First steps to standardise observatory services via VO standard protocols

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On behalf of the Observatory Services Group

The Problem:

THE INFORMATION IS OUT THERE

All information needed to plan an observation (via AO or ToO) is currently in facilities own web pages through forms.

Target Visibility Constraints

Observations info

BUT

Instrument info

Short-term schedule

Long-term schedule

This information is usually shown in a web page statically and is only accessible trough forms that have to be manually filled in.

Solution:

OBSERVATORY SERVICES + STANDARIZATION

- Knowing that the information already exists in all facilities, the question is:

Why don't we standardise the information exchange to improve the efficiency to prepare observations?

MOVE FROM OBSERVATORY TOOLS TO OBSERVATORY SERVICES

Identify which observatory tools could be easily transformed in services (if they are not already a service)

Target visibility checks
Scheduled observation Info

- Standardise the input parameter
- Standardise the output information and format

Virtual Observatory protocols

Object Visibility Services Protocols:

International Virtual Observatory Alliance

Object Visibility Simple Access Protocol

Version 0.4

IVOA Working Draft 12 September 2018

This version:
ObjVisSAP-0.4-20180912
Latest version:
ObjVisSAP-0.3-20180904

Previous version(s):

Working Group:
http://www.ivoa.net/twiki/bin/view/IVOA/IvoaDAL

Editor(s):
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TBC: Representatives of a large multi-observatory collaboration

International Virtual Observatory Alliance

Observation Locator Table Access Protocol

Version 0.4

IVOA Working Draft 13 September 2018

This version:
ObsLocTAP-0.4-20180913
Latest version:
ObsLocTAP-0.3-20180912
Previous version(s):
ObsLocTAP-0.2-20180713

Working Group:
http://www.ivoa.net/twiki/bin/view/IVOA/IvoaDAL

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Discussion:

FROM EMAIL DISCUSSIONS….

ObjVisSAP

- MANDATORY INPUT PARAMETERS
  - T_MIN AND T_MAX OPTIONAL
  - MULTIPLE TIME INTERVALS?
- HOW TO DEAL WITH VISIBILITIES FROM *LEO* SATELLITES
  - T_VALIDITY FIELD ADDED
- HOW TO DEAL WITH GROUND-BASED VISIBILITIES:
  - MOON_SEP FIELD ADDED
    - MOON_PHASE???
  - AIR-MASS FIELD ADDED
  - EM_THRESHOLD FIELD ADDED
  - MINIMUM ALLOWED TIME FROM/TO SUNSET/SUNRISE??
    - T_SUNSET, T_SUNRISE???

- HOW TO DEAL WITH VISIBILITIES THAT DEPENDS ON:
  - INSTRUMENT LAYOUT?
  - FREQUENCY SPACE?
- MOVING TARGETS?
- WEATHER FORESCAT INFORMATION?

Discussion:

FROM EMAIL DISCUSSIONS….

ObsLocTAP

- HOW TO DEAL WITH TARGET OF OPPORTUNITY OBSERVATIONS?
- HOW TO DEAL WITH FLEXIBLE SCHEDULES?
- HOW TO DEAL WITH FOV SEARCH → FOOTPRINTS?
  - RADIO ??
- HOW TO DEAL WITH OBS LOCATOR IN SURVEY TELESCOPES??

ObjVisSAP Input Parameters

PARAMETER	UTYPE	UCD	Description	Data Type	Unit
s_ra	**Char.SpatialAxis.Coverage.Location.Coord.Position2D.Value 2.C1 (REQUIRED)**	pos.eq.ra	Right Ascension (ICRS)	double	deg
s_dec	**Char.SpatialAxis.Coverage.Location.Coord.Position2D.Value 2.C2 (REQUIRED)**	pos	Declination (ICRS)	double	deg
t_min	**Char.TimeAxis.Coverage.Bounds.Limits.StartTime (MAY)**	time.start	Specify the Start Time to check for visibility. (MJD)	double	d
t_max	**Char.TimeAxis.Coverage.Bounds.Limits.StopTime (MAY)**	time.end	Specify the Stop Time to check for visibility (MJD)	double	d
min_vis	**Char.TimeAxis.Coverage.Duration (MAY)**	time.duration	Minimum visibility interval interval	double	s
max_vis	**Char.TimeAxis.Coverage.Duration (MAY)**	time.duration	Maximum visibility interval interval	double	s
elevation	**Char.SpatialAxis.Elevation.Refval.value (MAY)**	pos.elevation	angular distance above the horizon	double	d
moon_sep	**Char.SpatialAxis.Coverage.Extent.angular.distance (MAY)**	phys.angDist	Angular distance between the Moon and the point in the sky introduced as input	double	d
…					

ObjVisSAP Output Parameters

PARAMETER	UTYPE	UCD	Description	Data Type	Unit
t_validity	**Char.TimeAxis.Coverage.Time (REQUIRED)**	time.validity	Date when the visibility calculation will change (MJD)	Double	D
t_start	**Char.TimeAxis.Coverage.Bounds.Limits.StartTime (REQUIRED)**	time.start	Visibility window start time (MJD)	double	D
t_stop	**Char.TimeAxis.Coverage.Bounds.Limits.StopTime (REQUIRED)**	time.end	Visibility widow end time (MJD)	double	d
t_visibility	**Char.TimeAxis.Coverage.Support.Extent (REQUIRED)**	time.duration	Visibility duration window	double	s
pos_angle	**Char.SpatialAxis.Coverage.Location.Coord.Position2D.Value2.C3 (MAY)**	pos.eq.pos_angle	Satellite position angle	double	deg
em_threshold	**Char.Spectral.Axis.Energy.Threshold (MAY)**	em.energy	Energy threshold for this particular sky position and visibility time interval	double	keV

ObsLocTAP
TAP Schema

Table_name	Column_name	Unit	Type	Constraint	Description
ivoa.obsplan	t_planning	d	double	not null	Planning time in MJD
ivoa.obsplan	target_name	unitless	String		Astronomical object observed, if any
ivoa.obsplan	obs_id	unitless	String	not null	Observation ID
ivoa.obsplan	obs_collection	unitless	String		Name of the data collection
ivoa.obsplan	s_ra	deg	double		Central right ascension, ICRS
ivoa.obsplan	s_dec	deg	double		Central declination, ICRS
ivoa.obsplan	s_fov	deg	double		Diameter (bounds) of the covered region
ivoa.obsplan	s_resolution	arcsec	double		Spatial resolution of data as FWHM
ivoa.obsplan	t_min	d	double	not null	Start time in MJD
ivoa.obsplan	t_max	d	double	not null	Stop time in MJD
ivoa.obsplan	t_exptime	s	double	not null	Total exposure time
ivoa.obsplan	t_resolution	s	double		Temporal resolution FWHM
ivoa.obsplan	em_min	m	double		Start in spectral coordinates
ivoa.obsplan	em_max	m	double		Stop in spectral coordinates
ivoa.obsplan	em_res_power	unitless	double		Spectral resolving power
ivoa.obsplan	o_ucd	unitless	string		UCD of observable (e.g. phot.flux.density, phot.count, etc.)
ivoa.obsplan	pol_states	unitless	string		List of polarization states or NULL if not applicable
ivoa.obsplan	pol_xel	unitless	integer		Number of polarization samples
ivoa.obsplan	facility_name	unitless	string	not null	Name of the facility used for this observation
ivoa.obsplan	instrument_name	unitless	string		Name of the instrument used for this observation
ivoa.obsplan	obs_release_date	unitless	date		Observation release date (ISO 8601)
ivoa.obsplan	t_plan_exptime	s	double		Planned exposure time
ivoa.obsplan	category	unitless	string		Observation category (fixed, coordinated, etc…)
ivoa.obsplan	priority	unitless	enum integer		Priority level {0, 1, 2}
lvoa.obsplan	execution_status	unitless	string		One of the following values: Planned, Executed, Aborted

BACK-UP

The XMM-Newton & Integral: Visibility Check Use Case

XMM-Newton

http://xmm.esac.esa.int/XMMVisCheck?
startDate=11-10-2017&
minduration=12.000&
coordinates=equatorial&
ra=192.063458&
dec=17.77394

INTEGRAL

http://integral.esac.esa.int//IntegralVisCheck?
startDate=11-10-2017&
minduration=12.000&
coordinates=equatorial&
ra=192.063458&
dec=17.77394

xmm.esac.esa.int/XMMVisCheck?ra=321&dec=34&minDuration=5000&startdate=20-Dec-2017&enddate=20-Dec-2018&coordinates=equatorial


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[{"SolarA":"89.3","Rev":"3293","VisStar":"2017-12-01 10:19","AstroA":"241.2","VisEnd":"2017-12-03 01:12","StarPh":"0.12","Round":"130000","VisDur":"139962","EndPh":"0.93"},
{"SolarA":"87.9","Rev":"3294","VisStar":"2017-12-03 10:11","AstroA":"239.7","VisEnd":"2017-12-05 00:54","StarPh":"0.12","Round":"130000","VisDur":"139376","EndPh":"0.93"},
{"SolarA":"86.5","Rev":"3295","VisStar":"2017-12-05 10:05","AstroA":"238.2","VisEnd":"2017-12-07 00:47","StarPh":"0.12","Round":"130000","VisDur":"139318","EndPh":"0.93"},
{"SolarA":"85.1","Rev":"3296","VisStar":"2017-12-07 09:59","AstroA":"236.8","VisEnd":"2017-12-09 00:39","StarPh":"0.12","Round":"130000","VisDur":"139189","EndPh":"0.93"},
{"SolarA":"83.7","Rev":"3297","VisStar":"2017-12-09 09:53","AstroA":"235.3","VisEnd":"2017-12-11 00:31","StarPh":"0.12","Round":"130000","VisDur":"139045","EndPh":"0.93"},
{"SolarA":"82.3","Rev":"3298","VisStar":"2017-12-11 09:46","AstroA":"233.8","VisEnd":"2017-12-13 00:12","StarPh":"0.12","Round":"130000","VisDur":"138334","EndPh":"0.92"},
{"SolarA":"80.9","Rev":"3299","VisStar":"2017-12-13 09:39","AstroA":"232.3","VisEnd":"2017-12-15 00:03","StarPh":"0.12","Round":"130000","VisDur":"138278","EndPh":"0.92"},
{"SolarA":"79.5","Rev":"3300","VisStar":"2017-12-15 09:31","AstroA":"230.7","VisEnd":"2017-12-16 23:55","StarPh":"0.12","Round":"130000","VisDur":"138259","EndPh":"0.92"},
{"SolarA":"78.1","Rev":"3301","VisStar":"2017-12-17 09:23","AstroA":"229.2","VisEnd":"2017-12-18 23:47","StarPh":"0.12","Round":"130000","VisDur":"138228","EndPh":"0.92"},
{"SolarA":"76.7","Rev":"3302","VisStar":"2017-12-19 09:17","AstroA":"227.7","VisEnd":"2017-12-20 23:29","StarPh":"0.12","Round":"130000","VisDur":"137542","EndPh":"0.92"},
{"SolarA":"75.4","Rev":"3303","VisStar":"2017-12-21 09:12","AstroA":"226.1","VisEnd":"2017-12-22 23:21","StarPh":"0.12","Round":"130000","VisDur":"137392","EndPh":"0.92"},
{"SolarA":"74.0","Rev":"3304","VisStar":"2017-12-23 09:06","AstroA":"224.5","VisEnd":"2017-12-24 23:03","StarPh":"0.12","Round":"130000","VisDur":"136627","EndPh":"0.92"},
{"SolarA":"72.7","Rev":"3305","VisStar":"2017-12-25 08:59","AstroA":"222.9","VisEnd":"2017-12-26 22:54","StarPh":"0.12","Round":"130000","VisDur":"136509","EndPh":"0.92"},
{"SolarA":"71.6","Rev":"3306","VisStar":"2017-12-27 08:52","AstroA":"222.3","VisEnd":"2017-12-28 01:42","StarPh":"0.12","Round":"60000","VisDur":"60634","EndPh":"0.48"}]
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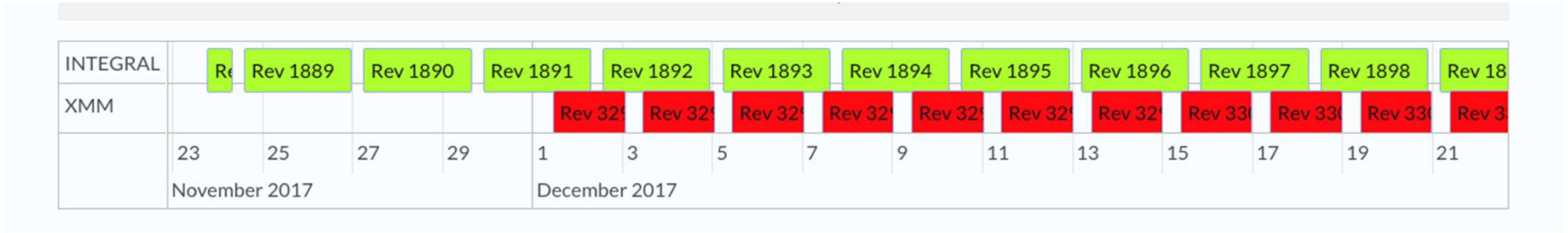

The XMM-Newton & Integral: Observation Info Use Case

XMM-Newton

http://xmm.esac.esa.int/XMMVisCheck?
coordinates=equatorial&
ra=192.063458&
dec=17.77394

INTEGRAL

http://integral.esac.esa.int//IntegralVisCheck?
coordinates=equatorial&
ra=192.063458&
dec=17.77394