CDS participation in projects

F. Genova and the CDS team

Guidelines for participation in projects

- Driven by the CDS needs and interests

- Five on-going European projects with different main drivers
  - CoSADIE: Euro-VO leadership

    Maintain European VO collaboration and assess medium term sustainability, in close collaboration with Astronet

  - Three projects of the SPACE framework, ARCHES, AstroDeep and VIALACTEA
    - Scientific interest of staff members (cf CS recommendation)
    - Development of new methods
    - Service usage in different scientific contexts
    - Dissemination of results

  - RDA Europe (previously iCORDI)

    Assert and develop CDS expertise in the domain of scientific data sharing

- Participation in space projects
  - Gaia
  - CoRoT

CoSADIE (1)

- Collaborative and Sustainable Astronomical Data Infrastructure for Europe

- E-Infrastructure framework, Coordination Action

- 2 years (09/2012-08/2014), 475 k€

- Five partners: CNRS (with UNISTRA), INAF, INTA, UEDIN, UHEI

  i.e. France, Italy, Spain, UK, Germany

  ESA and ESO associated partners

- Two main objectives
  - Maintain coordination of VO activities in Europe
  - Assess medium term sustainability (2nd year)

- Activities towards VO users (scientists and data providers), coordination of technological activities, coordination of outreach towards education and the general public interested in astronomy

CoSADIE (2)
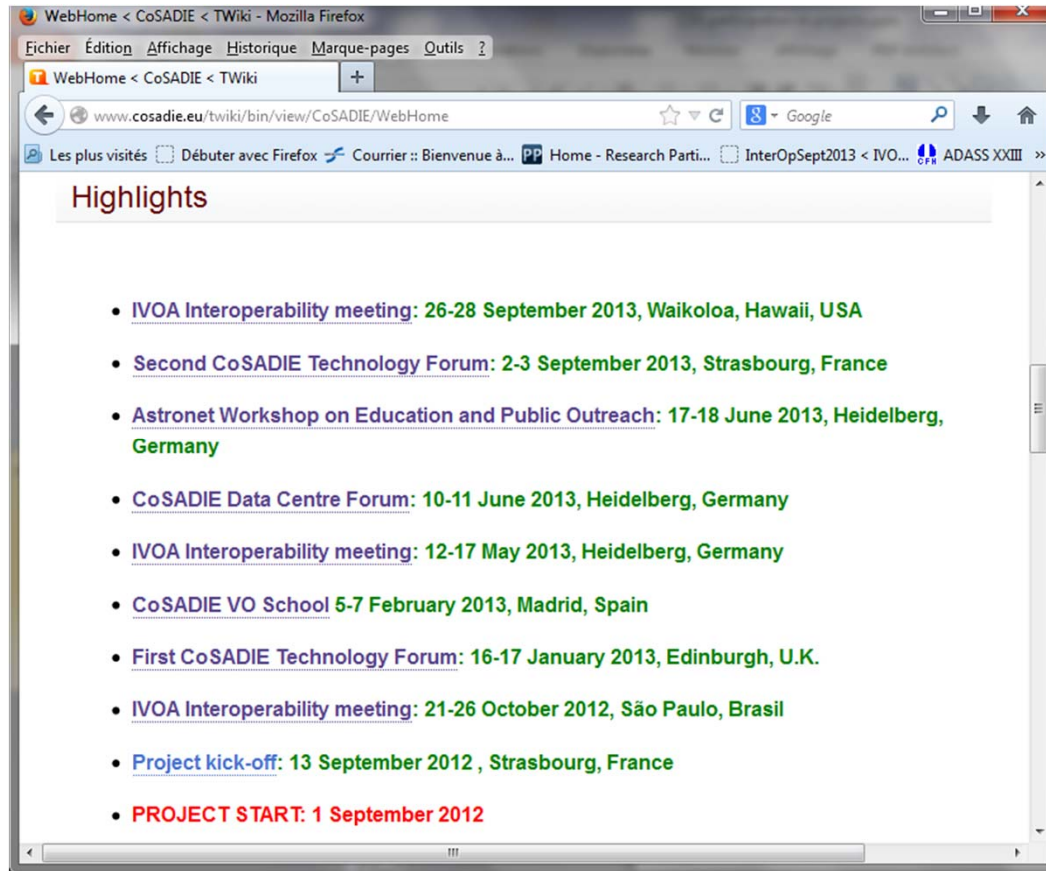
- Science Advisory Committee
- European VO School, used as template for similar activities at national or local level
- Data Centre Forum – excellent response of data centres which want to have regular meetings
- Technology Forums
- Education tutorials (usage of Aladin and Stellarium)

CoSADIE (3)

- Excellent collaboration with Astronet, which has a task on follow up of the 2008 Roadmap recommendations about the VO
  - Astronet coordinator participated in CoSADIE kick-off and in one SAC meeting
  - CoSADIE invited to participate in Astronet activities (Exec meetings, Town Hall meeting at EWASS 2013 in Turku, M. Allen: Infrastructure Roadmap update)
- Euro-VO future depends on the Horizon 2020 work programme
  - e-Infrastructure projects will be generic and not thematic (except Virtual Research Environment)
  - Infrastructure projects tend to be pre-defined
    - Euro-VO I3 submitted to 2012 Consultation
    - ESFRI clusters, not only for ESFRI projects but can be inclusive
  - Good connection with "neighbouring" disciplines
    - Planetary studies customize VO standards and tools
    - Collaboration with CTA to understand their needs

ARCHES

- Astronomical Resource Cross-matching for High Energy Studies
- Partners: Université de Strasbourg (with CNRS) – High Energy team and CDS, UC (Cantabria), INTA, AIP, ULEIC
- Cross-correlation of XMM catalogue with extensive archival resources, producing well characterized multi-wavelength data in the form of Spectral Energy Distributions for large sets of objects
- Validation through pilot projects (AGN, galactic, cluster science)
- CDS participation
  - Cross-match methods
  - Selection of archival catalogues
  - Personnel training
  - Dissemination of results in the VO
- Close collaboration with the High Energy Team, in particular A. Nebot and L. Michel

ASTRODEEP
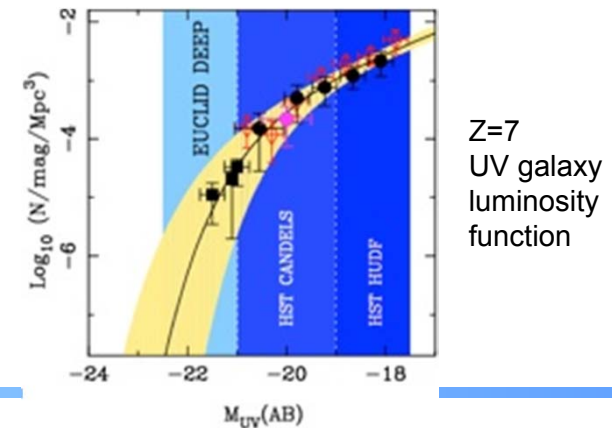
Unveiling the power of the deepest images of the Universe

- Adriano Fontana, Coordinator, (INAF - OA Rome, I)

- James Dunlop, (University of Ediunburgh, UK)

- David Elbaz (CEA-Saclay, FR)

- S. Derriere (CDS Strasbourg, FR)

- A. Comastri (INAF - OA Bologna, I)

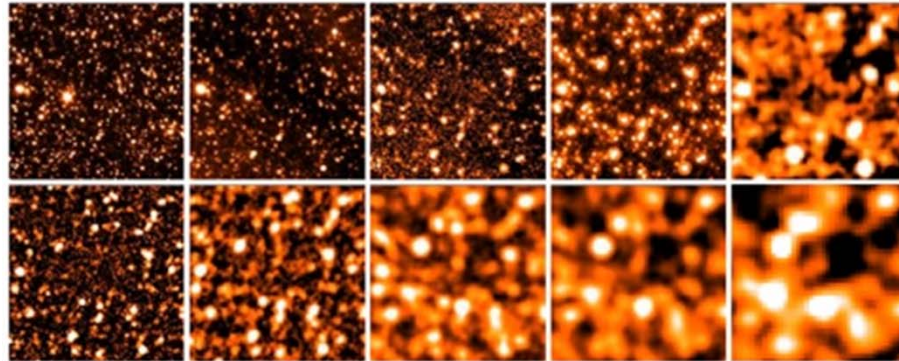- S. Faber (Univ. of S. Cruz, USA)

UDS field, WFC3 HST CANDELS

Scientific goals :

- First galaxies and cosmic re-ionization

- Complete history of obscured and un-obscured star formation

- Formation of the most massive galaxies

- Nature of the connection between the evolution of galaxies and their central super-massive black holes.

FP7 SPACE program 2013-2016

- Algorithm/software development and testing
- Data reduction/ release
- Scientific data validation/analysis

Z=7 UV galaxy luminosity function

	Area Wave.	GOODS-N 150'²	EGS-CANDELS 150'²	UDS 1'²	UDS-CANDELS 150'²	COSMOS 1'²	COSMOS-CANDELS 150'²	GOODS-S 150'²	HUDFs 15'²
HERSCHEL	500µm	9 mJy	12.8 mJy	13.4 mJy	13.4 mJy	9.5 mJy	9.5 mJy	9 mJy	9 mJy
	350µm	7.2 mJy	8.9 mJy	9.3 mJy	9.3 mJy	6.6 mJy	6.6 mJy	7.2 mJy	7.2 mJy
	250µm	5.7 mJy	10.7 mJy	11.2 mJy	11.2 mJy	8.0 mJy	8.0 mJy	5.7 mJy	5.7 mJy
	160µm	2.7 mJy				11 mJy	11 mJy	2.4 mJy	2.4 mJy
	100µm	1.1 mJy	3.7 mJy	4.0 mJy	4.0 mJy	5 mJy	5 mJy	0.8 mJy	0.8 mJy
	70 µm							1.0 mJy	1.0 mJy
Spitzer	70 µm	2.4 mJy	3.5 mJy	18 mJy	18 mJy	10 mJy	10 mJy	3.1 mJy	3.1 mJy
	24 µm	21 µJy	50 µJy	230 µJy	230 µJy	60 µJy	60 µJy	20 µJy	20 µJy
	16 µm	32 µJy						52 µJy	52 µJy
	8 µm	1.7 µJy	4.8 µJy	10.2 µJy	10.2 µJy	17.3 µJy	17.3 µJy	1.7 µJy	1.7 µJy
	5.8 µm	1.4 µJy	3.9 µJy	8.3 µJy	8.3 µJy	13.4 µJy	13.4 µJy	1.4 µJy	1.4 µJy
	4.5 µm	0.2 µJy	0.6 µJy	1.2 µJy	1.2 µJy	2.0 µJy	2.0 µJy	0.2 µJy	0.2 µJy
	3.6 µm	0.1 µJy	0.3 µJy	0.6 µJy	0.6 µJy	1.1 µJy	1.1 µJy	0.1 µJy	0.1 µJy
VLT/VISTA/ UKIDSS	2µm(K)	25.6	23.8	25.0	26.0	25.0	26.0	26.8	27.2
HST-WFC3	1.6 µm(H)	27.8	26.7	---	26.7	---	26.7	27.8	29.9
	1.2 µm(J)	27.8	26.7	---	26.7	---	26.7	27.8	29.9
	1 µm(Y)	28.0	---	---	---	---	---	28.0	30.0
VLT/VISTA	1µm(Y)	---	---	24.6	26.5	26.7	26.7	26.7	26.7
HST-ACS	0.85µm(Z)	27.6	---	---	---	---	---	27.6	29.4
	0.75 µm(I)	28.7	27.8	---	27.8	27.2	27.8	28.7	29.9
	0.6 µm(V)	28.2	27.9	---	27.9	27.2	27.9	28.2	30.1
	0.45µm(B)	28.2	---	---	---	---	---	28.2	29.7
CFHT/VLT LBT	0.36µm(U)	28.2	27.0	27.5	27.5	27.7	27.7	28.0	28.0
GALEX	0.14-0.28	26.0	25.0	25.0	25.0	25.0	25.0	26.0	26.0
XMM	2-10 keV	1.5×10^{-15}	---	3×10^{-15}	3×10^{-15}	3×10^{-15}	3×10^{-15}	4×10^{-16}	4×10^{-16}
XMM	5-10 keV	4×10^{-15}	---	1×10^{-14}	1×10^{-14}	1×10^{-14}	1×10^{-14}	7×10^{-16}	7×10^{-16}
Chandra	0.5-2 keV	2×10^{-17}	5×10^{-17} erg cm² s⁻¹	---	---	2×10^{-16}	---	1×10^{-17}	1×10^{-17}

- Multi-resolution source extraction and photometry
- Multi-frequency cross-match
- Catalogues creation

CDS contribution to data dissemination :
- Integrating ultra-deep fields in SIMBAD
- Catalogues publication in VizieR
- Dedicated data portal (using widgets)

The Milky Way as a Star Formation Engine

- FP7-SPACE, 9 institutes in 7 countries, coord. S. Molinari (INAF)
  - participant: *L. Cambrésy* (CDS)
  - external member of the steering committee: *A. Schaaff* (CDS)
  - Starting date: Oct 2013

- Objectives
  - creation of a galaxy-scale predictive model for star formation
  - exploit the combination of all the new-generation infrared to radio surveys of the Galactic Plane using a novel data and science analysis paradigm based on 3D visual analytics and data mining framework
  - boost the scientific exploitation of ESA missions space data by developing new and carefully tailored image processing tools
  - combine in a VO-compatible and interoperable way the surveys from space-borne missions and ground-based observatories
  - build and visualize a new 3D representation of the Milky Way Galaxy

VIA LACTEA: CDS contribution

- 3D mapping of the extinction in the Galaxy
  - Deep near-infrared surveys (UKIDSS, VVV) and the Besançon model of stellar population will be compared to build a 3D extinction map.

  - new constraints from the 2D Herschel maps and higher resolution and sensitivity submm continuum data from the JCMT SCUBA2 as well as ATLASGAL surveys will also be incorporated.

  - Further refinement of both the stellar population in the extinction method and rotational model in the kinematic method will lead to a common solution that agrees with the observational constraints.

The Galactic Plane at 345°< l <330° as seen in the Herschel/Hi-GAL survey (350µm, 160µm, 70µm), demonstrating the unprecedented ability of new-generation infrared surveys to trace cold dust in the diffuse ISM, cold filamentary structures and bright and active star-forming regions.

RDA Europe

- EC funded coordination action led by CSC, Finland
- The project started in Sept. 2012 for two years, and evolved extremely rapidly between the proposition/negotiation and now, because the creation of the Research Data Alliance was much faster than expected
- Preparatory meetings Sept.-Oct. 2012, kick-off March 2013 (Goethenburg, Sweden), 2nd Plenary Sept. 2013 (Washington, DC)
- RDA aim is to facilitate data sharing across borders
- Strong support from EC, NSF, Australia
- Working Groups and Interest Groups tackle different aspects
  - IG: mainly discussion groups
  - WG: well defined concrete short term objectives, implementable products

RDA WGs and IGs

RDA Europe: CDS role in the project

- ## Support to RDA
  - Analysis of communities
    - Astronomy
    - Human sciences (Huma-Num)
    - Participation in a maths workshop on data sharing
    Online databases: from L-functions to combinatorics
  - Organisation of a science workshop in Munich Febr. 2014
  - FG member of the RDA Technical Advisory Board

- ## "Prototypes"
  - Interfacing the IVOA framework with OGSA-DAI
  - IVOA as a prototype of RDA
  - Proposed: Analysis of EUDAT developments with IVOA point of view
    EUDAT: European Data Infrastructure
    Generic building blocks of the data infrastructure
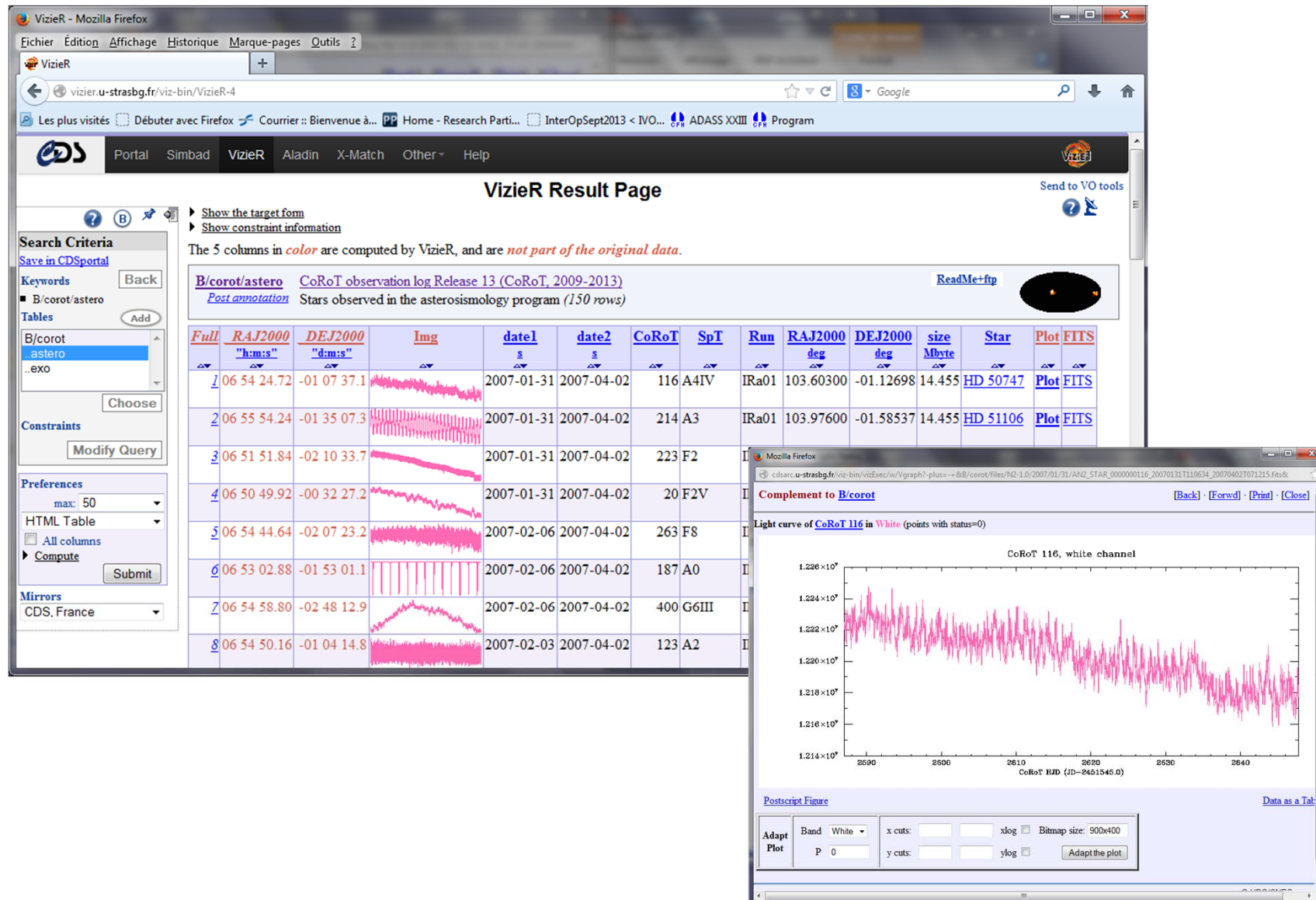
Participation in space projects

- Gaia
  - Dissemination of catalogues and images
  - Capacities demonstrated by the fast ingestion of the GUMS model, the fast queries allowed by the CDS services and the handiness of the progressive visualisation in Aladin
  - The largest catalogue to date in VizieR

- CoRoT
  - Preservation and distribution of processed data
  - Assessment of additional developments on time series

CoRoT log in VizieR