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Data Reduction and Modeling Access to Raw and Processed Data

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Raw Data Access

- **How much do we as clients want, now and ultimately?**
  - Multi-TB datasets
    - bandwidth, storage, processing power, etc.
    - Server side processing versus home institutions

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Raw Data Access Search Parameters

- **Astronomical**
  - target position, frequency, time, polarization
- **Programmatic**
  - Proposal ID, Title, Applicant names
- **Environmental**
  - Tamb, humidity, etc.
- **Instrumental**
  - ???
- **Quality**
  - ???

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Processed Data Access

- **Processing ideally removes instrumental, environmental signatures**
  - How much to preserve in processed products
- **Instrumental configuration often ambiguous**
  - “any matching X” versus “all matching X”
- **Identify related files**
  - Derived from raw data
  - Derived immediately from (e.g. catalogs from images)
  - Siblings (e.g. line catalog, point source catalog, clump catalog)

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Access Interface

- **Web site**
  - Easy to use + understand (if well-designed)
  - Adequate for 95% of users (proposal_id + UT date)
  - Inflexible and hard to maintain (power users unhappy)
- **TAP server**
  - SQL-like interface
    - obscore + ALMA-specific parameters
  - Very flexible (power users happy)
  - Allows large, long-running queries
  - Learning-curve for SQL (minimized by not requiring joins)

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Sample TAP Query

```
SELECT Observation.collectionID AS "Collection ID",
    Observation.telescope_name AS Telescope,
    Observation.instrument_name AS Instrument,
    Plane.dataProductType AS "Data Product Type",
    Observation.target_name AS Target,
    COORD1(CENTROID(Plane.position_bounds)) AS RA,
    COORD2(CENTROID(Plane.position_bounds)) AS DEC
FROM caom.Observation AS Observation
    JOIN caom.Plane AS Plane
        ON Observation.obsID = Plane.obsID
WHERE  Observation.collection = "BLAST"
    AND Observation.target_name = "BLAST"
```

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User-Processed Data

-
- **Experienced users almost always better than pipelines**
- **Quality control/certification**
  - key projects/surveys versus joe astronomer?
  - security against malicious users
    - server-side data products versus externally generated
- **Linking to journal articles**
  - Normally long after products are generated and archived

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Advanced Imaging with Custom Models

- **Moving target against sidereal background**
  - Often useful for solar system studies
  - Point, multiple or compact targets
- **Fitting externally generated models**
  - e.g. outflow simulations, stellar dust rings
  - scale, translate, rotate in 3-D
  - arbitrary parameters
  - interface to external modeling software (e.g. mathematica)
    - Server-side versus client processing again

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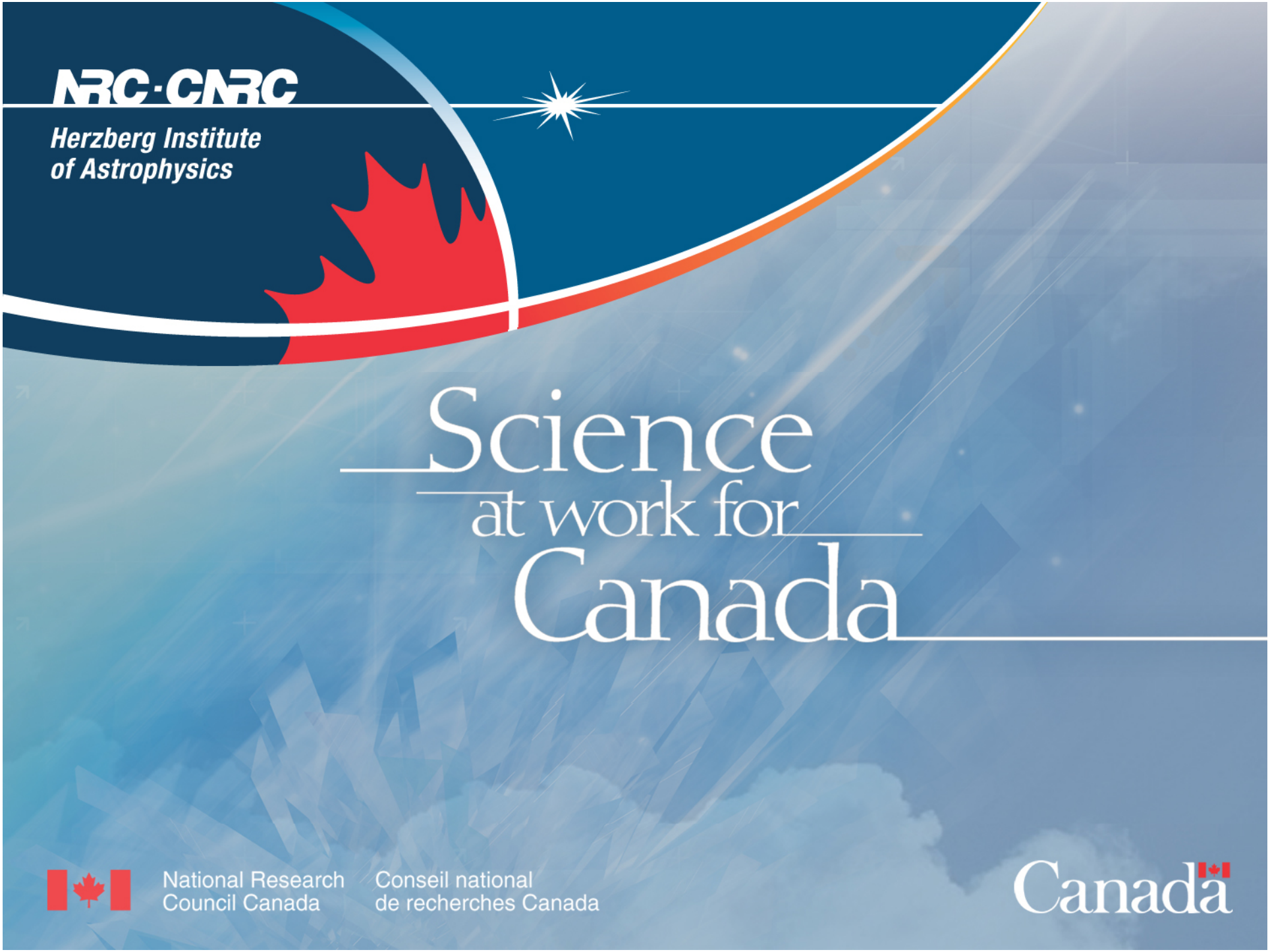
Modeling-Related Issues

- **Parallel / cloud processing**
  - Processing speed
  - Explore parameter spaces, confidence intervals
  - Client clouds or ALMA-certified clouds?

- **Library of basic models?**
  - shock fronts
  - jet/outflow models
  - Moving point sources (possibly multiple)
  - Others????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