



IR Space Missions colloquium

Konkoly Observatory
Budapest, 11 May 2006

Infrared astronomy and space activities in Hungary

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Vice-chairman-elect of UN COPUOS

Hungary's space activities – an overview

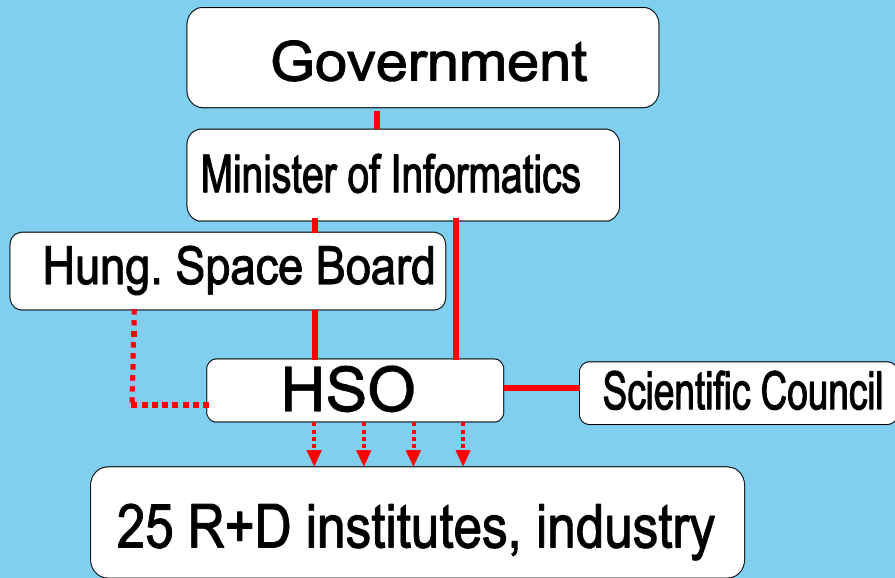
- ❖ **Main features of our space activity**
 - ❖ History
 - ❖ Organization
 - ❖ Budget
- ❖ **International relations**
- ❖ **Progress in ESA-Hungarian relations**
- ❖ **IR astronomy, as a successful ESA-Hungarian project**

Brief history

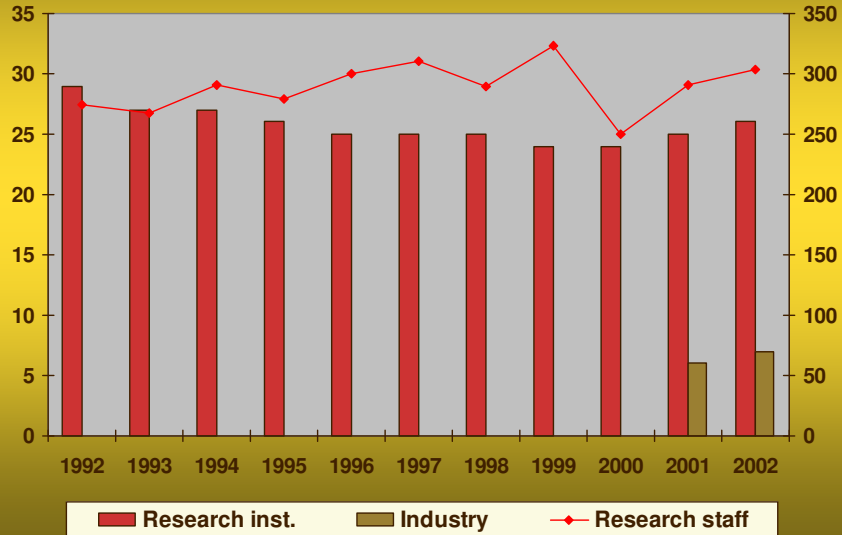
- ◆ 1946: Zoltán Bay – Lunar radar
- ◆ 1960s – 80s: Intercosmos
 - 1971: First Hungarian on-board instrument
 - 1980: Hungarian cosmonaut
 - 1986: VEGA mission
- ◆ 1992 – : New organisation:
Hungarian Space Office
 - supervised by a minister (instead of Academy)
 - new international relations
 - applications vs. basic research
 - creating space industry



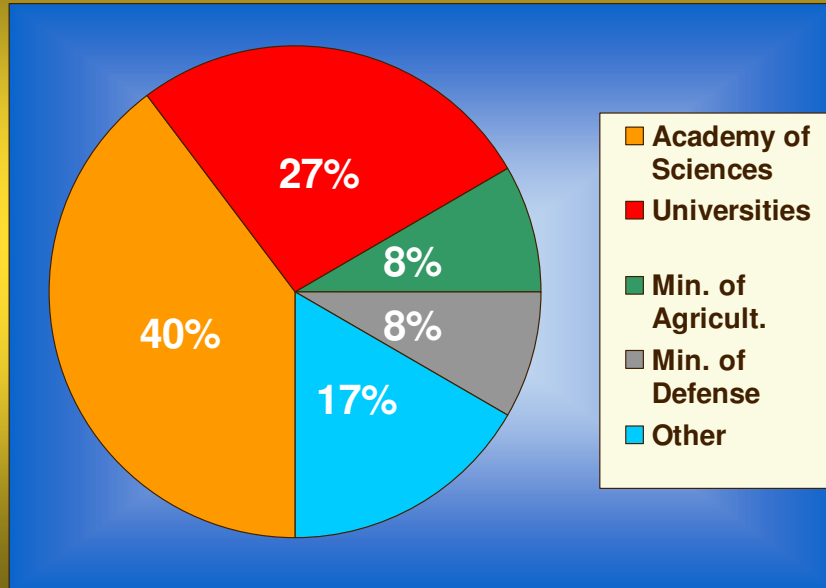
Organisation



Institutes and researchers



Supporting institutions

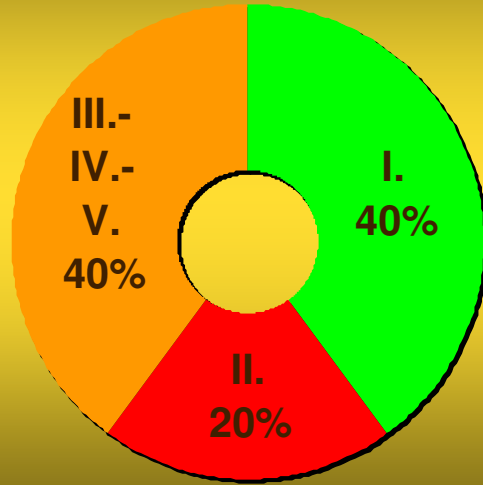




Research fields

Main fields of activity

- ❖ I. Earth observation
- ❖ II. Space physics
- ❖ III. Life sciences
- ❖ IV-V. Space technics and technology



I. Earth observation

10 institutes

- ❖ theory and application of remote sensing
- ❖ space geodesy
- ❖ geophysics
- ❖ meteorology etc.



II. Space physics

3 institutes

- ❖ astronomy
- ❖ planetology
- ❖ physics of interplanetary field
- ❖ cosmic materials etc.



III. Life sciences

8 institutes

- ❖ biophysics
- ❖ microbiology
- ❖ psychology
- ❖ vestibular research
- ❖ aerospace medicine
- ❖ simulating the effects of weightlessness etc.



IV. Space technics and technology

4 institutes

- ❖ building on-board instruments,
- ❖ software development
- ❖ materials sciences
- ❖ telecom etc.





High priority projects

High priority projects

- ❖ **Applications**

- ❖ **Remote sensing**

- ❖ **Navigation**

- ❖ **On-board instruments**

- ❖ **Dosimetry (Pille)**

- ❖ **Materials sciences (UMC)**

- ❖ **SAS geophysical instrument**

- ❖ **ESA Rosetta mission participation**

Remote sensing

- ♦ Agriculture
 - ♦ crop area monitoring
 - ♦ agricultural subsidiaries
 - ♦ crop forecast
 - ♦ wine and orchard monitoring
- ♦ Environmental protection (land use monitoring)
- ♦ Mapping, surveying, GIS
- ♦ Flood, waterlog, drought monitoring, disaster management

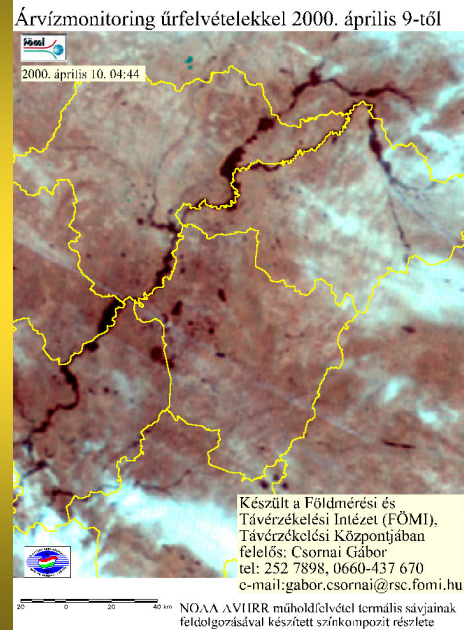
Agriculture

- ❖ Regular crop forecast for the Min. of Agriculture
- ❖ Land parcel identification system
- ❖ EU area-based subsidy control



Environmental protection, disaster management

- ❖ CORINE Land Cover, 1:50 000, according to European standards
- ❖ Change detection in Szigetköz region
- ❖ Flood and drought monitoring



Mapping, GIS projects for local governments

- ❖ Developments towards the improvement of the remote sensing data service and the examination of applying superhigh resolution satellite images for topographic map edition



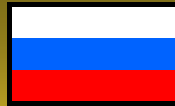
Navigation applications

- ❖ GPS, Galileo, (Glonass)
- ❖ Some applications:
 - ❖ surveying, intelligent transport, disaster management etc.
- ❖ Demand for high accuracy (?)
- ❖ Awareness increase





Pille



Personal dosimeter, checking the radiation absorbed by astronauts' body



Pille: a success story

1980: Salyut-6

1984: Challenger

1994: Euro-Mir

1997: NASA-Mir

2001: ISS (USA)

2003: ISS (Russia)



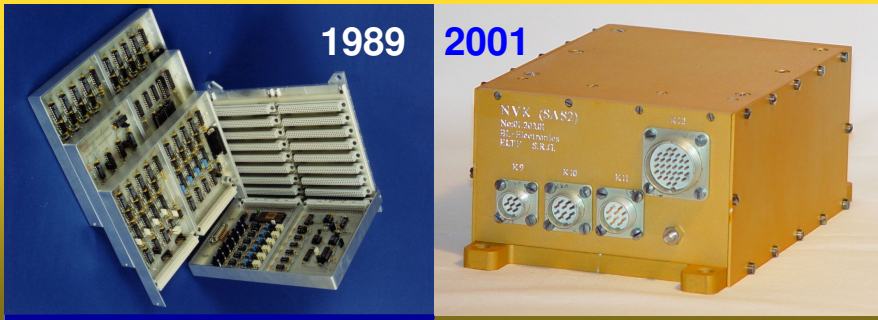
UMC (space furnace)

- 1994-95 and 2000-2001: successful NASA tests
- Prototype for ISS
- NASA withdraws its intention
- 2002: Millenium prize (Hung. Patent Office)
- Milestone in Hungarian space industry: UMC sold to NASA (for ground experiments)

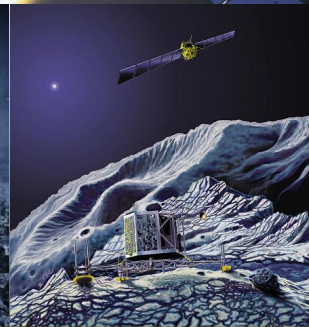
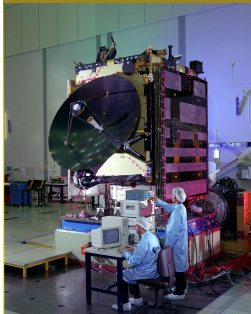


SAS instrument for geophysical research

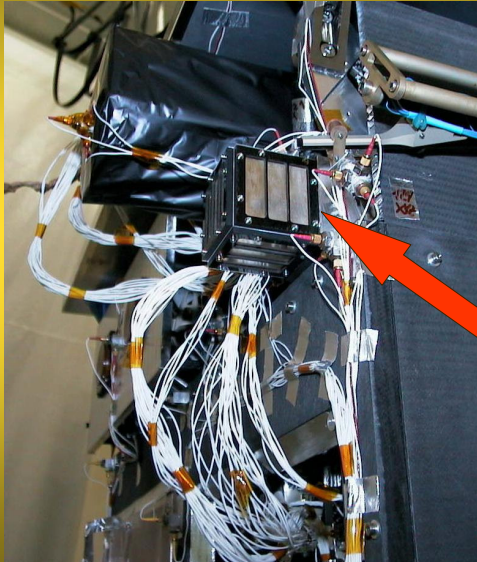
- 1989: Intercosmos-24
- 2001-: Compass (-2) Russian satellite
- Predvestnik, Vulcan series
- Russian-Ukrainian-Hungarian experiment for ISS



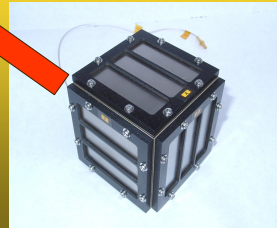
Rosetta cometary probe



Rosetta cometary probe



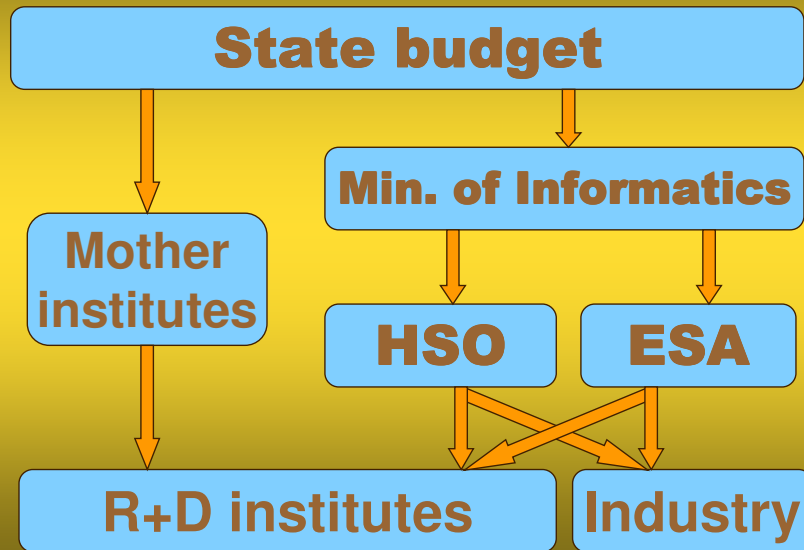
- ❖ Hungarian participation: about 1%
- ❖ Lander power supply
- ❖ Orbiter CDMS
- ❖ Simple Plasma Monitor
- ❖ Dust Impact Monitor
- ❖ Ros. Plasma Consortium



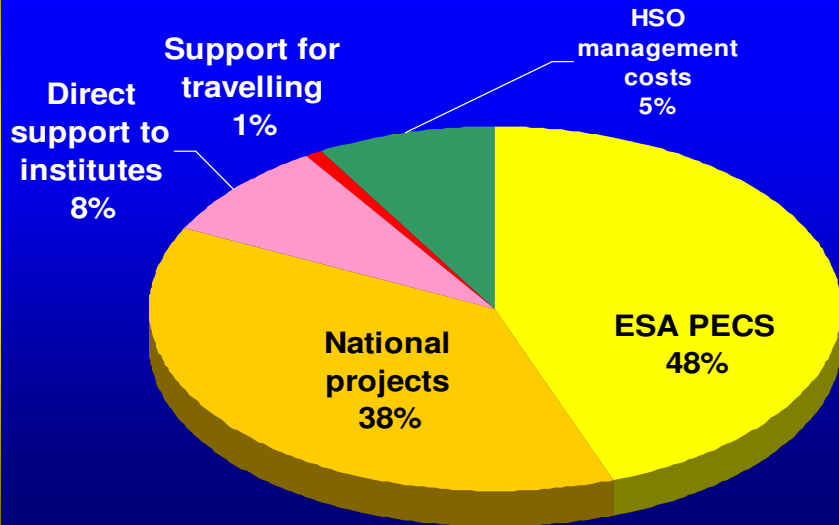


Financing

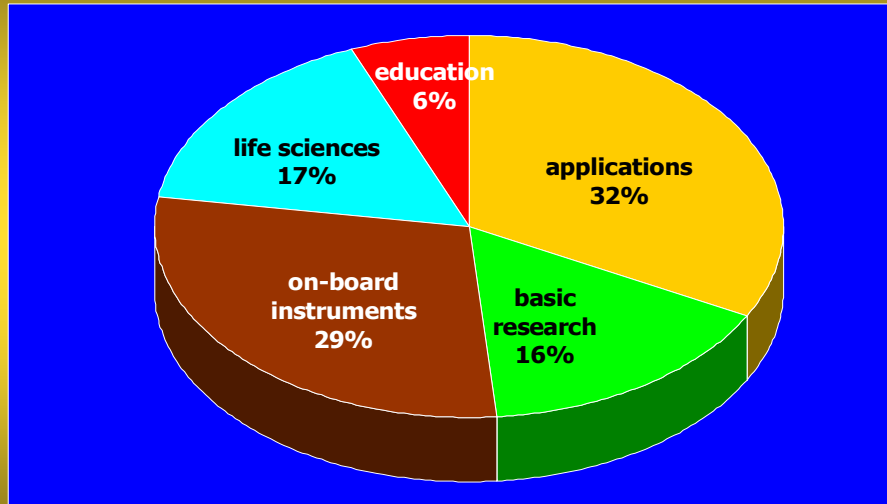
Source of budget



Budget - 2004

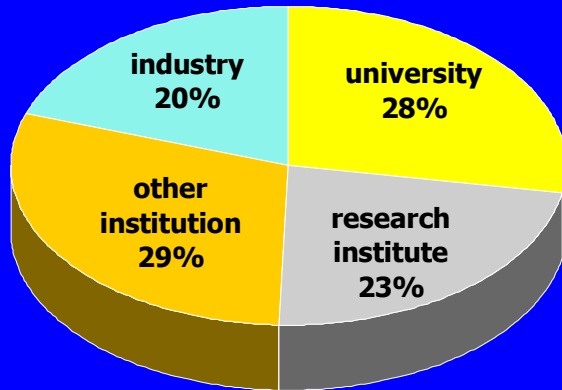


Thematic distribution



Based on year 2004 projects (59 pcs)

Project leaders

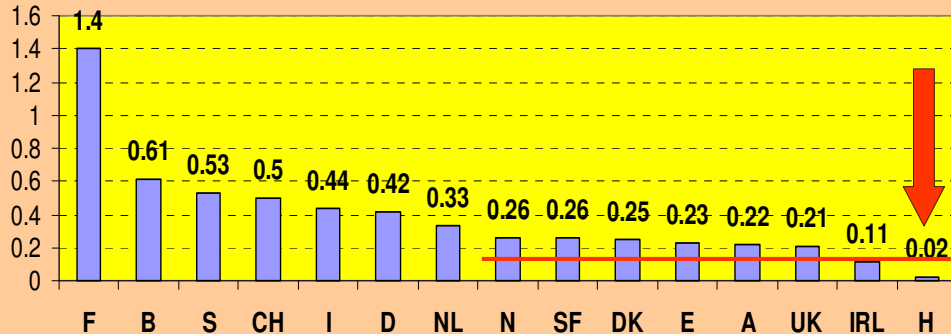


Based on year 2004 projects (59 pcs)

Our budget

in international comparison

Space budget in thousandth of GDP

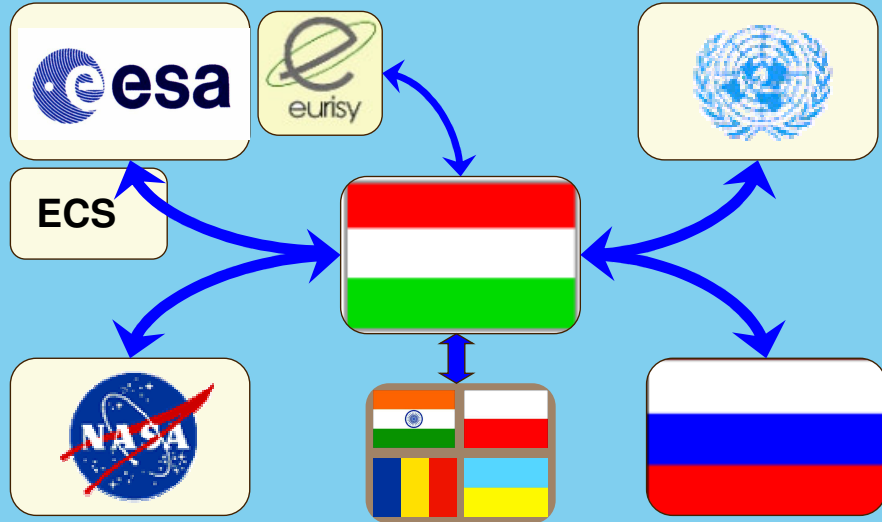


Sources: Eur. Sp. Directory 99, ESA Ann. Rep. 97,
www.eurospace.org, CIA The World Factbook 98



International relations

International relations





relations to



- **1991: General Agreement**
- **1997: Extension of the General Agreement**
- **1998: Hungary joins PRODEX programme**
- **1999 - : Information on Hungary's possible accession to the ESA Convention**
- **1999 Oct.: ESA Workshop in Budapest (ESA's relations to 4 CEE countries)**
- **2001: Extension of the General Agreement**
- **2003: Joining PECS**
- **2006: Official negotiations on the accession to the ESA Convention**

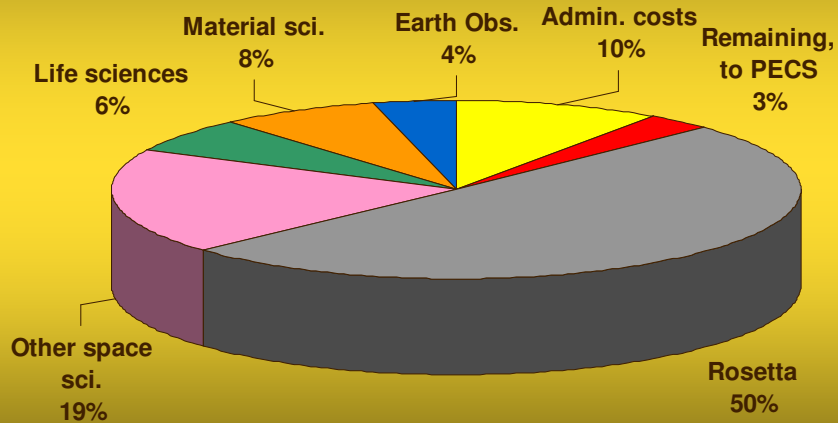
Of the „ten new” and candidates

				
Gen. Agreem.	1991	1996	1994	1993
PRODEX	1998	2000	---	---
PECS	2003	2004	---	2006

5 years in PRODEX

- **1998-2003 (2004)**
- **15 projects**
- **3.445 million euro contribution**

Thematic distribution



Total: 3,5 M euro

Summary of projects

- **Rosetta** - 6 projects (CDMS, Rosina RNGIS, RPC, Simple Plasma Monitor, Dust Impact Monitor, Lander Power Supply Unit)
- **Space Physics:** Cluster Data Exploitation, ISOPHOT Data Processing, Netlander participation,
- **Life Sciences:** ISS-EXPOSE, Matroshka ISS Neutron Detection
- **Earth Observation:** ENVISAT application for Flood/Waterlog and Draught/Crop Monitoring
- **Material sciences:** MICAST, MAPP, Modelling of Nucleation

PRODEX conclusions

- **Opportunity for participation in state-of-the-art projects**
- **Good scientific output**
- **Internally: good argument for higher level of financing**

Origins of PECS

A Hungarian initiative

(following the summer 1999 accession negotiations)

- 1999 October:
ESA Workshop
in Budapest
(ESA's relations
to 4 CEE countries)



Signing of the PECS Agreement (Budapest, 7 April 2003)



Signing of the PECS Charter (5 Nov. 2003)



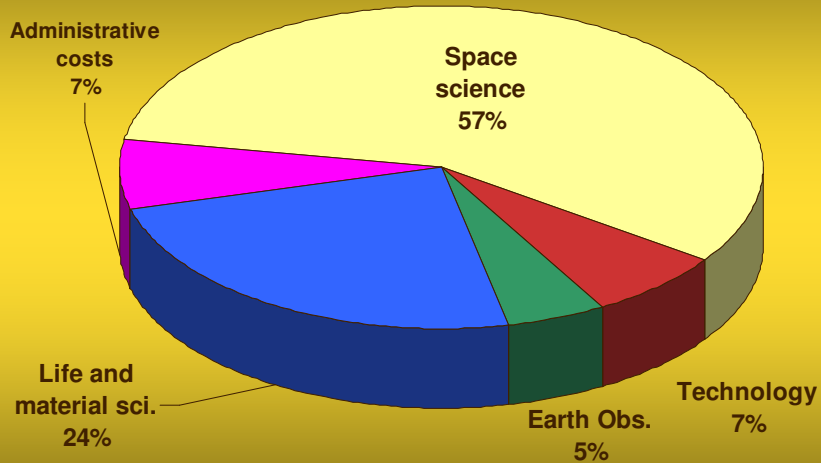
Proposed fields of activity

- ❑ Earth observation and related fields
- ❑ Software, electronics, instrument building
- ❑ Basic space sciences
- ❑ Hardware development
- ❑ Microgravity (human and non-human)
- ❑ Navigation

Summary of 31 projects

- **Rosetta, BepiColombo (6+4):** (CDMS, RPC, SPM, DIM, Lander Power Supply)
- **Further Space Physics (7):** Cluster-2, Venus Express, Mars DDS, Herschel PACS, SOHO-Virgo, COROT
- **Earth Observation (3):** ENVISAT application for Flood/Waterlog and Draught/Crop Monitoring, DInSAR, School Atlas
- **Life Sciences (4):** ISS-EXPOSE, SSIIOUX-exobiology, Matroshka ISS Neutron Detection, DOSTEL
- **Physical microgravity (5):** MICAST, Modelling of Nucleation, MONOPHAS, Microgravity foams, Hydrodynamic instability
- **Technology (2):** PALAGMI, Advanced monitoring

Planned breakdown of costs



Contribution: minimum 1 million euro/year

Goal: full ESA membership

- ❖ **Dec. 2005: Government authorization for accession negotiations**
- ❖ **Jan. 2006: Hungary announced the intention to access the ESA Convention**
- ❖ **March 2006: ESA Council authorization for the DG for the negotiations, obstacles, conditions specified**
- ❖ **(Later in 2006: PECS Committee)**
- ❖ **Later in 2006: begin of negotiations**

Possible roadmap:

- ❖ **2008: transition year**
- ❖ **2009: accession**
- ❖ **OR: few more years in PECS**

Conclusions: the place of IR astronomy in the landscape

- ❖ The space field in Hungary has long tradition.
- ❖ Good progress in ESA relations, goal is full membership.
- ❖ Successful implementation of the PECS agreement
- ❖ Konkoly Observatory plays an important role (3 successful projects)
- ❖ Estimated contribution to mandatory programmes as a member state: 5–7 million euros (5–7 times more than in PECS!)
- ❖ Future: if the budget allows (membership!) broadening of the on-going projects, instead of launching new ones (though not excluded)
- ❖ Industrial participation is desirable
- ❖ Further advantage: astronomy belongs to mandatory activity





