

Multi-mission Coordinations

An example Use Case for needing: VO standards for Telescope Visibility and Observing Plans



INTEGRAL

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Jesus Salgado¹, **Emilio Salazar**¹,
Richard Saxton¹, **Aitor Ibarra**¹,
Peter Kretschmar¹, Matthias Ehle¹



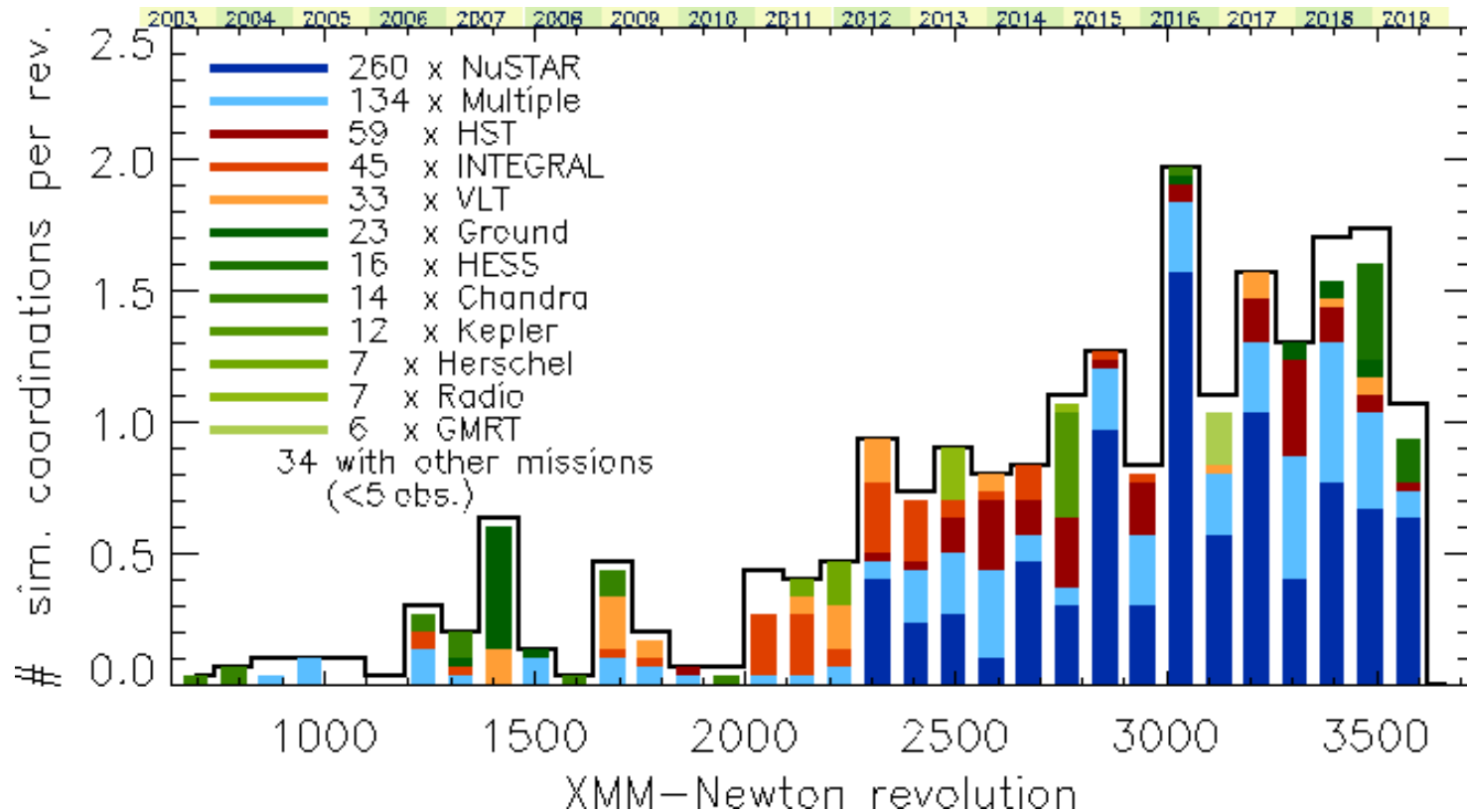
XMM-Newton

¹European Space Astronomy Centre (ESAC), Villafranca del Castillo, Spain

²European Space TEchnology Center (ESTEC), Noordwijk, The Netherlands

Demand for coordinated observations *increasing*

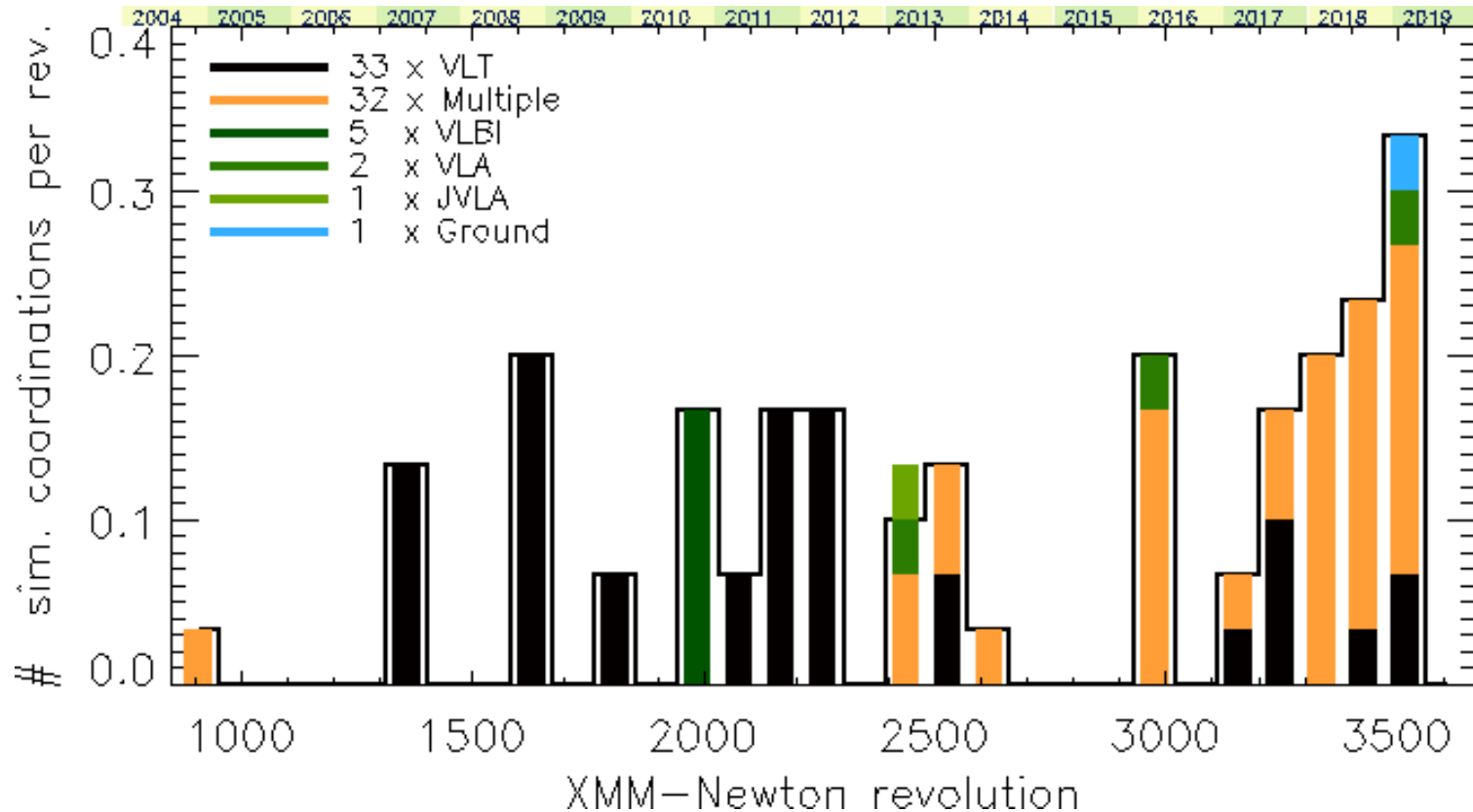
Evolution for XMM-Newton



Demand for coordinated observations *increasing*



Evolution for XMM-Newton also with ESO facilities

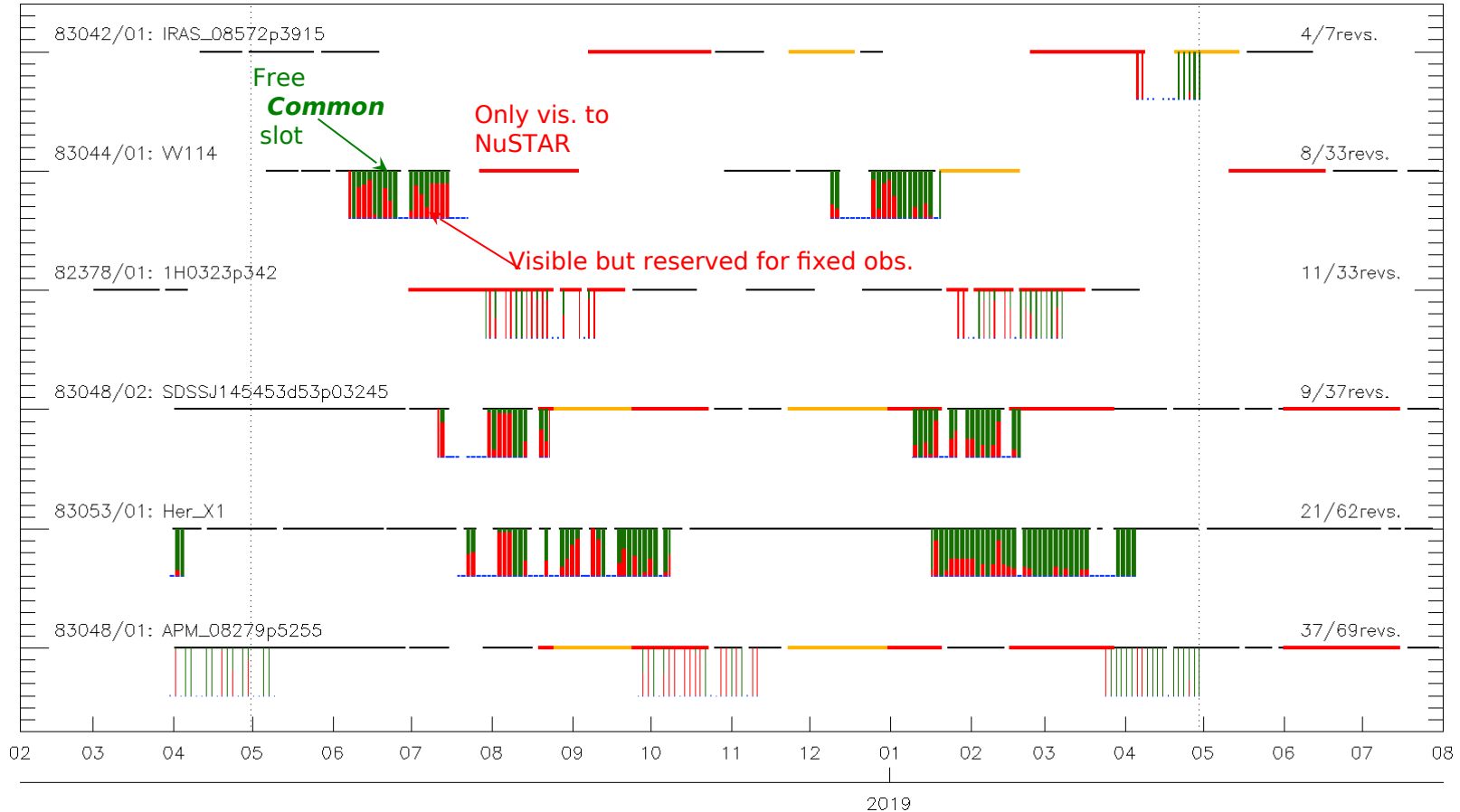


Basic Elements for Coordination:

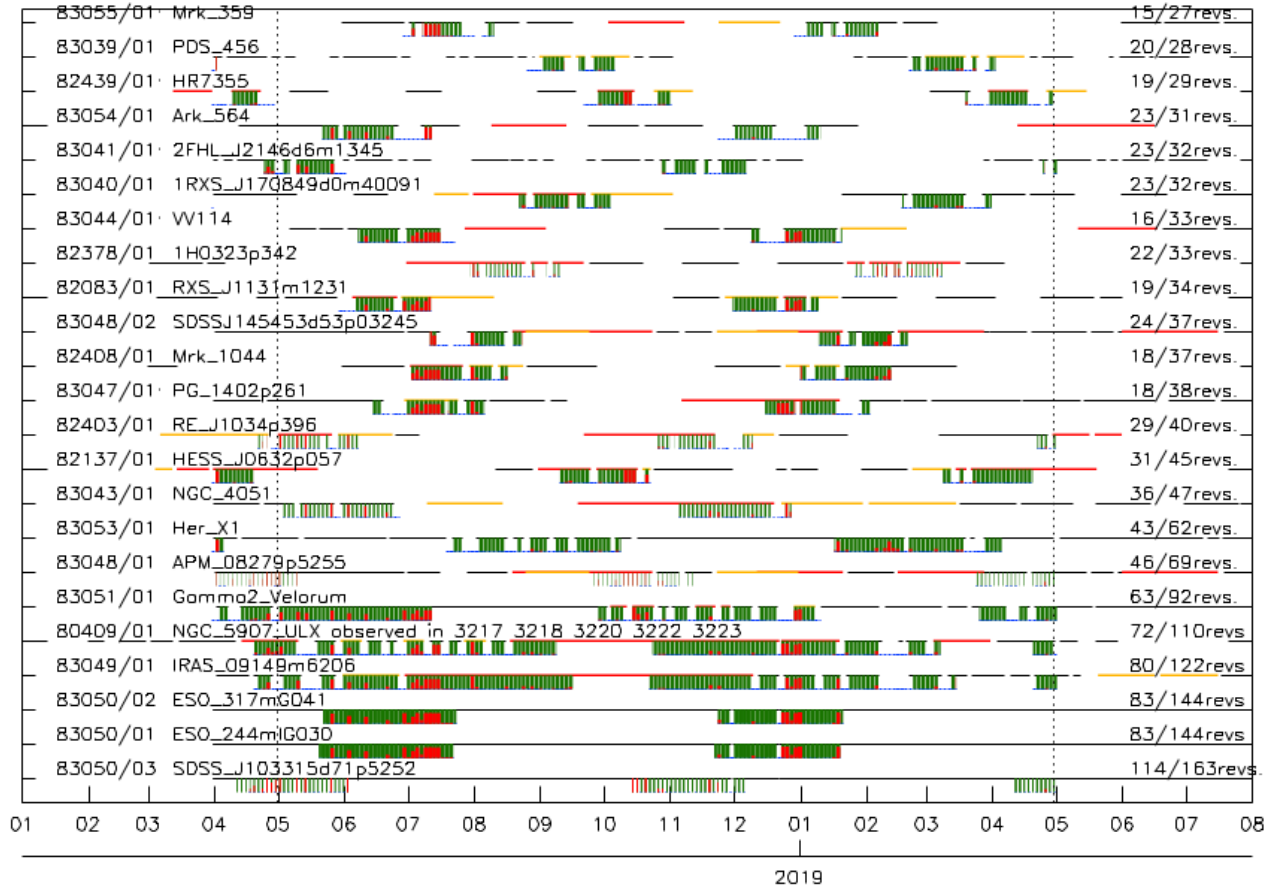
+ Common Visibility

+ Respecting time-constrained observations

Example: common XMM/NuSTAR Visibility/planning



Example: common XMM/NuSTAR Visibility/planning



Information needed to plan an observation (AO or ToO) in Individual facilities web pages

Target
Visibility
Constraints

Instrument
characteristics

BUT

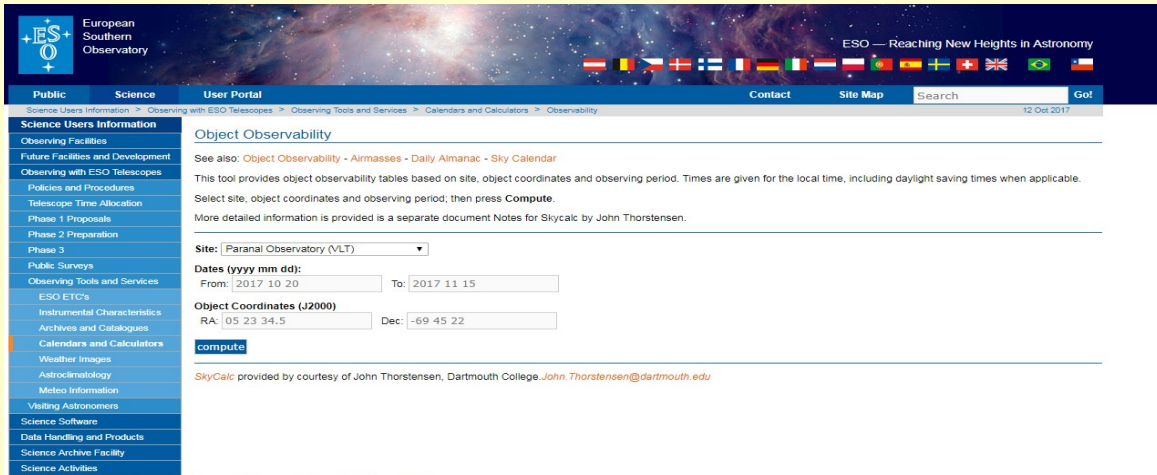
Short-term
schedule

Observations
info

Long-term
schedule

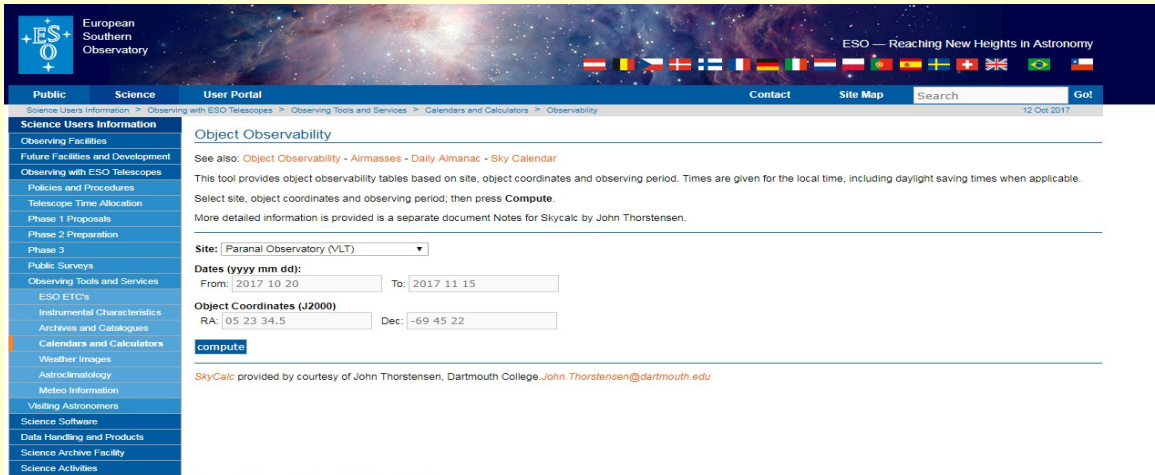
This information shown in a **static web page** and only accessible through forms that have to be filled in **manually**.

Target Visibility



The screenshot shows the ESO website's 'Object Observability' tool. At the top, there is a navigation bar with 'Public', 'Science', 'User Portal', 'Contact', and 'Site Map' tabs. A search bar is located on the right. Below the navigation bar, a left sidebar contains a list of menu items such as 'Science Users Information', 'Observing Facilities', and 'Future Facilities and Development'. The main content area is titled 'Object Observability' and includes a 'See also' section with links to 'Object Observability - Airmasses', 'Daily Almanac', and 'Sky Calendar'. A paragraph explains that the tool provides object observability tables based on site, object coordinates, and observing period. Below this, there are input fields for 'Site' (set to 'Paranal Observatory (VLT)'), 'Dates (yyyy mm dd)' (From: 2017 10 20, To: 2017 11 15), and 'Object Coordinates (J2000)' (RA: 05 23 34.5, Dec: -69 45 22). A 'compute' button is present. At the bottom, a note states 'SkyCalc provided by courtesy of John Thorstensen, Dartmouth College. John.Thorstensen@dartmouth.edu'.

Target Visibility



European Southern Observatory

ESO — Reaching New Heights in Astronomy

Public Science User Portal Contact Site Map Search Go!

Science Users Information > Observing with ESO Telescopes > Observing Tools and Services > Calendars and Calculators > Observability 12 Oct 2017

Science Users Information

Observing Facilities

Future Facilities and Development

Observing with ESO Telescopes

Policies and Procedures

Telescope Time Allocation

Phase 1 Proposals

Phase 2 Preparation

Phase 3

Public Surveys

Observing Tools and Services

ESO ETO's

Instrumental Characteristics

Archives and Catalogues

Calendars and Calculators

Weather Images

Astroclimatology

Meteo Information

Visiting Astronomers

Science Software

Data Handling and Products

Science Archive Facility

Science Activities

Object Observability

See also: [Object Observability - Airmasses](#) - [Daily Almanac](#) - [Sky Calendar](#)

This tool provides object observability tables based on site, object coordinates and observing period. Times are given for the local time, including daylight saving times when applicable.

Select site, object coordinates and observing period; then press **Compute**.

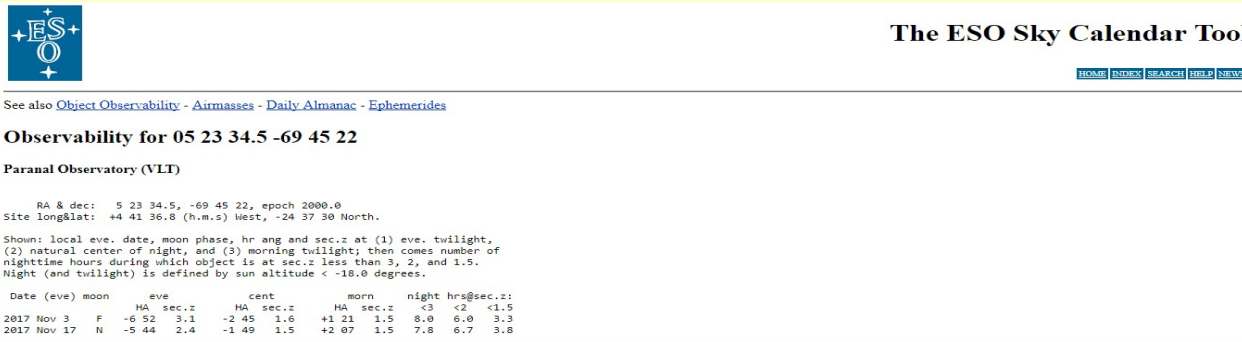
More detailed information is provided in a separate document [Notes for SkyCalc](#) by John Thorstensen.

Site:

Dates (yyyy mm dd):
 From: To:

Object Coordinates (J2000)
 RA: Dec:

SkyCalc provided by courtesy of John Thorstensen, Dartmouth College John.Thorstensen@dartmouth.edu



The ESO Sky Calendar Tool

[HOME](#) [INDEX](#) [SEARCH](#) [HELP](#) [NEWS](#)

See also [Object Observability - Airmasses](#) - [Daily Almanac](#) - [Ephemerides](#)

Observability for 05 23 34.5 -69 45 22

Paranal Observatory (VLT)

RA & dec: 5 23 34.5, -69 45 22, epoch 2000.0
 Site long&lat: +4 41 36.8 (h.m.s) West, -24 37 30 North.

Shown: local eve, date, moon phase, hr ang and sec.z at (1) eve, twilight, (2) nighttime center of night, and (3) morning twilight; then comes number of nighttime hours during which object is at sec.z less than 3, 2, and 1.5. Night (and twilight) is defined by sun altitude < -18.0 degrees.

Date (eve)	moon	eve	HA	sec.z	cent	HA	sec.z	morn	night	hrs@sec.z:
								<3	<2	<1.5
2017 Nov 3	F	-0 52	2.1	-2 45	1.6	+1 21	1.5	8.0	6.0	3.3
2017 Nov 17	N	-5 44	2.4	-1 49	1.5	+2 07	1.5	7.8	6.7	3.8

SkyCalc provided by courtesy of John Thorstensen, Dartmouth College. John.Thorstensen@dartmouth.edu

Target Visibility

XMM-NEWTON MULTI-TARGET VISIBILITY CHECKER

YOU CAN LOOKUP SIMBAD OR NED AGAIN, OR RUN THE VISIBILITY CHECKER USING THE RESULTS RETURNED BELOW.

Target Name (eg: Abell 1750)

Please note: there is a 30 second timeout should SIMBAD or NED not respond.

SIMBAD LOOKUP RESULTS:

If you are happy with these results, complete the "Visibility Details" and Submit

TARGET DETAILS

Target Name Target name or identifier for output (eg: Abell 1750)
 RA Decimal degrees or HH:MM:SS.S (eg: 13:30:52.5)
 Dec Decimal degrees or DD:MM:SS.S (eg: -01:50:27.0)

VISIBILITY DETAILS

Select either
 Revolution Range First Revolution default is AO17 revolution range: 3369 to 3551
 Last Revolution

or
 Date Range From Date default is AO17 range: 01 May 2018 - 30 Apr 2019
 To Date

Minimum visibility (minimum time the bin must be visible. Default is 5000 s)

The ESO Sky Calendar Tool

See also [Object Observability](#) - [Airmasses](#) - [Daily Almanac](#) - [Ephemerides](#)

Observability for 05 23 34.5 -69 45 22

Paranal Observatory (VLT)

RA & dec: 5 23 34.5, -69 45 22, epoch 2000.0
 Site long&lat: +4 41 36.8 (h.m.s) West, -24 37 30 North.

Shown: local eve, date, moon phase, hr ang and sec.z at (1) eve, twilight, (2) natural center of night, and (3) morning twilight; then comes number of nighttime hours during which object is at sec.z less than 3, 2, and 1.5. Night (and twilight) is defined by sun altitude < -18.0 degrees.

Date (eve) moon	eve	cent	morn	night	hrs@sec.z:
	HA	sec.z	HA	sec.z	<3 <2 <1.5
2017 Nov 3 F	-6 52	3.1	-2 45	1.6	+1 21 1.5 8.0 6.0 3.3
2017 Nov 17 N	-5 44	2.4	-1 49	1.5	+2 07 1.5 7.8 6.7 3.8

[SkyCalc](#) provided by courtesy of John Thorstensen, Dartmouth College. John.Thorstensen@dartmouth.edu



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RA Decimal degrees or HH:MM:SS.S (eg: 13:30:52.5)

Dec Decimal degrees or DD:MM:SS.

VISIBILITY DETAILS

Select either

Revolution Range First Revolution default is AO17 rev

Last Revolution

or

Date Range From Date default is

To Date

Minimum visibility (minimum time the bin must be v



XMM-NEWTON AO17 TARGET VISIBILITY CHECKER

VIEWING CONSTRAINTS FOR XMM-NEWTON

Visible corners	Bin Size	Solar Aspect Angle Range	Min Earth Angle
All four	2° x 2°	70° - 110°	42°

SEARCH CRITERIA FOR ALL TARGETS

Min Vis (s)	Start Orbit	End Orbit	Start Date	End Date
5000	3369	3551	01-May-2018	29-Apr-2019

Targets that are only visible for a small fraction of an orbit are only visible at the start or end of a revolution (see columns Visibility Start/End Phase) and therefore have a higher likelihood for increased background radiation.

SEARCH RESULTS PER TARGET

Target Name	RA	Dec
M31	10.6647	41.2687

Rev.	Vis. Start (yyyy-mm-dd hh:mm)	Vis. Window Duration (s)	Vis. End (yyyy-mm-dd hh:mm)	Rounded Vis. (s)	Visibility Start Phase	Visibility End Phase	Solar Aspect Angle(°)	Mean Astronomical Position Angle(°)
3397	2018-06-28 02:58	27036	2018-06-28 10:29	25000	0.76	0.92	71.3	74.2
3398	2018-06-29 12:49	78126	2018-06-30 10:31	75000	0.47	0.92	72.6	72.8
3399	2018-07-01 12:42	78063	2018-07-02 10:23	75000	0.47	0.92	74.2	71.7
3400	2018-07-03 12:35	77939	2018-07-04 10:14	75000	0.47	0.92	75.7	70.6
3401	2018-07-05 12:29	77804	2018-07-06 10:06	75000	0.47	0.92	77.3	69.5
3402	2018-07-07 12:22	77715	2018-07-08 09:58	75000	0.47	0.92	78.8	68.5
3403	2018-07-09 12:15	78302	2018-07-10 10:00	75000	0.47	0.93	80.4	67.4
3404	2018-07-11 12:07	78348	2018-07-12 09:53	75000	0.47	0.93	82.0	66.3

See also [Object Observability - Airmasses - Daily Almanac](#)

Observability for 05 23 34.5 -69 45 22

Paranal Observatory (VLT)

RA & dec: 5 23 34.5, -69 45 22, epoch 2000.0
Site long&lat: +4 41 36.8 (h.m.s) West, -24 37 30 North

Shown: local eve. date, moon phase, hr ang and sec.z at (2) natural center of night, and (3) morning twilight; t nighttime hours during which object is at sec.z less than the Night (and twilight) is defined by sun altitude < -18.0

Date (eve) moon	eve	cent	morn			
2017 Nov 3	F	-6 52	3.1	-2 45	1.6	+1 21
2017 Nov 17	N	-5 44	2.4	-1 49	1.5	+2 07

Target Visibility



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Home > [Astronomy](#) > [Object Visibility](#)

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

Night or date when the local night starts. *Staralt, Startrack only.*

Observatory

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

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.

RA & dec: 5 23 34.5, -69 45 22, epoch 2000.0
 Site long&lat: +4 41 36.8 (h.m.s) West, -24 37 30 North
 Shown: local eve. date, moon phase, hr ang and sec.z at (2) natural center of night, and (3) morning twilight; t nighttime hours during which object is at sec.z less than the Night (and twilight) is defined by sun altitude < -18.0
 Date (eve) moon eve cent morn
 2017 Nov 3 F -6 52 3.1 -2 45 1.6 +1 21
 2017 Nov 17 N -5 44 2.4 -1 49 1.5 +2 07

Rev.	(yyyy-mm-dd hh:mm)	Duration (s)	Vis. End (yyyy-mm-dd hh:mm)	Rounded Vis. (s)	Visibility Start Phase	Visibility End Phase	Solar Aspect Angle(*)	Mean Astronomical Position Angle(*)
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3398	2018-06-29 12:49	78126	2018-06-30 10:31	75000	0.47	0.92	72.6	72.8
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3404	2018-07-11 12:07	78348	2018-07-12 09:53	75000	0.47	0.93	82.0	66.3

TY CHECKER
 TS RETURNED BELOW.

XMM-NEWTON AO17 TARGET VISIBILITY CHECKER

VIEWING CONSTRAINTS FOR XMM-NEWTON

Visible corners	Bin Size	Solar Aspect Angle Range	Min Earth Angle
All four	2" x 2"	70° - 110°	42°

SEARCH CRITERIA FOR ALL TARGETS

Min Vis (s)	Start Orbit	End Orbit	Start Date	End Date
5000	3369	3551	01-May-2018	29-Apr-2019

Visible at the start or end of a revolution (see columns Visibility Start/End Phase) and therefore have a higher likelihood for increased background radiation.

Target Visibility

ISAAC NEWTON GROUP OF TELESCOPES

About ING ▾ Astronomy ▾ Developments ▾ Public Information ▾ Search:

Home > Astronomy > Object Visibility

Object Visibility – STARALT

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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

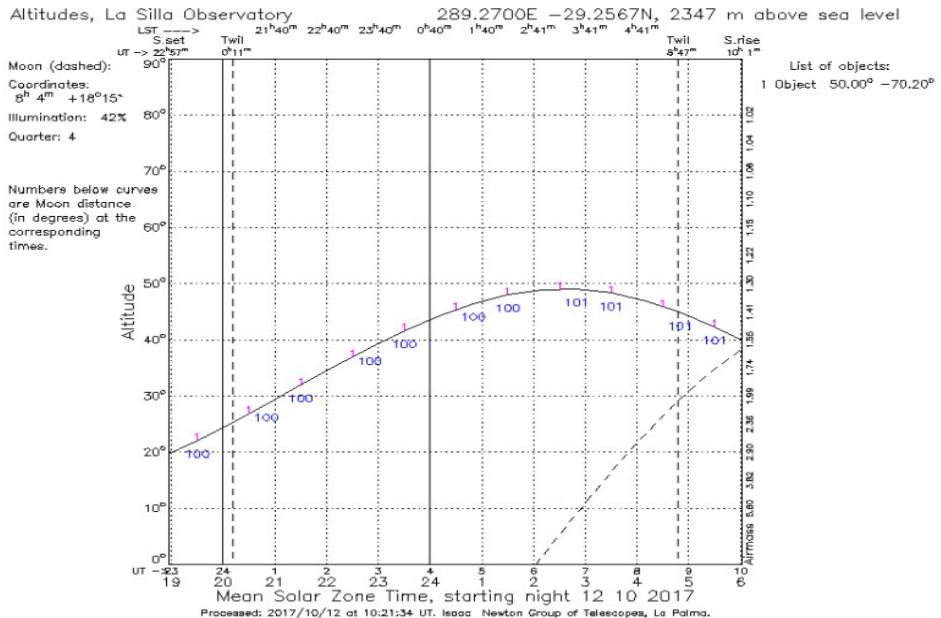
Coordinates 50.0 -70.2

Formats can be any of these:
 name hh mm ss ±dd mm ss
 name hh:mm:ss ±dd: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

Slide 13

Observing Plans:

SCIENCE ARCHIVE FACILITY

Observational Raw Data Query Results

Home
Instrument-specific Software
ESO Linkbox Overview
Archive FAQ
Linkbox Facility WISE
ESO HOME

To request data please select the datasets in the results table by marking the checkbox in the left-most column, then press the Request dataset buttons below.
(How will be prompted for your ESO User Portal username and password. If you do not yet have an ESO User Portal account, please fill out the registration form.)
 Datasets for which the proprietary period is over are highlighted in green and are publicly available.
 Datasets that are still under the proprietary period are highlighted in red and can only be downloaded by the corresponding PI.
 Datasets that are not yet available in the Archive are marked with a 'N/A'.

Request dataset buttons: None Mark All Mark Public Mark Proprietary New query Programs Your Requests

PPST for October 8th, 2017 (DoY 281)

October Nov Dec 2017
 PPST APST View

N	Filter	MJD-OBS	Airmass	Ambient
1	50034.30000	1.147		CRIM Select?
2	50034.30000	1.201		CRIM Select?
3	50034.30000	1.000		CRIM Select?

Notes:
 Click on target ID to see a summary for all segments belonging to that target ID.
 Click on segment number to see information for just that segment ID.
 PPST time is calculated from begin to end. This does not take slewing into account.
 SAA Cost - Observation performed during passage through the South Atlantic Anomaly (SAA) to avoid XRT passive cooling. No data is collected during SAA passages.

Begin	End	Target ID	Seg.	Target Name	R.A.	Dec.	RA	MJD	MJDST	MJDUT	Phase	Height	Time (s)
2017-10-08 00:00:00	2017-10-08 00:31:00	25276	6	SWIFT 281-00	57.59771	-60.20000	136.41465	Auto	00:00:00	100	1000	100	1000
2017-10-08 00:31:00	2017-10-08 00:31:00	102108	1	2817767	67.62932	-60.30000	129.18816	PC	00:32:07	700	600	700	600
2017-10-08 00:31:00	2017-10-08 00:43:00	87028	6	Swift 2845A-1-4505	74.08820	-45.07200	114.72315	PC	00:33:16	45	400	45	400
2017-10-08 00:43:00	2017-10-08 00:53:00	86211	1	86208	348.35641	-68.68480	138.78863	PC	00:33:57	60	700	60	700
2017-10-08 00:53:00	2017-10-08 01:09:00	88224	4	2MASSJ1614346+470420	243.61552	-47.08750	232.30975	Auto	00:33:58	90	900	90	900
2017-10-08 01:09:00	2017-10-08 01:38:00	82629	1	SDSS J16201-1-0941	277.50797	-16.67775	268.17722	PC	00:34:06	88	1800	88	1800
2017-10-08 01:38:00	2017-10-08 02:15:00	23528	6	Swift 281-00	57.59771	-60.20000	136.41465	Auto	00:35:00	100	1000	100	1000
2017-10-08 02:15:00	2017-10-08 02:15:00	86208	6	Swift 2845A-1-4505	74.08741	-45.07135	119.72009	PC	00:35:00	45	400	45	400

Search Results

[Search Results](#)
[Retrieval List](#)
[Help](#)

Primary package
 Secondary package
 Custom selection

Add Products to Retrieval List

View Observation Information

Select all | Unselect all

Select	Row	Seq Num	Obs ID	Instrument	Grating	Appar. Exp	Exposure	Target Name	PI Name	RA	Dec	Status	Data Mode	Exp. Mode	Avg. Cnt Rate	Ext. Cnt	Start Date	Public Release Date	Proposal	Type	Obs. Cycle	Prop. Cycle	Science Category	Joint	Grid Nat
<input type="checkbox"/>	1	703152	17566	HRC-S	LETTG	35.0	34.8	ASASSN-141i	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	
<input type="checkbox"/>	2	703152	17567	HRC-S	LETTG	45.0	44.6	ASASSN-141i	Miller	12 48 15.20	+17 46 26.20	archived			68.49	3044836	2014-12-11 08:45:20	2014-12-12 05:20:16	15708488	DDT	15	15	ACTIVE GALAXIES AND QUASARS	None	
<input type="checkbox"/>	3	703277	18345	ACIS-S	NONE	25.0	23.84	ASASSN-141i	Makajm	12 48 15.20	+17 46 26.30	archived	VFAINT	TE	1.37	32575	2016-01-28 14:39:01	2017-01-29 08:31:06	17700613	GO	17	17	ACTIVE GALAXIES AND QUASARS	XMM-NRAO	
<input type="checkbox"/>	4	703278	18346	ACIS-S	NONE	60.0	58.47	ASASSN-141i	Makajm	12 48 15.20	+17 46 26.30	archived	VFAINT	TE	2.15	125536	2016-08-03 13:07:31	2017-08-04 12:41:18	17700613	GO	17	17	ACTIVE GALAXIES AND QUASARS	XMM-NRAO	
<input type="checkbox"/>	5	703279	18347	ACIS-S	NONE	15.0	14.67	ASASSN-141i	Makajm	12 48 15.20	+17 46 26.30	observed	VFAINT	TE	2.08	30482	2017-08-03 18:31:04	2018-08-06 16:01:08	17700613	GO	18	17	ACTIVE GALAXIES AND QUASARS	XMM-NRAO	
<input type="checkbox"/>	6	703279	20127	ACIS-S	NONE	25.0	25.0	ASASSN-141i	Makajm	12 48 15.20	+17 46 26.30	observed	VFAINT	TE	2.09	54034	2017-08-04 08:21:10	2018-08-06 16:01:08	17700613	GO	18	17	ACTIVE GALAXIES AND QUASARS	XMM-NRAO	
<input type="checkbox"/>	7	703279	20128	ACIS-S	NONE	40.0	39.01	ASASSN-141i	Makajm	12 48 15.20	+17 46 26.30	observed	VFAINT	TE	2.10	81754	2017-08-05 14:16:16	2018-08-06 16:01:08	17700613	GO	18	17	ACTIVE GALAXIES AND QUASARS	XMM-NRAO	
		Totals																						0	

2017-10-08 08:58:00	2017-10-08 09:10:00	33028	1	CG 1331	239.13534	-29.82716	239.79154	PC	08:30:02	91	720														
2017-10-08 09:10:00	2017-10-08 09:15:00	33029	1	CG2015 WL2	291.49804	-11.72374	262.00000	PC	09:01:54	95	3000														
2017-10-08 09:15:00	2017-10-08 09:22:00	33600	2	CG2015 WL2	291.49804	-11.72374	262.00000	PC	09:02:00	95	420														
2017-10-08 09:22:00	2017-10-08 09:40:00	33601	2	CG2015 WL2	291.49804	-11.72374	262.00000	PC	09:02:00	95	1000														
2017-10-08 09:40:00	2017-10-08 09:53:00	10268	2	AT201794	206.22884	-14.77635	209.89092	PC	09:01:00	74	780														

50034.30000
1.147
CRIM Select?
50034.30000
1.201
CRIM Select?
50034.30000
1.000
CRIM Select?

Observing Plans:



SCIENCE ARCHIVE FACILITY

Observational Raw Data Query Results

Request data please select the datasets in the results table by marking the checkbox in the left-most column, then press the Request marked datasets button.

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XMM-Newton

XMM-Newton Observation Search

Target Name		RA	Dec	Pos_Angle	Comments	
Obs_Duration	Obs_Start_Time	Obs_End_Time	Rev	IB		
Observation ID						
Exposures' details						
Instrument - Filter - Mode (Exp_ID)		Start	Sched_dur	Exec_dur		
0804270901						
XMM-RM11	14:20:08.10	+52:28:54.1	327:47:25.7			
22000 sec	2017-05-29@20:59:30	2017-05-30@03:06:10	3200	E3		
OM - UVW1 - Full Low (006)	29@21:17:42	05-7868				
OM - UVW1 - Full Low (007)	29@23:29:31	05-7868				
OM - UVW1 - Full Low (008)	30@01:41:20	05-5056				
M1 - THIN1 - Full Frame (001)	29@21:16:37	05-20881				
M2 - THIN1 - Full Frame (002)	29@21:17:11	05-20852				
PN - THIN1 - Full Frame (003)	29@21:39:49	05-19509				
R1 - Spectro + O (004)		05-20986				

Request marked datasets

PPST for October 8th, 2017 (DoY 281)

IN	Filter	MJD-OBS	Airmass	Ambient
<input type="checkbox"/>	5004.30000	1.107	0.000	0.000
<input type="checkbox"/>	5004.30000	1.201	0.000	0.000
<input type="checkbox"/>	5004.30000	1.000	0.000	0.000

Search Results

Search Results Retrieval List Help

Chandra Data Archive

View Observation Information

Add Products to Retrieval List


Primary package
 Secondary package
 Custom selection

Select	Row	Seq Num	Obs_ID	Instrument	Grating	Appar. Exp	Exposure	Target Name	PI Name	RA	Dec	Status	Data Mode	Exp. Mode	Avg. Cnt Rate	Ext. Cnt	Start Date	Public Release Date	Proposal	Type	Obs. Cycle	Prop. 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	HRC-S	TE	61.23	2130972	2014-12-08 23:20:28	2014-12-10 06:43:58	15708488	DDT	15	15	ACTIVE GALAXIES AND QUASARS	None		
<input type="checkbox"/>	2	703152	17567	HRC-S	LETG	45.0	44.46	ASASSN-14i	Miller	12 48 15.20	+17 46 26.20	archived	HRC-S	TE	68.49	3044836	2014-12-11 08:45:20	2014-12-12 05:20:16	15708488	DDT	15	15	ACTIVE GALAXIES AND QUASARS	None		
<input type="checkbox"/>	3	703277	18345	ACIS-S	NONE	25.0	23.84	ASASSN-14i	Makayem	12 48 15.20	+17 46 26.30	archived	VFAINT	TE	1.37	32575	2016-01-28 14:39:01	2017-01-29 08:31:06	17700613	GO	17	17	ACTIVE GALAXIES AND QUASARS	XMM-NRAO		
<input type="checkbox"/>	4	703278	18346	ACIS-S	NONE	60.0	58.47	ASASSN-14i	Makayem	12 48 15.20	+17 46 26.30	archived	VFAINT	TE	2.15	125536	2016-08-03 13:07:31	2017-08-04 12:41:18	17700613	GO	17	17	ACTIVE GALAXIES AND QUASARS	XMM-NRAO		
<input type="checkbox"/>	5	703279	18347	ACIS-S	NONE	15.0	14.67	ASASSN-14i	Makayem	12 48 15.20	+17 46 26.30	observed	VFAINT	TE	2.08	30482	2017-08-03 18:31:04	2018-08-06 16:01:08	17700613	GO	18	17	ACTIVE GALAXIES AND QUASARS	XMM-NRAO		
<input type="checkbox"/>	6	703279	20127	ACIS-S	NONE	25.0	25.0	ASASSN-14i	Makayem	12 48 15.20	+17 46 26.30	observed	VFAINT	TE	2.09	54034	2017-08-04 08:21:10	2018-08-06 16:01:08	17700613	GO	18	17	ACTIVE GALAXIES AND QUASARS	XMM-NRAO		
<input type="checkbox"/>	7	703279	20128	ACIS-S	NONE	40.0	39.01	ASASSN-14i	Makayem	12 48 15.20	+17 46 26.30	observed	VFAINT	TE	2.10	81754	2017-08-05 14:16:10	2018-08-06 16:01:08	17700613	GO	18	17	ACTIVE GALAXIES AND QUASARS	XMM-NRAO		
		Totals																								

Observing Plans:




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		
2017.1.00896.L	NGC7496	Schinnerer, Eva

[More...](#)

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	Cen_A	Nagai, Hiroshi



Search Results

[Search Results](#)
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View Observation Information

Add Products to Retrieval List

Primary package
 Secondary package
 Custom selection

Select all | Unselect all

Select	Row	Seq Num	Obs ID	Instrument	Grating	Appr. Exp	Exposure	Target Name	PI Name	RA	Dec	Status	Data Mode	Exp. Mode	Avg. Cnt Rate	Ext. Cnt	Start Date	Public Release Date	Proposal	Type	Obs. Cycle	Prop. 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	
<input type="checkbox"/>	2	703152	17567	HRC-S	LETG	45.0	44.46	ASASSN-14i	Miller	12 48 15.20	+17 46 26.20	archived			68.49	3044836	2014-12-11 08:45:20	2014-12-12 05:20:16	15708488	DDT	15	15	ACTIVE GALAXIES AND QUASARS	None	
<input type="checkbox"/>	3	703277	18345	ACIS-S	NONE	25.0	23.84	ASASSN-14i	Makym	12 48 15.20	+17 46 26.30	archived	VFAINT	TE	1.37	32575	2016-01-28 14:39:01	2017-01-29 08:31:06	17700613	GO	17	17	ACTIVE GALAXIES AND QUASARS	XMM-NRAO	
<input type="checkbox"/>	4	703278	18346	ACIS-S	NONE	60.0	58.47	ASASSN-14i	Makym	12 48 15.20	+17 46 26.30	archived	VFAINT	TE	2.15	125536	2016-08-03 13:07:31	2017-08-04 12:41:18	17700613	GO	17	17	ACTIVE GALAXIES AND QUASARS	XMM-NRAO	
<input type="checkbox"/>	5	703279	18347	ACIS-S	NONE	15.0	14.67	ASASSN-14i	Makym	12 48 15.20	+17 46 26.30	observed	VFAINT	TE	2.08	30482	2017-08-03 18:31:04	2018-08-06 16:01:08	17700613	GO	18	17	ACTIVE GALAXIES AND QUASARS	XMM-NRAO	
<input type="checkbox"/>	6	703279	20127	ACIS-S	NONE	25.0	25.0	ASASSN-14i	Makym	12 48 15.20	+17 46 26.30	observed	VFAINT	TE	2.09	54034	2017-08-04 08:21:10	2018-08-06 16:01:08	17700613	GO	18	17	ACTIVE GALAXIES AND QUASARS	XMM-NRAO	
<input type="checkbox"/>	7	703279	20128	ACIS-S	NONE	40.0	39.01	ASASSN-14i	Makym	12 48 15.20	+17 46 26.30	observed	VFAINT	TE	2.10	81754	2017-08-05 14:16:10	2018-08-06 16:01:08	17700613	GO	18	17	ACTIVE GALAXIES AND QUASARS	XMM-NRAO	
Totals						0.00	0.00								0										


















“Diversity is about embracing differences, and recognizing the amazing things that are possible when it’s woven into an organization’s culture”





- Initial definition by ESA team, then discussed with about 60 supporting partners (observatory operators, platform operators, institutions, scientists etc.)
 - Workshop held on 21st September 2018 in ESAC
- Consolidated protocol descriptions presented to Virtual Observatory
 - Positive response, certification expected soon
- INTEGRAL, Chandra, GAIA, and HXMT have developed prototypes used here to demonstrate how it works:

Example Use Case:

I have a target and want to know how long I have to wait until it can be observed by multiple observatories

Example URL Query:

GRS 1915+105 date range
RA=288.8, DEC=10.95

cURL -s "<http://integral.esa.int/isocweb/tvp.html?startDate=26-04-2019&endDate=26-05-2019&duration=12.600&action=predict&ra=288.8&dec=10.95&format=json>"

cURL -s "<http://integral.esa.int/isocweb/tvp.html?startDate=26-04-2019&endDate=26-05-2019&duration=12.600&action=predict&ra=288.8&dec=10.95&format=json>"

Output in JSON Format

Demonstration for INTEGRAL



```
jness-Lenovo-G50-80:~> curl -s "http://integral.esa.int/isocweb/tvp.html?startDate=26-04-2019&&endDate=26-05-2019&duration=12.600&action=predict&ra=288.8&dec=10.95&format=json" | sed '/^$/d'  
{"RA": "288.8", "RAHMS": "19:15:12.00",  
"DEC": "10.95", "DECHMS": "+10:57:00.0",  
"START_DATE": "2019-04-26",  
"END_DATE": "2019-05-26",  
"DITHER_PATTERN": "Raster",  
"MINIMUM_DURATION": "12.6",  
"TOTAL_DURATION": "1417164",  
"INTERVALS":  
[  
{"revolution" : "2083", "start": "2019-04-24 14:07:48 GMT",  
"end": "2019-04-26 18:25:00 GMT" ,"duration": "188232"}  
/  
{"revolution" : "2084", "start": "2019-04-27 05:56:36 GMT",  
"end": "2019-04-29 10:14:40 GMT" ,"duration": "188284"}  
/  
{"revolution" : "2085", "start": "2019-04-29 21:45:43 GMT",  
"end": "2019-05-02 02:05:08 GMT" ,"duration": "188365"}  
/  
{"revolution" : "2086", "start": "2019-05-02 13:35:23 GMT",  
"end": "2019-05-04 17:56:04 GMT" ,"duration": "188441"}  
/  
{"revolution" : "2087", "start": "2019-05-05 05:25:42 GMT",  
"end": "2019-05-07 09:46:48 GMT" ,"duration": "188466"}  
/  
{"revolution" : "2088", "start": "2019-05-07 21:16:20 GMT",  
"end": "2019-05-10 01:36:28 GMT" ,"duration": "188408"}  
/  
{"revolution" : "2089", "start": "2019-05-10 13:06:24 GMT",  
"end": "2019-05-12 17:25:02 GMT" ,"duration": "188318"}  
/  
{"revolution" : "2090", "start": "2019-05-13 04:55:13 GMT",  
"end": "2019-05-14 08:19:23 GMT" ,"duration": "98650"}  
]  
]
```



Demonstration for INTEGRAL

```
#!/bin/bash
```

```
out=`mktemp tempXXXXXX` || exit 1  
trap "rm -f $out*" 0 1 2 3 5
```

```
ra=$1  
if test x${2} = x; then  
    echo Need to provide coordinates in decimal units  
    exit 1  
else  
    dec=$2  
fi
```

```
root="http://integral.esa.int/isocweb/tvp.html"
```

```
dstart=$(date +%d-%m-%Y) ←  
dend=$(date -d "+30 days" +%d-%m-%Y) ←
```

```
#dstart="08-02-2019"
```

```
echo "${root}?startDate=${dstart}&duration=12,600&action=predict&endDate=${dend}&coordinates=equatorial&ra=${ra}&dec=${dec}&format=json"
```

```
curl -s "${root}?startDate=${dstart}&duration=12,600&action=predict&endDate=${dend}&coordinates=equatorial&ra=${ra}&dec=${dec}&format=json" > $out.json  
less $out.json | jq '.INTERVALS[].revolution' | cut -d'"' -f2 > $out.rev  
less $out.json | jq '.INTERVALS[].start' | cut -d'"' -f2 > $out.start  
less $out.json | jq '.INTERVALS[].end' | cut -d'"' -f2 > $out.end
```

```
n=$(wc -l $out.rev | cut -d' ' -f1)  
d=$(date +%y-%m-%d)  
d=${dstart}
```

```
echo "Visibility from Today ($d) to ${dend}"
```

```
for ((i=1; i<n; i++)); do  
    a=$(sed -n "${i},${i} p" $out.rev)  
    b=$(sed -n "${i},${i} p" $out.start)  
    c=$(sed -n "${i},${i} p" $out.end)  
    echo " $a $b $c"
```

```
done
```

Bash script

Take RA/Dec as input

Display visibility intervals

from start date to 30 days in future

Demonstration for INTEGRAL

```
#!/bin/bash
```

```
out=`mktemp tempXXXXXX` || exit 1  
trap "rm -f $out*" 0 1 2 3 5
```

```
ra=$1  
if test x${2} = x; then  
    echo Need to provide coordinates in decimal units  
    exit 1  
else  
    dec=$2  
fi
```

```
root="http://integral.esa.int/isocweb/tpv.html"
```

```
dstart=$(date +%d-%m-%Y) ←  
dend=$(date -d "+30 days" +%d-%m-%Y) ←
```

```
#dstart="08-02-2019"
```

```
echo "${root}?startDate=${dstart}&duration=12,600&action=predict&endDate=${dend}&coordinates=equatorial&ra=${ra}&dec=${dec}&format=json"
```

```
curl -s "${root}?startDate=${dstart}&duration=12,600&action=predict&endDate=${dend}&coordinates=equatorial&ra=${ra}&dec=${dec}&format=json" > $out.json  
less $out.json | jq '.INTERVALS[].revolution' | cut -d'"' -f2 > $out.rev  
less $out.json | jq '.INTERVALS[].start' | cut -d'"' -f2 > $out.start  
less $out.json | jq '.INTERVALS[].end' | cut -d'"' -f2 > $out.end
```

```
n=$(wc -l $out.rev | cut -d' ' -f1)  
d=$(date +%y-%m-%d)  
d=${dstart}  
echo "Visibility from Today ($d) to ${dend}"  
for ((i=1; i<n; i++)); do  
    a=$(sed -n "${i},${i} p" $out.rev)  
    b=$(sed -n "${i},${i} p" $out.start)  
    c=$(sed -n "${i},${i} p" $out.end)  
    echo " $a $b $c"  
done
```

Bash script

Take RA/Dec as input

Display visibility intervals

from start date to 30 days in future

```
> ./too.sh 288,8 10,95  
Visibility from Today (26-04-2019) to 26-05-2019  
2083 2019-04-24 14:07:48 GMT 2019-04-26 18:25:00 GMT  
2084 2019-04-27 05:56:36 GMT 2019-04-29 10:14:40 GMT  
2085 2019-04-29 21:45:43 GMT 2019-05-02 02:05:08 GMT  
2086 2019-05-02 13:35:23 GMT 2019-05-04 17:56:04 GMT  
2087 2019-05-05 05:25:42 GMT 2019-05-07 09:46:48 GMT  
2088 2019-05-07 21:16:20 GMT 2019-05-10 01:36:28 GMT  
2089 2019-05-10 13:06:24 GMT 2019-05-12 17:25:02 GMT
```


International Virtual Observatory Alliance

IVOA Documents



ObjVisSAP

Object Visibility Simple Access Protocol
Version 0.5

IVOA Working Draft 19 March 2019

Interest/Working Group:

<http://www.ivoa.net/twiki/bin/view/IVOA/IvoaDAL>

Author(s):

Aitor Ibarra, Richard Saxton, Jesús Salgado, Matthias Ehle, Carlos Gabriel, James Dempsey, María Díaz Trigo, Yue Huang, Jaime Keenea, Mark Kettenis, Peter Kretschmar, Erik Kuulkers, Uwe Lammers, Giorgio Matt, Bruno Merín, Marco Molinaro, Jan-Uwe Ness, Julian Osborne, Emma de Oña Wilhelmi, Edward J. Salbol, Emilio Salazar, Celia Sánchez, Gregory Sivakoff, Lian Tao, Aaron Tohuvavohu, Bill Workman

Editor(s):

Aitor Ibarra, Richard Saxton, Jesús Salgado

<http://ivoa.net/documents/ObjVisSAP/>

Simple Access Protocol (SAP)

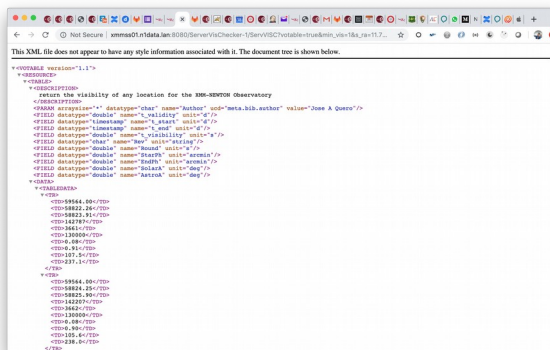
Implementation depends on Observatory
(adaptation)

Based on parameter=value approach
Basic interface Coordinates/Time

Implementation of ObjVisSAP

Needs:

- Algorithm to calculate visibility of a point in the sky in any language. It could interact with a database, a file, or nothing at all. (Mission dependent)
- Web server which interfaces with the user/client. Most missions have already a web interface that shows the visibility
- Response as VOTable (specific XML format)



```
This XML file does not appear to have any style information associated with it. The document tree is shown below.
<?xml version="1.1"?>
<TABLE>
  <DESCRIPTION>
    <TEXT>
      <p>ASKAR the visibility of any location for the SOO-SWOTCH Observatory</p>
    </TEXT>
  </DESCRIPTION>
  <FIELD>
    <NAME>arrayname</NAME>
    <DATA type="char" name="Author" uri="meta.bib.author" value="Jose A Quero"/>
  </FIELD>
  <FIELD>
    <NAME>timestamp</NAME>
    <DATA type="float" name="t_start" unit="d"/>
  </FIELD>
  <FIELD>
    <NAME>double</NAME>
    <DATA type="double" name="visibility" unit="1"/>
  </FIELD>
  <FIELD>
    <NAME>char</NAME>
    <DATA type="char" name="name" unit="deg"/>
  </FIELD>
  <FIELD>
    <NAME>double</NAME>
    <DATA type="double" name="ra" unit="deg"/>
  </FIELD>
  <FIELD>
    <NAME>double</NAME>
    <DATA type="double" name="dec" unit="deg"/>
  </FIELD>
  <FIELD>
    <NAME>double</NAME>
    <DATA type="double" name="ra_max" unit="deg"/>
  </FIELD>
  <FIELD>
    <NAME>double</NAME>
    <DATA type="double" name="ra_min" unit="deg"/>
  </FIELD>
  </FIELD>
  <TABLEINFO>
    <FIELD>
      <NAME>arrayname</NAME>
      <DATA type="float" name="t_start" unit="d"/>
    </FIELD>
    <FIELD>
      <NAME>double</NAME>
      <DATA type="double" name="visibility" unit="1"/>
    </FIELD>
    <FIELD>
      <NAME>char</NAME>
      <DATA type="char" name="name" unit="deg"/>
    </FIELD>
    <FIELD>
      <NAME>double</NAME>
      <DATA type="double" name="ra" unit="deg"/>
    </FIELD>
    <FIELD>
      <NAME>double</NAME>
      <DATA type="double" name="dec" unit="deg"/>
    </FIELD>
    <FIELD>
      <NAME>double</NAME>
      <DATA type="double" name="ra_max" unit="deg"/>
    </FIELD>
    <FIELD>
      <NAME>double</NAME>
      <DATA type="double" name="ra_min" unit="deg"/>
    </FIELD>
  </TABLEINFO>
  <TABLE>
    <FIELD>
      <NAME>arrayname</NAME>
      <DATA type="float" name="t_start" unit="d"/>
    </FIELD>
    <FIELD>
      <NAME>double</NAME>
      <DATA type="double" name="visibility" unit="1"/>
    </FIELD>
    <FIELD>
      <NAME>char</NAME>
      <DATA type="char" name="name" unit="deg"/>
    </FIELD>
    <FIELD>
      <NAME>double</NAME>
      <DATA type="double" name="ra" unit="deg"/>
    </FIELD>
    <FIELD>
      <NAME>double</NAME>
      <DATA type="double" name="dec" unit="deg"/>
    </FIELD>
    <FIELD>
      <NAME>double</NAME>
      <DATA type="double" name="ra_max" unit="deg"/>
    </FIELD>
    <FIELD>
      <NAME>double</NAME>
      <DATA type="double" name="ra_min" unit="deg"/>
    </FIELD>
  </TABLE>
</TABLE>
```

Implementation Examples:

- PHP + Apache server (easy to implement, usually included the PHP support in the Apache web server)



- Java + Tomcat (servlet container), more robust development, easy to decouple the view (webpage) from the model (the visibility algorithm)



- Python (django). Very popular within the astronomy community.



Ask the expert: Emilio Salazar

International Virtual Observatory Alliance

IVOA Documents



ObsLocTAP

<http://ivoa.net/documents/ObsLocTAP/>

TAP Protocol Similar to ObsTAP

Data Model Constraints:

- a. Observation Characterization
- b. Axes:
 - Spatial Coverage
 - Spectral Coverage
 - Polarization
- c. Observatory provenance

Observation Locator Table Access Protocol
Version 0.5

IVOA Working Draft 09 September 2019

Interest/Working Group:

<http://www.ivoa.net/twiki/bin/view/IVOA/IvoaDAL>

Author(s):

Aitor Ibarra, Jesús Salgado, Matthias Ehle, Carlos Gabriel, James Dempsey, Markus Demleitner, María Díaz Trigo, Yue Huang, Jaime Keenea, Mark Kettenis, Peter Kretschmar, Erik Kuulkers, Uwe Lammers, Giorgio Matt, Bruno Merín, Marco Molinaro, Jan-Uwe Ness, Julian Osborne, Emma de Oña Wilhelmi, Edward J. Salbol, Emilio Salazar, Celia Sánchez, Richard Saxton, Gregory Sivakoff, Lian Tao, Aaron Tohuvavohu, Bill Workman

Editor(s):

Jesús Salgado, Aitor Ibarra

Creating a Observation Locator Service

1. For an Observation Locator Service (ObsLocTAP) you need:
 - a. A **database** (usually PostgreSQL) with a table that contains future observations
 - b. A **TAP** (Table Access Protocol) service
2. There are some **toolkits** that allow deployment of a TAP server without major effort:
 - TAPTuto: <http://cdsportal.u-strasbg.fr/taptuto/>
 - DACHS from GAVO:
<http://soft.g-vo.org/dachs>
<https://dachs-doc.readthedocs.io/tutorial.html>
 - SAADA:
<http://saada.unistra.fr/saada/>

Creating a Observation Locator Service

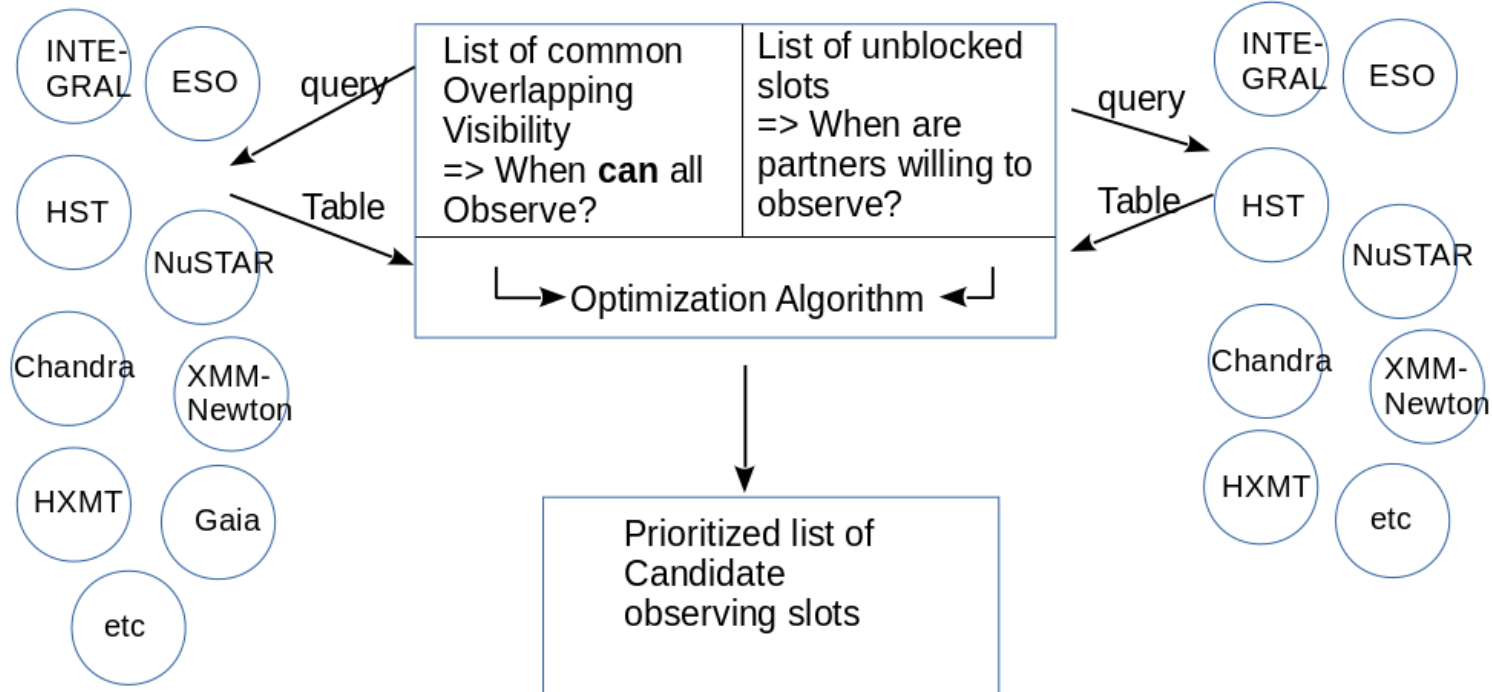
- ObsLocTAP table is described in the specification:
 - <http://www.ivoa.net/documents/ObsLocTAP/index.html>
 - and in our implementation guide
 - https://www.cosmos.esa.int/web/vovisobs_protocols/obsloctapimplguide
- **FINALLY... as a bonus!**
- Observatories could also use the same TAP server to publish **other** tables/catalogues
- ADQL (Astronomical Data Query Language) allows complex astronomical queries using Virtual Observatory clients (e.g. TOPCAT) on your tables

Ask the expert: Jesus Salgado

Visibility Services ObjVisSAP

Observation Services ObsLocTAP

Use Cases
Tools, Clients, Apps etc:





363
9 643
38

Search...

sky.esa.int

Welcome to ESASky!

ESASky is an application that allows you to visualise and download public astronomical data.

Choose a mode

Science

Explorer

Don't show this dialog again [\(Read our cookie policy\)](#)

Close



MULTIMISSION VISIBILITY AND SCHEDULE

Source name

<input type="text"/>	Look up
----------------------	---------

Coordinates (RA, DEC) in degrees *

255.2	-41.67
-------	--------

Start and End (UTC) *

2019-11-18T14:24	2020-05-18T13:24
------------------	------------------

Start and End (MJD)

<input type="text"/>	<input type="text"/>
----------------------	----------------------

Calculate

MULTIMISSION VISIBILITY AND SCHEDULE

Source name

<input type="text" value="NGC 3227"/>	<input type="button" value="Look up"/>
---------------------------------------	--

Coordinates (RA, DEC) in degrees *

<input type="text" value="155.87737"/>	<input type="text" value="19.86508"/>
--	---------------------------------------

Start and End (UTC) *

<input type="text" value="2019-11-15T14:24"/>	<input type="text" value="2019-12-10T13:24"/>
---	---

Start and End (MJD)

<input type="text" value="58802.600509259"/>	<input type="text" value="58827.558842592"/>
--	--

<input type="button" value="Calculate"/>
--

MULTIMISSION VISIBILITY AND SCHEDULE

<http://integral.esa.int/visObsTap/>

Source name

NGC 3227

Look up

Coordinates (RA, DEC) in degrees *

155.87737

19.86508

Start and End (UTC) *

2019-11-15T14:24

2019-12-10T13:24

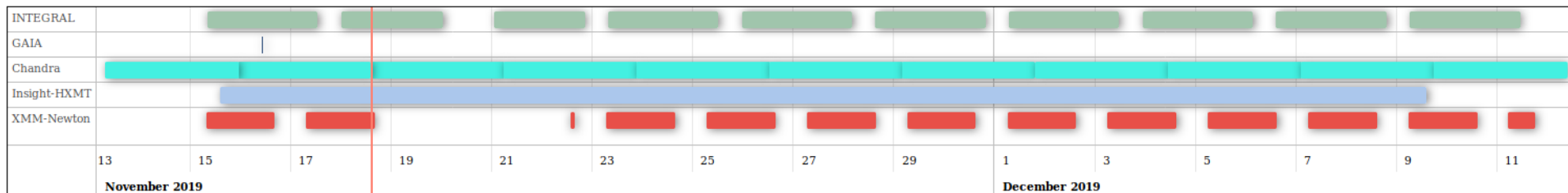
Start and End (MJD)

58802.600509259

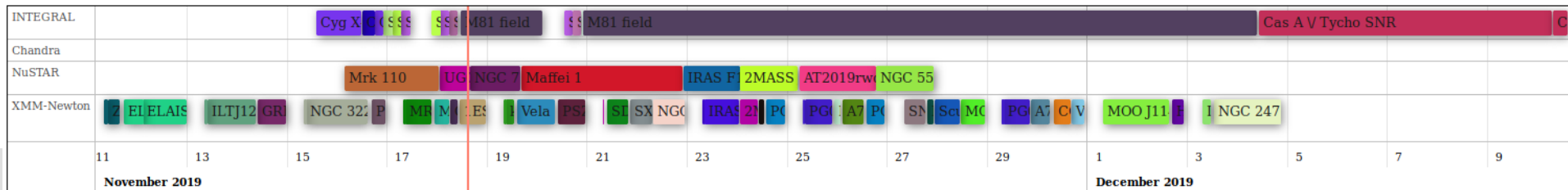
58827.558842592

Calculate

Visibility



Schedule



Looking for a more fancy name - Ideas?



<http://integral.esa.int/visObsTap/>

MMPlan = Multi-Messenger Planning tool

TOBY=Tool for Observation visiBility and schedule

MMAMVO =Multi Mission Approach
for the Modern Virtual Observatory

OOPS = OurObsPlanS

EMOOJI - Explore Multi-Observatory
Opportunities for Joint Investigations

Summary



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

Always happy to welcome new collaborators!

You can contribute:

Additional Use Cases

Convince observing facilities to implement VO services

So they become widely used

Write us an email: jan.uwe.ness@esa.int