

Challenges of coordination and possible solutions



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Constraints (examples)



- No observations while passing through **radiation belts**
- **Orientation** of space craft to sun
- **Large avoidance** angles around Sun and **anti-Sun**, Moon, Earth, Bright planets
- **No slewing over Moon and Earth** (planets ok)
- **Availability of ground stations**
- **No commanding during ground-station handovers**
- Down times during maintenance

Some constraints only known a short time in advance
=> Flexibility with long-term planning

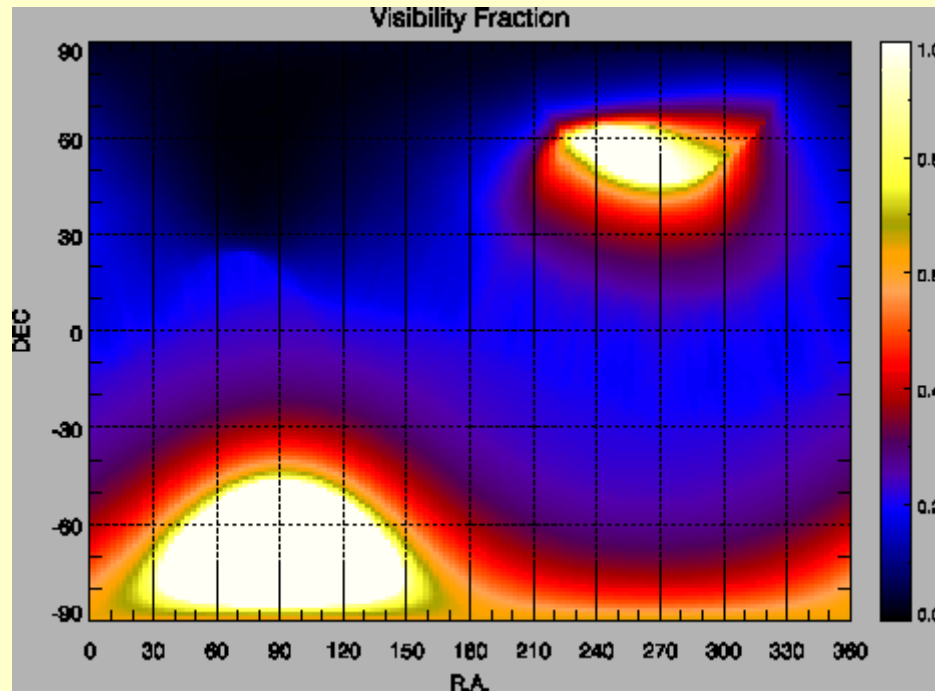
Space-specific constraints in bold red



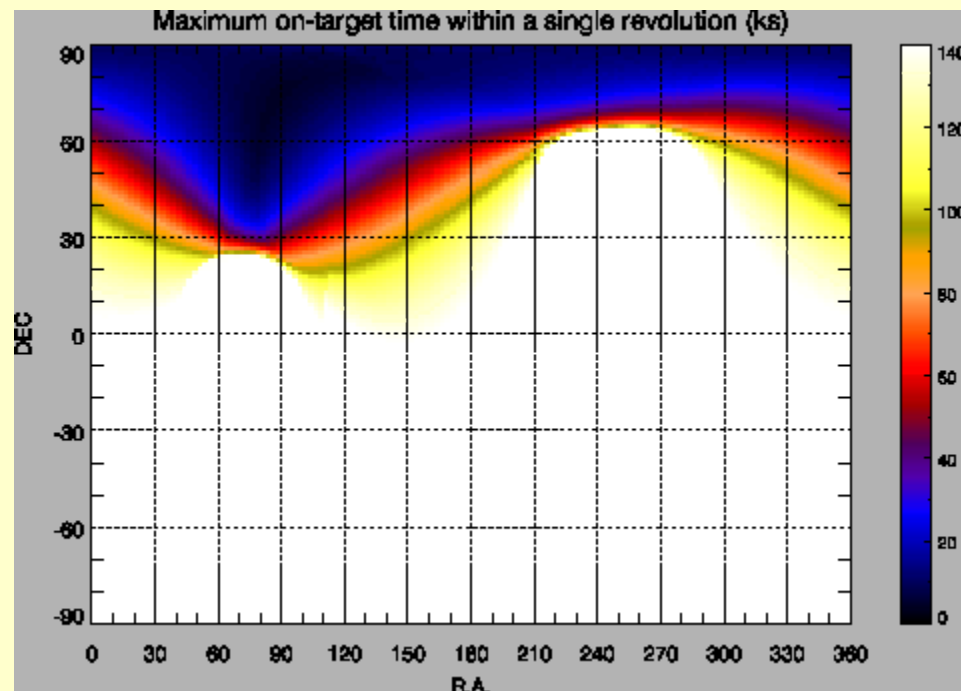
Observing Constraints

XMM-Newton

Visibility Fraction

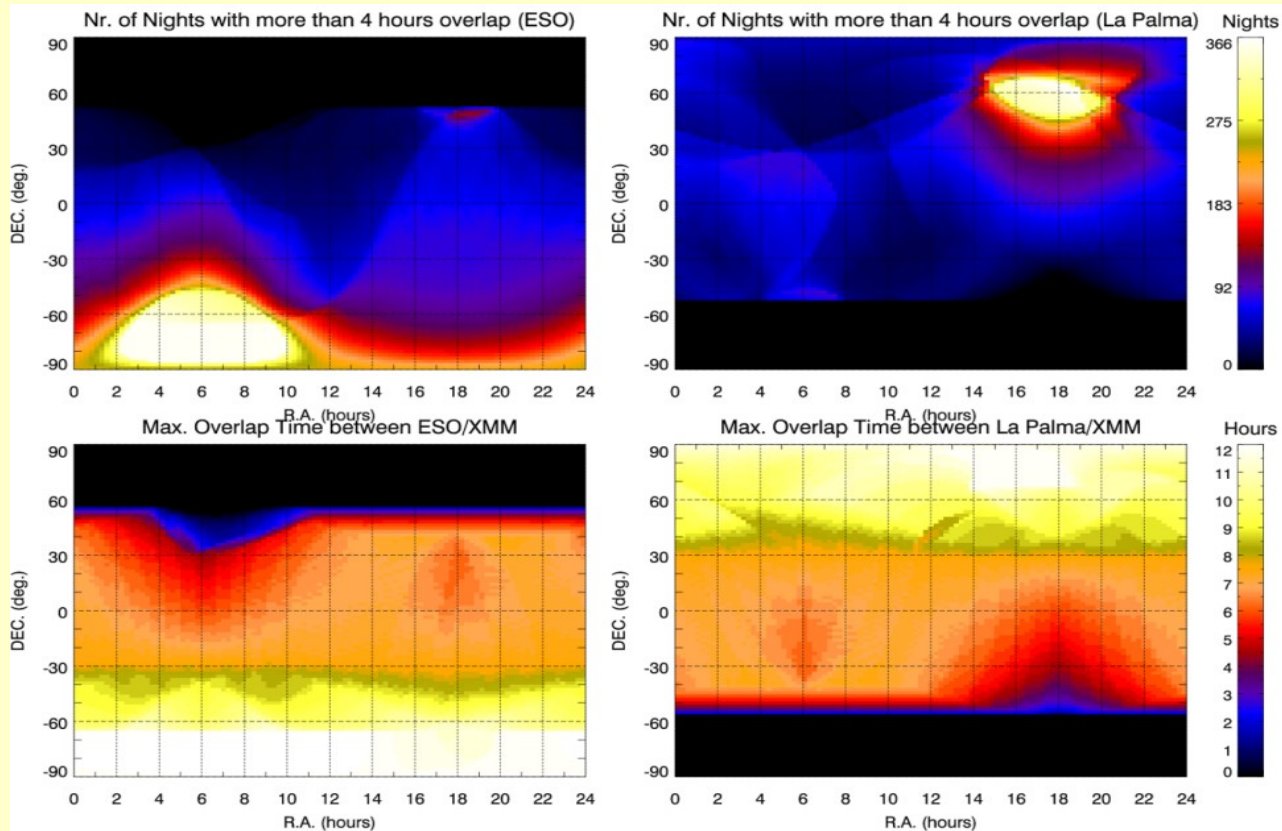


Maximum on-target time within a single revolution (ks)



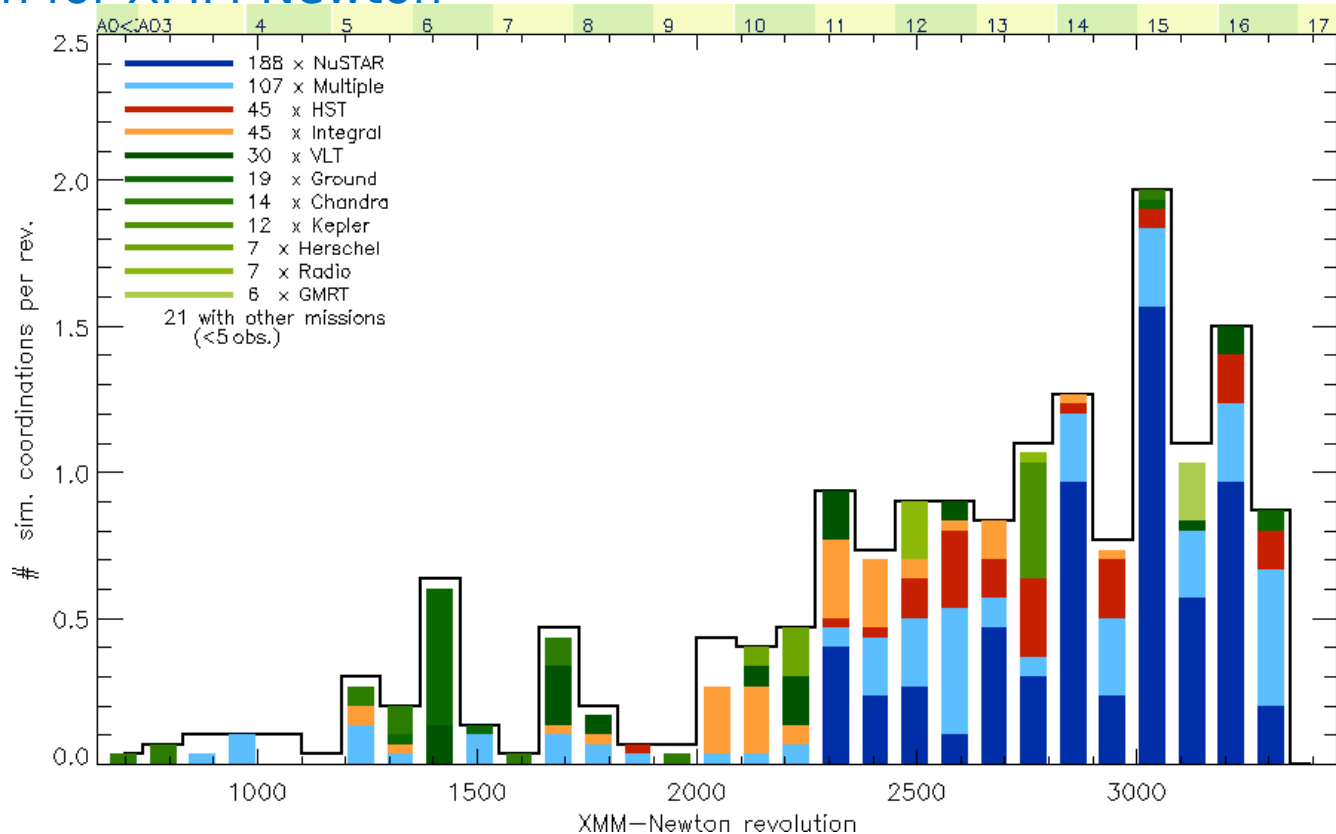
Observing Constraints

XMM-Newton plus others



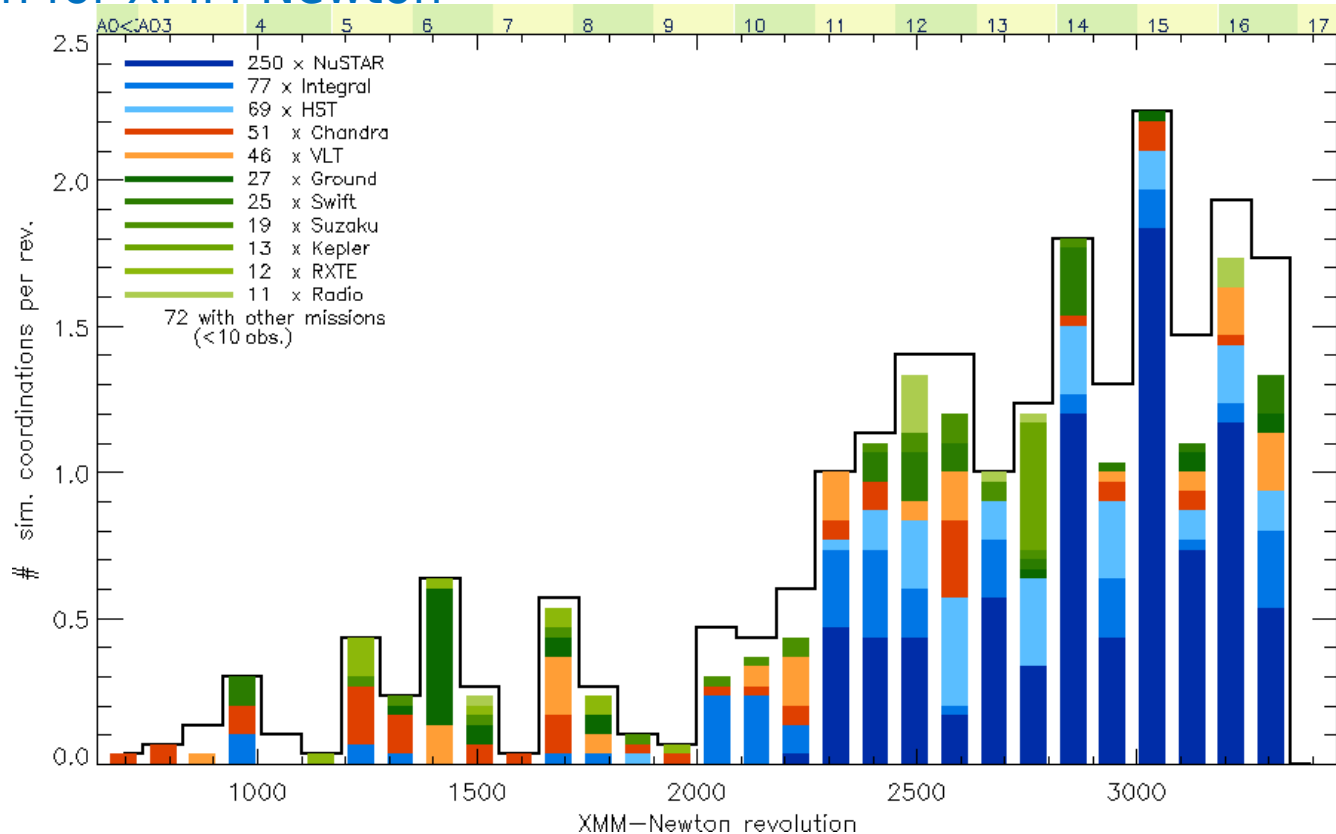
Increasing Demand for Coordinated observations

Evolution for XMM-Newton



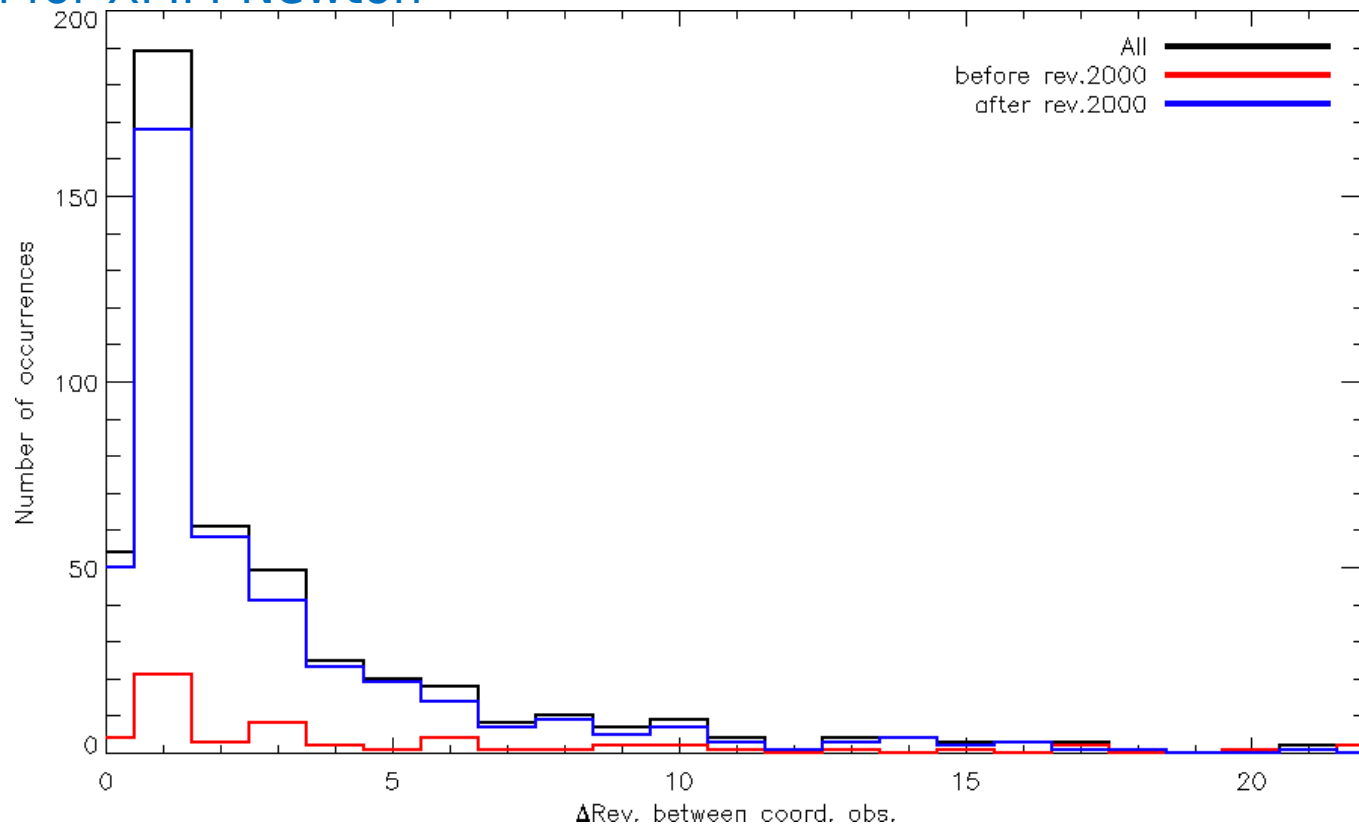
Increasing Demand for Coordinated observations

Evolution for XMM-Newton



Increasing Demand for Coordinated observations

Evolution for XMM-Newton



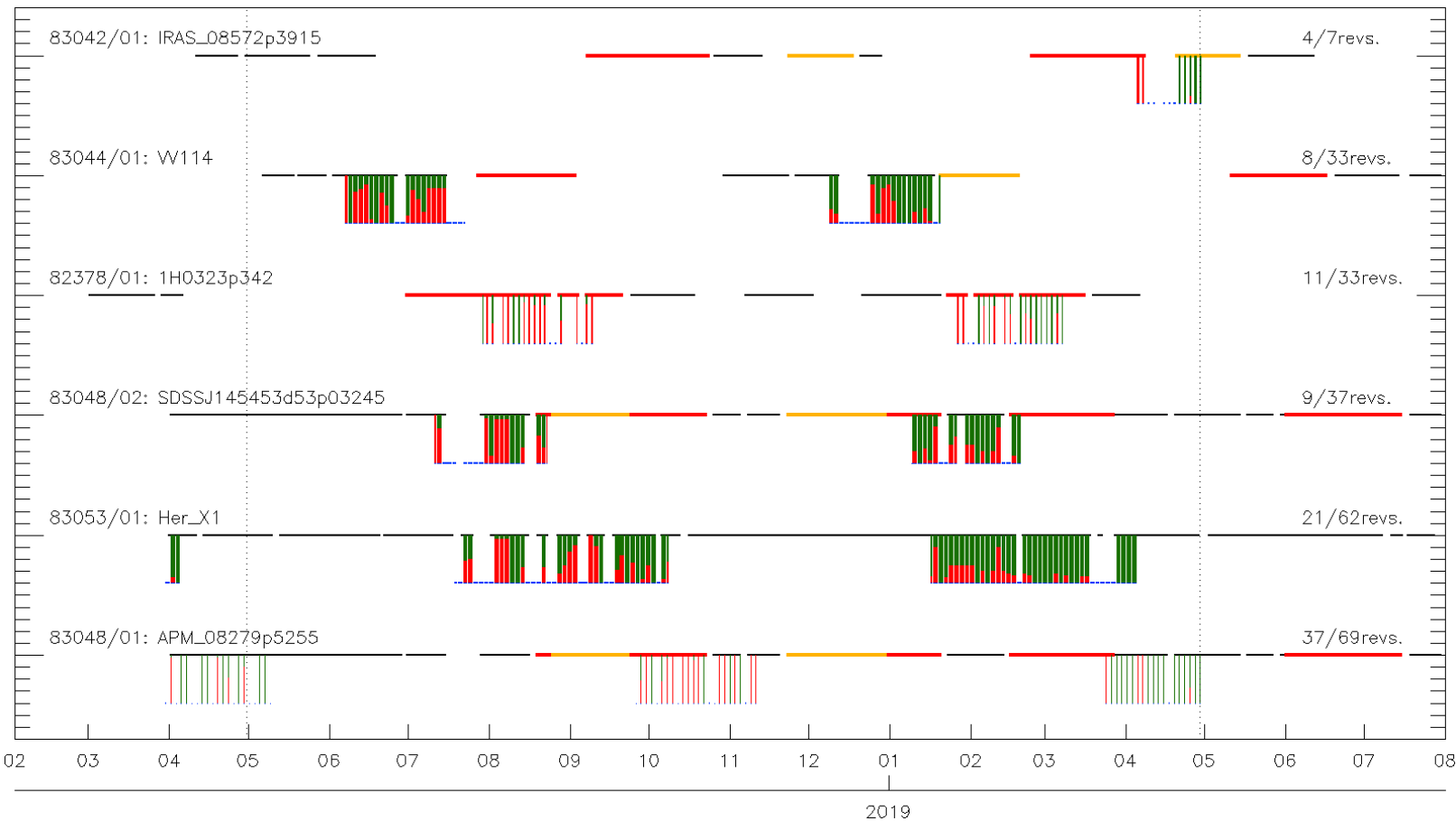
Coordination with other observatories

Strategies:

- Before planning coordinated observations, need to have all “own” time-critical observations planned
- Important to keep record of margins for later steps
- Determine constraint-free observing slots of own facility
- Present available slots to other facilities and determine overlap
- Some agreements may contain the more flexible observatories to follow the scheduling of the less flexible ones

Thus, manoeuvre around own constraints and other constraints:

- Visibility hard constraints
- Observing Plan soft constraints depending on priorities



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

Target
Visibility
Constraints

Instrument
characteristics

BUT

Short-term
schedule

Observations
info

Long-term
schedule

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

All information about Target Visibility Checks is there...

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Object Visibility – STARALT

Staralt is a program that shows the observability of objects in various ways: either you can plot altitude against time for a particular night (**Staralt**), or plot the path of your objects across the sky for a particular night (**Startrack**), or plot how altitude changes over a year (**Starobs**), or get a table with the best observing date for each object (**Starmult**). For further information, click on the "help" button at the bottom of the page.

Mode Staralt ▾

Night 12 ▾ October ▾ 2017 ▾ or date when the local night starts. *Staralt, Startrack only.*

Observatory La Silla Observatory (Chile) ▾
 Select one above or specify your own site with this format:
 Longitude(°East) Latitude(°) Altitude(metres) UTC offset(hours)
 Ex.: 289.2767 -30.2283 2725 -4

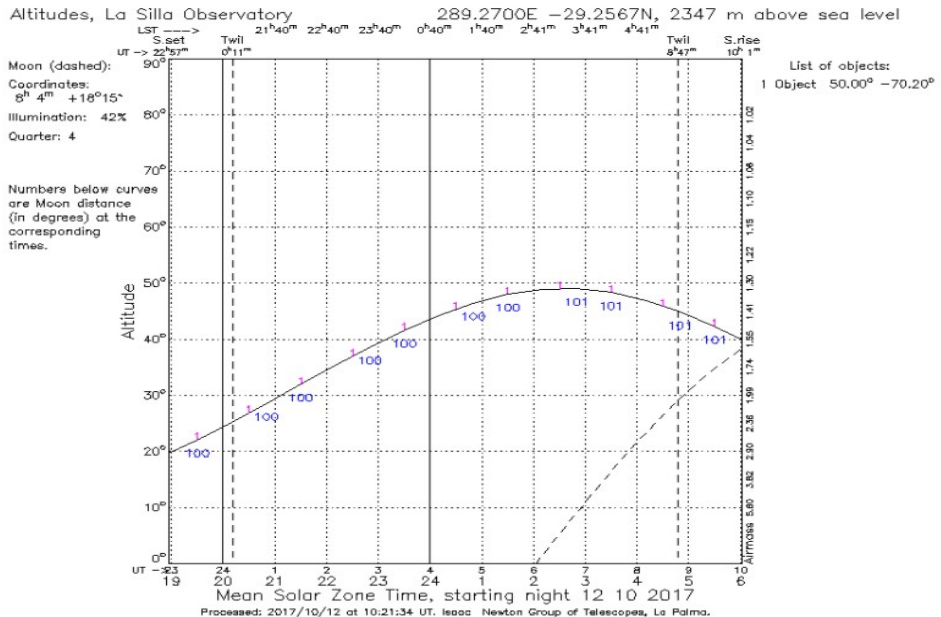
Coordinates 50.0 -70.2

Formats can be any of these:
 name hh mm ss tdd mm ss
 name hh:mm:ss tdd:mm:ss
 name ddd.ddd dd.ddd
 name must be a single word with no dots, avoid using single numbers. Every entry must be in the same format, do not use different formats with different entries. We recommend a maximum of 100 targets per submission.

Rev.	(yyyy-mm-dd hh:mm)	Duration (s)	Vis. (yyyy-mm)
3397	2018-06-28 02:58	27036	2018-06-28 10:29
3398	2018-06-29 12:49	78126	2018-06-30 10:31
3399	2018-07-01 12:42	78063	2018-07-02 10:23
3400	2018-07-03 12:35	77939	2018-07-04 10:14
3401	2018-07-05 12:29	77804	2018-07-06 10:06
3402	2018-07-07 12:22	77715	2018-07-08 09:58
3403	2018-07-09 12:15	78302	2018-07-10 10:00
3404	2018-07-11 12:07	78348	2018-07-12 09:53

TY CHECKER

TS RETURNED BELOW.



75000	0.47	0.92	77.3	69.5
75000	0.47	0.92	78.8	68.5
75000	0.47	0.93	80.4	67.4
75000	0.47	0.93	82.0	66.3

And information about scheduled observation...



ALMA
Chandra



Atacama Large Millimeter/submillimeter Array
In search of our Cosmic Origins





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ALMA Status Page

Weather Conditions at AOS

Current Date	Current Time	Location	Humidity	Temperature	Dewpoint	Wind Direction	Wind Speed	Pressure
2017/10/12	11:08:37 UTC	Central Weather Station	23.60 %	-4.83 ° C	-22.52 ° C	307.00 °	5.10 m/s	553.78 hPa


[More...](#)

Recent observations (QA0 Pass)


Project	Source	PI
Magnetic field structure in the bipolar outflow driven by Orion Source I		
2017.1.00497.S	Orion_Source_I	Hirota, Tomoya
ALCHEMI: the ALMA Comprehensive High-resolution Extragalactic Molecular Inventory		
2017.1.00161.L	ngc253	Martin, Sergio
100,000 Molecular Clouds Across the Main Sequence: GMCs as the Drivers of Galaxy Evolution		
2017.1.00886.L	NGC7496	Schinnerer, Eva

Public observations

Project	Source	PI
Protolunar disks around directly imaged young exoplanets		
2015.1.01210.S	PZ_tel	Perez, Sebastian
From Dark to Light: Star Clusters in Formation		
2015.1.01308.S	Serpens_Main_and_Serpens_South	Mundy, Lee
Polarimetric Observation of Centaurus A: Poloidally-dominated Magnetic Field vs. Toroidally-dominated Magnetic Field in the Innermost Jet		
2015.1.00421.S	Car A	Nagai, Hirochi



Chandra X-ray Center



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View Observation information

Primary package
 Secondary package
 Custom selection

Select all | Unselect all

Select	Row	Seq Num	Obs ID	Instrument	Grating	Appr Exp	Exposures	Target Name	PI Name	RA	Dec	Status	Data Mode	Exp Mode	Avg Cat Rate	Ect Cnt	Start Date	Public Release Date	Proposal	Type	Obs Cycle	Drvg Cycle	Science Category	Joint	Grid No
<input type="checkbox"/>	1	703152	17566	HRC-S	LETG	35.0	34.8	ASASSN-14i	Miller	12 48 15.20	+17 46 26.20	archived			61.23	2130972	2014-12-08 23:20:28	2014-12-10 06:43:58	15708488	DDT	15	15	ACTIVE GALAXIES AND QUASARS	None	
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Totals																									

Comments

ObsTap as existing standard

... Core components of the Observation data model that are necessary to perform data discovery when querying data centres for astronomical observations of interest ...

Extend this standard to be used for visibility check and scheduled observation info

obs_id	unitless	String	Observation ID	OBS_ID
obs_publisher_did	unitless	String	Dataset identifier given by the publisher	?
access_url	unitless	String	URL used to access (download) dataset	TBD
access_format	unitless	String	File content format (see in App. Error! Reference source not found.)	NULL
access_estsize	kbyte	integer	Estimated size of dataset in kilo bytes	NULL
target_name	unitless	String	Astronomical object observed, if any	"Target" ?
s_ra	deg	double	Central right ascension, ICRS	RA
s_dec	deg	double	Central declination, ICRS	DEC
s_fov	deg	double	Diameter (bounds) of the covered region	Fixed value for each XMM-Newton Instrument
s_region	unitless	String	Sky region covered by the data product (expressed in ICRS frame)	TBD, not easy for RGS



International

Virtual

Observatory

Alliance

Observation Data Model Core Components and its Implementation in the Table Access Protocol

Slide 13



The XMM-Newton & Integral: Visibility

XMM-Newton

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

INTEGRAL

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

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INTEGRAL	Rev 1889	Rev 1890	Rev 1891	Rev 1892	Rev 1893	Rev 1894	Rev 1895	Rev 1896	Rev 1897	Rev 1898	Rev 18				
XMM				Rev 32	Rev 32	Rev 32	Rev 32	Rev 32	Rev 32	Rev 32	Rev 33	Rev 33	Rev 33	Rev 33	
	23	25	27	29	1	3	5	7	9	11	13	15	17	19	21
	November 2017				December 2017										

The XMM-Newton & Integral:

Observation Info

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>

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- Increasing demand for multi-mission coordinations
- Challenges:
 - Diverse formats of hard constraints (visibility)
=> Needed to find common slots (Can observe?)
Diverse formats of observing plans (Will observe?)
=> Needed to find common slots with lowest scientific impact
- Solutions:
Standard of visibility and observing information
=> machine readable, interface with optimization routines
(clients)



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Object Visibility Access Protocol

Version 0.1

IVOA Note 18 May 2018

This version:
OVAP-0.1-20180518

Latest version:

Previous version(s):

Editor(s):
Aitor Ibarra
Richard Saxton
Jesús Salgado

Author(s):
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OVAP IVOA Note



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Observation Locator Access Protocol

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Slide 17



European Space Agency

1. Simple Access Protocol
2. Easy to implement for the different observatories
3. Already available in a non-standard way in many cases
4. Based on “parameter=value” approach
5. VOTable response
6. Analyzed to be done as a TAP protocol but it was not so easy to implement



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If interested to collaborate, contact any of us!



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