

Observation Facilities in the VO

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Available Lists

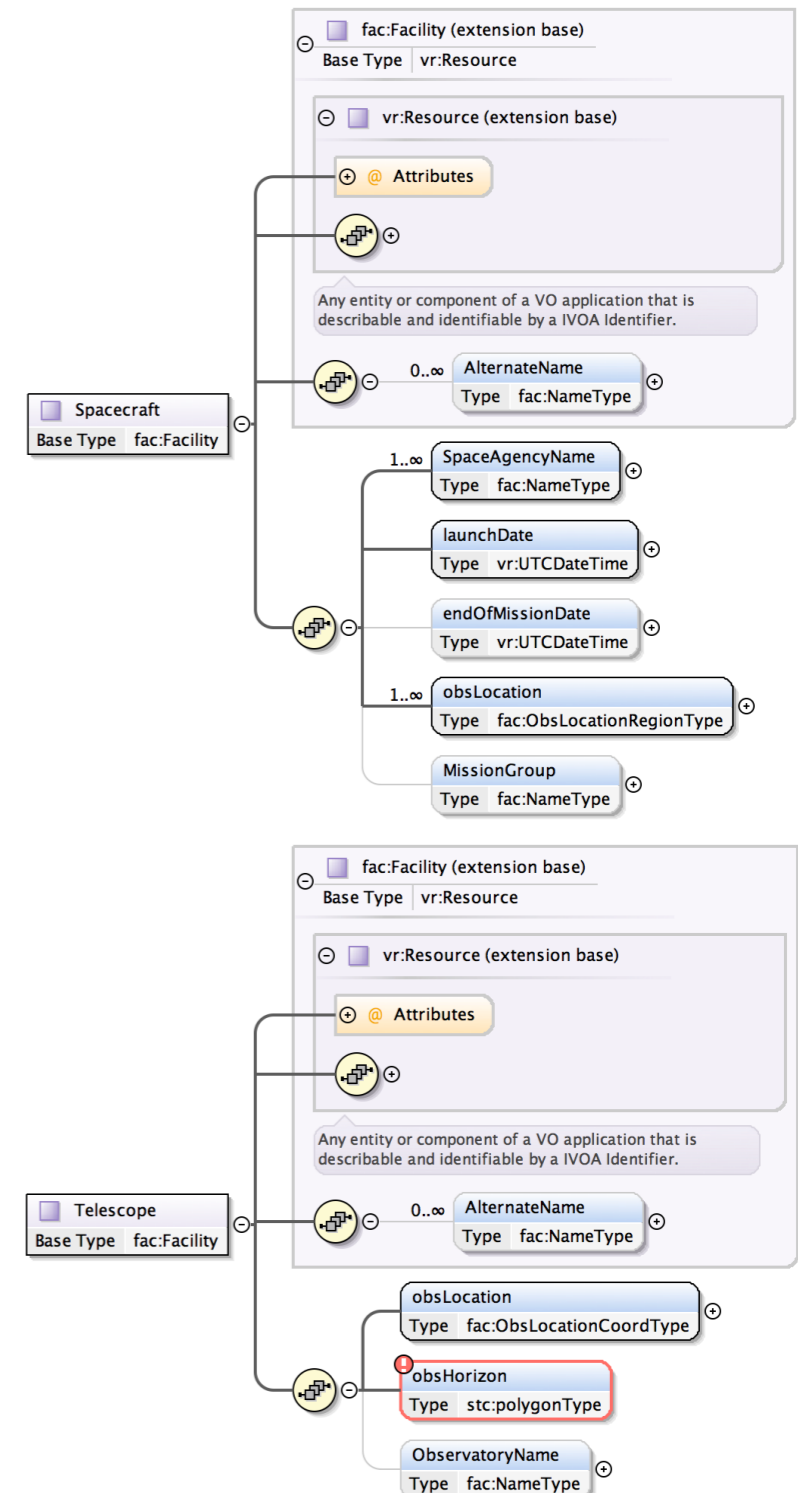
| List | Facility Type | number of Records |
|-------------|----------------|-------------------|
| NSSDC | space | 7203 |
| NASA/NAIF | space | 196 |
| NASA/PDS | space | 50+ |
| SPASE | space + ground | 215 |
| SANA | space | 1053 |
| AAS | ground | 417 |
| Harvard/ADS | ground | 257 |
| IRAF | ground | 58 |
| IAU/MPC | ground | 1864 |
| Xephem | ground | 461 |
| WMO/Oscar | space | 683 |

VOFacility

as an extension of VOResource

- Extension of VOResource with addition of:


```
<alternateName> + "namingAuthority" attribute
<title>Cassini</title>
<alternateName>CASSINI</alternateName>
<alternateName>Cassini Orbiter</alternateName>
<alternateName namingAuthority="naif">-82</alternateName>
<alternateName namingAuthority="nssdc">1997-061A</alternateName>
<alternateName namingAuthority="pds">co</alternateName>
```
- **Spacecraft** = extension of Facility with:
 - + LaunchDate + EndOfMissionDate
 - + SpaceAgencyName + MissionGroup +
 - + ObsLocation [ObsRegion + TimeInterval [StartTime + StopTime]]
- **Telescope** = extension of Facility with:
 - + ObservatoryName
 - + ObsLocation [long,lat,alt]
 - + ObsHorizon [polygon]
- Next: Add Instruments with references to Facilities.
- Next-next:FieldAnalog, Laboratory Experiment and Numerical Experiment



Current Work Plan

There are several objectives to this action:

- Create a **name resolver** for observation facilities (ground based observatories and space missions)
- Promote a **standard nomenclature** for Observation Facilities
- There are several lists of observation facilities and a need to be able to search for observation facilities, whatever alias is used. This means: being able to link those lists.
- Help **observation planning** with provision of sky horizon elevations at each Observatory
- Related to that: find a way to generate automatically horizon from google API, or GIS ? Then users can edit it for fine tuning buildings etc. Maybe use something like the footprint editor?
http://aladin.u-strasbg.fr/footprint_editor/
- Set up a database for **amateur astronomer** observatories
- **Extend the EPN-TAP core** data model in order to be able to include observatories and **share the 'matrix of observatories' (<http://iwf.oeaw.ac.at/matrix/>) database via EPN-TAP**. The basis for the data model additions will be provided by VOFacility and VOResource definitions.

Inventory

- <https://voparis-confluence.obspm.fr/display/VES/Existing+List+of+Observatories+and+Spacecraft>
- Austrian team started to cross-match all identified lists. Result to be used in their “Observatory Matrix”

```
{ "nssdc:2004-023A": { "alternateName": [ { "namingAuthority": "nssdc", "name": "Navstar 55", "id": "2004-023A" } ], "facilityType": "spacecraft", "referenceURL": [ { "url": "http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=2004-023A", "title": "NSSDC catalog entry" } ], "launchDate": "2004-06-23" }, "nssdc:1973-105A": { "alternateName": [ { "namingAuthority": "nssdc", "name": "Cosmos 625", "id": "1973-105A" } ], "facilityType": "spacecraft", "referenceURL": [ { "url": "http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=1973-105A", "title": "NSSDC catalog entry" } ], "launchDate": "1973-12-21" }, "nssdc:1967-023A": { "alternateName": [ { "namingAuthority": "nssdc", "name": "Cosmos 148", "id": "1967-023A" } ], "facilityType": "spacecraft", "referenceURL": [ { "url": "http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=1967-023A", "title": "NSSDC catalog entry" } ], "launchDate": "1967-03-16" }, "xephem:Lick Observatory (36-inch)": { "alternateName": [ { "namingAuthority": "xephem", "name": "Lick Observatory (36-inch)" } ], "facilityType": "observatory", "location": { "coordinates": { "lat": 37.33333333333336, "alt": 1290.0, "lon": 121.65 } }, "nssdc:1977-001A": { "alternateName": [ { "namingAuthority": "nssdc", "name": "Cosmos 888", "id": "1977-001A" } ], "facilityType": "spacecraft", "referenceURL": [ { "url": "http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=1977-001A", "title": "NSSDC catalog entry" } ], "launchDate": "1977-01-06" }, "nssdc:1977-054A": { "alternateName": [ { "namingAuthority": "nssdc", "name": "Molniya 1-37", "id": "1977-054A" } ], "facilityType": "spacecraft", "referenceURL": [ { "url": "http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=1977-054A", "title": "NSSDC catalog entry" } ], "launchDate": "1977-06-24" }, "xephem:Kenosha": { "alternateName": [ { "namingAuthority": "xephem", "name": "Kenosha" } ], "facilityType": "observatory", "location": { "country": "Wisconsin", "coordinates": { "lat": 42.59527777777778, "alt": 185.9, "lon": 87.83638888888889 } }, "nssdc:1981-003A": { "alternateName": [ { "namingAuthority": "nssdc", "name": "Cosmos 1238", "id": "1981-003A" } ], "facilityType": "spacecraft", "referenceURL": [ { "url": "http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=1981-003A", "title": "NSSDC catalog entry" } ], "launchDate": "1981-01-16" }, "iau-mpc:106": { "alternateName": [ { "namingAuthority": "iau-mpc", "id": "106", "name": "Crni Vrh" } ], "facilityType": "observatory", "location": { "coordinates": { "cos": 0.69662, "lon": 14.0711, "sin": 0.71519 } }, "iau-mpc:107": { "alternateName": [ { "namingAuthority": "iau-mpc", "id": "107", "name": "Cavezzo" } ], "facilityType": "observatory", "location": { "coordinates": { "cos": 0.70998, "lon": 11.003, "sin": 0.70186 } }, "iau-mpc:104": { "alternateName": [ { "namingAuthority": "iau-mpc", "id": "104", "name": "San Marcello Pistoiese" } ], "facilityType": "observatory", "location": { "coordinates": { "cos": 0.71985, "lon": 10.8042, "sin": 0.69202 } }, "nssdc:1972-018A": { "alternateName": [ { "namingAuthority": "nssdc", "name": "DMSP 5B/F2", "id": "1972-018A" } ], "facilityType": "spacecraft", "referenceURL": [ { "url": "http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=1972-018A", "title": "NSSDC catalog entry" } ], "launchDate": "1972-03-24" }, "iau-mpc:103": { "alternateName": [ { "namingAuthority": "iau-mpc", "id": "103", "name": "Ljubljana" } ], "facilityType": "observatory", "location": { "coordinates": { "cos": 0.694, "lon": 14.47, "sin": 0.715 } }, "iau-mpc:100": { "alternateName": [ { "namingAuthority": "iau-mpc", "id": "100", "name": "Ahtari" } ], "facilityType": "observatory", "location": { "coordinates": { "cos": 0.462, "lon": 24.13, "sin": 0.884 } }, "iau-mpc:101": { "alternateName": [ { "namingAuthority": "iau-mpc", "id": "101", "name": "Kharkov" } ], "facilityType": "observatory", "location": { "coordinates": { "cos": 0.64403, "lon": 36.2322, "sin": 0.76246 } }, "nssdc:1976-028A": { "alternateName": [ { "namingAuthority": "nssdc", "name": "Cosmos 810", "id": "1976-028A" } ], "facilityType": "spacecraft", "referenceURL": [ { "url": "http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=1976-028A", "title": "NSSDC catalog entry" } ], "launchDate": "1976-03-26" },
```

Resolver at IMCCE: Quaero

- Same name resolver as SSoDNet, using a rest interface.

- Some data already included:

<https://api.ssodnet.imcce.fr/quaero/1/sso/ACE>

Result:

```
{"class":["Orbiter","Payload","Operational"],  
"updated":"2017-05-09","name":"ACE","aliases":  
["1997-045A","24912","ADVANCED COMPOSITION  
EXPLORER"],"parent":"Sun","system":"Sun","id":"ACE",  
"ephemeris":false,"type":"Spacecraft"}
```

PDS4-Information Model

- OAIS serialization for NASA/PDS (Planetary Data System)
- Information Model includes description of instrument hosts and instruments

| | Entity | Card | Value/Class | Ind |
|------------------------------|--|------|---|-----|
| Hierarchy | Tagged_NonDigital_Child | | | |
| | . Observing_System_Component | | | |
| Subclass | none | | | |
| Attribute | description | 0..1 | | |
| | name | 1 | | |
| | type | 1 | Airborne | |
| | | | Aircraft | |
| | | | Artificial Illumination | |
| | | | Balloon | |
| | | | Facility | |
| | | | Instrument | |
| | | | Laboratory | |
| | | | Literature Search | |
| | | | Naked Eye | |
| | | | Observatory | |
| | | | Spacecraft | |
| | | | Suborbital Rocket | |
| | | | Telescope | |
| Inherited Attribute | none | | | |
| Association | external_reference | 0..* | External Reference | |
| | internal_reference | 0..1 | Internal Reference | |
| Inherited Association | none | | | |
| Referenced from | Observing_System | | | |

| | Entity | Card | Value/Class | Ind |
|------------------------------|--|------|--|-----|
| Hierarchy | Tagged_NonDigital_Object | | | |
| | . TND0_Context | | | |
| | . . Investigation | | | |
| Subclass | none | | | |
| Attribute | description | 1 | | |
| | name | 0..1 | | |
| | start_date | 1 | | |
| | stop_date | 1 | | |
| | type | 1 | Individual Investigation | |
| | | | Mission | |
| | | | Observing Campaign | |
| | | | Other Investigation | |
| Inherited Attribute | none | | | |
| Association | data_object | 1 | Conceptual Object | |
| Inherited Association | none | | | |
| Referenced from | Product_Context | | | |

| | Entity | Card | Value/Class | Ind |
|------------------------------|---|----------------------------|---------------------------------|-----|
| Hierarchy | Tagged_NonDigital_Object | | | |
| | . TND0_Context | | | |
| | . . Instrument_Host | | | |
| Subclass | none | | | |
| Attribute | description | 1 | | |
| | instrument_host_version_id *Deprecated* | 0..1 | | |
| | naif_host_id | 0..1 | | |
| | name | 0..1 | | |
| | serial_number | 0..1 | | |
| | type | 1 | Earth Based | |
| | | | Earth-based | |
| | | | Lander | |
| | | Rover | | |
| | | Spacecraft | | |
| | version_id *Deprecated* | 0..1 | | |
| Inherited Attribute | none | | | |
| Association | data_object | 1 | Physical Object | |
| Inherited Association | none | | | |
| Referenced from | Product_Context | | | |