ESA Sky

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IVOA Interop

Sydney 30 October 2015

ESA sky

- **Goal**: to facilitate data discovery and archival science for ALL users
  - Multi-wavelength
  - Project agnostic
  - Exploration

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- Interface to all astronomy archives

- Current status is a beta releae

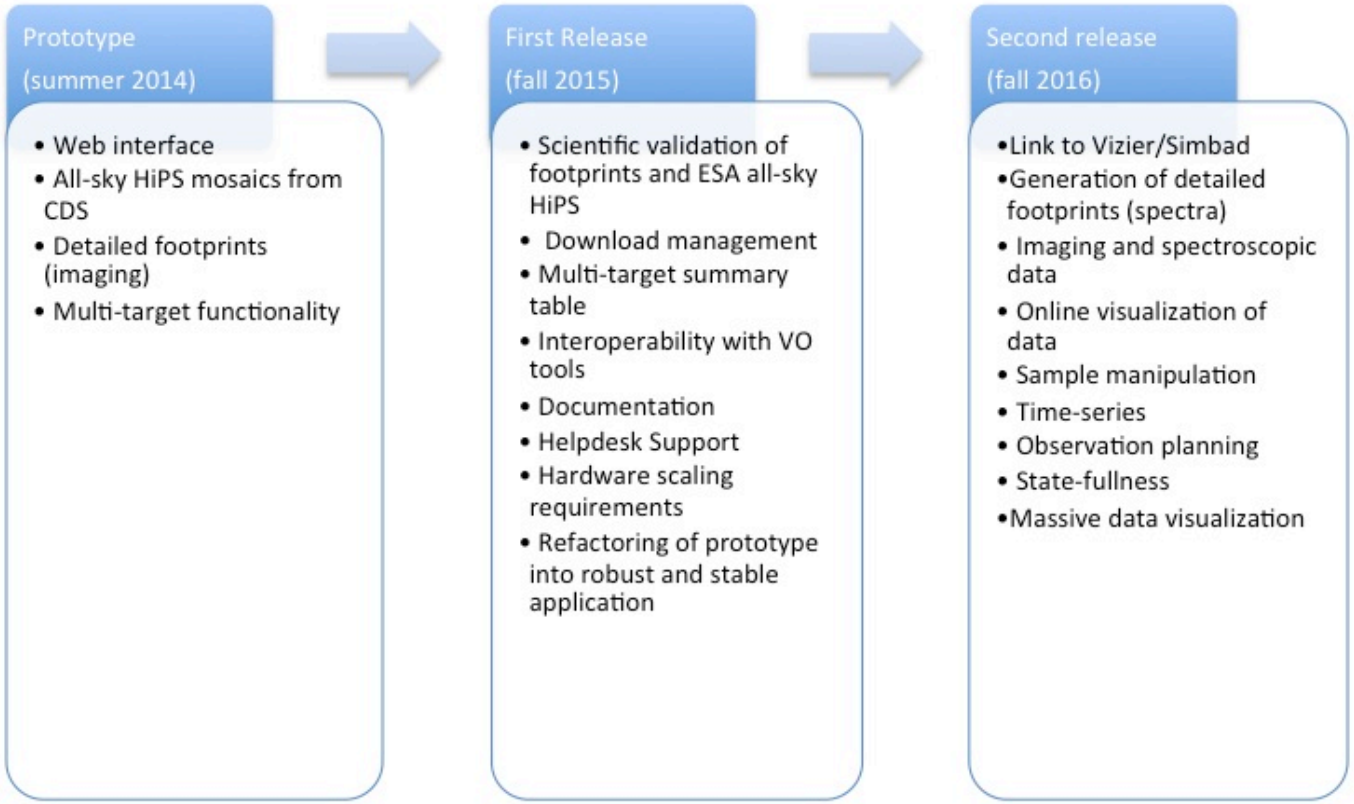
ESA sky beta

- Ingredients of first beta release :
  - All-sky (Hierarchical Progressive Surveys)
  - Footprints
  - Access to data in individual archives
- Use cases of first beta release :
  - Explore multi-wavelength skies
  - Single and multiple targets
- Images and catalogues only, most missions

- Data contents of first beta release:
  - 13 years of **INTEGRAL** data, 2077 gamma-ray sources
  - 16 years of **XMM-Newton** data, 8721 observations, 565962 X-ray and 6 million optical/UV sources
  - 25 years of **HST** data, 588820 observations, 29 million optical sources
  - 4 years of **Hipparcos** data, 2.5 million optical sources
  - 2.3 year of **ISO** data, 47652 observations
  - 4 years of **Herschel** data, 16039 observations
  - 4 years of **Planck** data, 9 all-sky maps, 153142 radio sources

ESA sky (Beta)
Bruno
archives.esac.esa.int/esasky-beta/
GAL
43.0078761 +6.9045986
Sky:XMM EPIC color
m 83
Upload target list
Try the ESA sky beta yourself !
http://archives.esac.esa.int/esasky-beta
Data Panel
XMM-Newton
XMM-OM(UV)
HST
ISO
Herschel
ObservationId
Instrument
RA (J2000)
DEC (J2000)
Showing global sky coverage for the mission.
Zoom in to get the actual footprints of the individual observations.
FoV: 180°
Close data panel
esa

ESA Astronomy Multi-Mission Interface Roadmap (technology)



ESA Astronomy Multi-Mission Interface Roadmap (data contents)

Prototype (summer 2014)

- **All-sky HiPS mosaics:**
  - XMM-Newton (CDS)
  - HST (CDS)
  - Planck (CDS)
  - Herschel-SPIRE (ESA)
- **Science ready data (imaging):**
  - XMM-Newton
  - HST (core)
  - Herschel-SPIRE
- **Catalogs:**
  - 3XMM-DR4
  - XMM Slew
  - XMM OM

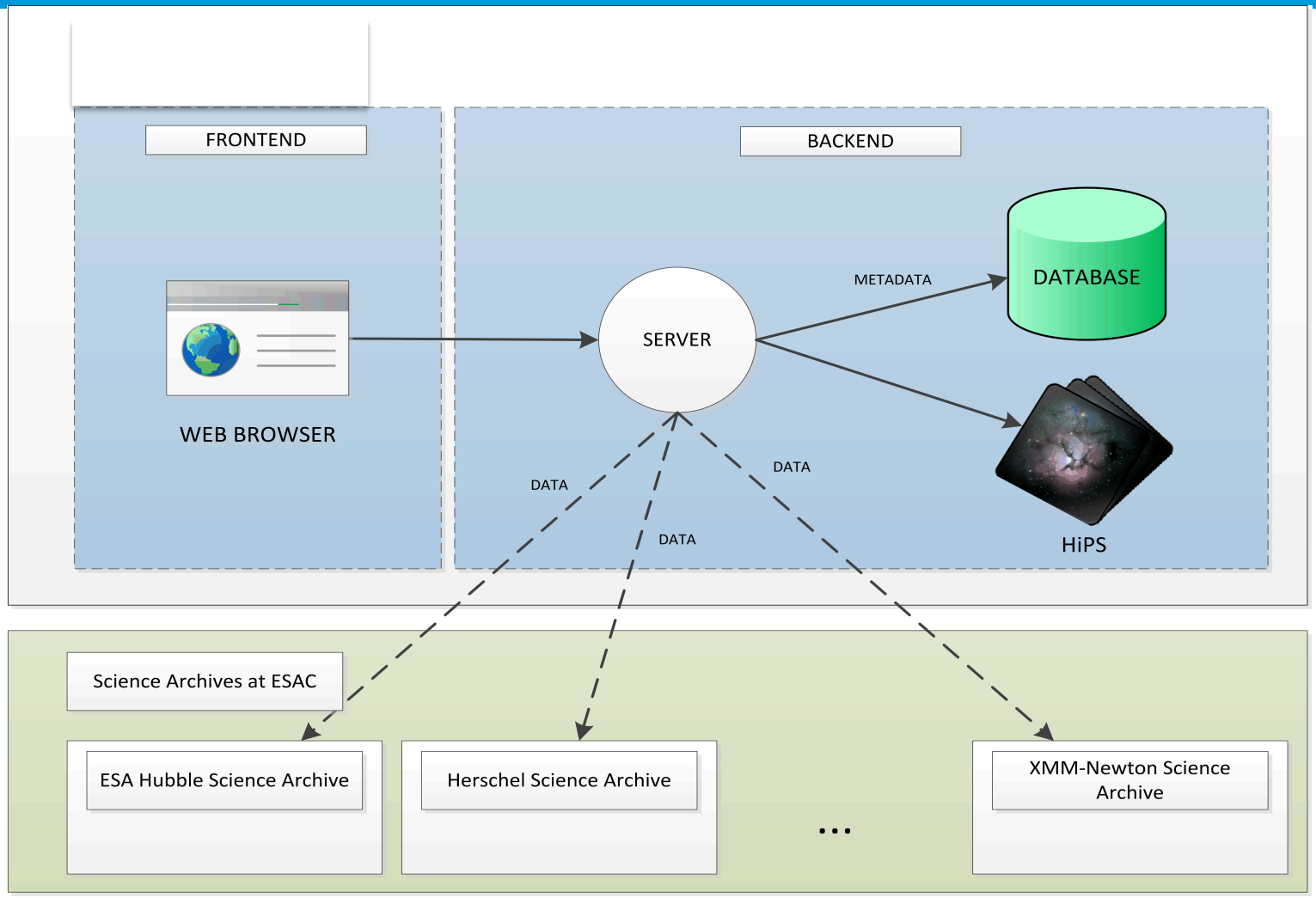
First Release (fall of 2015)

- **All-sky HiPS mosaics:**
  - EXOSAT (ESA)
  - INTEGRAL (ESA)
  - XMM-Newton (ESA)
  - HST (ESA)
  - ISO (ESA)
  - AKARI (ESA)
  - Herschel (ESA)
  - Planck (ESA)
- **Science ready data (imaging):**
  - EXOSAT
  - INTEGRAL
  - XMM-Newton
  - HST
  - ISOCAM
  - Herschel
- **Catalogs:**
  - 3XMM DR5
  - XMM Slew
  - XMM OM
  - Hubble Source catalog
  - Hipparcos
  - AKARI catalogs
  - Planck catalogs

Second release (fall of 2016)

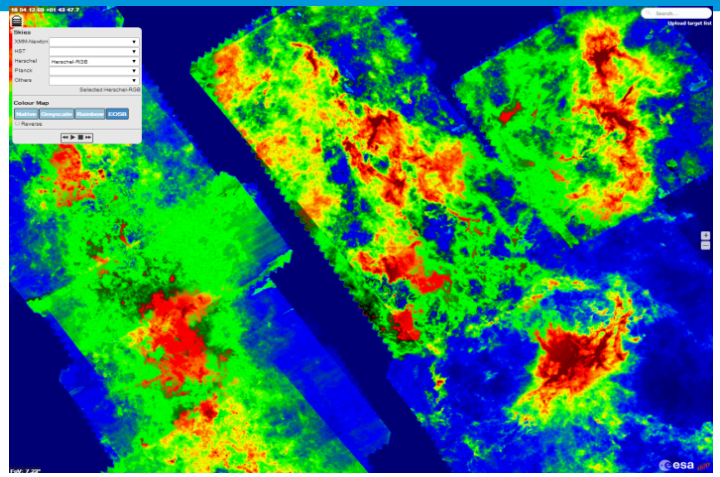
- **All-sky HiPS mosaics**
- **Science ready data (imaging and spectra):**
  - EXOSAT
  - INTEGRAL
  - XMM-Newton
  - HST
  - ISOCAM
  - Herschel
- **Catalogs:**
  - 3XMM-DR4
  - XMM Slew
  - XMM OM
  - Hubble Source catalog
  - Hipparcos
  - Gaia
  - AKARI catalogs
  - Herschel Point Source Catalogs
  - Planck catalogs

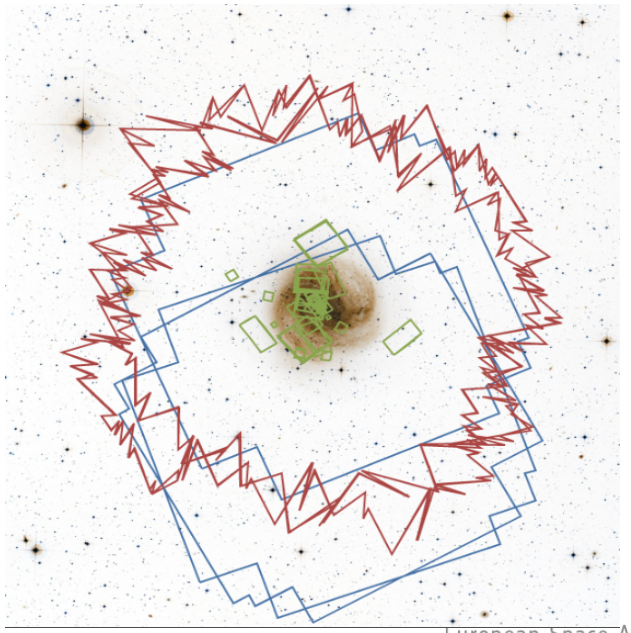
Beta - Architecture



Beta - Backend Data Generation

- HiPS: Hierarchical Progressive Survey
  - HEALPix sky tessellation
  - Number of levels depend on pixel angular resolution
    - Planck (low) 3 levels
    - Herschel (medium) 7 levels
    - HST (high) 14 levels
- Footprints
  - HST: Provided by project
  - Herschel: Footprint Finder (ST-ECF)
  - XMM: Instrumental + pointing





Beta - Backend Data Access

- Apache HTTP Server
  - Serves HiPS requests
- Java Servlet container
  - Serves TAP & Target Resolver requests
- Database
  - PostgreSQL DB
  - Spherical data types library (PgSphere)
  - Footprints -> Spherical data types
- Usage of IVOA Protocols & Standards
  - TAP requests
  - ADQL translation to SQL + PgSphere
  - Storage of STC-S footprint information

Beta - Frontend

- Running on a Web Browser (HTML5/ CSS3)
- Google Web Toolkit
  - Aladin Lite wrapper (JSNI)
  - Data Visualization (Highcharts)
- Usage of IVOA Protocols
  - TAP accessing archive metadata
  - ADQL describing complex FoVs
- Astronomical services access
  - Target coordinates resolver
  - Angular size resolver

MMI people

- **Prototype**:
  - Andy Pollock
  - Michael Rosa
  - Deborah Baines
  - Bruno Merín (part time, astro archives science lead and MMI product owner)
  - Jesús Salgado (part-time, astro archives technical lead)
  - Iñaki Ortiz de Landaluze
  - Nacho León
- **Beta version**:
  - Fabrizio Giordano (key person, full-time)
  - María Henar Sarmiento (part-time, GUI)
  - Elena Racero (part-time, HiPS and footprints)
  - Belén López Martí (full-time, HiPS development)
  - Pilar de Teodoro (part-time, DB)
  - Sara Nieto (part-time, DB ingestion)
  - Raúl Gutiérrez (part-time, backend)
  - Juan González (part-time, DB optimization)

MMI contributors/supporters

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- **INTEGRAL**: Guillaume Belanger, Erik Kuulkers, Peter Kretschmar
- **XMM-Newton**: Nora Loisseau, Pedro Rodríguez, Matteo Guainazzi, María Santos Lleó
- **Gaia**: José Hernández, Jos de Bruijne, Timo Prusti
- **Euclid**: Bruno Altieri, John Hoar, Pedro Gómez
- **Herschel**: Eva Verdugo, David Teyssier, Miguel Sánchez-Portal, Jon Cook, Ivan Valtchanov, Daniel Galán, Pedro García Lario, Göran Pilbratt
- **Planck**: Xavier Dupac, Marcos López Carniego, Jan Tauber
- **Bepi-Colombo**: Jonathan McAuliffe
- **Research Fellows**: Pablo Riviere-Marichalar, Tim Rawle, Jean-Christophe Leyder
- **CAB**: Hervé Bouy, Ignacio Bustamante