

ESO Science Archives



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European Southern Observatory

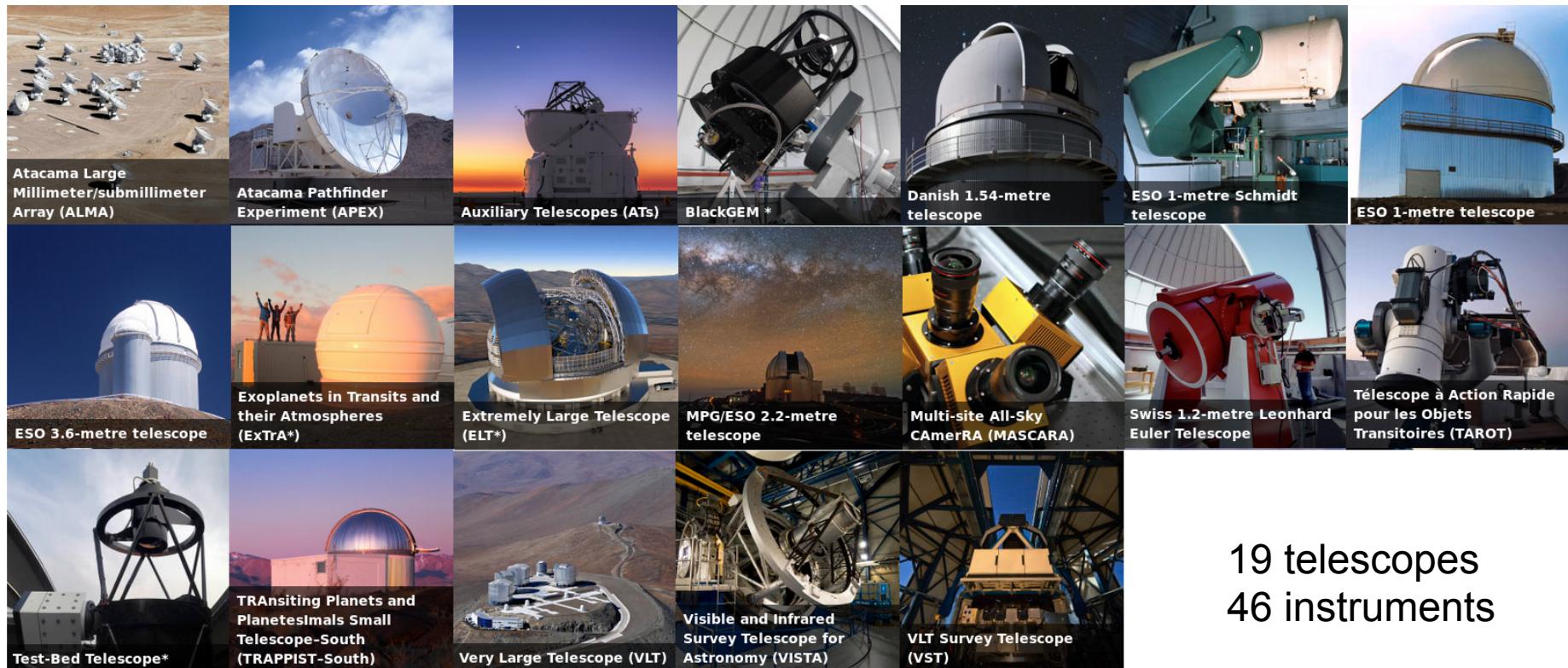
- European Organisation for Astronomical Research in the Southern Hemisphere
- 1962: 5 founding Member States
- 2017: 15 (+1) Member States
- Observatories located in Atacama desert, Chile



ESO observatory sites



ESO Telescopes



19 telescopes
46 instruments

ESO commitment

- ESO is committed to **open data**
- policy: data are public after a proprietary period of 12 months
- ESO provides very extensive user-support
 - USD
 - ALMA Regional Centres
- Workshops
 - LSP Users workshop, ESO calibration workshop, NEON School, ALMA Band 5 workshop, ...
- Joint observing programs
 - (XMM-VLT/VLTI, ALMA VLBI)

Future challenges

■ So much data

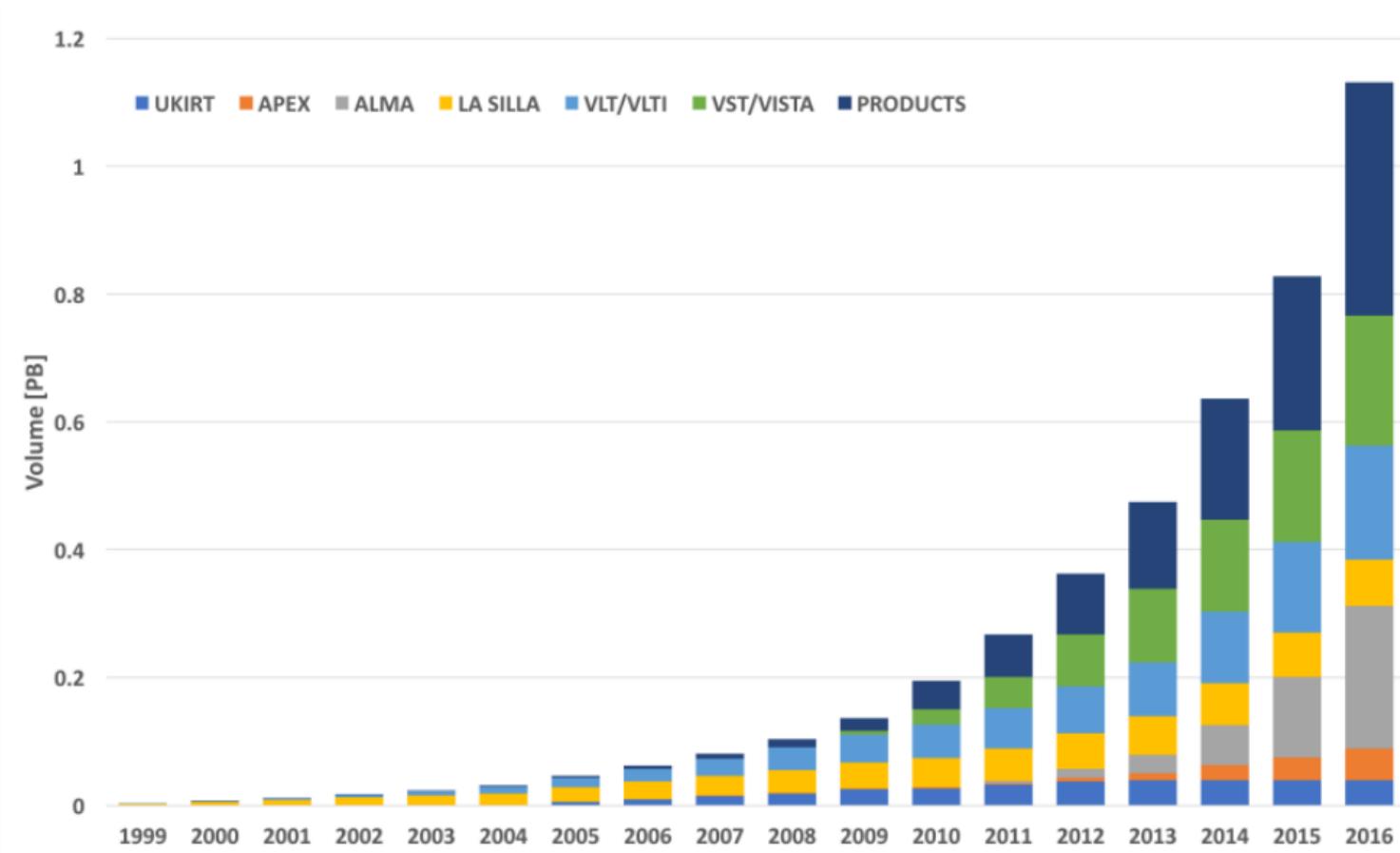
- SKA: up to 180TB/year/astronomer
- 2D images -> 3D data-cubes
- Most pixels will never be looked at by humans

■ Solutions:

- Processing to higher levels (pipelines)
- Data-mining and machine learning

■ Astronomers will become consumers of data

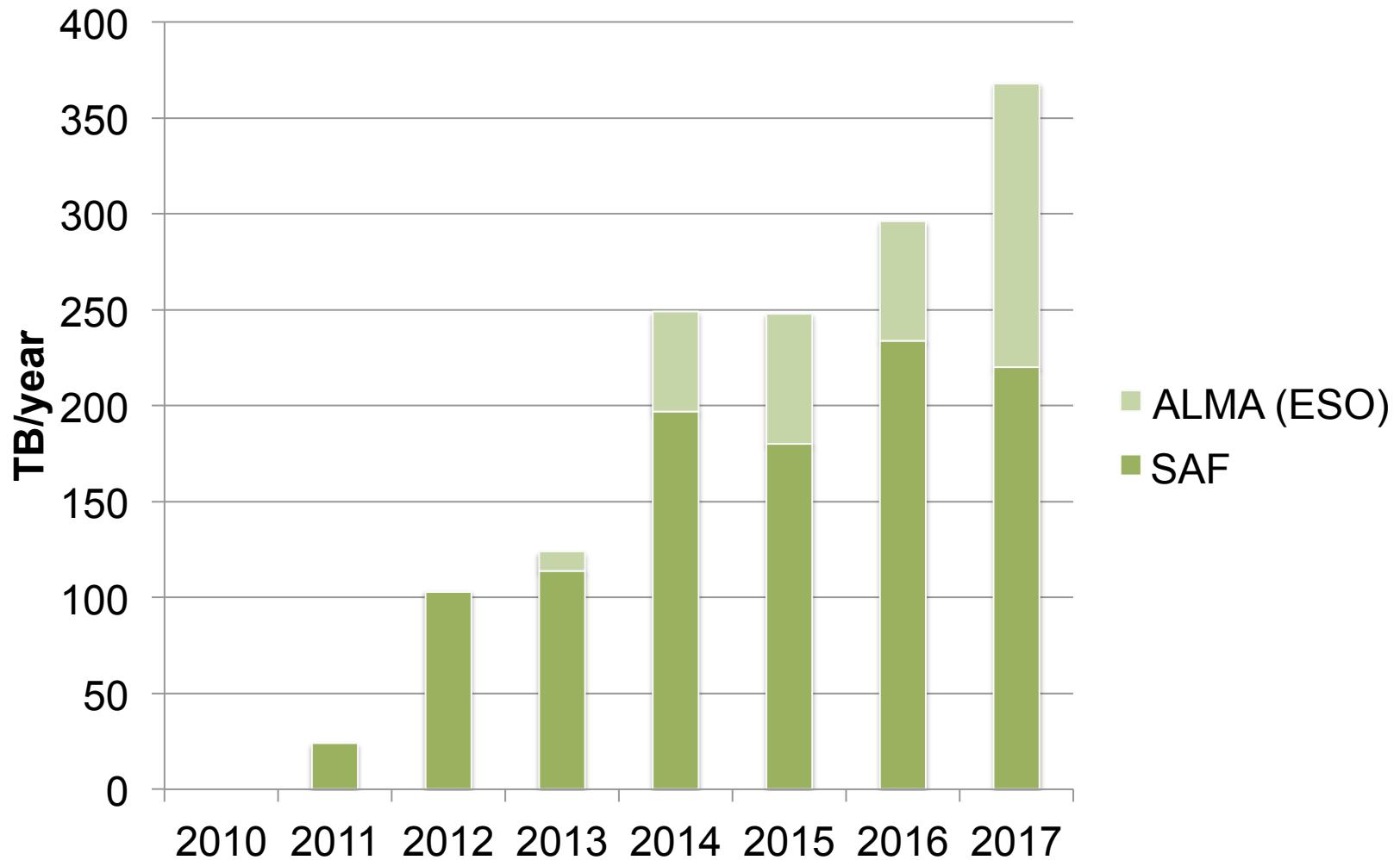
ESO Science Archives



- ~1200 TB / 50 million files
- 24 Tb per month increase

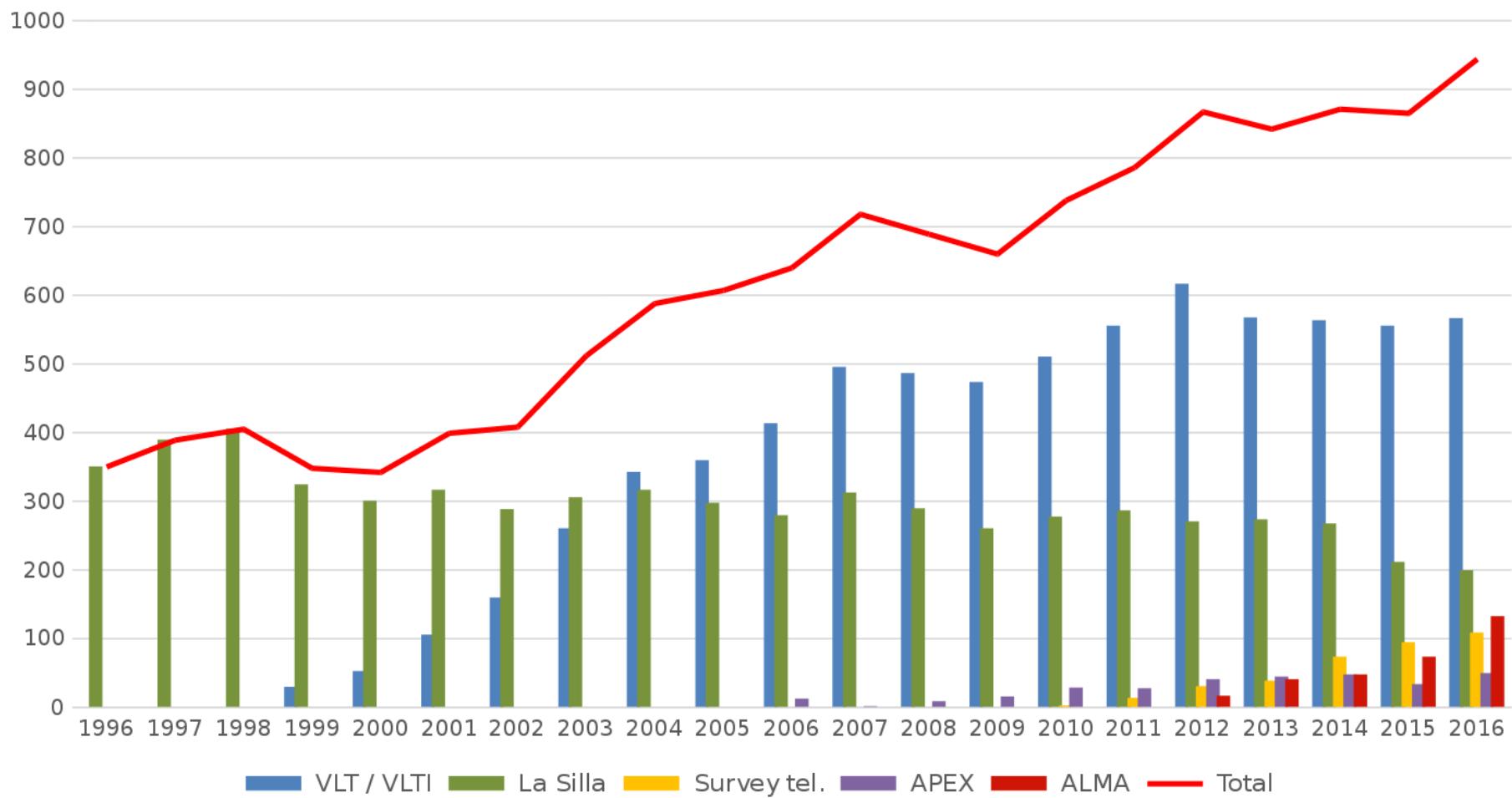
*Data volume / rates are not currently a problem...
-- Labour & \$\$\$ & Brainpower*

Data downloads

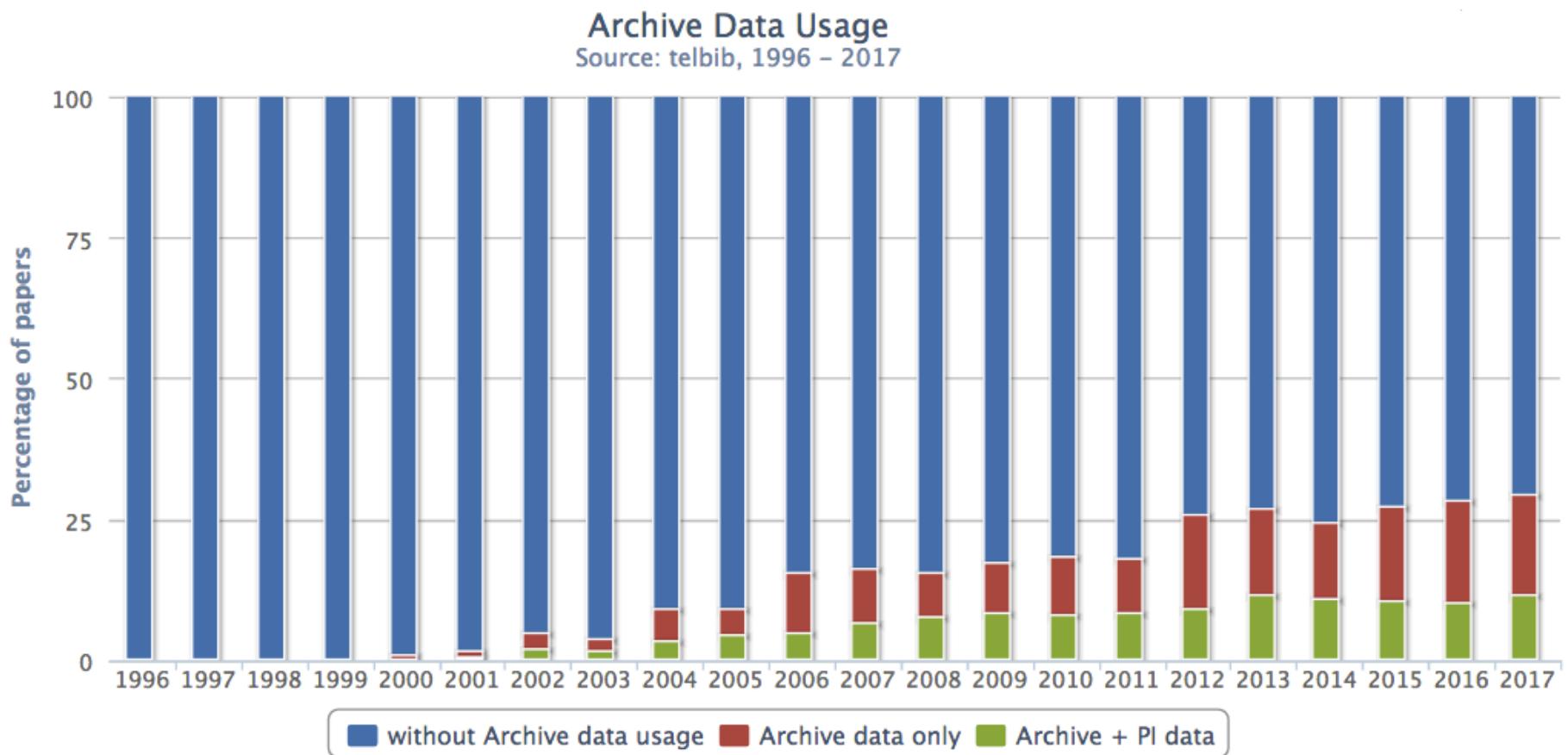


Publication statistics

ESO Publications 1996-2016



Archival publications



Archive interfaces

The screenshot shows the ESO Science Archive - Data Products interface. At the top, there is a search bar for 'Target/RA Dec' with a dropdown menu for 'Instrument'. Below the search bar are several filter panels:

- Object:** ATLAS survey (45944), HD128621 (19439), Str05 (13484), Str04 (13176), Str06 (12748). A note says 'Show 45 more out of 426415'.
- Data Type:** SPECTRUM (1989013), CATALOG (279739), IMAGE (271077), CUBE (5854), VISIBILITY (1154).
- Instrument:** GIRAFFE (1369713), VIRCAM (448871), HARPS (295586), UVES (123680), VIMOS (118264). A note says 'Show 15 more out of 20'.
- Date of Observation:** A histogram showing observations from 1999 to 2017. The x-axis is logarithmic, ranging from 1 to 1M.
- Total Exposure Time (s):** A histogram showing exposure times from 1 to 1M.

The main area displays a search result table with the following columns: Actions, Ppix, Object, Data type, Instrum., Obs.Date, T.Exp.T., Spec.Range, Spec.Res., SNR, PI, Program Id, Collection, #OB's, and Pub.Date. The results show various observations made with the HARPS instrument on 2017-06-14, with exposure times ranging from 300 to 900 seconds. A large image of a star field is overlaid on the table, with a red watermark reading 'Coming soon!'. At the bottom, it says 'Showing 100 out of 2546813 results' and '0 records marked (0)'. There are buttons for 'Request marked datasets' and 'Request all datasets'.

Archive interfaces

ALMA Science Archive Query

[Query Form](#) [Results Table](#)

Submit download request

J2000 ▾ 13:37:4.183 -29:51:46.34

Close Viewer Results Bookmark Export Table Results Help

Fov: 46.07

ALADIN

More columns Showing 72 of 72 rows.

	Project code	Source name	RA	Dec	Band	Integration	Release date	Velocity resolution	Frequency support	Pub
Filter:			H:M:S ▾	D:M:S ▾		seconds ▾		m/s ▾		
<input type="checkbox"/>	2015.1.01593.S	m83	13:37:02.13	-29:52:06.3	7	37.579	2017-04-19	848.91	344.29..360.15GHz	0
<input type="checkbox"/>	2015.1.01593.S	m83	13:37:00.92	-29:51:56.7	3	33786.720	2017-05-05	2684.00	94.84..110.83GHz	0
<input type="checkbox"/>	2015.1.01593.S	m83	13:37:05.63	-29:51:07.9	7	37.578	2017-05-20	848.91	344.29..360.15GHz	0
<input type="checkbox"/>	2015.1.01161.S	M83	13:37:00.75	-29:51:58.0	6	9822.960	2017-07-01	2458.25	229.14..247.21GHz	0
<input type="checkbox"/>	2015.1.01177.S	m83	13:37:00.92	-29:51:56.7	3	2419.200	2017-07-25	6659.15	85.61..101.27GHz	0
<input type="checkbox"/>	2015.1.01593.S							2684.00	94.83..110.83GHz	0
<input type="checkbox"/>	2015.1.01593.S							849.02	344.16..360.19GHz	0
<input type="checkbox"/>	2015.1.01177.S							6659.56	85.60..101.27GHz	0
<input type="checkbox"/>	2015.1.01593.S							849.01	344.16..360.20GHz	0
<input type="checkbox"/>	2016.1.00386.S							2386.39	229.64..247.20GHz	0
<input type="checkbox"/>	2016.1.00386.S							2386.32	229.65..247.21GHz	0
<input type="checkbox"/>	2016.1.00386.S							2386.33	229.65..247.21GHz	0
<input type="checkbox"/>	2016.1.00164.S							5691.17	95.00..110.77GHz	0
<input type="checkbox"/>	2016.1.00386.S							2386.33	229.65..247.21GHz	0
<input type="checkbox"/>	2016.1.00386.S							2386.29	229.66..247.21GHz	0
<input type="checkbox"/>	2016.1.00386.S							2386.25	229.64..247.21GHz	0
<input type="checkbox"/>	2016.1.00164.S							6012.12	89.51..105.22GHz	0

Project title
Molecular Clouds and Star Formation: Across M83

PI name
Sakamoto, Kazushi

Proposal abstract
We propose an arcsecond-resolution imaging of molecular gas in the central 10 kpc of M83, a third of which has been taken in Cycle 3. We will study molecular gas and cloud properties, star formation, their interrelation as well as relation to gas dynamics. M83 is the nearest face-on grand-design spiral galaxy with a stellar bar. Our mapping area contains two grand-design spiral arms, entire bar, and most of star forming regions in the galaxy. We will resolve individual GMCs at 20 pc resolution and achieve 10-sigma mass sensitivity of 1e4 Msun for beam-size clouds. Statistical properties of the GMCs will be analyzed as a function of gas dynamical environment (e.g., circumnuclear, on/off bar, bar-end, on-/inter-arm, and outer disk). We will also quantify using HST data the association of GMCs to young star clusters and HII regions. Our central question is : How do galactic structures such as the bar and spiral arms affect the properties of GMCs and subsequent star formation? Our unprecedentedly detailed wide-area observations will allow a significant progress toward its answer. The data will also serve as a base for multi-wavelength studies of M83 by the community.

Virtual Observatory

- The original idea of the VO has become a reality!
- ESO is committed to provide VO services
- Heavy use of VO standards, protocols and tools
 - VOTable, HiPS, STC-S, ObsCore, ADQL, AVM, ...
 - TAP, ObsTAP, SIAPv2, SSAP, ...
 - AladinLite, OpenCADCTap, TAPLibrary, ...
- Personal: “Could the UN endorse the IVOA?”

ESO data for everyone

■ ESA/ESO/NASA FITSliberator

- <https://github.com/esoobservatory/fitsliberator>

■ Content distribution standard for planetariums

- www.data2dome.org

■ Astronomy visualization metadata (AVM)

- IVOA-endorsed standard (in development)
- Already integrated into the
www.worldwidetelescope.org (WWT)



ESO data for everyone

www.worldwidetelescope.org

The screenshot shows the Worldwide Telescope application interface. At the top, there is a navigation bar with links for Home, Explore, Guided Tours, Search, Communities, View, and Settings. To the right of the navigation bar are buttons for "Install Windows Client" and "Sign In". Below the navigation bar, a breadcrumb trail indicates the current location: Collections > New VAMP Feeds > ESO (European Space Observatory) >. A progress bar at the top right shows "1 of 48".

The main content area displays a detailed image of the Helix Nebula (NGC 7293), a planetary nebula located in the constellation Aquarius. The nebula has a distinct ring-like structure with a central bright core.

On the left side, there is a "Layers" panel with a hierarchical tree view of various astronomical data layers:

- Sky
 - Overlays
 - Constellations
 - Constellation Pictures
 - Constellation Figures
 - Constellation Boundaries
 - Constellation Names
 - Grids
 - Equatorial Grid
 - Galactic Grid
 - AltAz Grid
 - Ecliptic Grid
 - Ecliptic Overview
 - Precession Chart
 - 2d Sky
 - Show Solar System
 - 3d Solar System
 - Milky Way (Dr. R. Hurt)
 - Stars (Hipparcos, ESA)
 - Planets (NASA, ETAL)
 - Planetary Orbits
 - Moon & Satellite Orbits
 - Asteroids (IAU MPC)
 - Lighting and Shadows



data for everyone

www.worldwidetelescope.org

The screenshot shows the Worldwide Telescope interface with the Chandra X-ray Observatory feed selected. The top navigation bar includes links for Home, Explore, Guided Tours, Search, Communities, and View. The main content area displays a dark background with several bright, multi-colored X-ray sources, identified as the Perseus Cluster. A sidebar on the left, titled 'Layers', contains checkboxes for various astronomical overlays, with 'Constellations' and 'Grids' currently checked. Below the sidebar is a list of image files, including 'NGC 3532', 'NGC 3532', 'NGC 1313', and 'VVV CL002'. The bottom of the interface features a toolbar with icons for Look At, Imagery, and Image Crossfade.

The screenshot shows the Worldwide Telescope interface with the Spitzer and Hubble feeds selected. The top navigation bar includes links for Home, Explore, Guided Tours, Search, Communities, and View. The main content area displays a dark background with a prominent red and orange nebula, identified as the Lagoon Nebula. A sidebar on the left, titled 'Layers', contains checkboxes for various astronomical overlays, with 'Constellations' and 'Grids' currently checked. Below the sidebar is a list of image files, including 'NGC 3532', 'NGC 1313', and 'VVV CL002'. The bottom of the interface features a toolbar with icons for Look At, Imagery, and Image Crossfade. The text 'Spitzer' is overlaid on the upper right portion of the interface.