

GESTION DE DATOS CIENTÍFICOS

ANA I. GÓMEZ DE CASTRO & JUAN CARLOS VALLEJO
GRUPO DE INVESTIGACIÓN COMPLUTENSE **AEGORA**



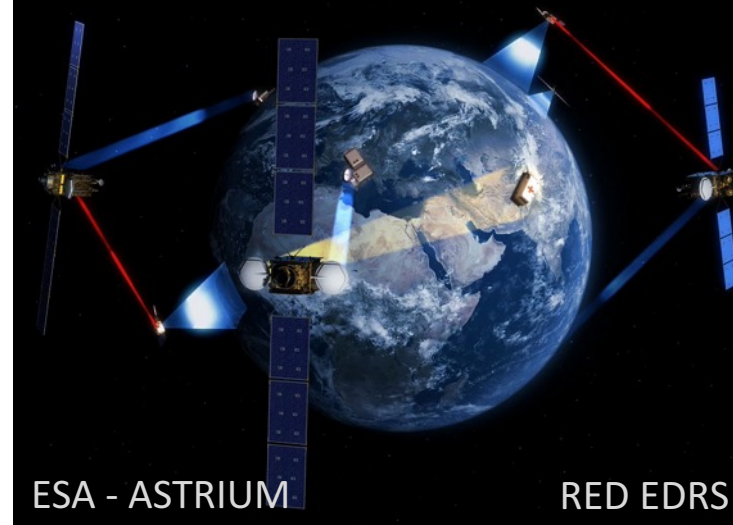
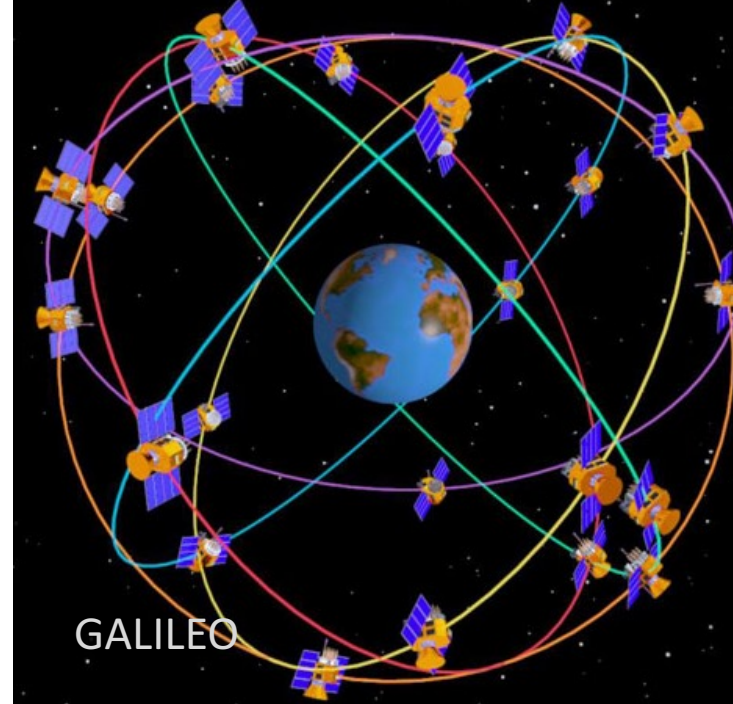
MENU

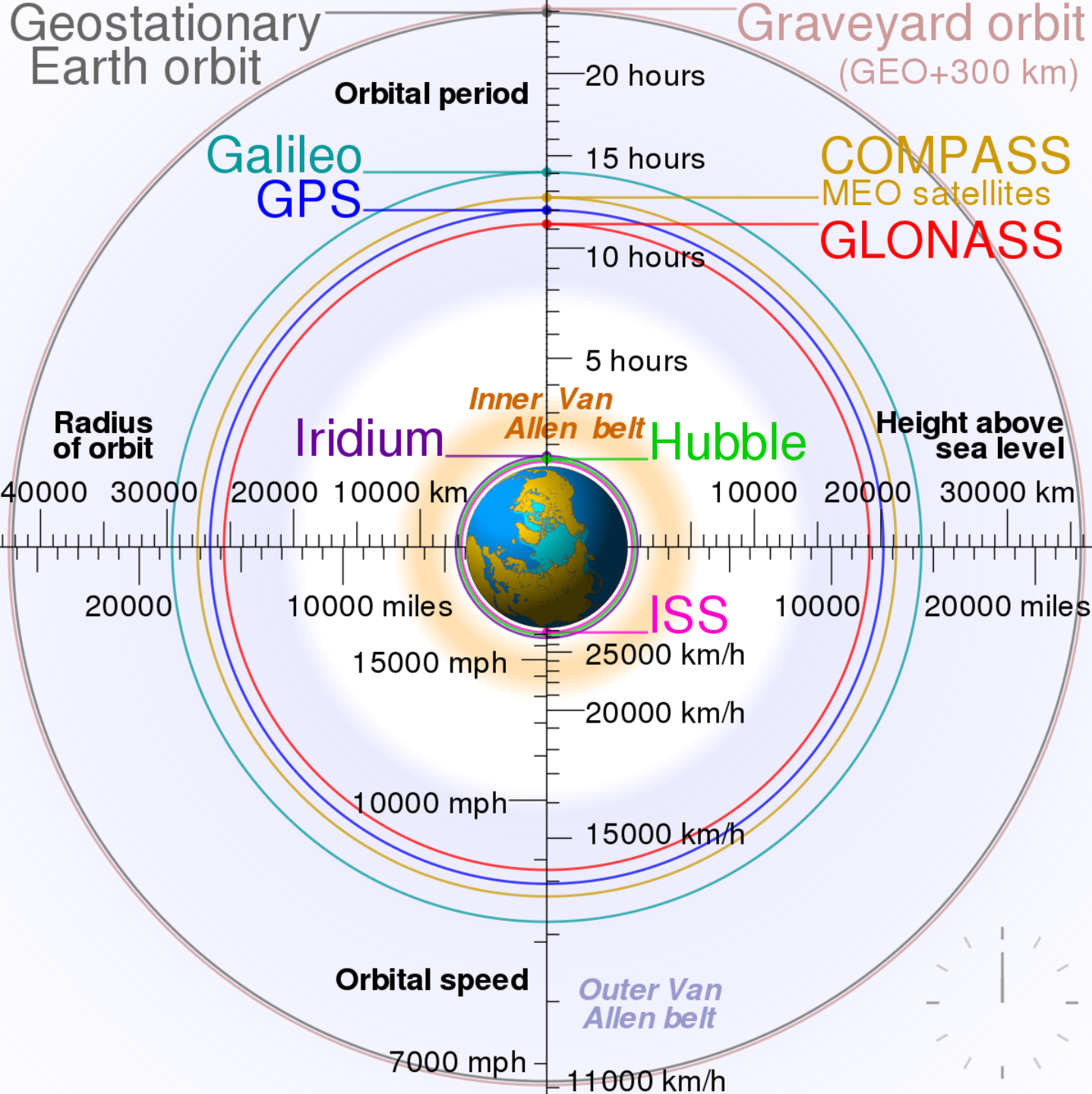
- Tipos de proyectos espaciales.
- Proyectos espaciales científicos.
- El observatorio espacial WSO-UV.
 - Centro de Operaciones Científicas
 - Propiedad intelectual

Tipos de proyectos espaciales

I. POR OBJETIVOS:

- **TECNOLÓGICOS:** Tests de nuevas tecnologías
- **CIENTÍFICOS:** investigación básica sobre el espacio.
- **SEGURIDAD Y DEFENSA:** redes de comunicación y observación
- **COMERCIALES:** servicios globales de comunicación, información





Tipos de proyectos espaciales

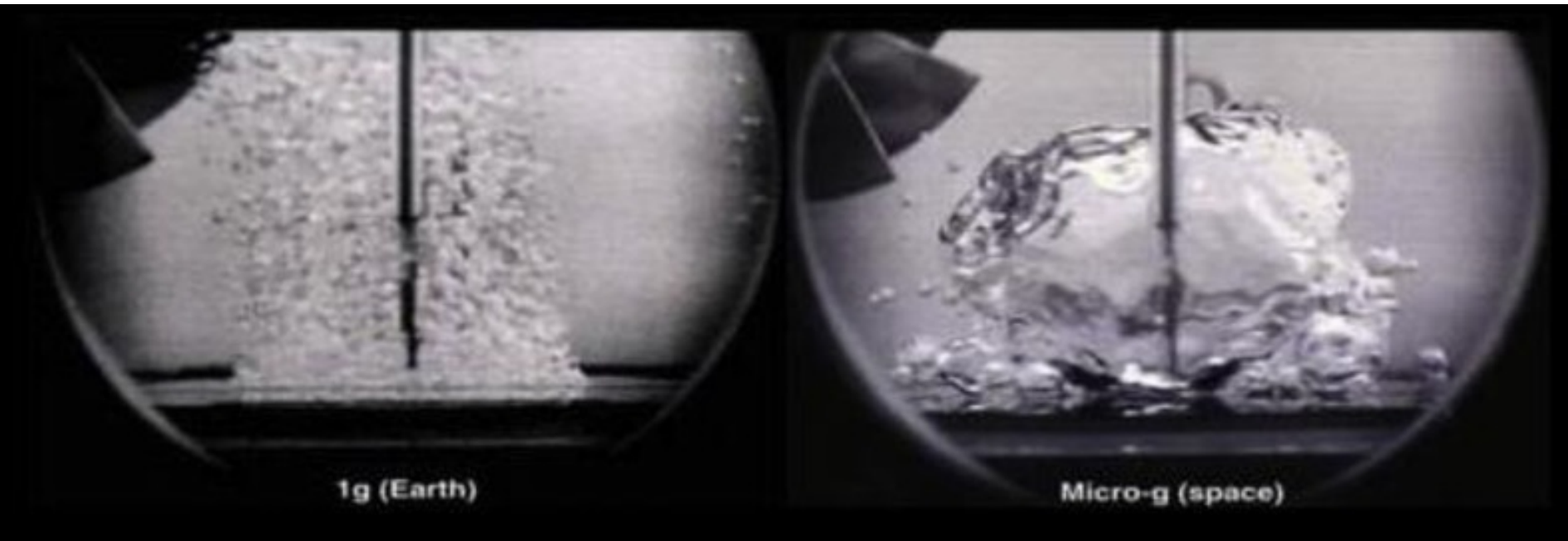
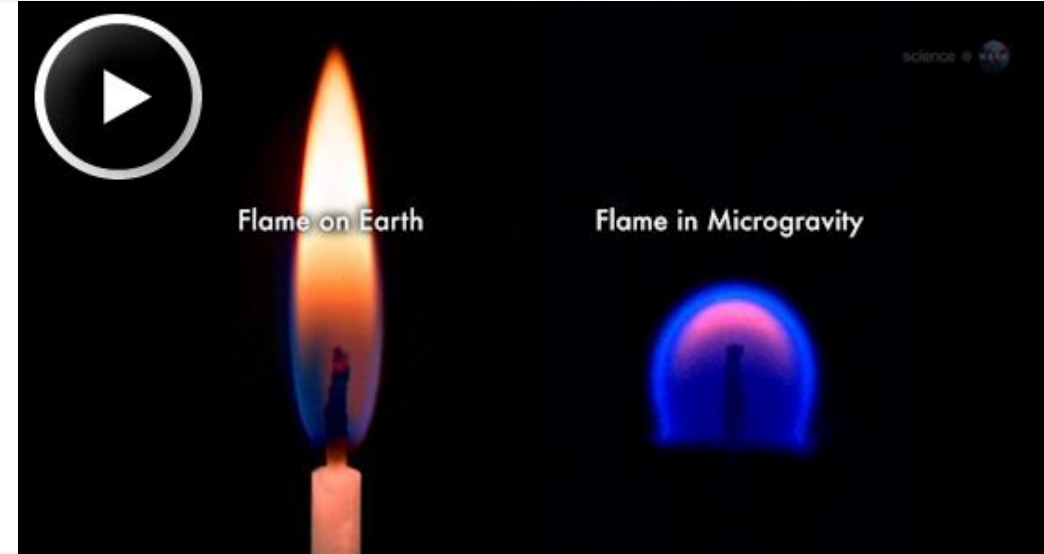
II. POR LOCALIZACION/DURACIÓN:

- ÓRBITA BAJA
- ÓRBITA GEOSÍNCRONA
- ÓRBITA GEOESTACIONARIA
- ÓRBITA ALTA
- OBSERVACIÓN DEL **SOL**
- MISIONES PLANETARIAS
- ESTACIONES ESPACIALES
- ESTACIONES LUNARES
- LABORATORIOS ORBITALES
- LANDERS/ROBOTS

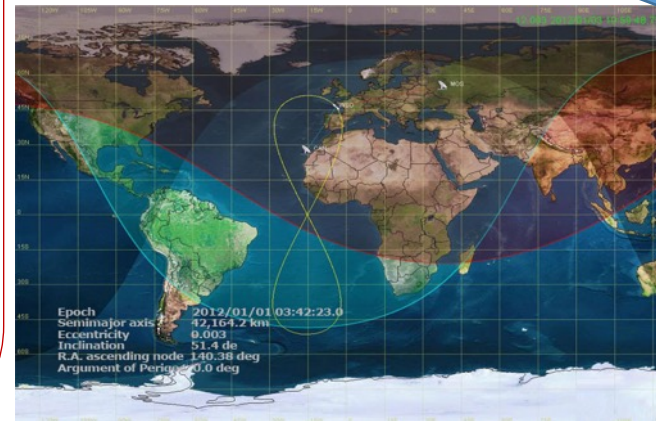
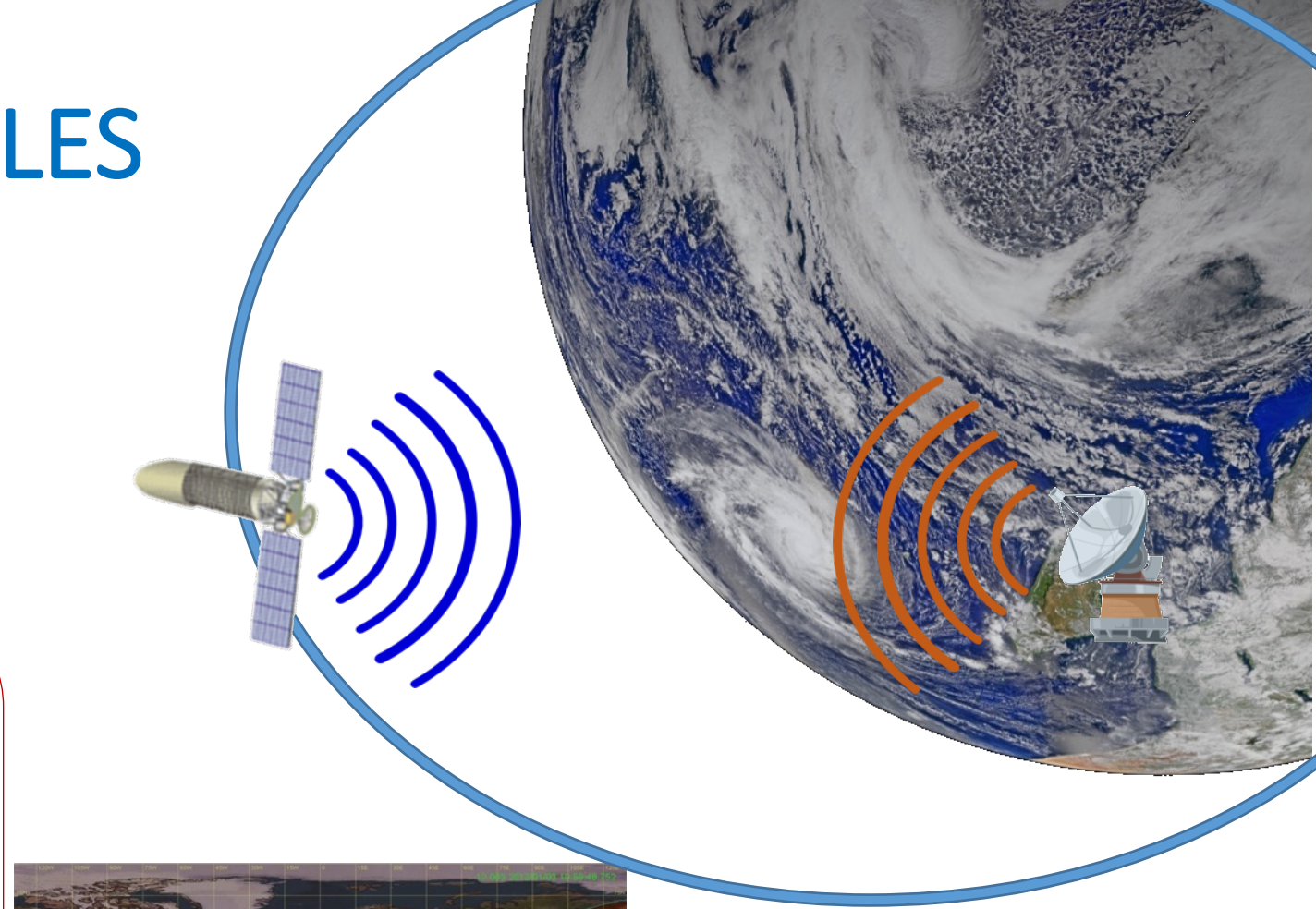
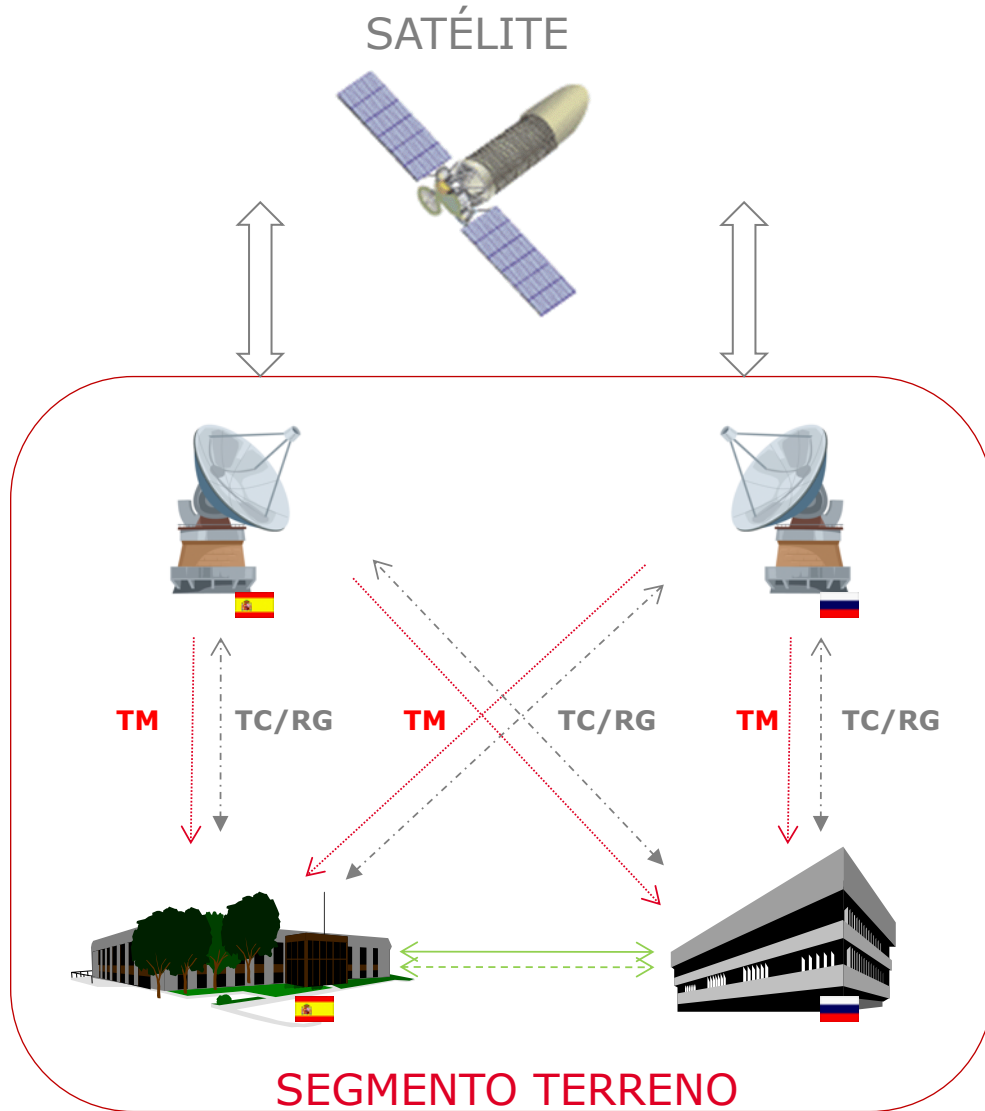


PROYECTOS ESPACIALES CIENTÍFICOS

- OBSERVACIÓN DE LA TIERRA
- **OBSERVATORIOS ASTRONÓMICOS**
- INVESTIGACIÓN DEL ENTORNO ESPACIAL
- INVESTIGACIÓN DEL SISTEMA SOLAR
- INVESTIGACIÓN EN MICROGRAVEDAD



OPERACIONES ESPACIALES



EL OBSERVATORIO ESPACIAL WSO-UV



WSO-UV en números

Semimajor axis	42.164 Km (as in any GSO)
Eccentricity	0.003
Inclination	40 deg
R.A. Ascending node	140.38 deg
Argument of Perigee	0.0 deg
Period	23 hrs 56min 4 secs (one sidereal day)
Epoch	TBD

Instruments

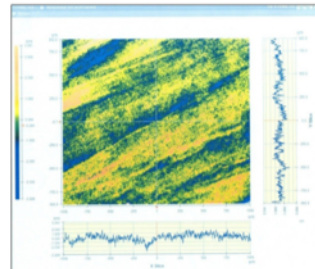
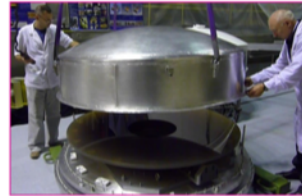
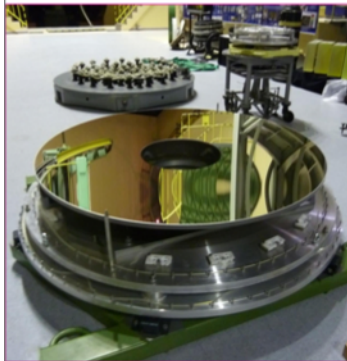
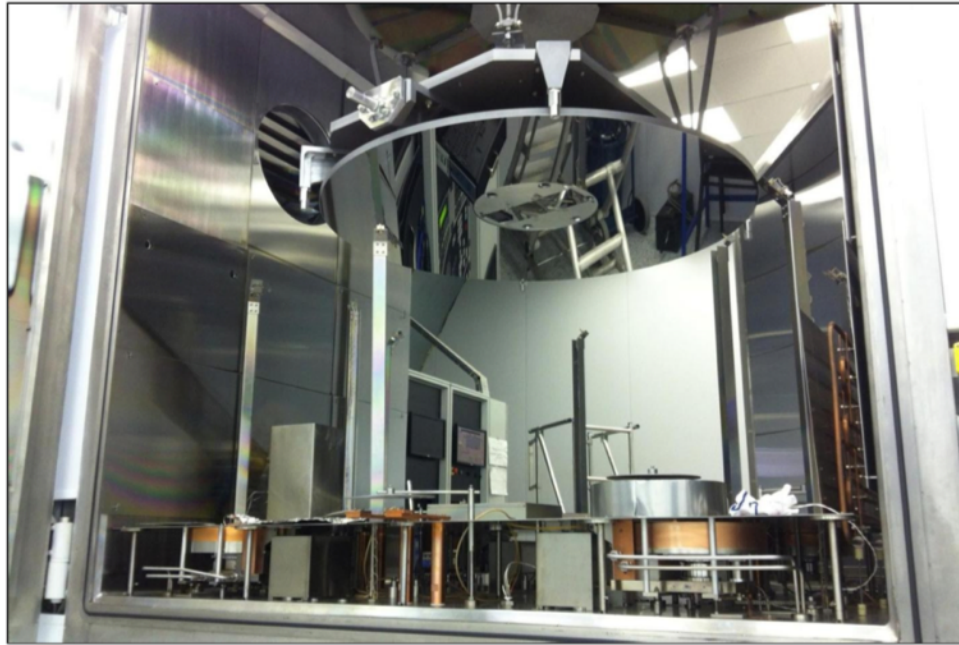
The WSO-UV telescope feeds two main instruments: the [spectrographs unit \(WUVS\)](#) and [field camera unit \(FCU\)](#), as well as the Fine Guidance System (FGS). WSO-UV instrumentation is designed to provide:

- Spectroscopic observations in the 115-315 nm range with dispersion 50,000.
- Long slit spectroscopy with spectral dispersion 1,000.
- Imagery of space objects with high resolution (up to 0.1 arcseconds in the 115-176 nm range) and wide field imaging in the 174-600 nm range.

The focal plane layout is shown in figure below. The Fine Guiding Sensors are located in a circle of radius 24.25 arcmin around the T-170M optical axis. WUVS entrance slits are intercalated between them, to guarantee accurate guiding during the foreseen long spectroscopic observations. The FCU picks off the beam from the telescope axis but requires an independent refocussing mechanism.

Optical System	Ritchey-Chrétien
Aperture diameter	1.7 m
Focal length	17 m (primary mirror)
f/#	10.0
Field of View (FoV)	30 arcmin (150 mm in diameter)
Wavelength range	115-600 nm
Primary Wavelength	200 nm
Optical quality	Diffraction limited at FoV center
Angular resolution on focal plane	12.13 arcsec/mm
Mass	1570 kg (1600 kg with adapter truss)
Size	5.67 x 2.30 m (transport) 8.43 x 2.3 m (operational)

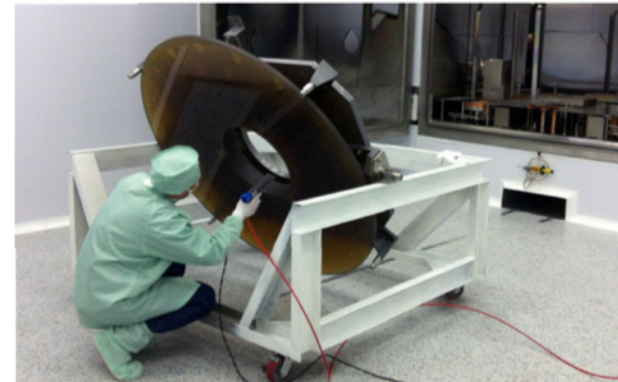
Estado del proyecto: espejos y recubrimientos



rms = 0.75 nm

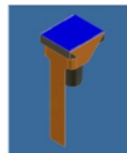
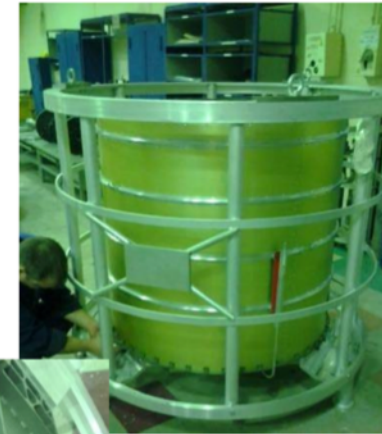
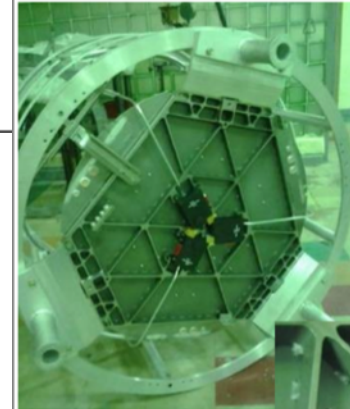
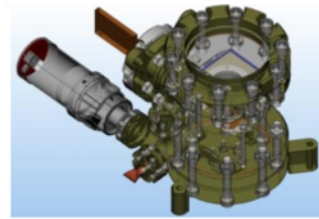
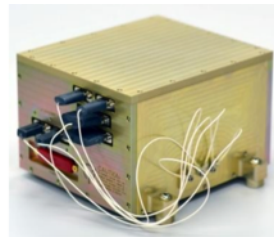
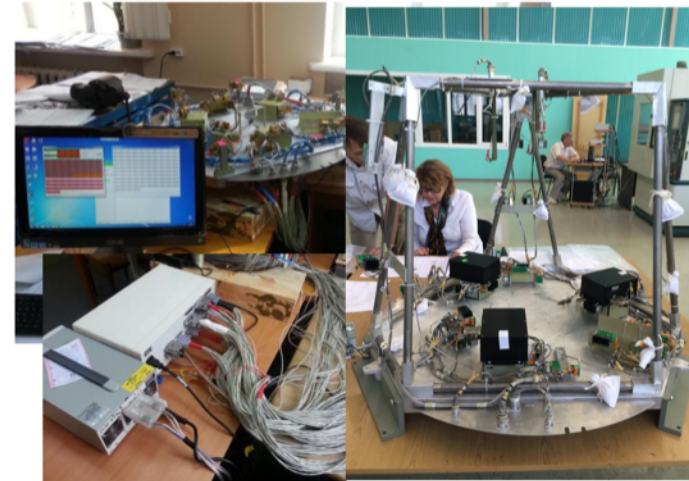
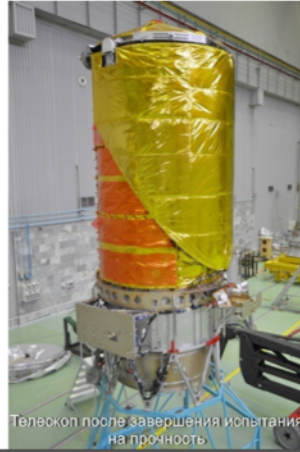
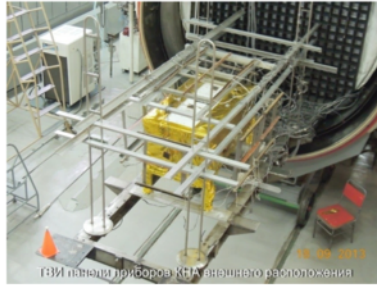
1 mm

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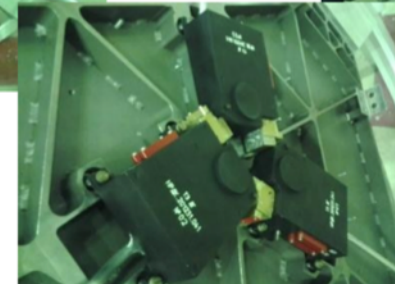
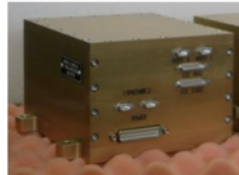


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Estado del proyecto: telescopio e instrumentos I

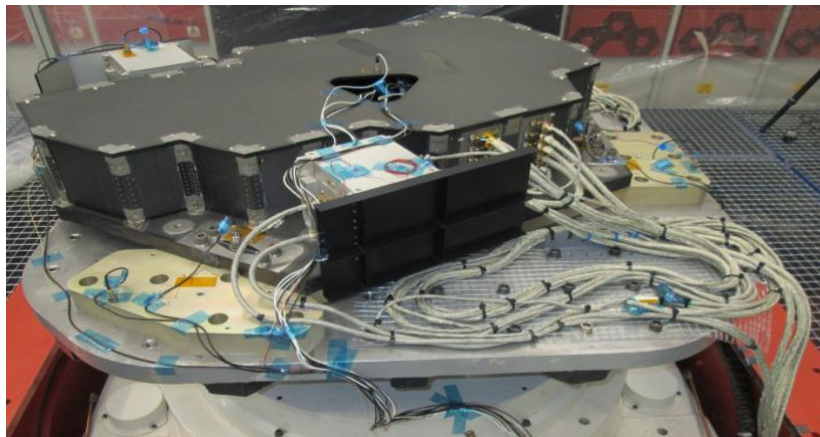
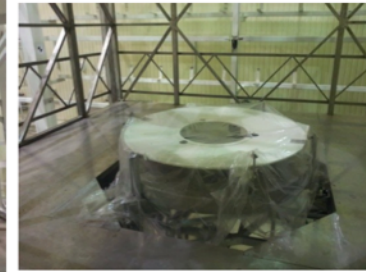
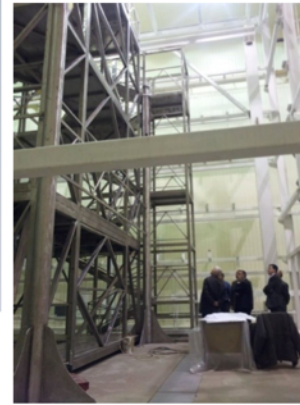
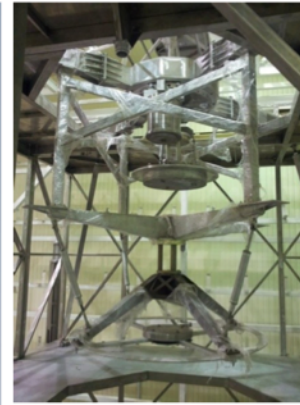
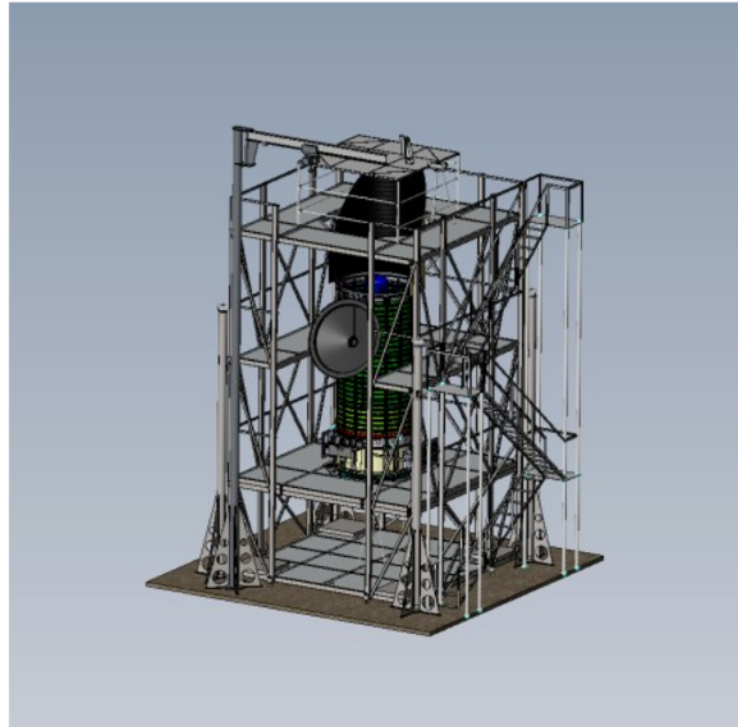


CCD 272 Custom design
4096 x 3112 12um pixel
Back illuminated, UV coating

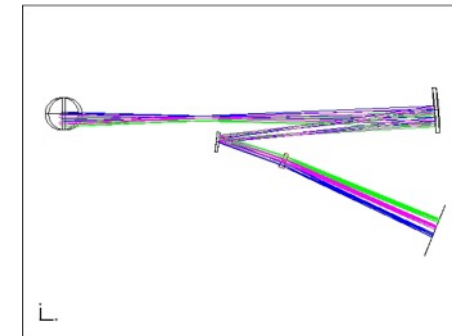




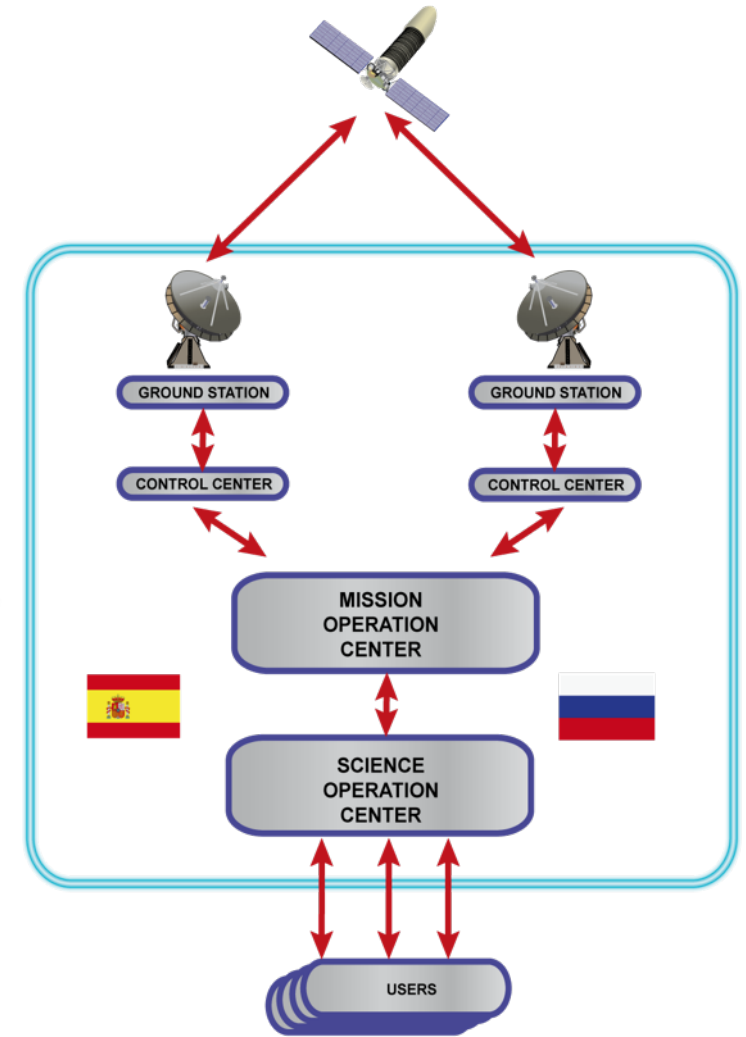
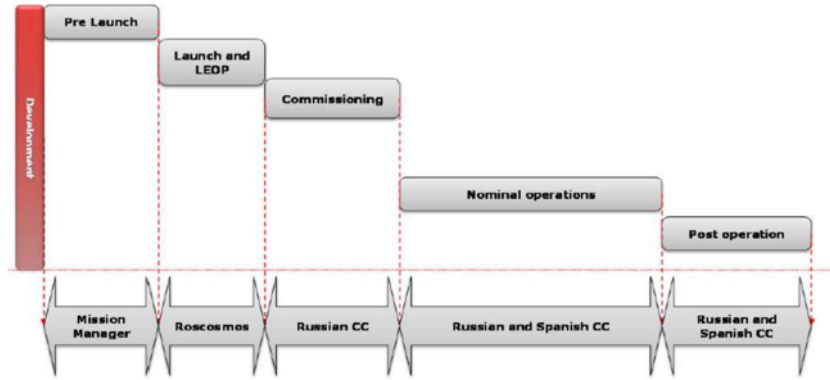
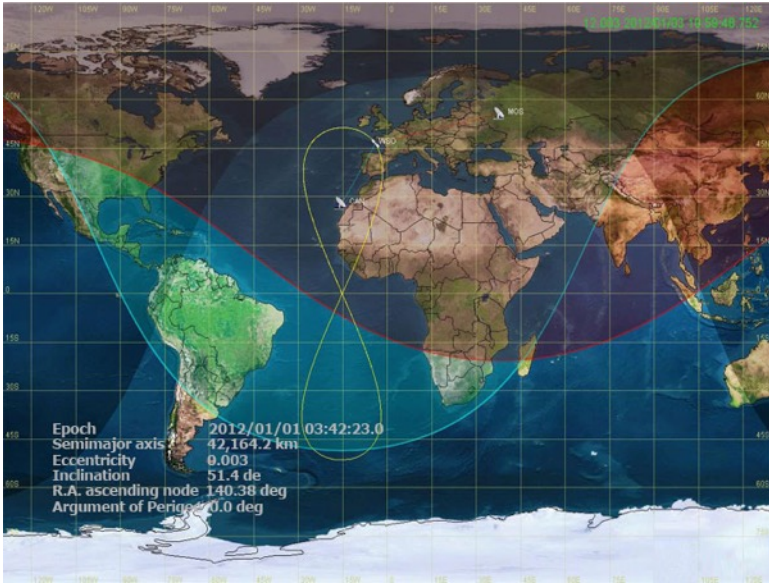
Estado del proyecto: Instalaciones de integración (2016) e instrumentos II



ISIS Optical Bench



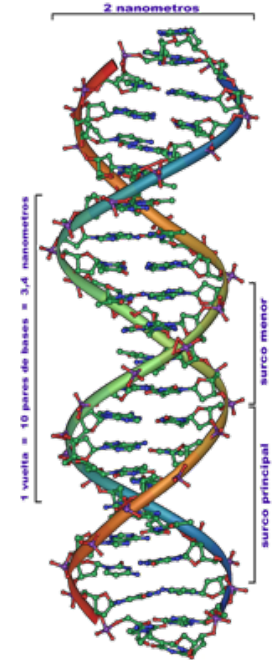
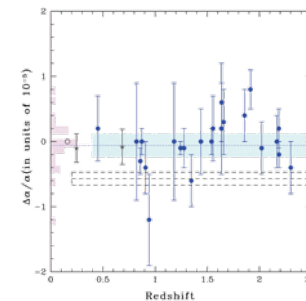
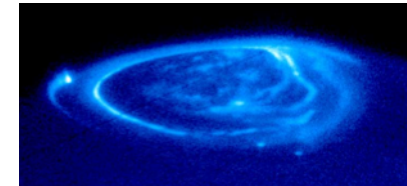
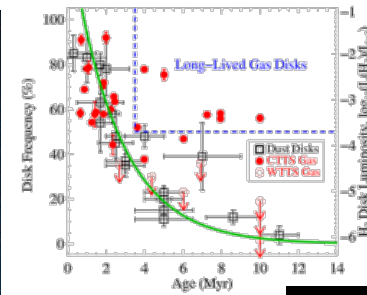
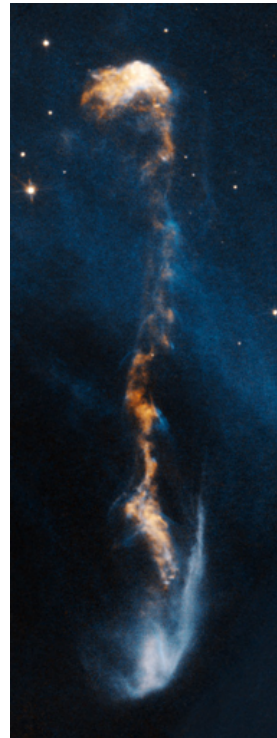
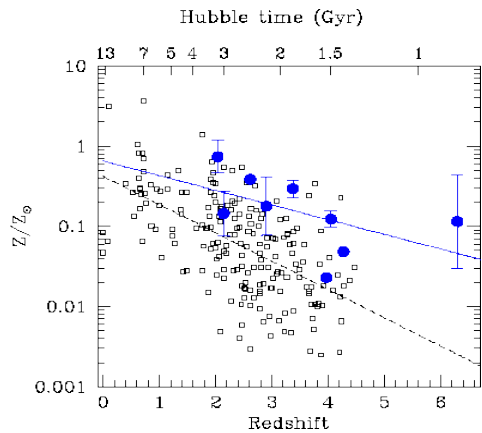
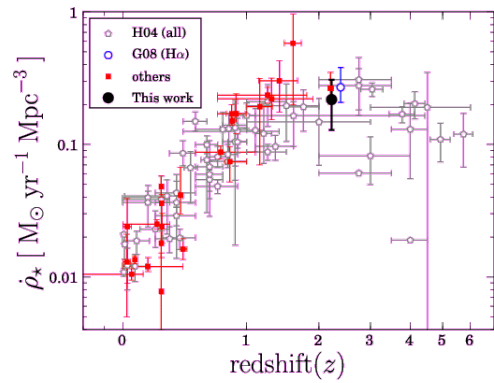
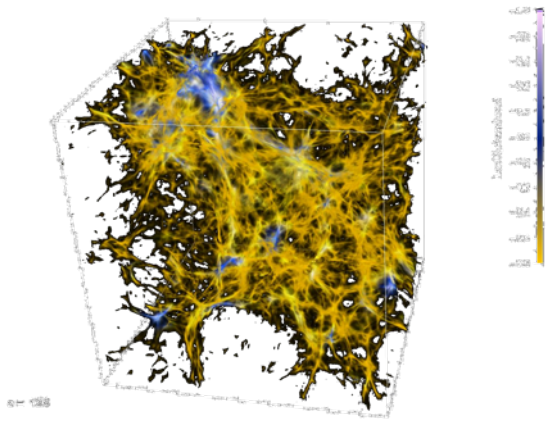
Segmento Tierra y operaciones científicas



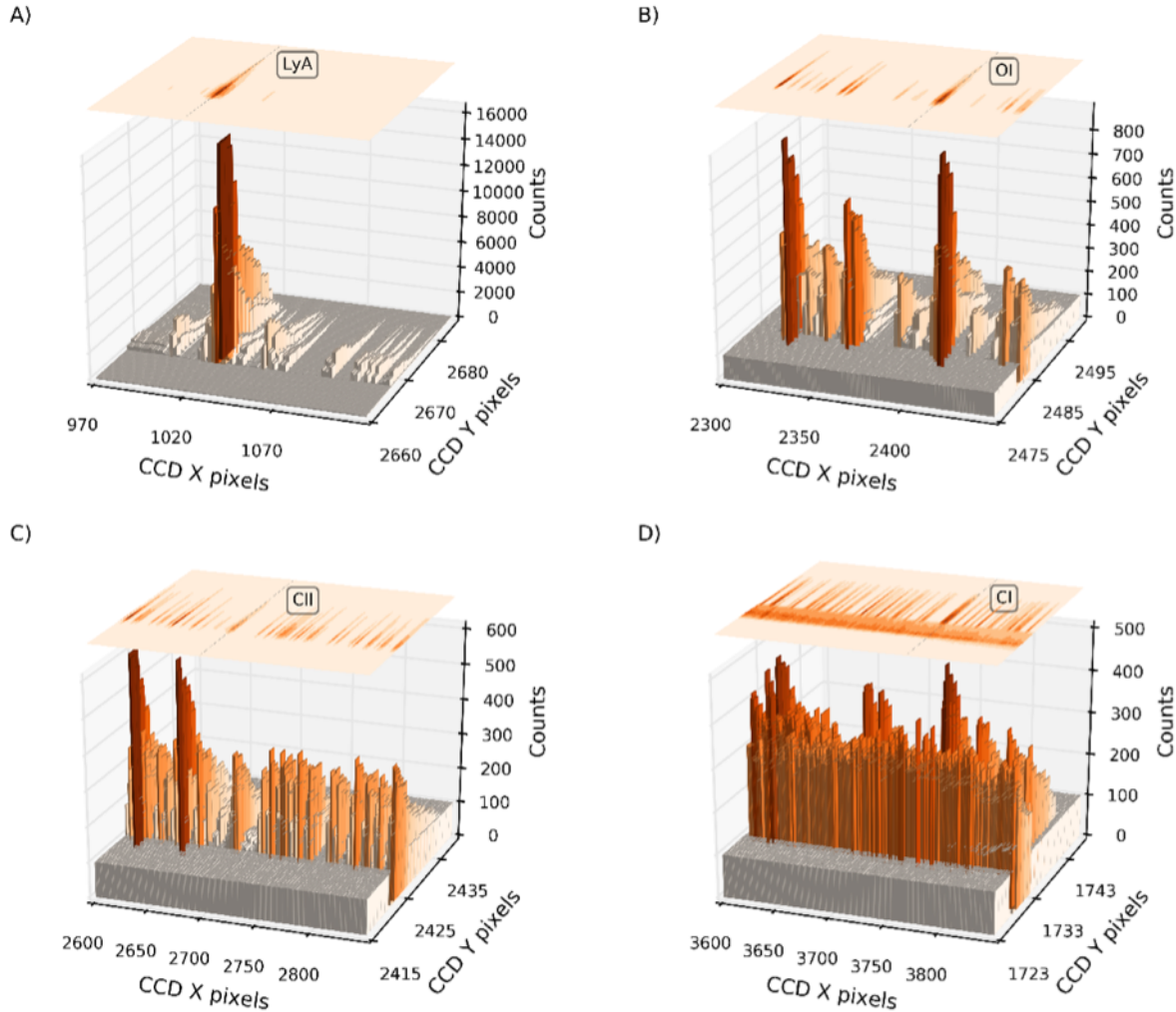
UCM (IZDA), LAVOCHKIN (DRCHA)

ASTRONOMÍA UV

- ✦ Evolución química del Universo
- ✦ Formación de sistemas planetarios
- ✦ Origen de la vida
- ✦ Física de los motores astronómicos



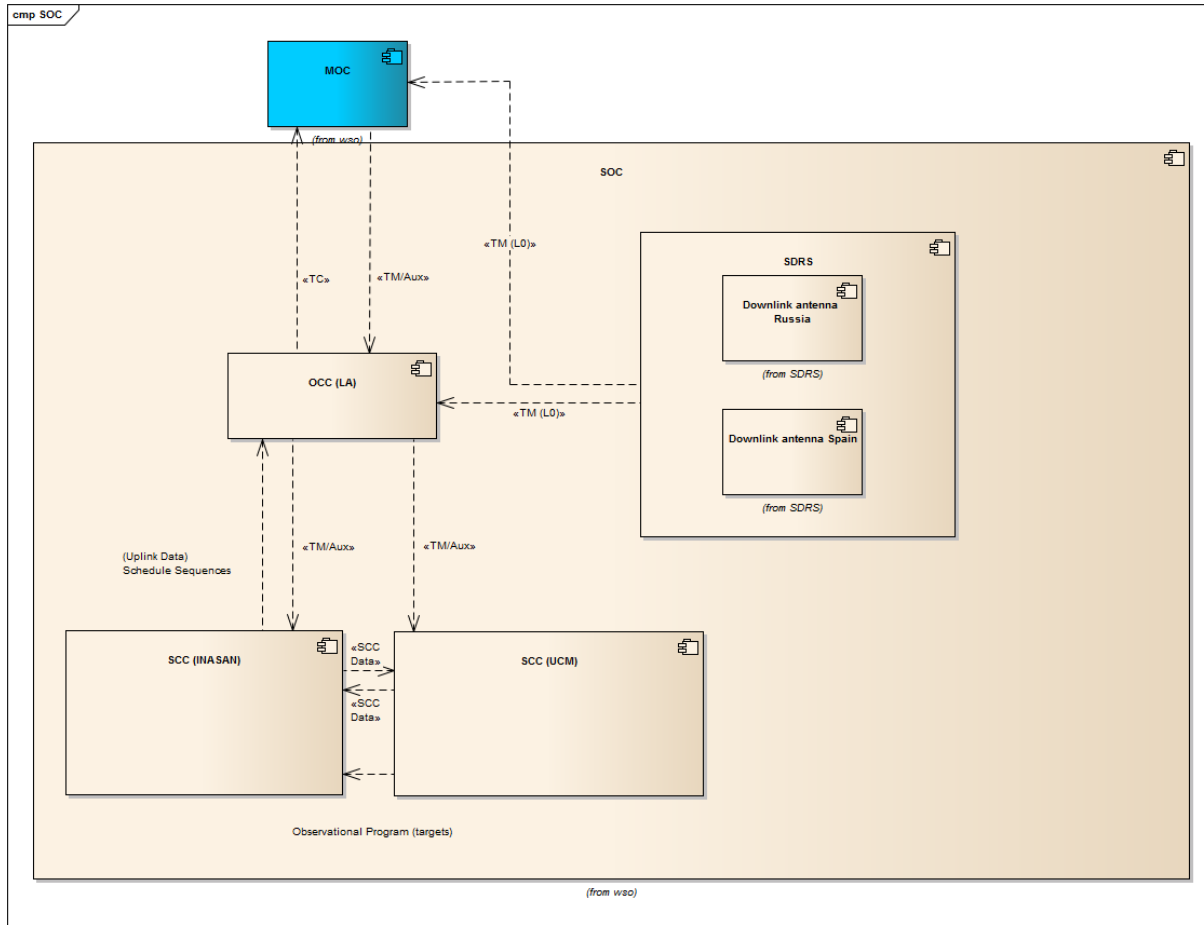
OPERACIÓN CIENTÍFICA DE LA MISIÓN



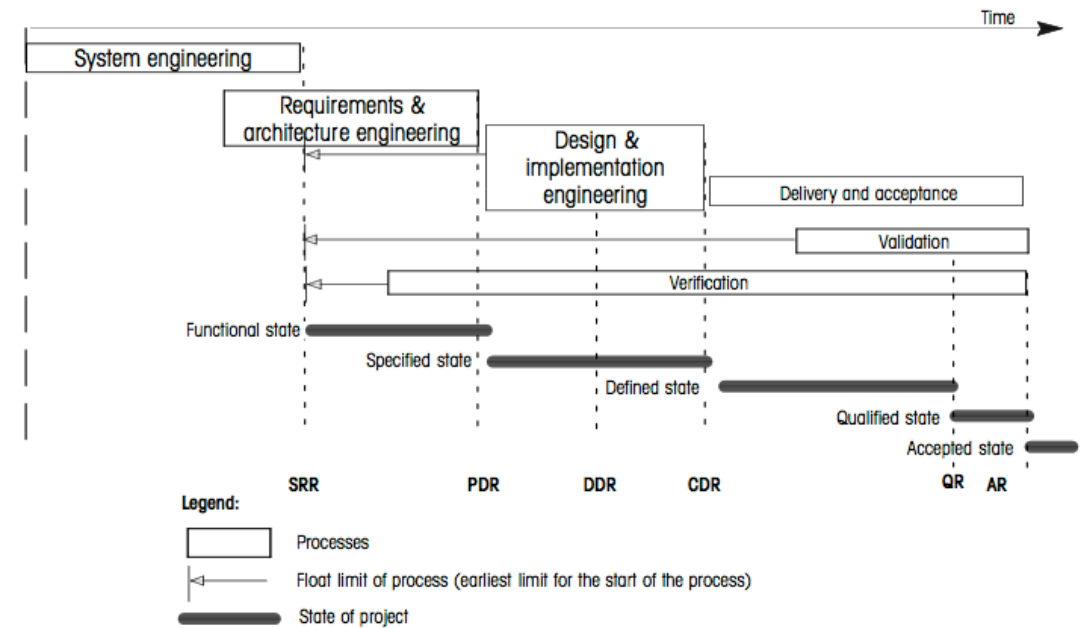
1. PLANIFICACIÓN DE LAS OBSERVACIONES
2. PROCESADO DE LOS DATOS Y DISTRIBUCIÓN
3. HERRAMIENTAS DE ANÁLISIS RÁPIDO DE LOS DATOS
4. ARCHIVO
5. SEGURIDAD, SEGUIMIENTO Y CONTROL

Figure 4. 3D fractions of a DG Tau echelle simulated image for the spectral orders corresponding to Lyman- α (LyA, panel A), O I (panel B), C II (panel C) and C I (panel D).

SUBSISTEMAS DEL SOC



- The Scientific Data Reception System (SDRS).
- The Operational Control Centre (OCC).
- The WSO Science Control Centres (SCCs).



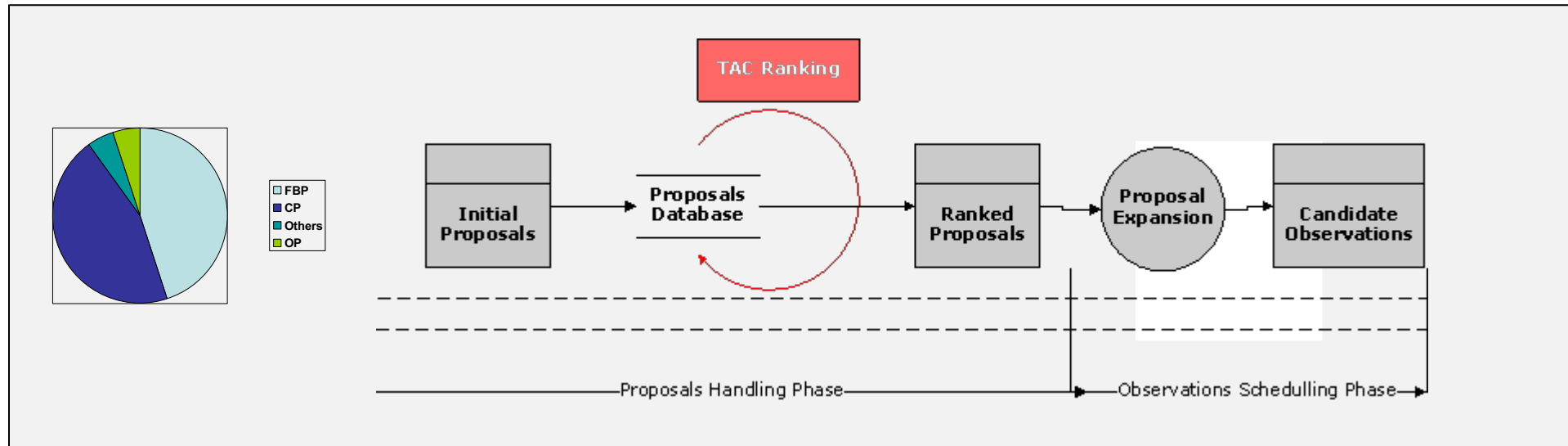
PROGRAMA CIENTÍFICO

CORE PROGRAM (CP): CIENCIA CLAVE DEL PROYECTO

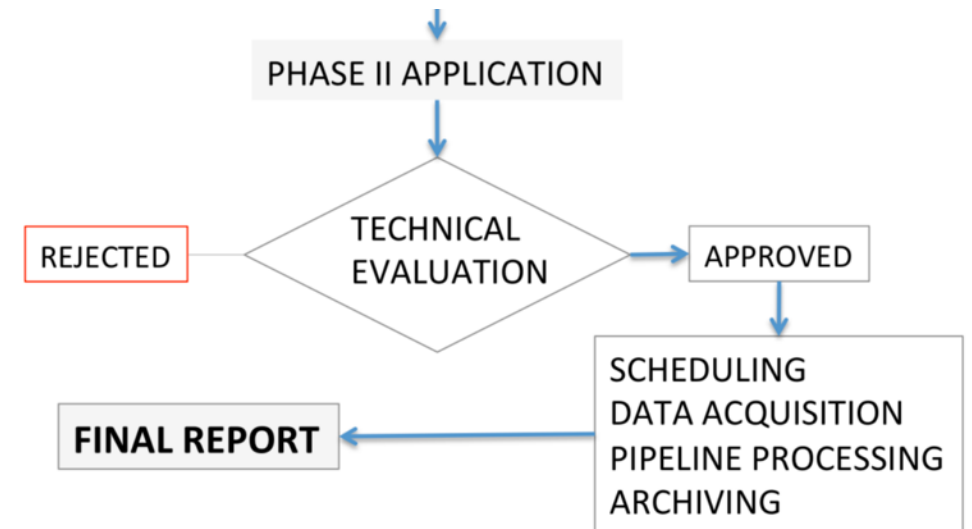
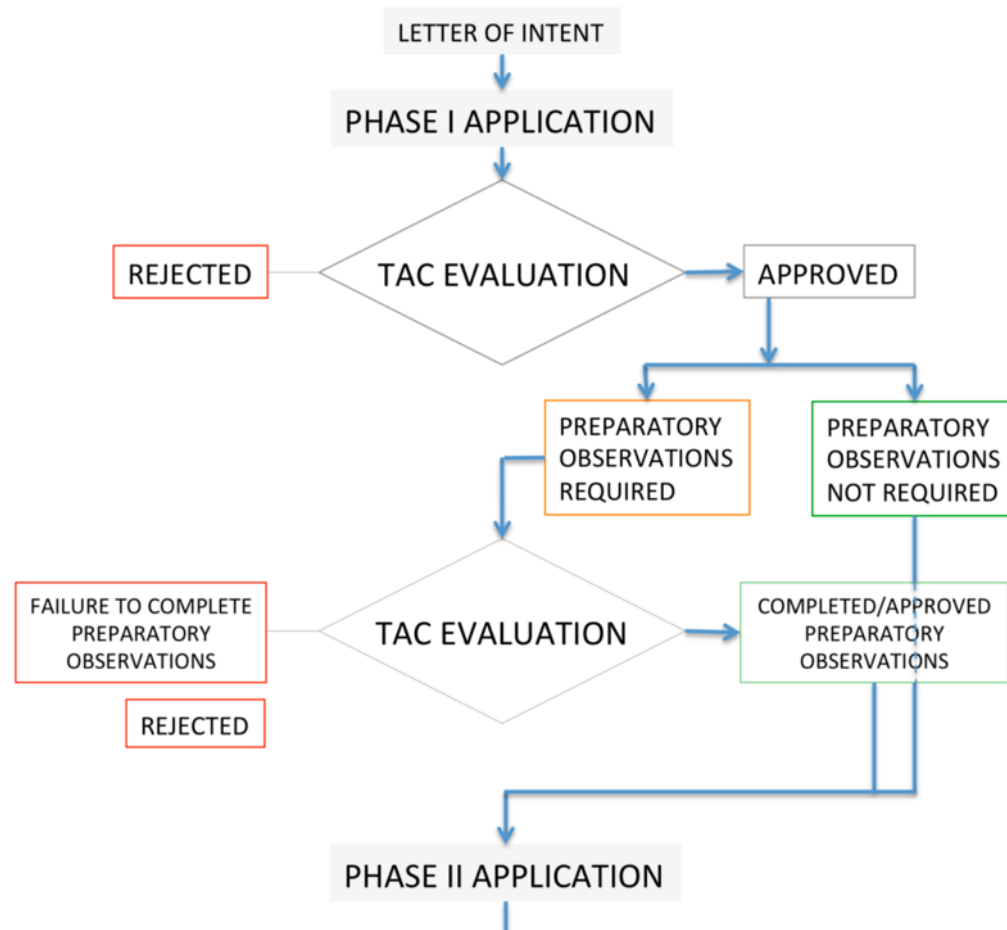
FUNDING BODIES PROGRAM (FBP): PROGRAMA GARANTIZADO PARA LAS AGENCIAS FINANCIADORAS

OPEN PROGRAM (OP): PROGRAMA DE OBSERVACIÓN ABIERTO A LA COMUNIDAD INTERNACIONAL (5% A PROYECTOS CONJUNTOS ENTRE PAISES DESARROLLADOS Y EN VÍA DE DESARROLLO – O.N.U.).

COMENZAMOS EN
OCTUBRE DE 2018



GESTIÓN DEL PROGRAMA CIENTÍFICO: Proceso seguido por una solicitud de tiempo de observación



OPERACIONES CIENTÍFICAS. PROPIEDAD INTELECTUAL (I)

- **Propiedad de datos personales**

El SOC necesita recopilar y almacenar datos personales de los investigadores que usen el observatorio.

- **Propiedad de datos procesados**

Los datos procedentes de cada observación son procesados en el SOC, almacenados y distribuidos.

Se consideran propietarios durante un periodo determinado (1año), tras el cual se liberan a la comunidad.

OPERACIONES CIENTÍFICAS. PROPIEDAD INTELECTUAL (II)

- **Propiedad de los algoritmos**

El SOC puede usar algoritmos de procesamiento en la pipeline que puedan ser propietarios de un centro o instituto con código no abierto.

Parte de la pipeline puede distribuirse a la comunidad para procesamiento interactivo, conteniendo estos algoritmos.

- **Propiedad del software**

El SOC puede usar software externo a la misión sujeto a ciertas restricciones comerciales o de licencia de distribución.

CONCLUSIONES

EN LAS OPERACIONES CIENTÍFICAS

LA PROPIEDAD INTELECTUAL DE LOS DATOS Y SU GESTION

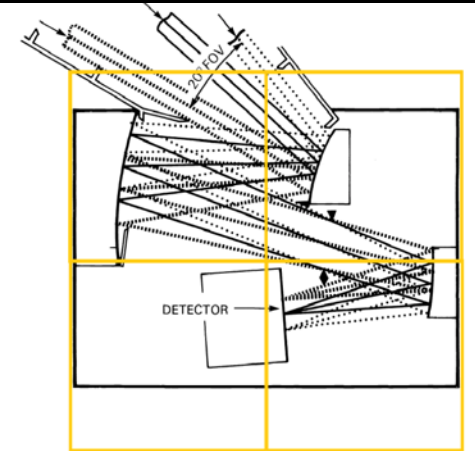
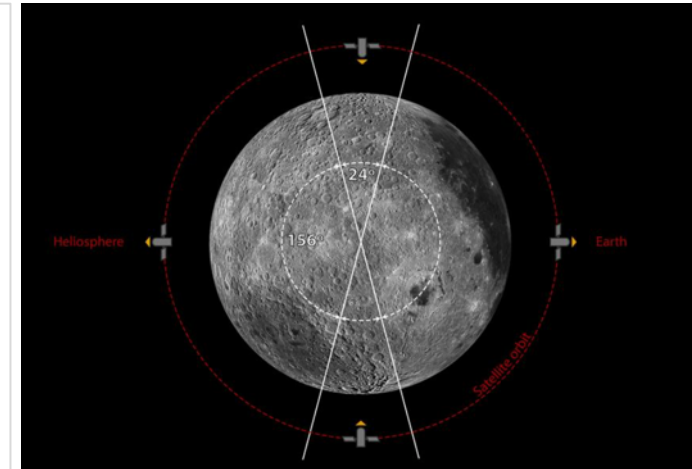
SON ASPECTOS LEGALES FUNDAMENTALES A CONSIDERAR

CUBESAT DEPLOYMENT FOR UV EXPLORATION

Ana I. Gómez de Castro¹, David Ehrenreich², Shingo Kameda³, Leire Beitia¹, Juan C. Vallejo¹ and Mikhail Sachkov⁴

¹AEGORA Research Group, Universidad Complutense Madrid, Spain; ²Observatoire Astronomique de l'Université de Genève, Switzerland; ³Department of Physics, Rikkyo University, Japan; ⁴Institute of Astronomy of the Russian Academy of Sciences, Russia

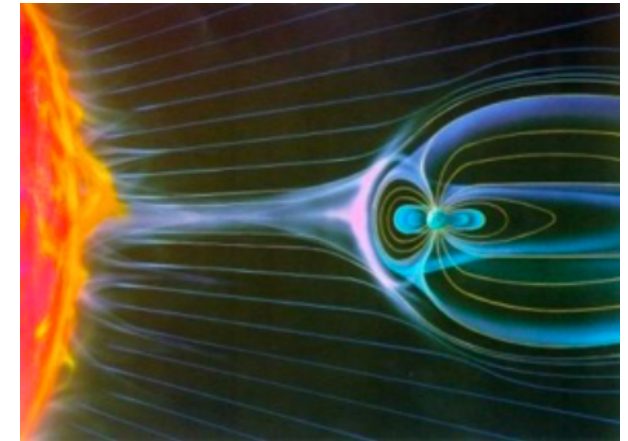
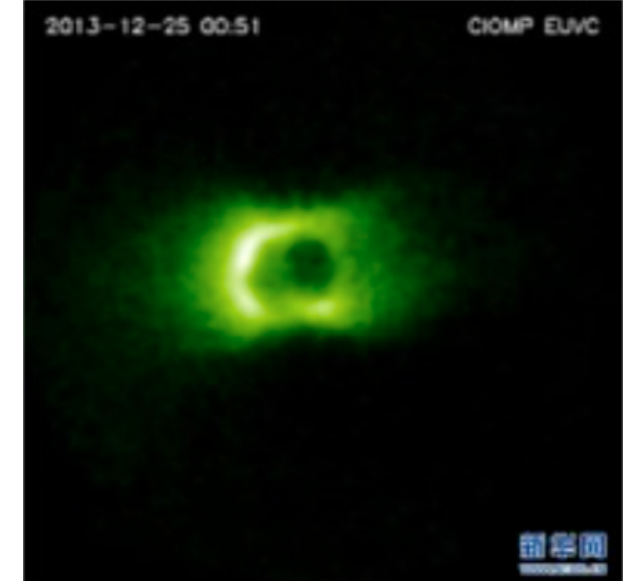
- Deploy a UV telescope integrated inside a 8U **cubesat** from ESA Gateway.
 - To determine the **distribution of neutral gas** in the Earth exosphere and to **observe the surface of the moon** in UV range.
 - Simultaneous measurement of the exospheric emission and the variable background will obtain the most accurate measurements of the Hydrogen distribution at large Earth radii.
- Goals:
 - Production of the first **3D map of the Earth exosphere from outside** by monitoring the Earth Ly α emission.
 - Study the interaction between the Earth magnetosphere and the interplanetary medium/solar wind.
 - Systematic **survey of the heliosphere in Ly α** , investigating the distribution of diffuse matter within.
 - **Monitoring of the water content** and the space weather in the Moon poles.



FROM THE VANTAGE POINT OF THE GATEWAY LOCATION

- Observation of **the Earth as an exoplanet** (UV observations of atmosphere): understanding the physical processes driving the formation and evolution of planet exospheres and magnetospheres.
- Detection of **extended features** against the heliospheric ultraviolet background: comets, dust clouds, HI filaments.
- **Variations of surface ice and frost in the moon polar** regions (as well as presence of dust clouds and plumes) through differential measurements of the Ly α emission variability.

Synergies with other ongoing UV projects, such as WSO-UV mission or studies for UV facilities such as LUVOIR/POLLUX or CETUS. Support to Solar System exploration missions



Deep Space Gateway

