Service Oriented Atmospheric Radiances (SOAR)

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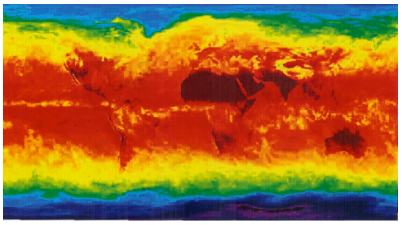
Background

- NASA and NOAA have large data holdings from many temperature and moisture sounding instruments over long time periods
- Atmospheric radiance data products are at different resolutions and temporal frequencies, and are stored in different formats



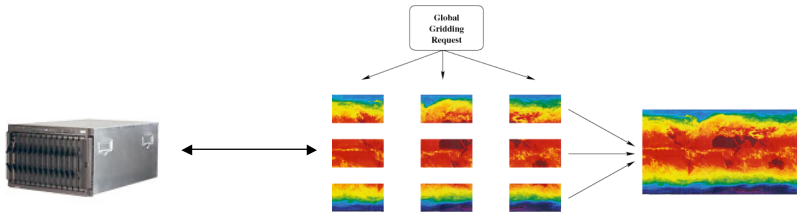
- The data transformations such as gridding, sampling, subsetting, convolving, etc. needed to produce comparable data sets from diverse atmospheric radiances needed for multiple instrument analyses in a scientifically valid manner are complex

Web Services

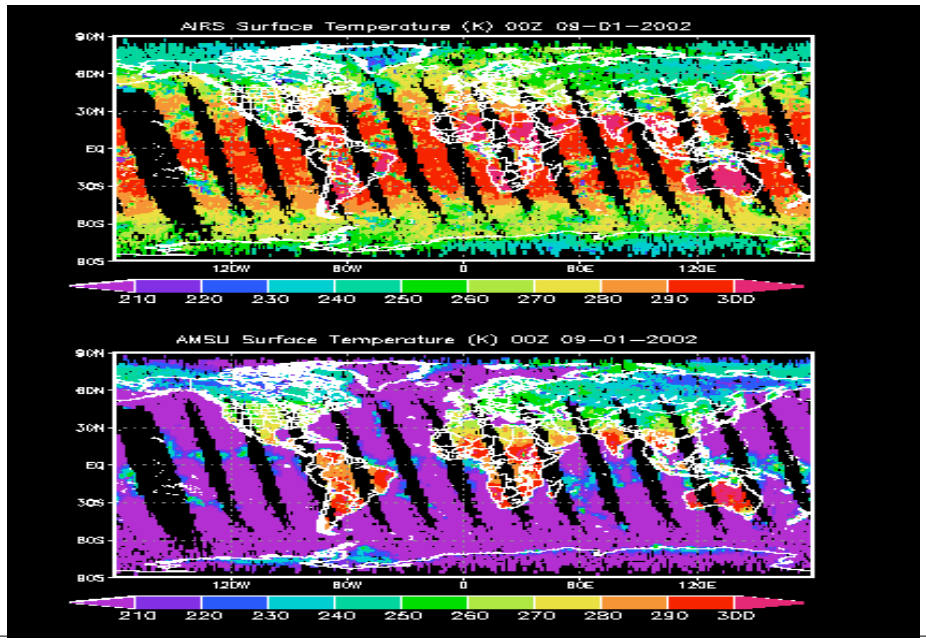
- SOAR is a scalable web service tool that will provide complex gridding services on-demand for atmospheric radiance data sets from multiple temperature and moisture sounding sensors
- Multiple Inputs
  - Human input through a WWW GUI
  - Direct machine interface as a Web Service for other value added applications
- Server will queue requests for a variety of complex science data services in a database tracking the various requested workflows

SOAR

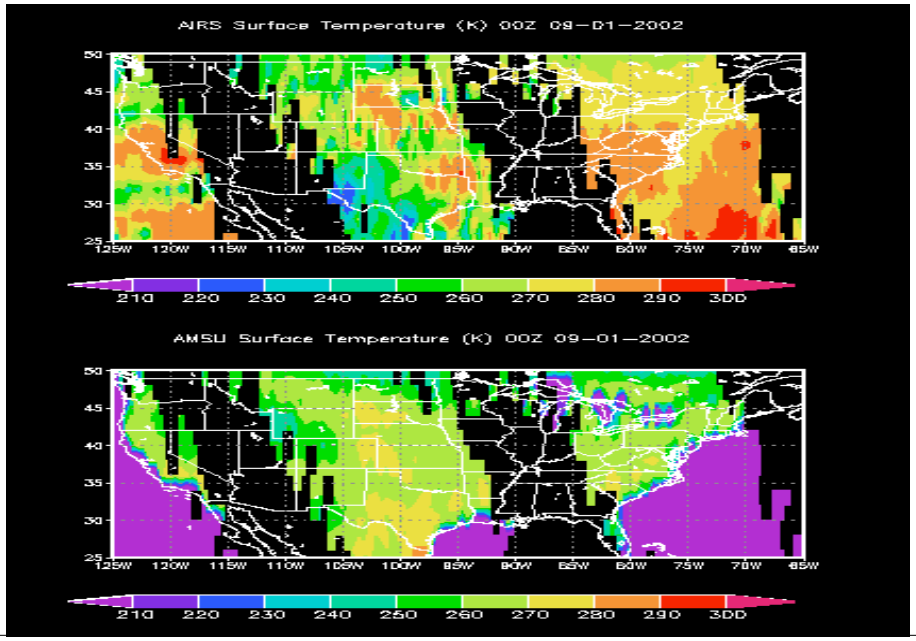
- Processing engine works through queued requests:
  - Query metadata database to determine the appropriate inputs needed to satisfy the request
  - Obtain files dynamically from online archives, local or remote
  - Divide each processing job into granules as appropriate
  - Allocate the components of the job in parallel to the compute cluster for processing
  - Combine processed granules as needed
  - Notify User when requested processed data files are available



AIRS/AMSU Global Temperature

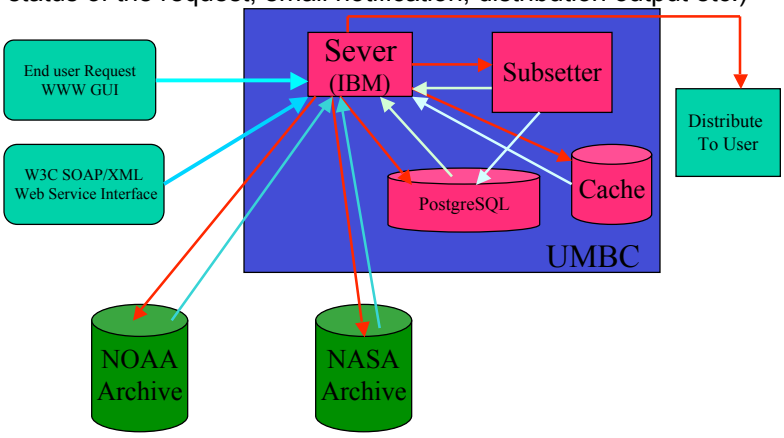


AIRS/AMSU US Surface Temperature



Database

- PostgreSQL will be used in this project.
- Metadata and transaction records will be stored in the database (user profile, instrument info, data location, descriptor file, the status of the request, email notification, distribution output etc.)



Data Networks, UMBC to NASA

- A high-speed (1 Gbps) network between UMBC and NASA will connect the demonstration server on the UMBC IBM BladeCenter cluster to a smaller IBM cluster at NASA GSFC
- This will enable high speed access to data from EOSDIS, NASA's Earth Observing System Data and Information System Project, including MODIS (Moderate Resolution Imaging Spectrometer) and OMI (Ozone Monitoring Instrument) data
- The two clusters will be used to demonstrate client server web services capabilities.

- Will perform complex services that are challenging to implement independently
- Arbitrary spatial/temporal/spectral subsetting and gridding
- Concatenation and Convolutions
- Examples:
  - spatial-temporal radiance averaging accounting for the field of view instrument response function, first footprint in grid bin, selecting min/max brightness temperatures within a grid element, ratios of channels, filtering, convolving high resolution spectral radiances to match broader band spectral radiances, limb adjustments, calculating variances of radiances falling in the grid box and creating visual displays of these fields.
- Modular and extensible, so we can add plugin support for more services building on a common framework