

Virtual Observatory Standard Protocols for Visibility (or better “Observing Constraints”) Observations (past, present and future)

No objections against recording this meeting were raised

Virtual Observatory Standard Protocols for Visibility (or better “Observing Constraints”) Observations (past, present and future)

Strategy: Make the world easier
before making it better

The team:

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Important definitions:

- + **Service**: Application which publishes/generates information as a provider
(e.g. Observatory)
- + **Client**: Application/tool accesses the service and processes/presents the information
(e.g. find common visibility intervals)
- + **User**: Person or a robot that makes use of the information provided by the service

mySpaceCal

High energy: AGILE Chandra Fermi INTEGRAL NuSTAR RXTE Suzaku Swift XMM-Newton

Other: Herschel Spitzer

Filter: Search

Show: saa-cold-*

Dummy pointings

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today

September 2018

month week day

Sun	Mon	Tue	Wed	Thu	Fri	Sat
26	27	28	29	30	31	1
Spinning Mode						
IGR J17591-2342		Perseus OB2 (3)			Galactic Center	
		Dummy pointing		Gal. Bulge region		
				Dummy pointing	Galactic Center	
2	3	4	5	6	7	8
Spinning Mode						
Galactic Center	Galactic Center		Orion_1			
Galactic Center			Dummy pointing		Perseus OB2 (5)	
Gal. Bulge region			Crab			
9	10	11	12	13	14	15
Spinning Mode						
Perseus OB2 (5)	Gal. Bulge region	Galactic Center		Crab		
Dummy pointing	Galactic Center			Dummy pointing		
16	17	18	19	20	21	22
Spinning Mode						
Crab	Dummy pointing		Galactic Center		Gal. Bulge region	Galaxy (l=0, b=-30)
	Crab	Galactic Center			Galactic Center	
	Crab	Gal. Bulge region				
23	24	25	26	27	28	29
Spinning Mode						
Galaxy (l=0, b=-30)						

VO Visibility and Observations Protocols

Goals of this workshop

- + Synchronize our understanding and goals of the proposed protocols
- + Form a large team to request the VO certificate together
- + Work out Use Cases as demonstration of the potentials
- + Develop the common language to get the services implemented world wide
- + Publish our strategies together

Beyond the scope of this workshop

- + Interfere with observatory policies
- + Solve difficulties of computing visibility for individual observatories
- + Planning/Coordination strategies
- + Over-complicating the services => Keep them simple at least to start with

Space Missions

Outer Space (Lagrange 1 or 2, solar system, etc)

Observatories	People	Characteristics	Major constraints
Athena	Matthias Ehle	High-resolution, micro-calorimeter X-ray spectroscopy	Under development
James Web Space Telescope (JWST)	Bill Workman Tom Donaldson	Near/mid-IR, Imaging, Spectroscopy	Sun/thermal, station-keeping, momentum (consumables)
Spitzer	Sean Carey	Infrared Observatory Earth-trailing heliocentric orbit	Sun, Anti Sun
Solar System missions	SPICE: Marc Costa	Portions of sky behind solar system objects may be unique fields Interface with SPICE	Spacecraft attitude
WFIRST	Bill Workman Tom Donaldson	Near-IR, Imaging, Spectroscopy	Sun/thermal, station-keeping, momentum (consumables)

Surveys:

Fixed observing patterns, limited AO and ToO

=> Observation locator service useful

Observatories	People	Characteristics
ARIEL	Ralf Kohley	Exo-planetary atmospheres, fixed fields
eROSITA	Jan Robrade Michael Freyberg Vadim Burwitz	All Sky X-ray Survey
Gaia	Uwe Lammers	All-Sky optical Survey, Astrometry, Photometry, Spectroscopy
Euclid	John Hoar	Weak lensing, mapping large-scale structures Search for dark matter/energy
PLATO	Laurence O'Rourke	Exo-planets search & study Large field of view

Space Missions High-Earth Orbit;

Typical Constraints: Sun, Moon, Earth, Radiation Belts

Observatories	People	Characteristics	Major constraints
Chandra	Belinda Wilkes Joshua Wing Raffaele D'Abrusco Janet Evans	X-ray, sub-arcsec imaging, spectroscopy (hi-res), timing, ToO, Director's Discretionary Time (DDT)	Thermal constraints
INTEGRAL	Matthias Ehle Erik Kuulkers Celia Sanchez Emilio Salazar Jan-Uwe Ness	γ -ray/X-ray/optical Observatory Imaging, Timing, Spectroscopy Long cont. obs., ToO	Anti-Sun
XMM-Newton	Peter Kretschmar Aitor Ibarra Richard Saxton Carlos Gabriel Jan-Uwe Ness	X-ray/UV/optical Imaging, Timing, Spectroscopy Long cont. observations, ToO, DDT	Anti-Sun optically bright objects
ARCUS	Randall Smith	High-resolution X-ray Spectroscopy Long cont. obs., ToO	Under study

Low-Earth Orbit (LEO)

In Flight Typical constraints: Sun, Moon, Earth, Radiation (South Atlantic Anomaly, SSA)

Observatories	People	Characteristics	Special constraints
AstroSat	Dipankar Bhattacharya	Multi- λ (X-ray/UV/vis) pointing telescope	Ram angle, Star Sensor
CALET (CALorimetric Electron Telescope)	Ken Ebisawa	Gamma-ray burst monitor (CGBM)	Wide Field of view ISS attitude
Insight HXMT	Yue Huang Lian Tao	Hard X-ray observatory	
HST	Bill Workman Tom Donaldson	IR, UV, Optical observatory Imaging, Spectroscopy	Earth occultation vs tight science timing constraints
MAXI	Tatehiro Mihara	X-ray all sky monitor	ISS attitude

Low-Earth Orbit (LEO)

In Flight Typical constraints: Sun, Moon, Earth, Radiation (South Atlantic Anomaly, SSA)

Observatories	People	Characteristics	Special constraints
NICER(Neutron Star Interior Composition Explorer)	Keith Grendreau Zaven Arzoumanian Michael Corcoran	X-ray pointing telescope, fast-response ToOs	ISS attitude and joint angles
NuSTAR	Karl Forster	X-ray Observatory Imaging, Timing, Spectroscopy	Blockage of Star Tracker, Stray light
Swift	Jamie Kennea Aaron Tohuvavohu	X-ray/UV Fast Slewing Imaging, Timing, Spectroscopy Priority: γ -ray bursts, Fill-in, ToO	Pole constraint

Low-Earth Orbit (LEO)

In Development

Typical constraints: Sun, Moon, Earth, Radiation (South Atlantic Anomaly, SSA)

Observatories	People	Characteristics	Additional constraints
Einstein Probe	Yue Huang Lian Tao	X-ray wide field imager. Transient alerts and follow up	
IXPE	Giorgio Matt	X-ray Polarimeter	
XRISM/XARM (Hitomi Recovery)	Matteo Guainazzi	Multi- λ (X-ray/UV/vis) pointing telescope	

Flying Observatories

Observatories	People	Characteristics	Major constraints
Sofia	Bernhard Schulz	IR Observations from Air Plane	Flight Schedules
Balloon			Flight Schedules

Ground-based Facilities - Radio, IR

Observatories	People	Characteristics	Major constraints
ALMA	Maria Diaz Trigo	Interferometer observing at mm and submm frequencies. High angular and spectral resolution. Capability to observe the Sun	Weather (1-2hrs) => Dynamic Schedule Very small FoV. Angular resolution changes along the year.
LOFAR	Jason Hessels	Huge radio array, mapping in S/W; can look in several directions at once.	
REM Rapid Eye Mount	Emilio Molinari Eliana Palazzi	Fast automatic repointing ability, t=> immediate response to random alerts possible. Simultaneous optical (g,r,i,z) and NIR (J or H or K) Ideal for GRB, GW and other transient counterparts search and follow-up and monitoring of known sources in time domain astronomy	Day/Night, weather, Moon

Ground-based Facilities

Visible: Typical Constraints: Hemisphere, Day/Night, weather, Moon

Observatories	People	Characteristics	Special constraints
SKA Australia SKA Africa Square km Array	Minh Huynh Gary Davis	Muliple small radio telescopes Optical telescope for transient astrophysic and Space Debris Tracking	Day/Night, weather, Moon
Gemini North Gemini South	Andrew Stephens Rene Rutten	Twin 8m Telescope Hawaii+Chile Fast-response ToO* High interest in MM* campaigns	Combined can access full sky
GTC Gran Telescopios Canarias	Antonio Luis Cabrera	10.4m optical/IR La Palma, Spain > 95 % queue mode (including ToO*)	
LSST Large Synoptic Survey Telescope	Tim Jenness Tiago Ribeiro	Deep, wide field	

*ToO: Target of Opportunity

MM: Multi-Messenger

Ground-based Facilities

Visible: Typical Constraints: Hemisphere, Day/Night, weather, Moon

Observatories	People	Characteristics
NOT Nordic Optical Telescope	Thomas Augusteijn	Flexible schedule many (>10) ToO* programs, Rapid-response mode
TMT Thirty Metre Telescope	Christophe Dumas	Final site to be decided end of 2018
SALT	David Buckley Stephen Potter	10-m optical (spectroscopy, polarimetry, high-speed photometry) 8 arcmin FoV 100% queue scheduled service observing ToO programs active transient science programme
Subaru	Tae-Soo Pyo	8.2m optical/IR, ToO* programs, Wide-Field with primary focus (HSC), Queue mode (~20% of HSC)

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Ground-based Facilities

Arrays, Telescope Networks

Typical Constraints: Coordination between array components

Observatories	People	Characteristics	Major constraints
BlackGEM MeerLICHT (prototype)	Paul Groot Steven Bloemen Stephen Potter	Gravitational Wave counterparts	Day/Night, weather, Moon
CTA Cherenkov Telescope Array	Emma Oña-Wilhelmi Catherine Boisson Jose Luis Contreras Pep Colomé	Very high-energy gamma-rays Interest in MM* campaigns, ToO*	Atmospheric conditions, zenith angle
Las Cumbres Observatory	Martin Dominik	Multi-site small, coordinated, optical telescopes	Day/Night, weather, Moon
JIVE/EVN Joint Institute for VLBI ERIC European VLBI Network	Arpad Szomoru Mark Kettenis	Multiple radio telescopes	Weather, Moon, Sun
LIGO-VIRGO	Eric Chassande-Mottin	Gravitational Wave observatory	

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Organisations

Entity	People	Characteristics
CSIC Consejo Superior de Investigaciones Científicas	Alvaro Gimenez	Spanish governmental council for Sciences
ESA European Space Agency ESDC ESAC Science Data Centre	Deborah Baines, Matthias Ehle, Aitor Ibarra, Ralf Kohley, Peter Kretschmar, Erik Kuulkers, Uwe Lammers, Jan- Uwe Ness, Bruno Merin, Emilio Salazar, Jesus Salgado, Celia Sanchez, Richard Saxton	Observations from Space: Earth obs., Astronomy, Solar System, Navigation, Launchers ESA Sky, multi-mission archives
ESO European Southern Observatory	Alberto Micol Nando Patat	Large Optical and Near-IR Ground-based facilities in Southern Hemisphere
NASA National Aeronautics Space Agency	Andrew Ptak Alan Smale	Observations from Space: Earth obs., Astronomy, Solar System, Navigation, Launchers
Space Telescope Science Institute (STScI)	Bill Workman Tom Donaldson	HST, JWST, and WFIRST

Networks, Activities, Programmes

Initiatives	People	Characteristics	Objectives for meeting
<p>ASTERICS Cleopatra DADI</p>	<p>Rob van der Meer Marjan Timmer Pep Colomé Catherine Boisson Mark Kettenis Arpad Szomoru Eric Cassande-Mottin</p>	<p>EC funded project Astronomy+Astroparticle communities Facilitate multi-messenger science</p>	<p>Find common grounds for multi-messenger observations</p>
<p>Team at McGill University</p>	<p>Daryl Haggard</p>	<p>Fluid communication of critical parameters for transient events, GW sources as well as EM sources. Multimessenger follow-up of LIGO-Virgo sources</p>	<p>VO standards can help meet the team's goals</p>
<p>SmartNet</p>	<p>Matt Middleton Phil Charles</p>	<p>Develop common language for VOA as key to implementing successful MWL observations in future</p>	
<p>OPTICON</p>	<p>Martin Dominik</p>	<p>Multi-observatory proposal platform</p>	

Networks, Activities, Programmes

Initiatives	People	Characteristics	
ePESSTO	Maria Teresa Botticella Stephen Smartt	extended-Public ESO Spectroscopic Survey for Transient Objects classifies transients from publicly available sources and wide-field surveys	ePESSTO runs for nine months of the year and typically has allocations of 10 nights per month
HEASARC	Edward Sabol Michael F. Corcoran	High-energy multi-mission visibility tool	
ISDC INTEGRAL Science Data Centre	Enrico Bozzo	Data archiving	
ENGAGE SKA	Domingos Barbosa Valerio Ribeiro	Portuguese consortium related to SKA Australia+Africa	Find best practices VO systems for their work
MAST Multi-mission Archive at Space Telescope	Tom Donaldson	Archives of Space Telescope Science Institute (STScI)	

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