

# Metadata for VO use of interferometry data

Anita Richards (JBO, AstroGrid) et al.

- End Users: Any astronomers (from PIs to grad students)
  - Consistent processing path implicit in B2E/E2E models, SDM
- Data products – user view
  - Any available, for downloading/off-line processing
  - Products which other VO tools understand in workflow e.g.
    - Feed image to source extractor, construct radio-to-X-ray SED
    - Feed spectrum to SLAP (line ID package)
- Data products – archive view
  - Data characterisation – metadata – observing log
  - Quick-look/static products
  - Products from remote-user-steered/VO triggered pipelines
  - Use test data for access tests too
- Data products – VO view
  - Get minimum essential descriptions tested on users

# Data products – VO view

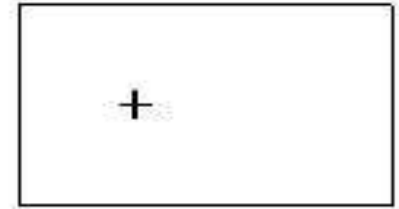
- See [www.ivoa.net/Documents](http://www.ivoa.net/Documents)
- NG interferometry metadata in database/xml
  - (not generated by direct search of FITS headers by VO)
- Registry – broad overview of data
  - Find if region (in any/all dimensions) *might* be available
    - Problems – different coverage in space, wavelength, time...
  - Self-assessed 1-2-3 quality; VO-assessed metadata quality
  - Restrictions on volume and availability
    - VO authentication should be possible in a year or so
- Observation/Characterisation/Spectrum etc. models
  - Describe data for selection and for workflow tools
  - Terms useful to users e.g. sky resolution not just baselines
  - Eventually algorithms e.g. f.o.v. dependance on  $\delta v$ ,  $t_{\text{int}}$ 
    - Possible issues: sub-bands in different configurations
    - Different minimum time resolution for imaging v. light curve ...etc.

# Heirarchical Coverage model



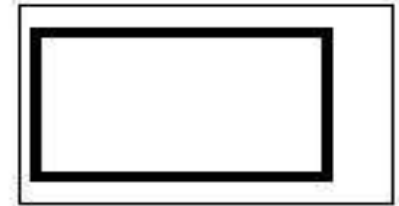
Location

**MUST**



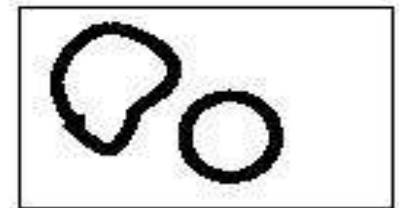
Bounds

Bounds



Support

**SHOULD**

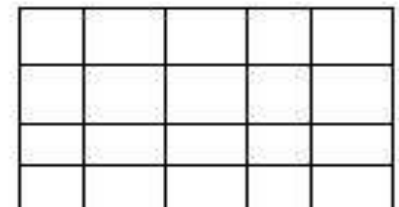


Sensitivity

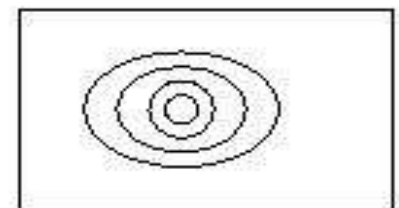
**MAY**



Sampling



Resolution



Outline



- xsd:schema "urn:vo-characterization"
  - xsd:complexType "CharacterisationType"
    - xsd:element "axisFrame"
    - xsd:element "coverage"
    - xsd:element "resolution"
    - xsd:element "location"
    - xsd:element "bounds"
    - xsd:element "support"
    - xsd:element "sensitivity"
  - xsd:complexType "CoverageType"
    - xsd:sequence
      - xsd:element "unit"
      - xsd:element "coordsystem"
      - xsd:element "location"
      - xsd:element "bounds"
      - xsd:element "support"
      - xsd:element "sensitivity"
  - xsd:complexType "LocationType"
    - xsd:sequence
      - xsd:element "coord"
  - xsd:complexType "BoundsType"
    - xsd:sequence
      - xsd:element "llimits"
  - xsd:complexType "SupportType"
    - xsd:sequence
      - xsd:element "Area"
      - xsd:element "AreaType"
  - xsd:complexType "SensitivityType"
    - xsd:sequence
      - xsd:element "variationMap"

Must have at least one  
Most data should have  
at least 3 STC axes  
plus observable (flux)

For each axis frame;  
apply to all elements  
unless redefined

Must give at least one  
(sometimes both)

Should give (unless =  
Bounds)

May give



- xsd:complexType "SamplingPrecisionType"
    - xsd:sequence
      - xsd:element "samplingPrecisionRefVal"
      - xsd:element "samplingPrecisionBounds"
      - xsd:element "samplingPrecisionSupport"
      - xsd:element "samplingPrecisionVariability"

May give – but if so:

- xsd:complexType "SamplingPrecisionRefValType"
    - xsd:element "samplingPeriod"
    - xsd:element "sampleExtent"

Must  
Should

- xsd:complexType "ResolutionType"
    - xsd:sequence
      - xsd:element "resolutionRefVal"
      - xsd:element "resolutionBounds"
      - xsd:element "resolutionSupport"
      - xsd:element "resolutionVariability"

May give – but if so:  
Must  
Should

- xsd:complexType "AccuracyType"
    - xsd:sequence
      - xsd:element "quality"
      - xsd:element "statError"
      - xsd:element "sysError"

Should give – and if so:  
Should

- xsd:complexType "ErrorType"
    - xsd:sequence
      - xsd:element "flavor"
      - xsd:element "cha:ErrorRefVal"
      - xsd:element "ErrorBounds"
      - xsd:element "ErrorVariability"

Must

# Visibility data for potential products

General	Spatial	Temporal	Spectral	Observable
frame/units	ICRF, deg	MJD	MHz	Jy/beam
Location	13.123456 +55.987654	50613.5	1658	0.001
Bounds	12.92, +55.58 13.32, +56.38	50613.0 50614.0	1650 1665	0.0002 0.5 (or function)
Support	13.123456 +55.987654 0.4	(on-source scan listing URL)	1650 1665	undef
Sensitivity	$f$ (support, 1ary beam)	undef	(bandpass LUT URL)	1
Filling Factor	1	0.7	0.93	undef
Resolution	0".2 2".0 0".2 2".0	5 m	1000 kHz	50 100 $\mu$ Jy/beam
Sampling	0".04 0".0625 0".04 0".0625	16 s	1000 kHz	undef

# Current VO metadata harvesting

- Data providers fill in Registry templates
  - Clunky, automation works poorly, manual entries rudimentary
- Existing tools (MeXx, DALIngestor) work on FITS
  - Will ALMA/EVLA/e-MERLIN use DB? XML?
- How do metadata map to Characterisation elements?
  - Unambiguously: e.g. Location = POS\_EQ\_RA\_MAIN or CRVAL1
  - Conversion formulae needed: e.g. Bounds =  $f(v, \text{aperture} \dots)$
  - Separate information: e.g. instrument log (on- or off-line)
- How should VOs retrieve metadata?
  - Trial XML templates or forms
  - Form to provide mappings common to large collection
  - Heuristics/manual tweaking (if safe from overwriting)

*thought: will engineering information be useful to a different community?*

# AstroGrid/RadioNet workshop

- ◆ Radio data management (1400 5 Dec – 1600 8 Dec)
- ◆ Workshop for data providers/large surveys etc.
  - Data flow using archives and pipelines
    - ◆ ParseITongue, Common Proposal Tool etc.
  - Data delivery
    - ◆ Publishing data to VOs
    - ◆ Use and development of relevant VO tools
- ◆ Science use (0900 4 Dec – 1300 5 Dec)

**Oxford w/c 4 December 2006**

**radiovo@jb.man.ac.uk [www.radionet-eu.org/events.php](http://www.radionet-eu.org/events.php)**