VOVisObs Workshop

ESAC, 21 September 2018 **Minutes from November 13, 2018**

Attendants

— At ESAC —

Deborah Baines	ESA, ESDC	DeB
Pep Colomé	CSIC, CTA & VO	PeC
José Luis Contreras	UCM, CTA	JLC
María Diaz Trigo	ESO, ALMA	MDT
Christophe Dumas	TMT	CD
Matthias Ehle	ESA, INTEGRAL	ME
Karl Forster	NuSTAR	KF
Aitor Ibarra	ESA, XMM-Newton	AI
Yue Huang	CAS, HXMT & Einstein Probe	YH
Jamie Kennea	Penn State, Swift	JK
Mark Kettenis	JIVE/EVN	MK
Ralf Kohley	ESA, ARIEL	UL
Peter Kretschmar	ESA, XMM-Newton	PK
Erik Kuulkers	ESA, INTEGRAL	EK
Uwe Lammers	ESA, Gaia	UL
Matt Middleton	U. Southampton, SmartNet	MM
Jan-Uwe-Ness	ESA, XMM-Newton & INTEGRAL	JUN
Larry O'Rourke	ESA, PLATO	LOR
Tae-Soo Pyo	NAOJ, Subaru	TSP
Emilio Salazar	ESA, INTEGRAL	ES
Jesús Salgado	ESA, ESDC, VO	JS
Celia Sanchez	ESA, INTEGRAL	CS
Richard Saxton	ESA, XMM-Newton	RS
Arpad Szomoru	JIVE/EVN	AS
Marjan Timmer	ASTRON, ASTERICS	MT
Lian Tao	CAS, HXMT & Einstein Probe	LT
Rob van der Meer	ASTRON, ASTERICS	RvdM
Eva Verdugo	ESA, PLATO	EV
Joshua Wing	CfA Harvard, Chandra	JW

— Video connection —

Thomas Augusteijn[1]	NOT	TA
Dipankar Battacharya	AstroSat	DiB
Steven Bloemen	BlackGEM	SB
Catherine Boisson	VO	CB
Maria Teresa Botticella	ESO, ePESSTO	MTB
Enrico Bozzo	ISDC, SmartNet	EB
Domingos Barbosa	SKA	DoB
David Buckley	SALT	DaB
Antonio Cabrera	GTC	AC
Sean Carey	Spitzer	SC
Phil Charles	SmartNet, SALT	PhC
Eric Chassande-Mottin	LIGO/VIRGO	ECM
Mike Corcoran[1]	HEASARC	MC
Raffaele D'Abrusco	Chandra	RDA
Gary Davis	SKA	GD
Martin Dominik	Las Cumbres Observatory	MD
Tom Donaldson	JWST & WFIRST	TD
Janet Evans[1]	Chandra	JE
Daryl Haggart	LIGO/VIRGO, ASTERICS	DH
Jason Hessels	LOFAR	JH
Tim Jenness	LSST	TJ
Giorgo Matt	Roma, IXPE	GM
Alberto Micol	ESO	AM
Tatehiro Mihara	MAXI	TM
Emma de Ona Wilhelmi	Barcelona, CTA	EdOW
Nando Patat	ESO	NP
Stephen Potter	SAO, SALT	SP
Valério Ribeiro	SKA	VR
Jan Robrade	eROSITA	JR
René Rutten	Gemini-S	RR
Bernhard Schulz	SOFIA	BS
Peter Soerensen	NOT	PS
Andrew Stephens	Gemini North	AS
Belinda Wilkes	Chandra	BeW
Bill Workman	STSci, HST, JWST, WFIRST	BiW

[1] *joined after lunch*

1 Welcome, Agenda

JUN welcomed the many participants and teams, locally and remotely. Everybody agreed to recording the meeting and video session.

JUN introduced the idea, especially the distinction between *Services* and *Tools* or *Clients*. He noted that *users* of the Serices might be, e.g., robotic tools. Gave example of *mySpacCal* tool developed in past and parsing HTML pages, but which could not be maintained as mission pages changed all the time.

Everybody very briefly introduced themselves and their mission or network. JUN then gave an overview presentation of the different involved missions and teams, grouped by commonalities.

2 Technical presentation on services

AI presented the basics of the proposed standards and the draft documents. He has added everyone who sent comments as co-authors of these documents.

CB warned that IVOA approval is a long process. One may have to follow different processes if many large observatories are involved. AI stated that the procedure has started. He will be at next IVOA meeting. JS explained that a Technical Note will be presented, which is the path forward recommended by IVOA, hoping for a fast recommendation.

2.1 ObjVisSAP (Object Visibility Simple Access Protocol)

An extended discussion ensued on the proposed ObjVisSAP standard and the input and output parameters.

As a general comment, UL noted that returning visibility intervals for Gaia would be easy (scanning law), but in contrast the proposed ObsLocTAP would be very hard to implement due to billions of effective observations and the way the Gaia data is organised.

JK asked how a footprint is implemented. JS mentioned that a standard exists, as boundary described by a polygon. JK missed in this the frequent sensitivity fall-off towards the outer border or possibly a probability map. EK commented that it should be up to the individual observatories what exactly is delivered. JLC noted that one might need maps both for sensitivity and for angular resolution.

There was a discussion if visibility should be returned for a region instead of a point. After some deliberation, the majority opinion expressed was that implementing regions for visibility checks appeared too complicated to be worth the effort.

A further detailed discussion on the proposed ObjVisSAP (Object Visibility Simple Access Protocol) standard and its parameters ensued.

TD stated that the `t_min` and `t_max` parameters should be required, so their implementation is enforced and the services are more uniform. Queries without specific `t_min` and `t_max` could be handled on the client side by asking for a huge time interval.

MD found the use cases not sufficiently defined for the discussion and offered to provide a use case on follow up of micro-lensing events. Others echoed the lack of more use cases. MM emphasised the need for coordinated observations as described in publications by, e.g., SmartNet.

Defining visibility is not always trivial. BiW noted that for HST, due to complex operations, the actual visibility intervals cannot easily be given ahead of detailed planning. Visibility on a given day can be predicted long ahead, but not the precise time intervals. For VLBI instruments the effective visibility can depend on the science case (which configuration is required).

BS noted that the services so far seemed to be targeted at a first iteration for further coordination. MDT reminded about the short time available for coordination of sky transients.

The optional output parameters were discussed in some depth. A majority expressed that "filter parameters" like moon distance should be optional output parameters, where applicable, rather than input. A client could then filter easily as required. For ground observatories the service should return `min_elevation/max_elevation` and `min_moon_sep/max_moon_sep` for the visibility time intervals. The service should also return an energy range `em_min` and `em_max` for for each visibility time interval. In many cases this may be constant, but for some observatories this may vary. From radio observatories the possibility was raised to add "sensitivity", "frequency", "angular resolution" as output parameter(s). This needs to be clarified further.

UL noted that the exact time reference frame used in output parameters needs to be specified.

After a brief lunch break, TA, MC and JE joined the video discussion. JUN and PK summarised the morning session.

2.2 ObsLocTAP (Observation Locator Table Access Protocol)

AI went on to discuss the proposed ObsLocTAP (Observation Locator Table Access Protocol) standard. JS explained the basics of a TAP service. In general a better explanation of the service in the introduction of the document was requested. JUN remarked that XMM-Newton has coordinated observation now about every 2 days and mid-to-long term coordination might be helped by such a service. Others noted the use in refining coordination efforts as schedules of some observatories become visible this way. It was noted that planned JWST observations are already visible in ESASky.

A varied discussion ensued also about the parameters of this proposed standard.

Regarding the `t_min` and `t_max` parameters some observatories may schedule an observation, but not yet know the exact time. It was proposed to remove the "NOT NULL" constraint for these parameters. Another option would be to provide a best guess time range.

Some attendants would prefer to use `t_elapse` instead of `t_plan_exptime`, but no clear consensus arose.

The definition of the `category` parameter is not clear and might be hard to homogenise.

The question on how to track if a certain observation was actually successful was raised, but no conclusive answer was found.

Another discussion was around the proposed `priority` field, which several attendants noted did not really exist for their observatories or were sceptical about its implementation. CS emphasised that this should not only encode scientific priority, but also criticality – a given high value observation might be easy to shift for one observatory, while another, lower ranked one might be tightly constrained. TD shared the scepticism, bur concurred that it might be useful for some observatories and proposed a scale of: 0 (can be moved), 1 (interact to see what can be done), 2 (won't be moved) as possible values.

AM noted that they were using the VO ObsCore for scheduled observations and asked if this should not be used instead. JS explained that, e.g., the ESA archive only has ObsCore data for *archived* observations, while the ObsLocTAP service is also especially meant for planned, or executed, but not yet archived observations. In the balance he and others felt that a similar, but new standard was better suited, as certain fields have different meanings in the two standards. AI proposed to discuss this further in the upcoming IVOA meeting, this was agreed by others.

3 Implementation

JUN asked around the table – and the video participants – how observatory operators see they can implement the services and who would be ready to set up a prototype implementation of one or both VO services as further proof of concept. The responses below are in alphabetical order of the projects or institutions.

MDT	ALMA	Unsure, but ObjVisSAP seems trivial.
DiB	AstroSat	protocols look similar to what they already do, so should be possible. Multiple instruments onboard AstroSat will lead to multiple visibilities.
SB	BlackGEM	Has to look into it, does not see big issues.
PeC	CTA	Sees commonalities between ObsLocTAP and CTA plan. ObjVisSAP should not be an issue technically, but maybe for policy. CTA will have short/mid/long-term plan. They also plan to follow-up on VOEvent data.
JW	Chandra	The situation is similar to Swift and NuSTAR.
JR	eROSITA	Can predict survey path for ObjVisSAP. ObsLocTAP technically feasible. Hard to say if funding will be available. It maybe more difficult for Russian part, especially regarding short-term changes.
AM	ESO	Cannot say much at this stage, will touch base at IVOA meeting.
UL	Gaia	Visibility protocol should be easy to implement. Sceptical that ObsLocTAP makes sense for Gaia and it would be lots of work.
AS	Gemini-N	difficult to say, good goals. But changing software can take longer Redoing their software, so good moment to consider. Same for Gemini-S.
MC	HEASARC	HEASARC support VO protocols (incl. a visibility tool). Interested in keeping up-to-date.
BW	HST	The information is there, the question is implementation cost. Need to understand use cases better.
YH & LT	HXMT	Technically this looks good. Need to explore if there are other issues.
MK	JIVE	ObjVisSAP is a certain challenge, ObsLocTAP should be no big issue. But support for radio astronomy data in ObsCore is not great.
TD	JWST & WFIRST	Will need to justify effort. There may be synergies with archive development.
MD	Las Cumbres	Similar to BW & TD. Have capable s/w team, but they are busy.
ECM	LIGO/VIRGO	Needs to understand use case better. The proposed standards are rather for pointed instruments. Visibility for GW observatories is hard to calculate (angular resolution varies strongly across field. Can provide when detector is available, but what would people do with this information?
JH	LOFAR	Should be possible, and then also for SKA.
TJ	LSST	Very interested in implementing some of this. LSST will only tell fields 2 h ahead of plan, this could then be scheduled via ObsLocTAP.
JLC	MAGIC & VERITAS	Need to ask.
TM	MAXI	MAXI is a passively pointed instrument, daily sky map. Don't make prediction of tomorrow's sky. Providing Visibility is simple.
KF	NuSTAR	Same as for Swift.
MC	NICER	MC also on NICER SWG, interested in coordinating with NICER. ISS structure make visibility checks more difficult. Very supportive of effort.
PS	NOT	NOT operations are database centred, the standards should be technically feasible, but manpower remains a question. Policies may complicate issues.
LOR	PLATO	Too early to consider.
DaB	SAAO/SALT	Now putting in effort on transient follow-up, where these plans might fit in.
PhC	SALT consortium	SALT is 100% queue-scheduled, which should make implementing standards easier. See also the SmartNet white paper from a 2015 meeting in Leiden. A SALT post-doc put together tool to check X-ray schedules and then find SALT opportunities.

VR	SKA	Can't really comment on SKA (above paygrade). Want to learn early to start up well.
BS	SOFIA	Sees possibility for ObjVisSAP service, also connection to archive for ObsLocTAP. But harder for scheduled information as SOFIA is driven by flight conditions. They know flight dates ∼1 year ahead. Will have to see if it can be done (incl. budget).
SC	Spitzer	Providing information on archive side. For operational side need strong use cases, also as Spitzer is coming closer to the end. As a related question: Is there an option to maintain sustainable observing logs in VO?
TSP	Subaru	ObjVisSAP should be no issue. ObsLocTAP is technically clear, but policy might be an issue.
JK	Swift	ObsLocTAP is trivial, just new format for existing information. ObjVisSAP is harder to say, short-term easy, long-term more difficult.
CD	TMT	ObjVisSAP no problem. ObsLocTAP easy for executed observations (all data will go to archive immediately), but difficult for planned observations as the policy is *not* to provide this kind of information.

4 Demonstrations & Clients

ES and AI briefly presented the existing service prototypes for INTEGRAL and XMM-Newton. JW noted that one needs clients to make the effort really worthwhile, a chicken and egg problem. MM remarked that M. Cotts (SALT) might do a prototype client, possibly up to the IVOA meeting. DB mentioned a possibly visualisation in ESASky. Some more discussion about clients followed.

RS and AI presented the development of SciApp, a framework for observing campaigns on transient events that would also interface with the proposed standards.

5 Next steps

The first goal is to achieve an IVOA recommendation. JS noted that two reference implementations are required, more would be better. Ideally, from different groups. TD stated that client and service implementations will be needed. Early adopters may have to iterate and repeat effort.

AS stated that they will start as soon as funding is obtained (early 2019). JW & JE need to understand details better before being able to commit for Chandra. UL will look into implementing ObjVisSAP for Gaia. KF could provide example service for NuSTAR, very similar to XMM-Newton, INTEGRAL. DB will consider a reference implementation for SALT. TA has no manpower to implement this currently. For Gemini, such an effort has to fit in rework of planning software – pressure for such efforts should come from users, not observatories.

DH proposed to set up common repository for use cases, since examples may help spark ideas for others, and still during the meeting set up a Google folder.

JUN noted that one seems to need both uses cases to motivate development and prototypes to help devise the use cases.

6 Publication

JUN described plans for a refereed publication, led by AI, to describe the background and give an overview of the standards. No comments.