Facilities and Instruments in the IVOA Registry and Resources

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** Virtual European Solar and Planetary Access*

Context

- The VESPA group has developed EPN-TAP, a protocol similar to ObsTAP for solar system and planetary observational data.

- In the description, the facility and instrument are part of the observations metadata.

- Databases or archives may have different names for facilities or instruments

- There is a need for a reference list for such objects and the registry is probably the right place to store it.

IPDA/IVOA interaction

- Other contextual aspect: IPDA is proposing to build a planetary facility and instrument list, in collaboration with other communities (such as IVOA, SPASE, IAU…)

- Proposed plan:
  - IPDA (and planetary data partners) to provide a reference list of planetary space missions and instruments.
  - SPASE (and other heliophysics partners) to provide a reference list of heliophysics missions and instruments.
  - IVOA (and other astrophysics partners) to provide a reference list of astrophysics facility and instruments (with planetary observations in our case, but not only)
  - Other partners (Europlanet and IMPEx, for instance) can start the list of models, simulations, field analogs

Facility

- There are several observation facility types:
  - Ground based observatory — *CFHT, CTA, LOFAR…*
  - Space mission — *Cassini, HST, XMM, Opportunity…*
  *- **Laboratory Experiment** — Ice spectroscopy…*
  *- **Field Analog** — Island, Sahara…*
  *- **Simulation** — Atmospheric Global Circulation Model of Mars, Venus or Titan; MHD modeling of the jovian magnetosphere…*

- It can be described as an extension of “VOResource”

- A facility contains instruments. It has location, which may depend on time.

Instrument

- An instrument belongs to a facility

- There are many types of instruments (*imager, spectrometer, spectro-imager, coronograph, magnetometer, radio receiver, particle analyzer…*). Such lists already exist and have to be checked and compiled.

- An instrument has an observation coverage (*time range, spectral range, resolution, field of view…)*, observational parameters (UCDs?)

- It can be described as an extension of “VOResource”.

Spacecraft listing

- **NSSDC/COSPAR** list = 7203 spacecraft **[www]**
  Fields*: ID, name, launch date, description URL*
  NB*: alternate names and* ***instruments*** *in desc. URL*

- **NASA/NAIF** list = 196 spacecraft **[txt]**
  Fields*: ID, name*
  NB*: contains synonyms;* ***instruments*** *can be retrieved*

- **CCSDS/SANA** list = 1053 spacecraft **[xml]**
  Fields*: ID, name, requestor, creation date, version, status, communication channel*

- ***Wikipedia****: TBD* **[www]**

Ground Obs. listing

- **IAU/MPC** list: 1864 items **[txt]**
  Fields*: code, longitude, cos, sin, name*
  NB1*: contains some spacecraft*
  NB2*: does not contain any radio telescopes*

- **NASA/NAIF** list: 35 items **[txt]**
  Fields*: code, name*
  NB*: Deep Space Network radio stations*

- ***Wikipedia****: TBD* ***[www]***

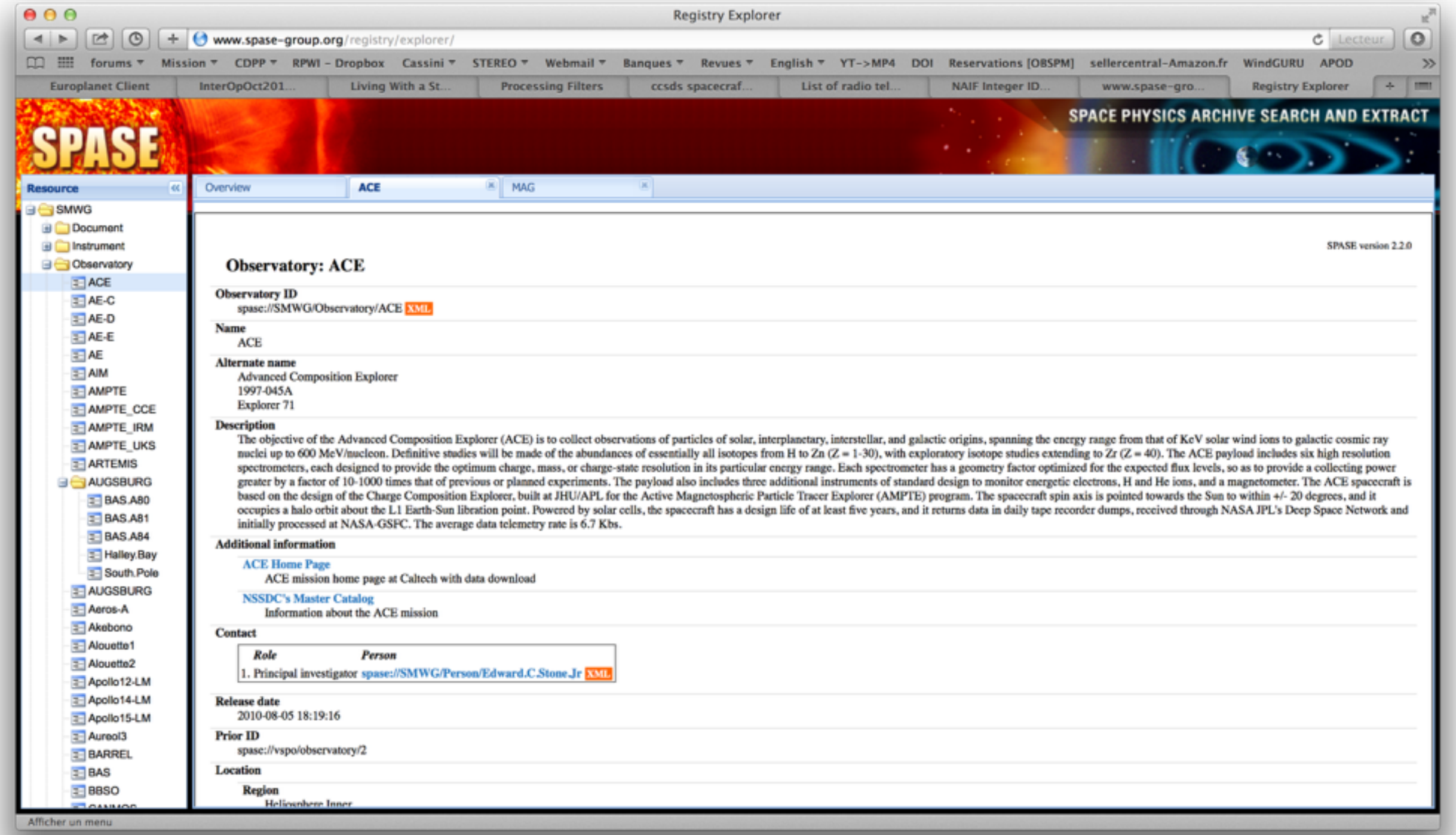
Space Physics Listing

- **SPASE/SMWG Registry**: 1781 Observatories **[xml]**
  Fields*: id, name, alternate name, description, contact, location*
  NB*: contains spacecrafts and ground observatories (including ground magnetometers)*

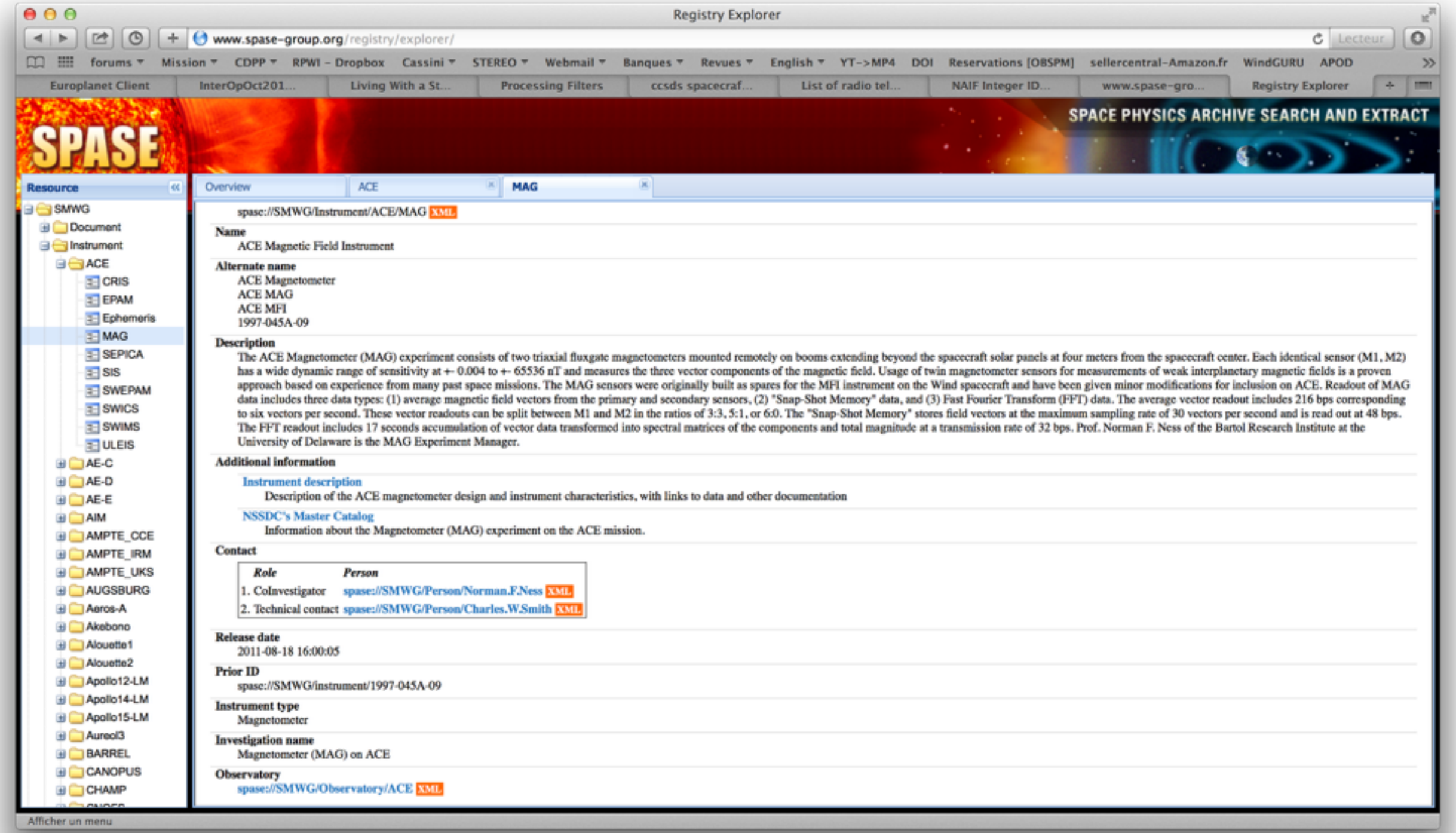
- **SPASE/SMWG Registry**: 2325 Instruments **[xml]**
  Fields*: id, name, alternate name, description, contact, location, instrument type, investigation name, observatory*

NB: SPASE = Space Physics Archive Search and Extract
SMWG = SPASE Metadata Working Group

Example of Observatory in the SPASE Registry



Example of Instrument in the SPASE Registry



putative VOFacility

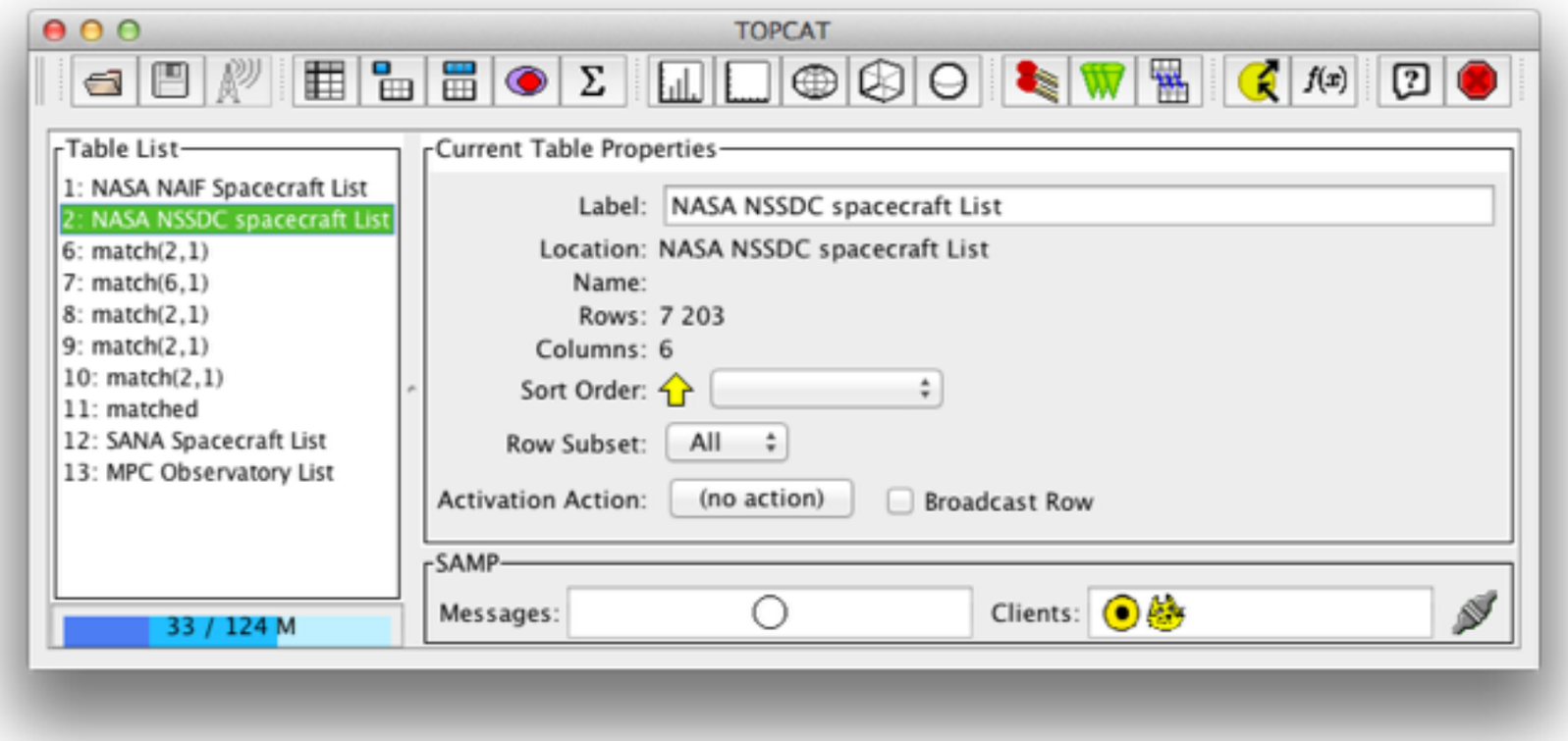
- Extension of VOResource with:
  - [0…∞] AlternateName + “origin” attribute
  - Location (region/target + coordinates)
  - Class (predefined list: Spacecraft/GroundObs…)
  - List of instruments (list of ivo-id)

putative VOInstrument

- Extension of VOResource with:
  - [0…∞] AlternateName + “origin” attribute
  - Instrument type (predefined list TDB)
  - Hosting Facility: ivo-id
  - Coverage:
    - temporal
    - spectral *(bounds instead of band)*
    - *…*
  - Measured parameter ucd (phot.flux, phys.magfield, phys.particle…)

First steps

- Build reference list, compiling various sources into VOTables
  NB: done for NSSDC/COSPAR, NASA/NAIF, CCSDS/SANA & IAU/MPC
- Cross-match lists (*ongoing*) and propose a preliminary reference list



Further Steps (1)

- Work with Semantics on observational parameter ucd listing and other semantic related topics

- Work with DCP for reference list consolidation

- Work with Registry to build up VOFacility and VOInstrument as extensions of VOResource

- Work with SPASE to cross-link IVOA and SPASE registries for instruments and observatories (to avoid duplicated entries). Discuss also with NASA/PDS4 registry team.

Further Steps (2)

- Check with IPDA, IAU and other organization if anything is missing.
- Joint endorsement of reference list by IVOA/IPDA/SPASE/IAU
- Build a name resolver using this reference list

NB: First version will contain only Spacecraft and Ground Observatories.