

Astronomy in the Open Science context



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□ An Open Science pioneer

- Open Science is currently a hot topic
- Astronomy has been a pioneer
 - CDS created in 1972 (remote access to IBM mainframe!)
 - FITS data format 1977
 - IUE (1978-1996) database
 - Bibcode (publication ID) end of 90's
 - Networked on-line data & bibliographic services started 1993-94
 - VO concept ~2000, precursors beforehand

□ The Virtual Observatory

- The Virtual Observatory is operational and used by data providers, scientists, amateur astronomers, education
- Aim: seamless access to data and tools
- VO is everywhere as soon as one uses on-line astronomy services but hidden (can be an issue!)
150.000 VO-enabled queries/day on CDS/VizieR
- Also used as building blocks of pipelines/data management systems

□ VO current priorities

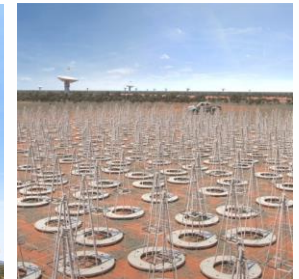
- Assess the integration of data from future large projects (beyond basic standards)
 - Multi-D – done
 - Time domain – on-going
- Large projects are invited to participate in IVOA
- In Europe: ASTERICS Astronomy Cluster (2015-2019)
 - WP *Data Access, Discovery & Interoperability* (4.5 M€)
 - VO teams from France, Germany, Italy, Spain, UK
 - Large projects and their precursors

□ Projects involved in ASTERICS - DADI

ESO Associate Partner – VLT/ELT

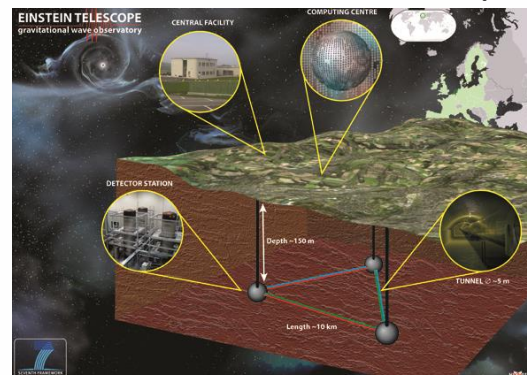
Close collaboration with ESA – Space requirements!

CTA

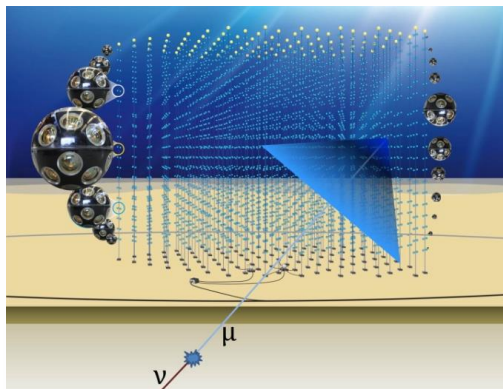


SKA

EGO/ET

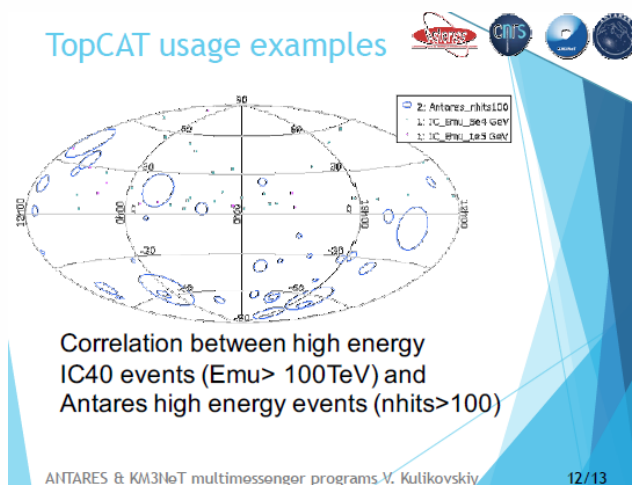


KM3Net

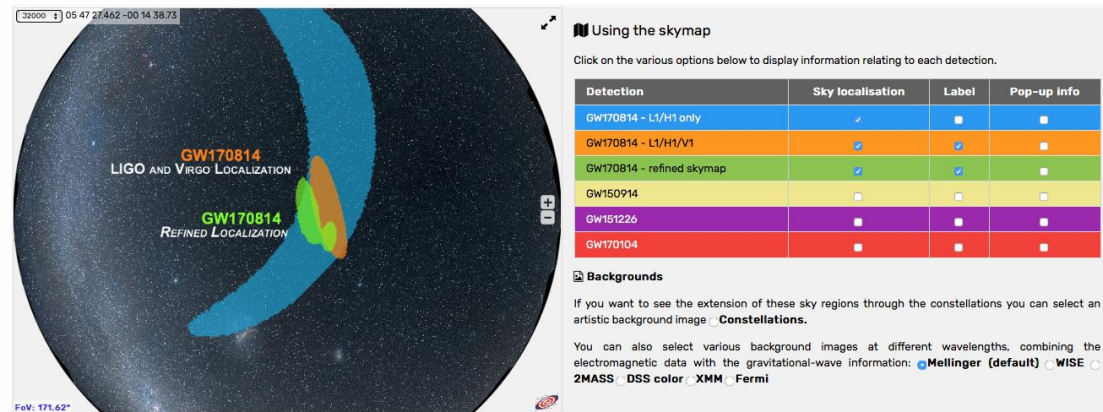


□ Cross-disciplinary aspects: ASTERICS

- ASTERICS: Astronomy/Astroparticle physics



ANTARES/IceCube



Gravitational Wave event localisation
in VO tool

Cross-disciplinary use of the VO framework

VESPA data services

- A table describing each of the service files (using std parameters)
- Stored in postgresql + TAP-handling application at the institutes
- Searches through an optimized interface, connected to VO tools



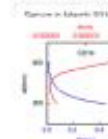
Results in service titan

granule_url	datapoint_type	target_name	time_min	time_max	access_url
79H_89E_La301_profile_C042.q.votable	profile	Titan	2005-02-14T12:00:00.000	2005-02-14T12:00:00.000	79H_89E_La301_profile_C042.txt
79H_89E_La301_profile_C02.q.votable	profile	Titan	2005-02-14T12:00:00.000	2005-02-14T12:00:00.000	79H_89E_La301_profile_C02.txt
79H_89E_La301_profile_C048.q.votable	profile	Titan	2005-02-14T12:00:00.000	2005-02-14T12:00:00.000	79H_89E_La301_profile_C048.txt
79H_89E_La301_profile_C044.q.votable	profile	Titan	2005-02-14T12:00:00.000	2005-02-14T12:00:00.000	79H_89E_La301_profile_C044.txt
79H_89E_La301_profile_C042.q.votable	profile	Titan	2005-02-14T12:00:00.000	2005-02-14T12:00:00.000	79H_89E_La301_profile_C042.txt
79H_89E_La301_profile_C045.q.votable	profile	Titan	2005-02-14T12:00:00.000	2005-02-14T12:00:00.000	79H_89E_La301_profile_C045.txt
79H_89E_La301_profile_C040CH.q.votable	profile	Titan	2005-02-14T12:00:00.000	2005-02-14T12:00:00.000	79H_89E_La301_profile_C040CH.txt
79H_89E_La301_profile_H2N.q.votable	profile	Titan	2005-02-14T12:00:00.000	2005-02-14T12:00:00.000	79H_89E_La301_profile_H2N.txt
79H_89E_La301_profile_C046.q.votable	profile	Titan	2005-02-14T12:00:00.000	2005-02-14T12:00:00.000	79H_89E_La301_profile_C046.txt

Plotting tools



Example queries

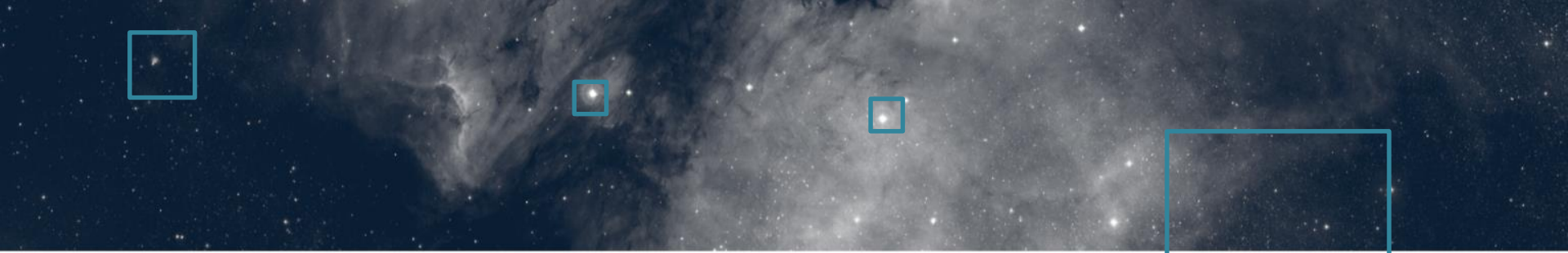


- Planetary sciences: EuroPlaNet/VESPA
- Virtual Atomic and Molecular Data Center (VAMDC)

From S. Erard

□ Key building blocks for cross-disciplinary usage

- Registry of resources
 - OAI-PMH
 - Dublin Core with disciplinary extensions
- Vocabularies: W3C SKOS-RDF

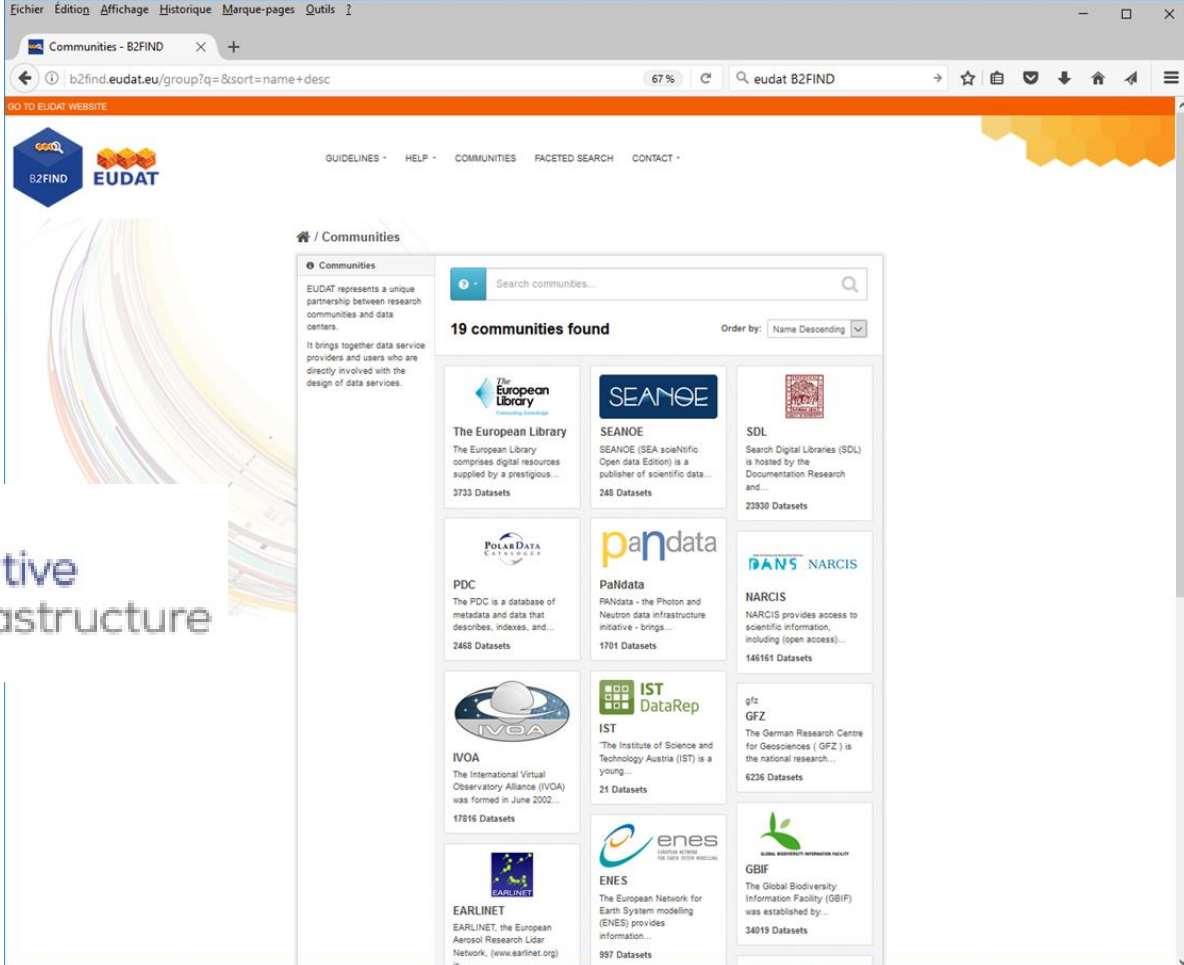


RELATIONSHIP WITH ‘GENERIC’ INITIATIVES

□ IVOA in EUDAT B2FIND Registry

 Collaborative
EUDAT Data Infrastructure

(EOSC)



The screenshot shows a web browser window displaying the 'Communities - B2FIND' page. The browser's address bar shows the URL 'b2find.eudat.eu/group?q=&sort=name+desc'. The page features a navigation bar with links for 'GUIDELINES', 'HELP', 'COMMUNITIES', 'FACETED SEARCH', and 'CONTACT'. The main content area is titled '/ Communities' and lists '19 communities found'. The communities are displayed in a grid, each with a logo, name, description, and dataset count. The communities listed include: The European Library (3733 Datasets), SEANOE (248 Datasets), SDL (23930 Datasets), PDC (2468 Datasets), PanData (1701 Datasets), NARCIS (146161 Datasets), IVOA (17816 Datasets), IST DataRep (21 Datasets), gfc GFZ (6236 Datasets), EARLINET (997 Datasets), ENES (997 Datasets), and GBIF (34019 Datasets).

□ IVOA is a WDS Network member



File Edit View History Bookmarks Tools ?

Network Members — Wor... x +

www.icsu-wds.org/community/membership/community/membership/network-m... 120 % Rechercher

Member Name	Field(s)	LoA [®]
International VLBI Service for Geodesy and Astrometry	Space sciences Earth sciences Geodesy, Astrometry	Yes
International Laser Ranging Service	Space sciences Earth sciences Physics Geodesy, Space Geodesy	Yes
International GNSS Service	Space sciences Earth sciences Geodesy, GPS, GNSS, Precise positioning, navigation, and timing	Pending
International Virtual Observatory Alliance (IVOA)	Astronomy	Yes
International Oceanographic Data and Information Exchange (IODE)	Earth sciences Oceanography	Yes
NASA ESDIS Project	Earth sciences Physics Geography Computer sciences Mathematics Systems science Engineering Environmental studies and forestry	Yes
International Space Environment Service (ISES)	Earth sciences Space sciences Space weather, Solar-Terrestrial physics	Yes
CLARIN ERIC	Cultural and ethnic studies Political science Psychology Sociology Statistics History Languages and linguistics	Pending

» WDS Members' Forum
» SciDataCon Conference
» Data Stewardship Award
» Promotion

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□ The Research Data Alliance

- Created in 2013 by Australian Government, European Commission & USA NSF
- Sociological & Technological bridges that enable open sharing of data
- 6200 members from 130 countries
- 89 Working & Interest Groups



□ IVOA gateways with RDA

- FG co-chair of RDA Technical Advisory Board
- Lessons learnt from building the IVOA are taken into account
- Staff from several IVOA national initiatives participate actively
 - Certification, Long Tail of Data, Provenance, Dynamic Data Citation, Federated Identity Management, Research Data Repository Interoperability, Repository Platforms for Research Data, Units of Measures
- Disciplinary Collaboration Framework IG (D. Schade)
- Discussion of RDA status and activities at each IVOA meeting

□ Conclusion

- Astronomy remains at the forefront in the Open Science Context
- Shares lessons learnt, expertise and products with other disciplines
- Shares lessons learnt and expertise with generic 'data initiatives'
- Interface with generic data initiatives
- In the European context interoperability with EOSC to be assessed – we would bring an operational international disciplinary data infrastructure for EOSC