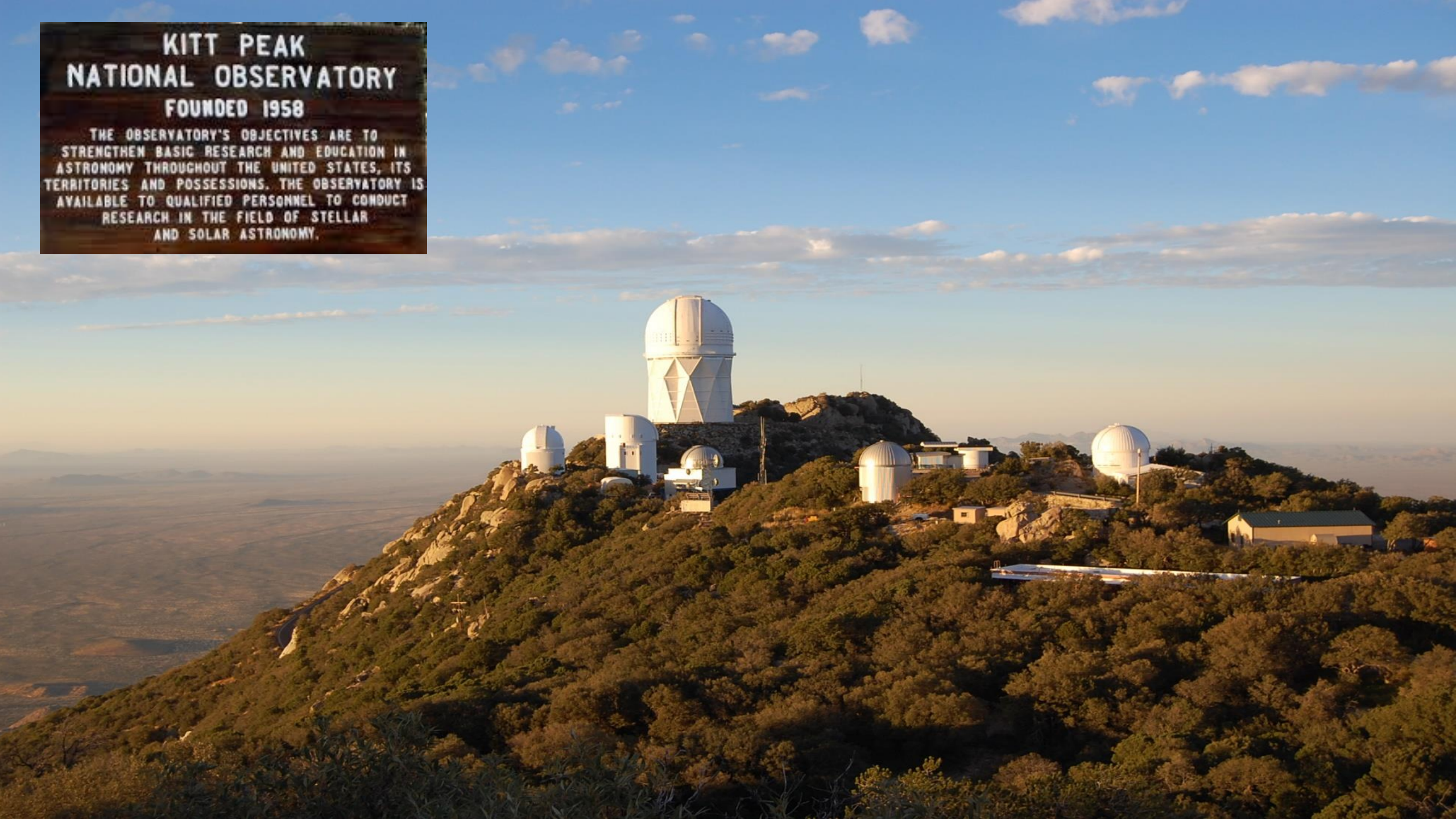
Où il est question d'une Europe de l'Astronomie

9 mai 2017, D. MOURARD

3 Jun 1948

Inauguration of the Hale telescope


KITT PEAK
NATIONAL OBSERVATORY
FOUNDED 1958
THE OBSERVATORY'S OBJECTIVES ARE TO STRENGTHEN BASIC RESEARCH AND EDUCATION IN ASTRONOMY THROUGHOUT THE UNITED STATES, ITS TERRITORIES AND POSSESSIONS. THE OBSERVATORY IS AVAILABLE TO QUALIFIED PERSONNEL TO CONDUCT RESEARCH IN THE FIELD OF STELLAR AND SOLAR ASTRONOMY.

Naissance du CERN en Europe au début des années 1950

Lausanne, Décembre 1949, Louis de Broglie propose la création d'un laboratoire européen de physique atomique lors de la Conférence européenne de la culture.

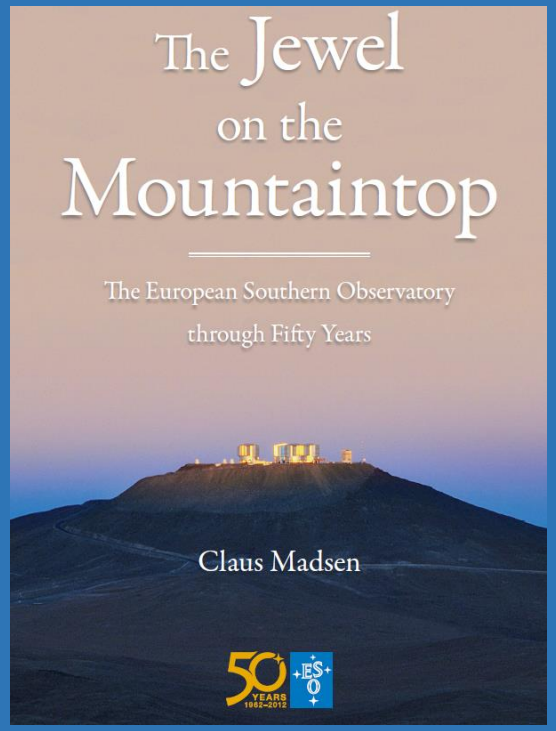
Florence, Juin 1950, lors de la 5e Conférence générale de l'UNESCO, les scientifiques font inscrire une résolution autorisant l'UNESCO à « assister et encourager la création de laboratoires régionaux pour accroître la coopération scientifique internationale ».

Paris, Décembre 1951, la première résolution concernant la fondation d'un Conseil européen pour la recherche nucléaire (CERN) est adoptée. Deux mois plus tard, 11 pays signent un accord pour la création du Conseil provisoire.

Le 29 septembre 1954 l'Organisation européenne pour la Recherche nucléaire voit officiellement le jour. Le Conseil provisoire du CERN est dissous, mais l'acronyme restera.

ESO: naissance en 1962

Allemagne, Belgique, France, Pays-Bas et Suède




Ont signé:

Prof. O. Heckmann
Directeur de l'Observatoire de Hambourg

Prof. A. Unsöld
Directeur de l'Observatoire de Kiel

Dr. P. Bourgeois
Directeur de l'Observatoire royal de Belgique

Dr A. Couder
Astronome de l'Observatoire de Paris

Prof. A. Danjon
Directeur de l'Observatoire de Paris

Prof. R. O. Redman
Directeur de l'Observatoire de Cambridge

Prof. J. H. Oort
Directeur de l'Observatoire de Leyde

Prof. P. Th. Oosterhoff
Astronome de l'Observatoire de Leyde

Prof. P. J. van Rhijn
Directeur du Laboratoire Astronomique "Kapteyn"
Groningue

Prof. B. Lindblad
Directeur de l'Observatoire de Stockholm

Prof. K. Lundmark
Directeur de l'Observatoire de Lund

Prof. K. G. Malmquist
Directeur de l'Observatoire d'Uppsala

Otto Heckmann, ESO's first Director, wrote in his book *Sterne, Kosmos, Weltmodelle*: *"American astronomy, based on large instruments, seemed destined to remain a monologue, even though fruitful science demands dialogue, yes even controversy."*

Naissance de l'ESA en 1975

- Au début des années 1960 germe l'idée de la création d'un programme spatial scientifique européen sur le modèle du CERN: commission préparatoire européenne pour la recherche spatiale (COPERS).
- 1962 : création de l'ESRO (European Space Research Organisation) dont l'objectif est la réalisation de satellites scientifiques et de l'ELDO, (European Launcher Development Organisation) pour le développement d'un lanceur européen baptisé Europa. Les deux organisations deviennent opérationnelles en 1964.
- 1963: création de la Conférence européenne des télécommunications par satellite (CETS).

- Juillet 1973: accord DE/FR/UK pour le financement des programmes :
  - le lanceur L3S (Ariane) souhaité par la France et qui est placé sous maîtrise d'œuvre du CNES,
  - le module de recherche Spacelab de la Navette spatiale américaine demandé par l'Allemagne
  - Le satellite de télécommunications maritimes MAROTS souhaité par le Royaume-Uni.
- Signature le 30 mai 1975 par onze États membres européens de la Convention de l'Agence spatiale européenne

La situation en France dans les années 60

- Création de l'ESO
- Vision d'une organisation nationale au service des grands projets
- Impulsion considérable de Jean-François DENISSE, tour à tour Président de l'Observatoire de Paris, du CNES et de l'INAG!
- Construction du Radiotélescope de Nançay et du Calculateur de l'Observatoire de Paris (lien ESO)
- Les décisions pour le CFHT et l'IRAM

Un tournant important

- Du milieu des années 1970 à la fin du siècle: construction des grands observatoires, montée en puissance de l'astronomie française.
- Poursuite de la perspective des très grands projets (ALMA, E-ELT, CTA, SKA)
- Rupture dans la dimension des projets – globalisation de plus en plus évidente
- Vision d'une prospective européenne renforcée

➔ **ASTRONET**

WHY ASTRONET? (AML, 2005)

- Projects for the next 10-20 years : ELT, SKA (Antarctica ?)…
  - These projects do not fit in the available budgets
  - What is the frame to build and operate these world-scale infrastructures?
- ESO and ESA do not cover the whole astronomy
- Large infrastructures for astroparticules : neutrinos, gravitational waves…
- If we have to convince our national authorities that we really need new large telescopes, we have to show a european strategy in astronomy
  - A european prospective in astronomy
  - An infrastructure roadmap
  - Including R&D and key technologies, training
- ASTRONET should be the tool to organize this european reflexion

ASTRONET

A consortium of funding agencies for European astronomy focusing on strategic planning and coordination

Aim

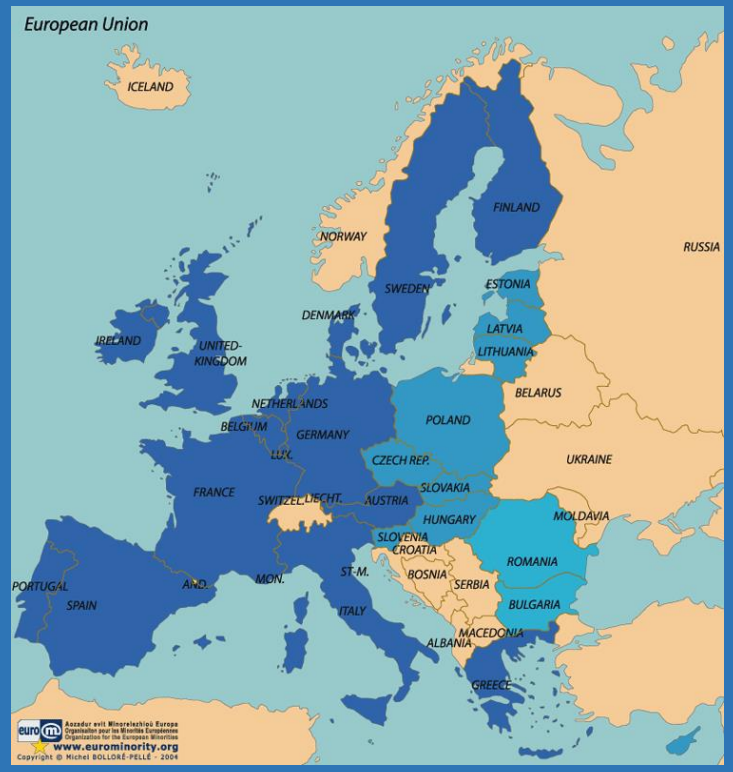
To develop the overall context that can *assist* national funding agencies and European organisations in taking *science-based, rational, and coordinated* decisions for the long-term benefit and cost-effectiveness of European astronomy.

ASTRONET is independent and involving all of Europe

Yes, a large part of Europe indeed

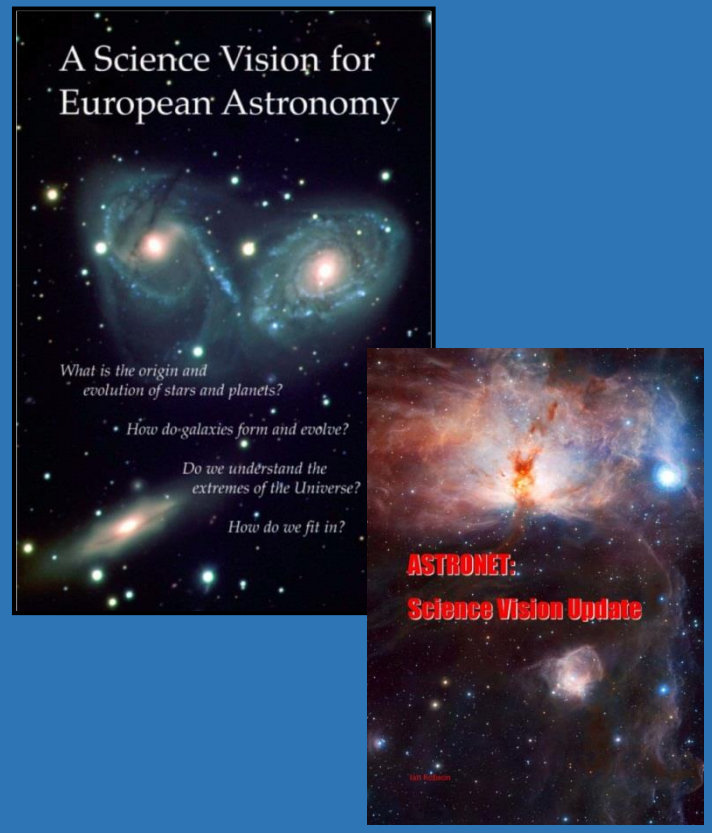
Integration of new Member States

- Analysis of the status of astronomy in the new MS
- Recommendations from targeted visits and concluding workshop:
  - Platform for coordination (national roadmaps)
  - Networking of infrastructures
  - Education / training future astronomers and engineers
  - Access to data (VO) and large facilities



Key achievement

Science Vision and Infrastructure Roadmap



2007 & 2014

2008 & 2015

Science Vision Update

Panel A: Do we understand the extremes of the Universe?

Panel B: How do galaxies form an evolve?

Panel C: What is the origin and evolution of stars and planets?

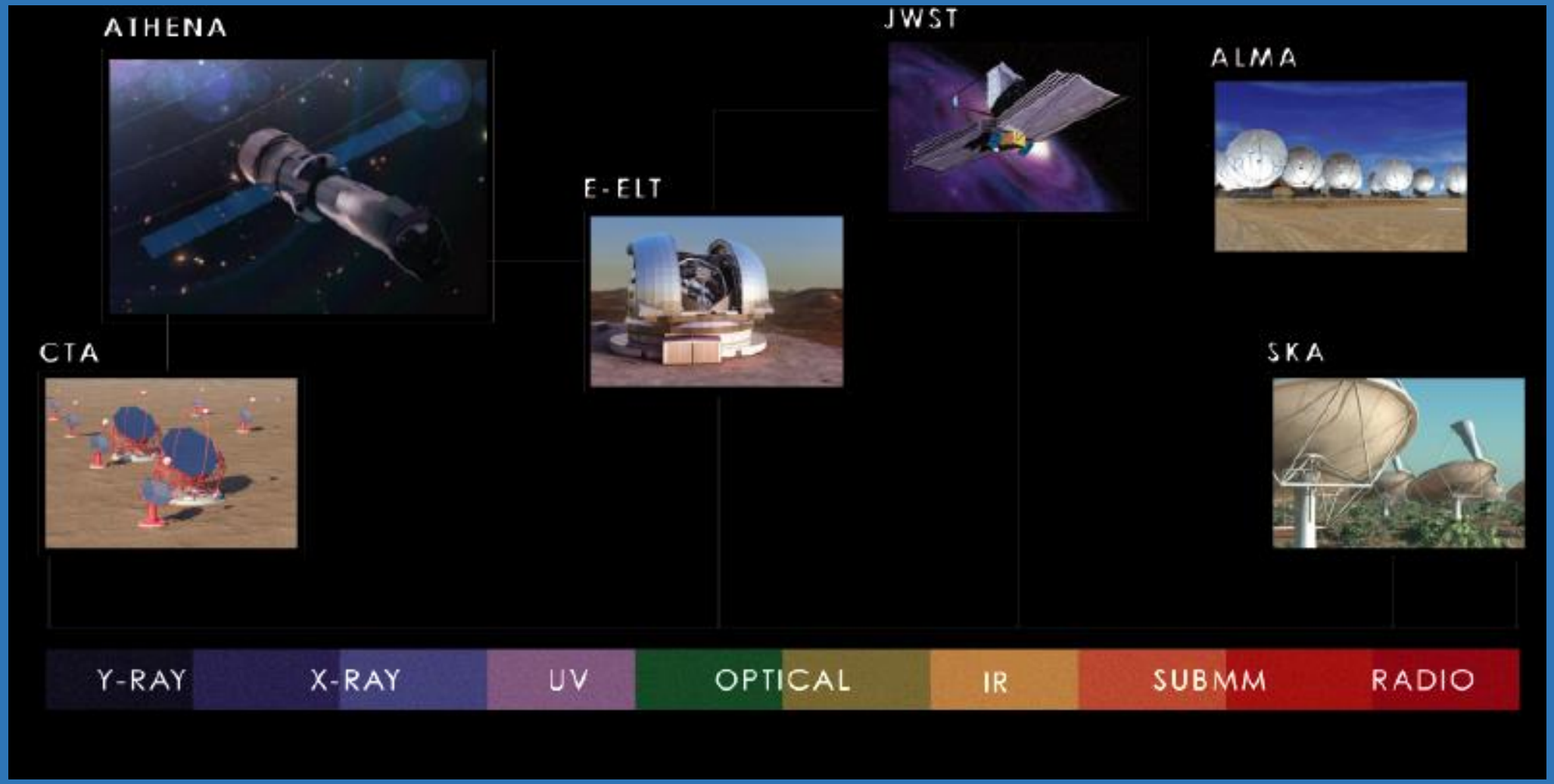
Panel D: How do we fit in?

- Good progress and significant new discoveries and advances: Exoplanets, AGN feedback, Milky Way filaments, solar weather, astrobiology
- The original questions still remain valid; probably some changes for the next edition
- Discoveries driven by host of new facilities from the ground and space

ASTRONET high-priority roadmap for new infrastructures

High-energy, Astrop & GW	UVOIR	Solar, Solar System & Lab
ASTRO-H (2016)	**ALMA (2011)**	**ExoMars (2016)**
eROSITA (2017)	**JWST (2018)**	**Solar Orbiter (2018)**
Athena (2028)	**WEAVE (2018), MOONS (2020), 4MOST (2020)**	**JUICE (2022)**
GW L3 (**2034**)	**EUCLID (2020)**	EST
CTA	**CHEOPS (2023)**	
KM3Net	**E-ELT (2024)**	
	PLATO (2024)	
	SKA Phase 1	

The new observatories in 2020-2030



2025: Where do we go?

ESA Cosmic Vision

ESO Long Term Plan

New ESFRI infrastructures:

EISCAT-3D, CTA, SKA, KM3NeT

National roadmaps completing the global landscape

But finite amount of resources (€+FTE)

➔ Reinforces the need for coordination and identification of additional partners

The era of Big-Science astronomy?

How do we coordinate the deployment of these facilities and manage the flood of new data efficiently?

How do we strike the right balance between new and existing facilities?

How do we train a new generation of leading scientists for this new era?

How do we preserve technology developments, innovation, risky experiments?

Remarks at the global level

Growth of the multimessenger/multiwavelength approaches

Growth of the trans disciplinary aspects

- With particle physics
- With fundamental physics
- With chemistry
- With biology

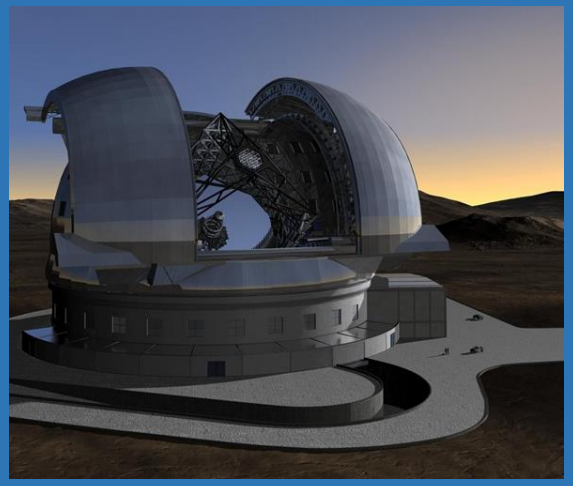
Transverse activities

- Theory, simulations, high performance computing
- Big data management, archives and science through the VO
- Laboratory astrophysics

Coordination, education

Implementing the Roadmap

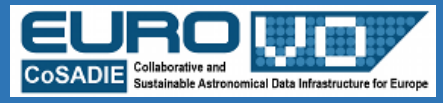
ASTRONET initiates, pushes and enables …



… focusing on efforts underlying the big facilities …

Supporting efforts

Preparing for a sustainable Virtual Observatory in Europe



ETFLA: European Task Force Laboratory Astrophysics

Astrophysical Software Laboratory Working Group

ERTRC: European Radio Telescope Review Committee

European Optical/IR Telescopes

ASTERICS H2020, cluster of infrastructures

Education and public outreach report

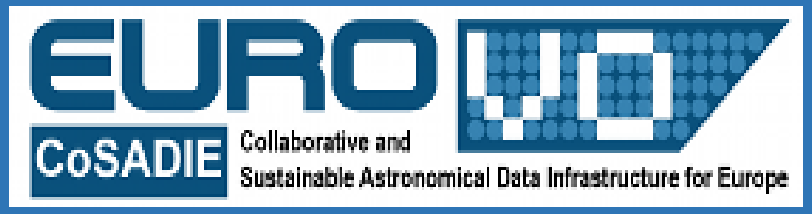
Virtual Observatory

Preparing for a sustainable Virtual Observatory (VO) in Europe

- Recommendations have been formulated in coordination with CoSADIE (2012-2014).
- Enabling role in positioning the VO in the ASTERICS, i.e. facilitating the implementation of the VO

Astrophysical Software Laboratory (ASL)

- Recommendations formulated by the ASL Working Group



Laboratory Astrophysics in Europe

ETFLA: European Task Force Laboratory Astrophyiscs

Chairs: Louis d'Hendecourt, Jonathan Tennyson

- Review of the state of the art of Laboratory Astrophysics in Europe (2013)
- Website and JISC-mail: www.labastro.eu
- Implementation plan for a European Laboratory Astrophysics Network (ELAN), H2020 starting community proposal
- Recommendations on the establishment of a LA database (March 2015)

Radio Astronomy in Europe

European Radio Telescope Review

- Preliminary recommendations discussed at EWASS 2013 and via the webforum
- Final report at EWASS 2015

Impact and follow-up in the context of SKA

- Discussion forum: Strengthening the Pan-European positioning of radio Astronomy for SKA
- Bottom-up discussions on European Regional Science Centres for SKA

European Optical/IR Telescopes

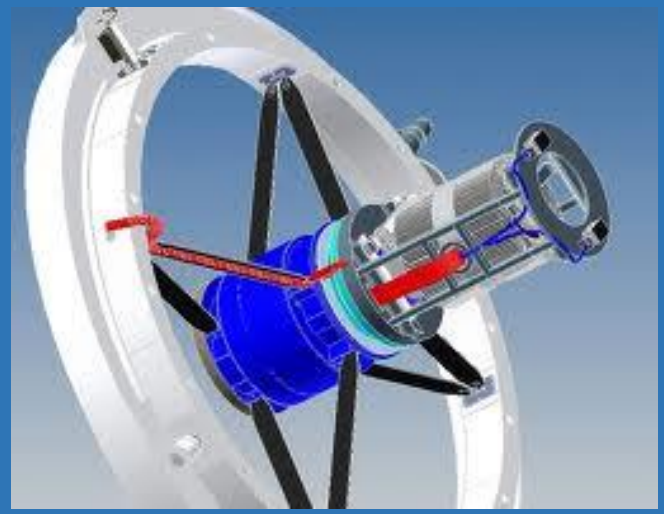
Review to develop a long-term strategy to optimize the use of optical/infrared telescopes by the European astronomical community.

Results:

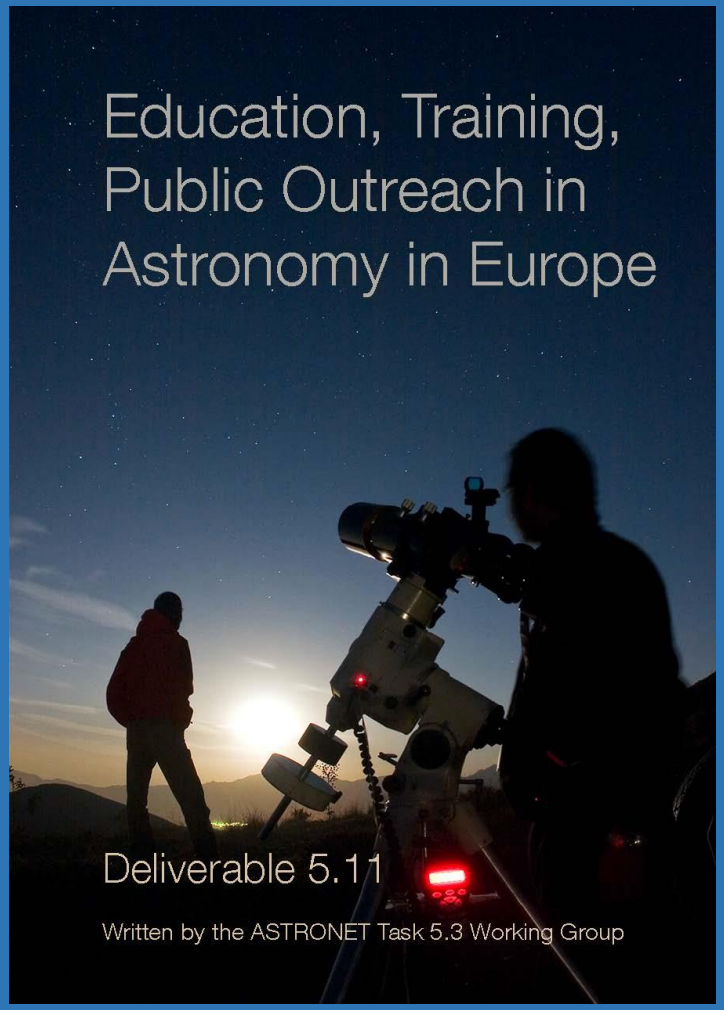
- Review 2-4 m telescopes completed
- Review 8-10m telescopes (June 2015)

Impact and follow-up actions:

- WEAVE: wide-field multi-object spectrograph for the WHT, European partnership



Education, training and outreach



- Report on education training and public outreach
- Including relationship with industry and technology transfer
- Recommendations on common actions to realize European coordination

Networking

- ASTRONET interacts with all relevant external stakeholders, networks and projects (European and global)
- EWASS sessions

Setting the future

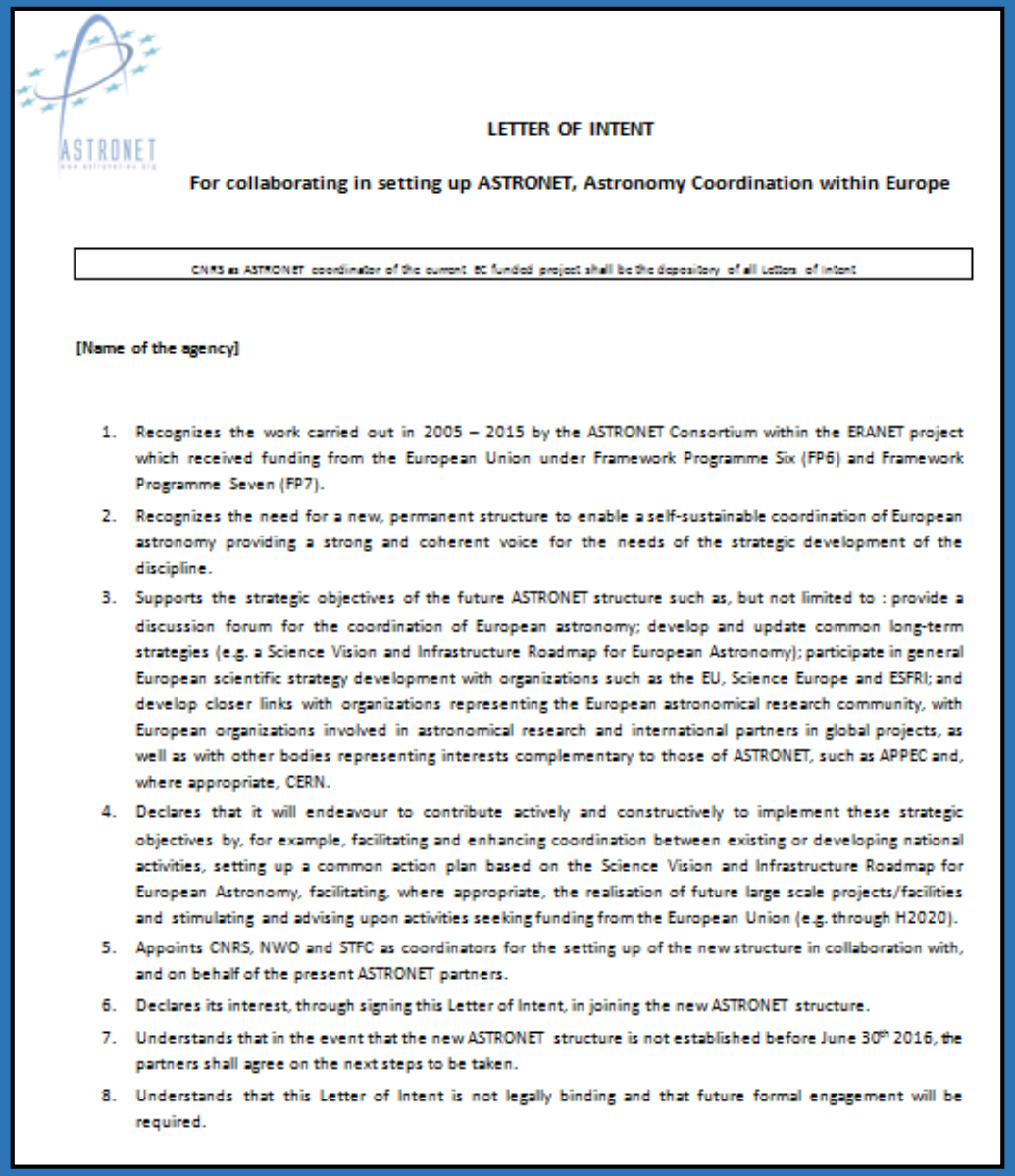
FP7-ASTRONET ended on June 30th, 2015

Signature of LoI in June 2015 in the direction of a MoU preparation

Signature of the MoU in October 2016

Astronomy Coordination within Europe via:
ASTRONET

25 Letters of Intent



LETTER OF INTENT

For collaborating in setting up ASTRONET, Astronomy Coordination within Europe

CNRS as ASTRONET coordinator of the current EC funded project shall be the depository of all Letters of Intent

[Name of the agency]

1. Recognizes the work carried out in 2005 – 2015 by the ASTRONET Consortium within the ERANET project which received funding from the European Union under Framework Programme Six (FP6) and Framework Programme Seven (FP7).
2. Recognizes the need for a new, permanent structure to enable a self-sustainable coordination of European astronomy providing a strong and coherent voice for the needs of the strategic development of the discipline.
3. Supports the strategic objectives of the future ASTRONET structure such as, but not limited to : provide a discussion forum for the coordination of European astronomy; develop and update common long-term strategies (e.g. a Science Vision and Infrastructure Roadmap for European Astronomy); participate in general European scientific strategy development with organizations such as the EU, Science Europe and ESFRI; and develop closer links with organizations representing the European astronomical research community, with European organizations involved in astronomical research and international partners in global projects, as well as with other bodies representing interests complementary to those of ASTRONET, such as APPEC and, where appropriate, CERN.
4. Declares that it will endeavour to contribute actively and constructively to implement these strategic objectives by, for example, facilitating and enhancing coordination between existing or developing national activities, setting up a common action plan based on the Science Vision and Infrastructure Roadmap for European Astronomy, facilitating, where appropriate, the realisation of future large scale projects/facilities and stimulating and advising upon activities seeking funding from the European Union (e.g. through H2020).
5. Appoints CNRS, NWO and STFC as coordinators for the setting up of the new structure in collaboration with, and on behalf of the present ASTRONET partners.
6. Declares its interest, through signing this Letter of Intent, in joining the new ASTRONET structure.
7. Understands that in the event that the new ASTRONET structure is not established before June 30th 2016, the partners shall agree on the next steps to be taken.
8. Understands that this Letter of Intent is not legally binding and that future formal engagement will be required.

Great encouragement

Place of ESO and ESA

Some feedbacks received:

- No interest because no common calls
- Financial issues (membership fee)

Strategic objectives

Provide a discussion forum for the coordination of European astronomy;

Develop and update common long-term strategies (e.g. a Science Vision and Infrastructure Roadmap for European Astronomy);

Participate in general European scientific strategy development with organizations such as the EU, Science Europe and ESFRI;

And develop closer links with organizations representing the European astronomical research community, with European organizations involved in astronomical research and international partners in global projects, as well as with other bodies representing interests complementary to those of ASTRONET, such as APPEC and, where appropriate, CERN.

Implementation objectives

facilitating and enhancing coordination between existing or developing national activities,

setting up a common action plan based on the Science Vision and Infrastructure Roadmap for European Astronomy,

facilitating, where appropriate, the realisation of future large scale projects/facilities and stimulating and advising upon activities seeking funding from the European Union (e.g. through H2020).

ASTRONET today: a MoU

- SIGNED by ESO, France, United Kingdom, Netherlands, Belgium, Italy
- + Hungary, Sweden.
- ESA as Observer, + EAS and APPEC
- Intentions to join from Greece, Spain, Germany, Czech Republic, Portugal, Finland, Denmark…

Workplan

WP	Tasks	Lead
1	Management activities 1. Executive office (CNRS) 2. Treasurer and responsible for collection of the fees (NWO) 3. Coordination office, animation, communication (#B4.8, #B4.9, #B4.10) (CNRS)	CNRS
2	Implementing the roadmap 1. #B4.6: optical interferometry (CNRS) 2. #B4.7: radio astronomy (NWO) 3. Monitoring the European medium and large size O/IR ground facilities (MINECO&ESO) 4. Astronomy heritage (dealing with a coordination at European level of the national activities in astronomy historical instrumentation and observatories, archives and libraries) (INAF) 5. #D6.1: Astrophysical Software Library (→ ASTERICS Forum) 6. #D6.2: Data facilities (→ ASTERICS Forum) 7. Space and Ground coordination (#A3.1, #B4.1, #B4.2, #B4.3) (TBD by the Board) 8. Training, schools (#E7.1, #E7.2, #E7.3) (TBD by the Board) 9. Outreach (#E7.4, #E7.5, #E7.6) (TBD by the Board)	NWO
3	Preparing the future: the next Science Vision and roadmap exercise. Target is 2018 for the period 2021-2030 (parallel/synergy with US-DS)	STFC
4	Wider engagement of the European astronomical community: Including a European Forum of emerging Astronomy communities in coordination with New Member States Working Group at ESO (Remote access to data sets, VO activities, Evolution/Renovation of local facilities, relation to ASTRONET roadmap…) that could be held during yearly EWASS meetings	CAS/CZ

Decadal Survey & ESA

- US Decadal Survey – 2020
- New Words, New Horizons (2010)
- Vision & Voyages for Planetary Science (2011)
- Solar and Space Physics – a science for a technological society (2013).

- Mid-term assessment (2016)

- The Space Science Decadal surveys – lessons learned & best practices (2015)

- NASA Space Technology Roadmap Priorities revisited (2016)

- ESA Cosmic Vision 2015-2025
- Science Programme Technical Development Plan (2017)
- ESA Exploration Programme (Aurora)

Merci!