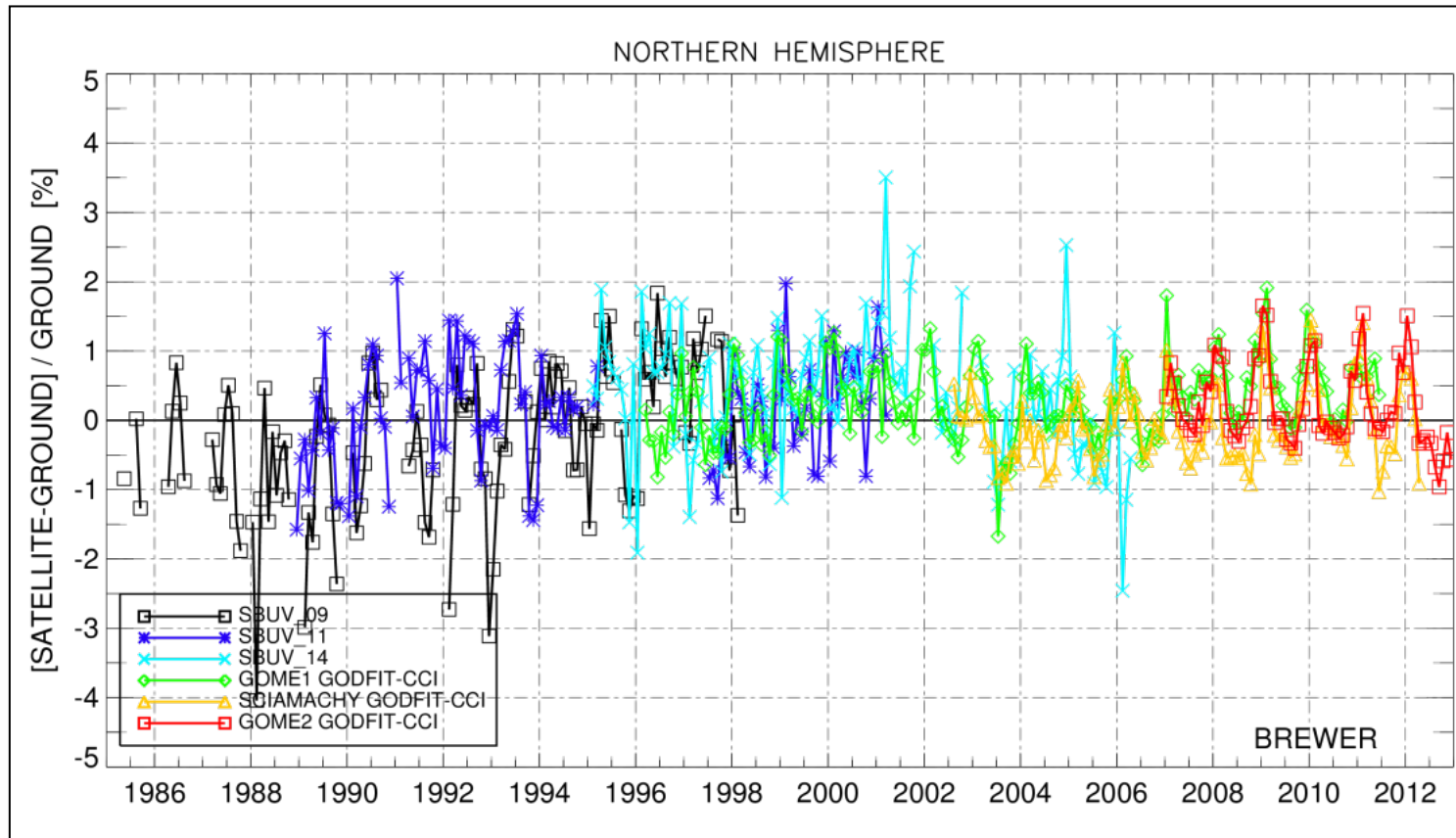
## NDACC Network



⇒ Data for policy makers (e.g. Montreal Protocol and IPCC)

# Participation to global networks

## Development of ground-based networks for validation of satellite measurements



Validation of satellite measurements with accurately (re-)calibrated ground-based instruments



# Participation to global networks



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AWDANet (network of whistler receiving stations for monitoring of the plasmasphere)

National level:

- BRAMS (Network of RADio Meteor Stations)
- UV Network

# Participation to satellite communities

## Current satellite missions:

### Earth observations:

- ALTIUS
- PICASSO

### Solar observations:

- SOLSPEC

### Solar system missions:

- MARS EXPRESS : SPICAM
- VENUS EXPRESS : SPICAV
- ROSETTA: ROSINA
- EXOMARS TGO : NOMAD (strong heritage from the VENUS-EXPRESS)

# Participation to satellite communities



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## Earth and solar observations:

- Global Ozone Monitoring Experiment (GOME), 1993-2004 and validation sub-group
- Scanning Imaging Absorption Spectrometer for Atmospheric Chartography (SCIAMACHY)
- Global Ozone Monitoring by Occultation of Stars (GOMOS) since 1995 plus QWG
- ACE-SCISAT Science Team since 1998
- IASI
- GOSAT
- OCO-2
- TROPOMI
- GOME-2 on board MetOp (EUMETSAT)
- ESA-4S Scientific Committee since 2007
- ALTIUS and PICASSO Science Teams

# Participation to satellite communities

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## Planetary and cometary missions:

- SWT of Vex and ExoMars TGO
- JWST Mars Focus Group

## Space Physics:

- ULYSSES: interdisciplinary science participation in the 90ies
- CLUSTER: involvement since 1996

# Software developments at the Institute



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## Atmospheric research:

GMES/Copernicus  
ESA CCI

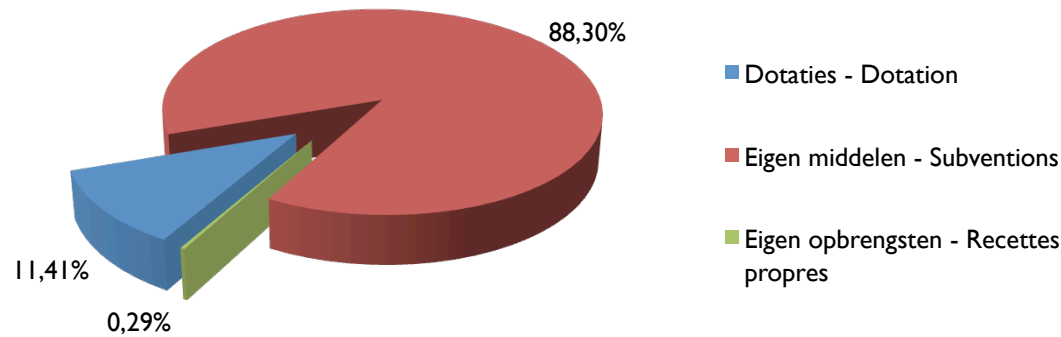
## Space Physics:

SPENVIS

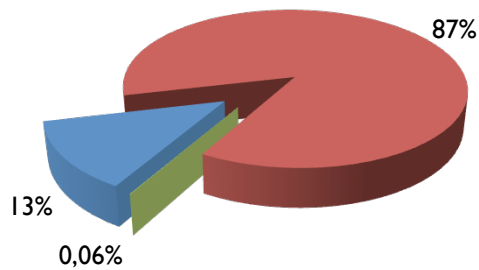
# Budget from international cooperative projects

**2013**

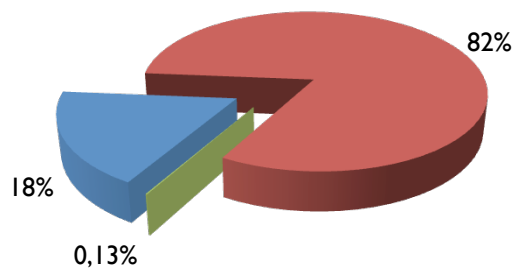
Drop in the relative importance of institutional funding (dotation-dotaties)



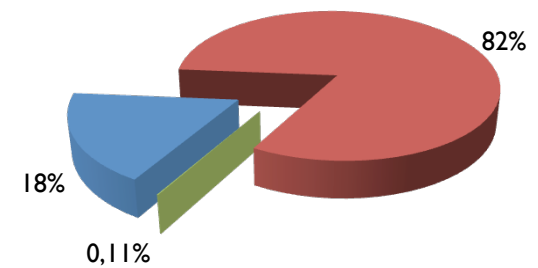
**2012**



**2011**



**2010**



# Some personal thoughts



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- IASB-BIRA is **very highly regarded** among the national and international community. I believe its future is bright if they are supported to continue their research activity.
- Funding sources tend to be more and more oriented toward “guided” research, which leave little freedom to explore new fields. This guidance is necessary for space projects requiring expensive experimental developments and infrastructures, but in the long run, **they should not kill personal or team initiatives.**
- Efforts have been made to encourage scientific **collaborations between BIRA-IASB and university teams (BRAIN projects for example).** I am convinced that this line needs to be encouraged in the future as they benefit to both sides.

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# Thank you for your attention!

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