A Generalized Pipeline for Creating & Serving High-Resolution Satellite Imagery

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Agenda

- Goal/purpose
- Details of current pipeline
- Known limitations (a sampling!)
- Additional processing considerations
- Future plans
- Random ending thoughts

(Lofty) Goal

- Cultivate a single pipeline that can efficiently satisfy the majority of imaging requests by PO.DAAC users

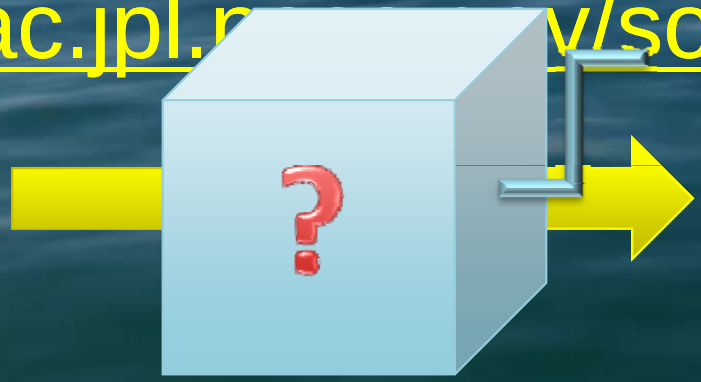
Current System: State of the Oceans

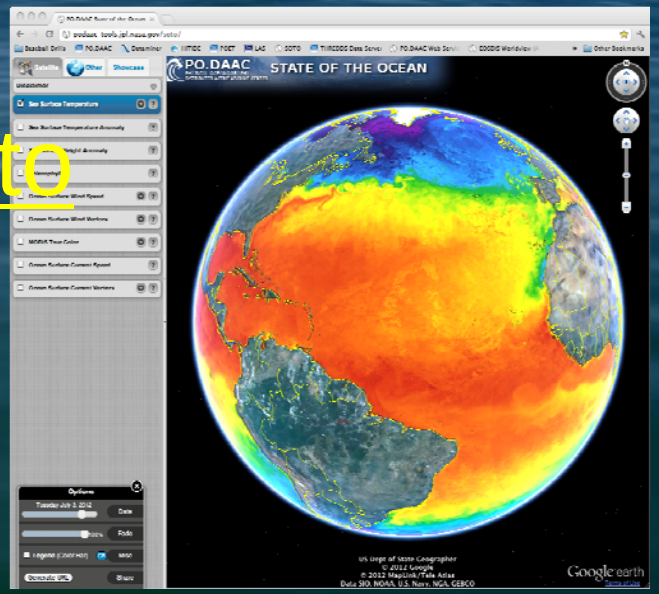
- Google Earth based web interface facilitating daily NRT image access for last 30 days
- Processing pipeline to be separate entity

Physical Oceanography DAAC

Distributed Active Archive Center

ac.jpl.n v/soto





Current Primary Components

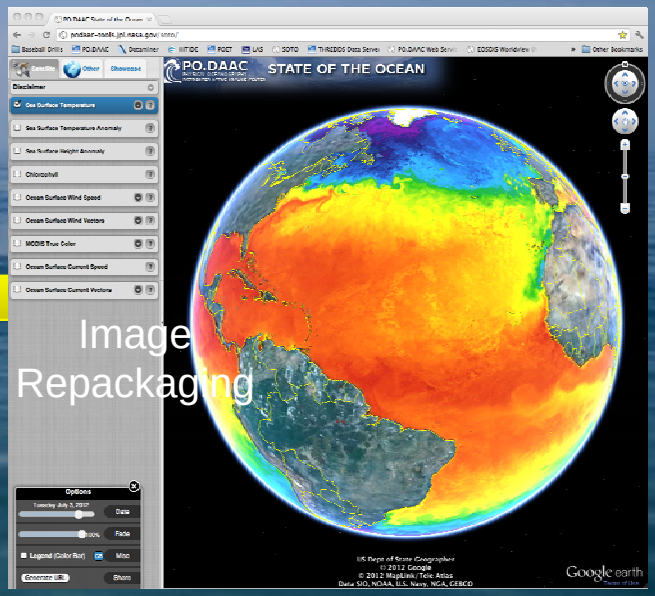
Physical Oceanography DAAC

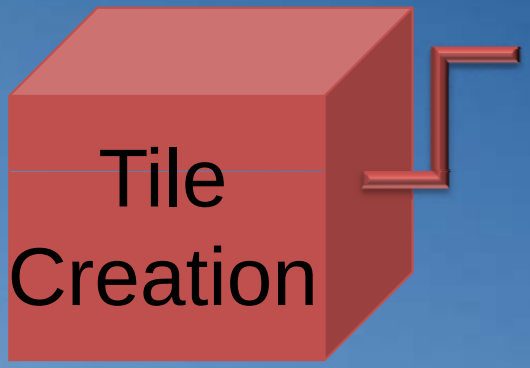
Distributed Active Archive Center

Tile Creation

Image Creation

Image Repackaging





- Transforms L2 and L3 science data products into grids of floating-point tiles
- Grids based upon equirectangular projection
- Organized by a hierarchy of directories utilizing common taxonomy

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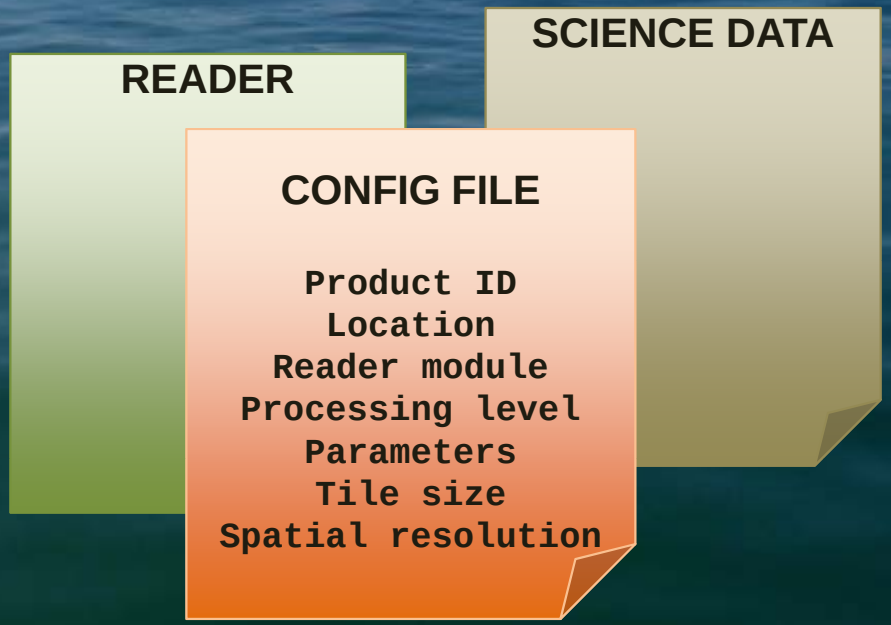
year/day_of_year/global_sizeXY/n_tilesXY/parameter_name/time_of_day/
```

- Geolocation must exist or be derivable
- L3 reprojected if not equirectangular

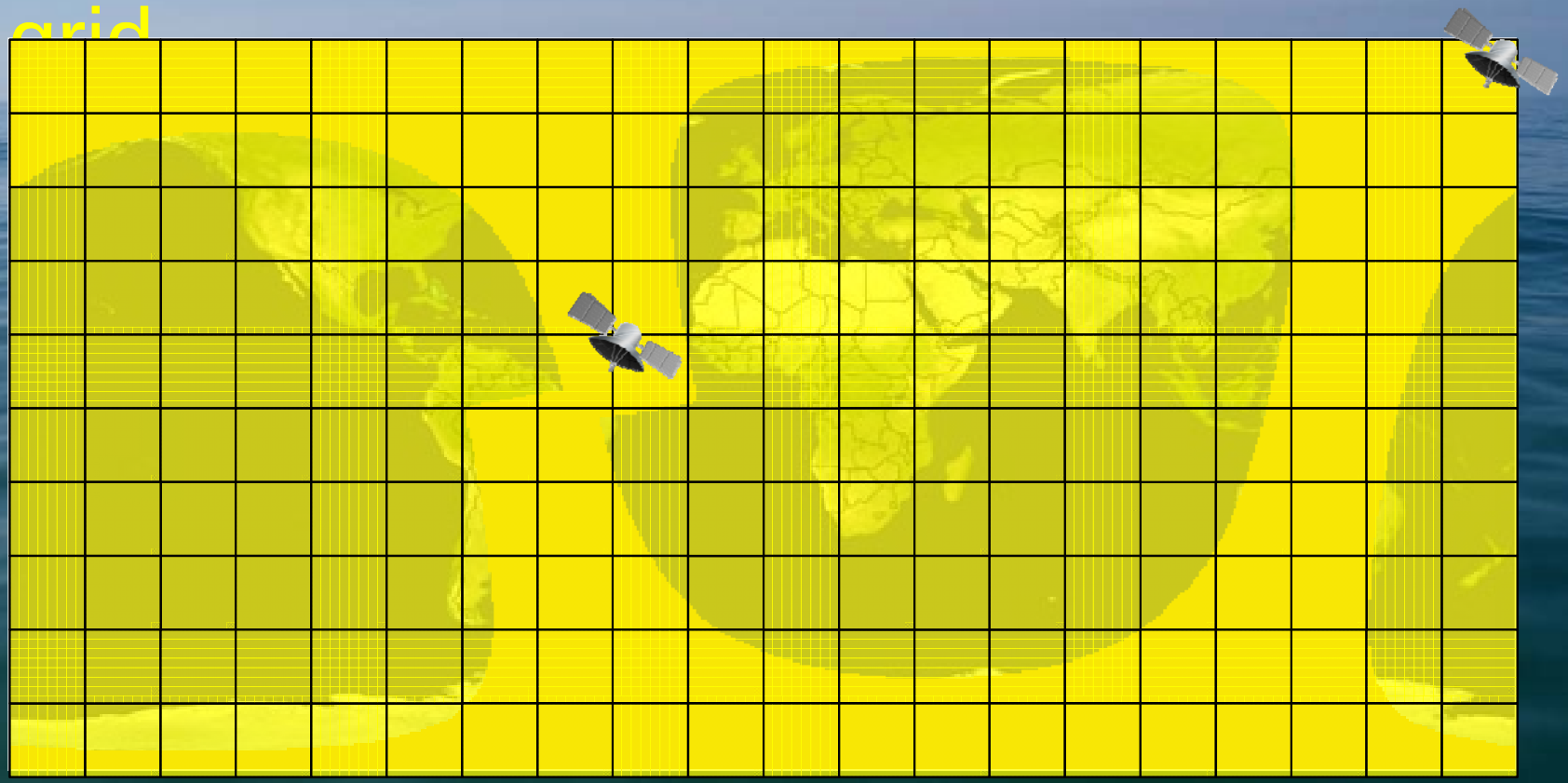
Process for Adding a Data Product

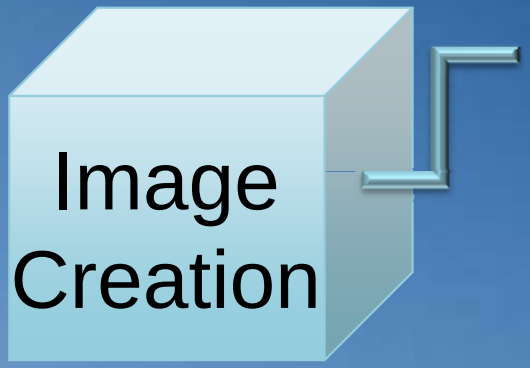
- Build (or modify) a reader function
  - Returns product file contents in standardized structure
- Update configuration file



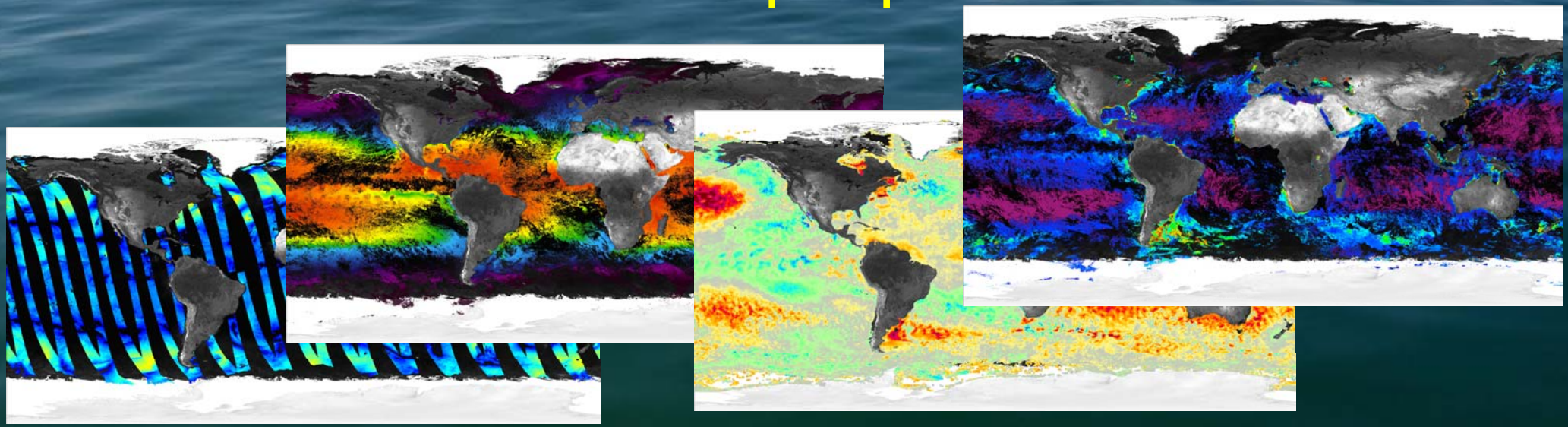
Tiling Example: Level 2 File

- Tradeoff between minimizing “low coverage” tiles and total number of tiles in grid

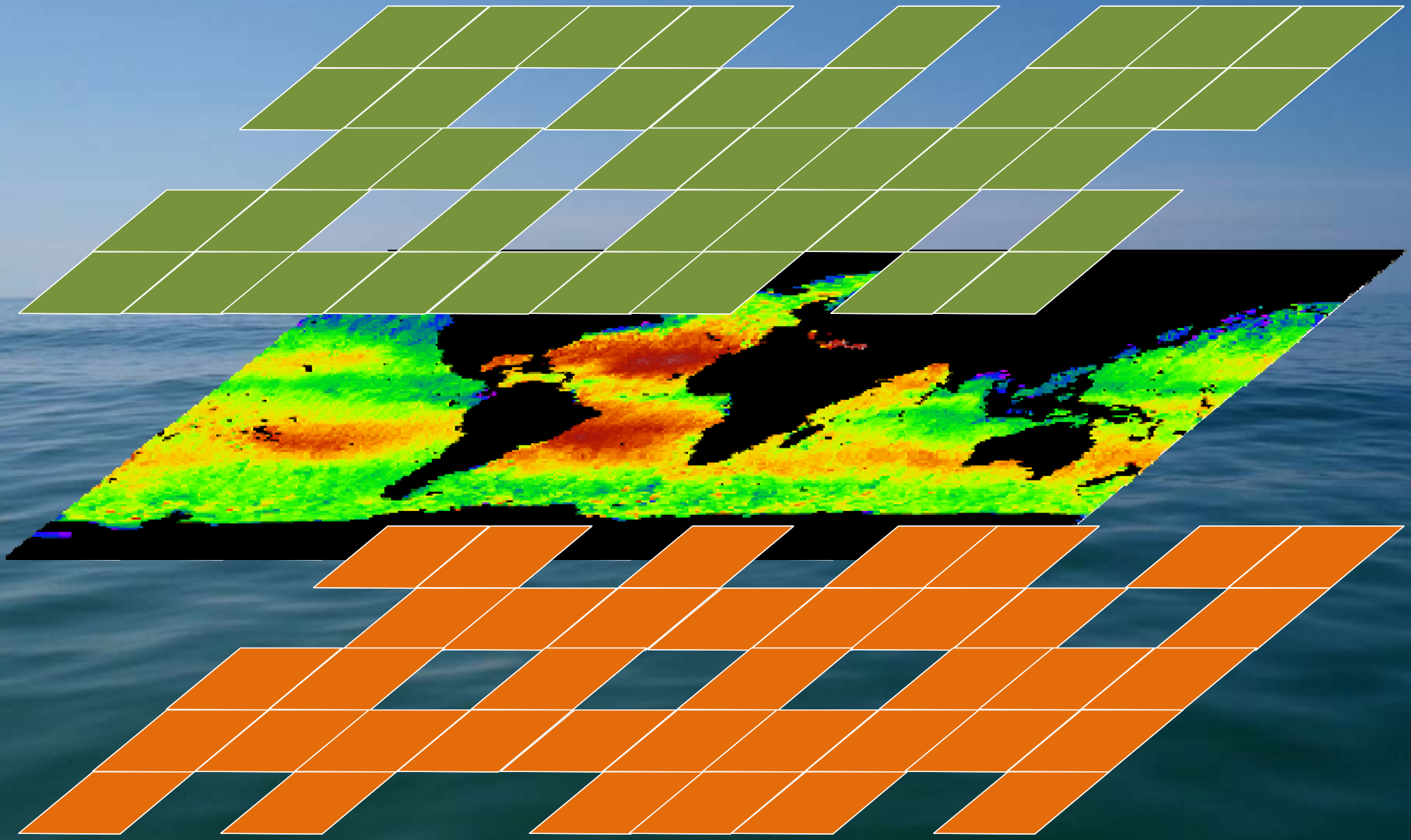




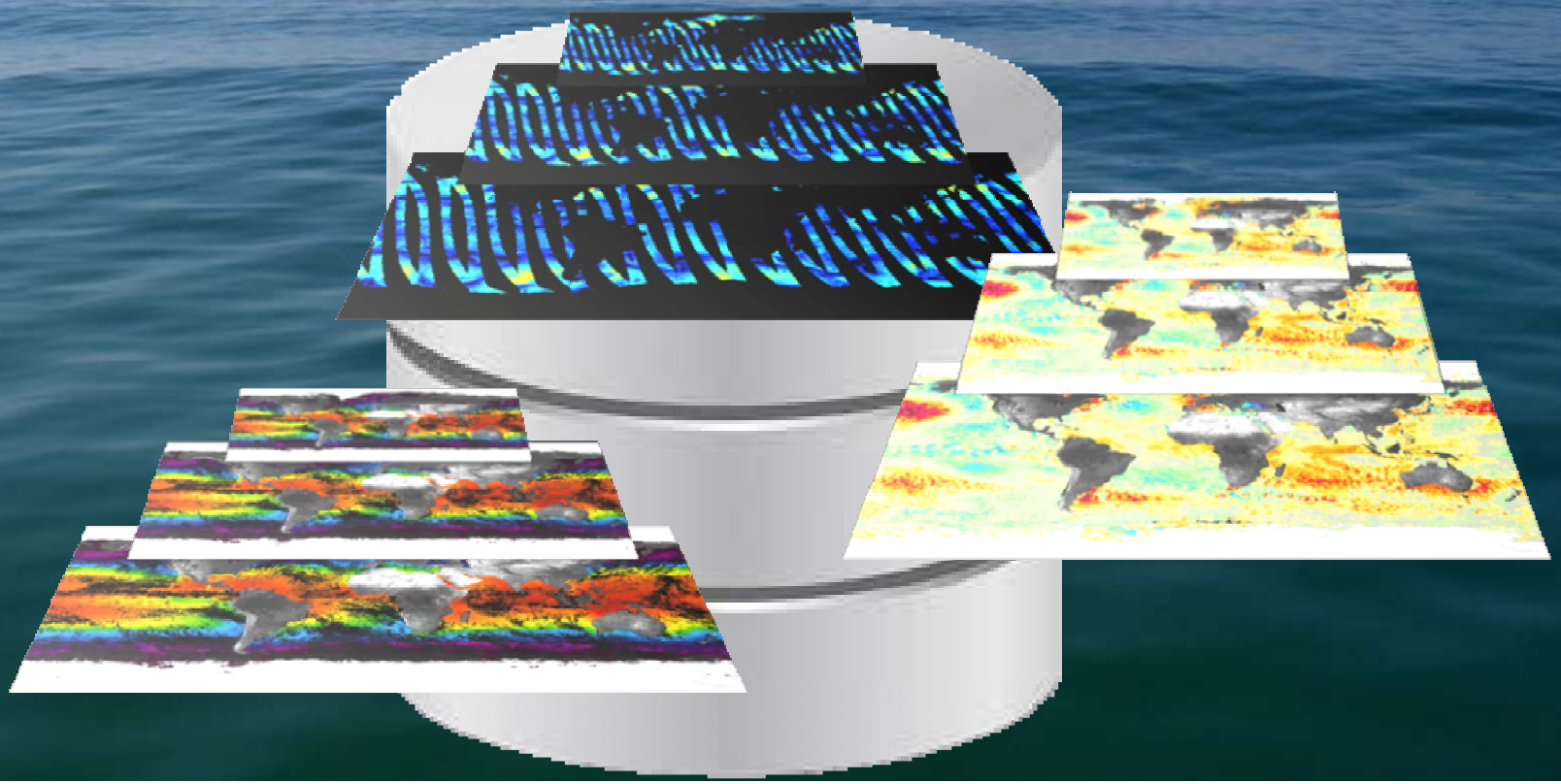
- Merges and converts tiles into images
  - Based upon space/time/scale/color parameters
- Coincident tiles can be averaged or follow precedence rule (latest/earliest)
- Can combine multiple products



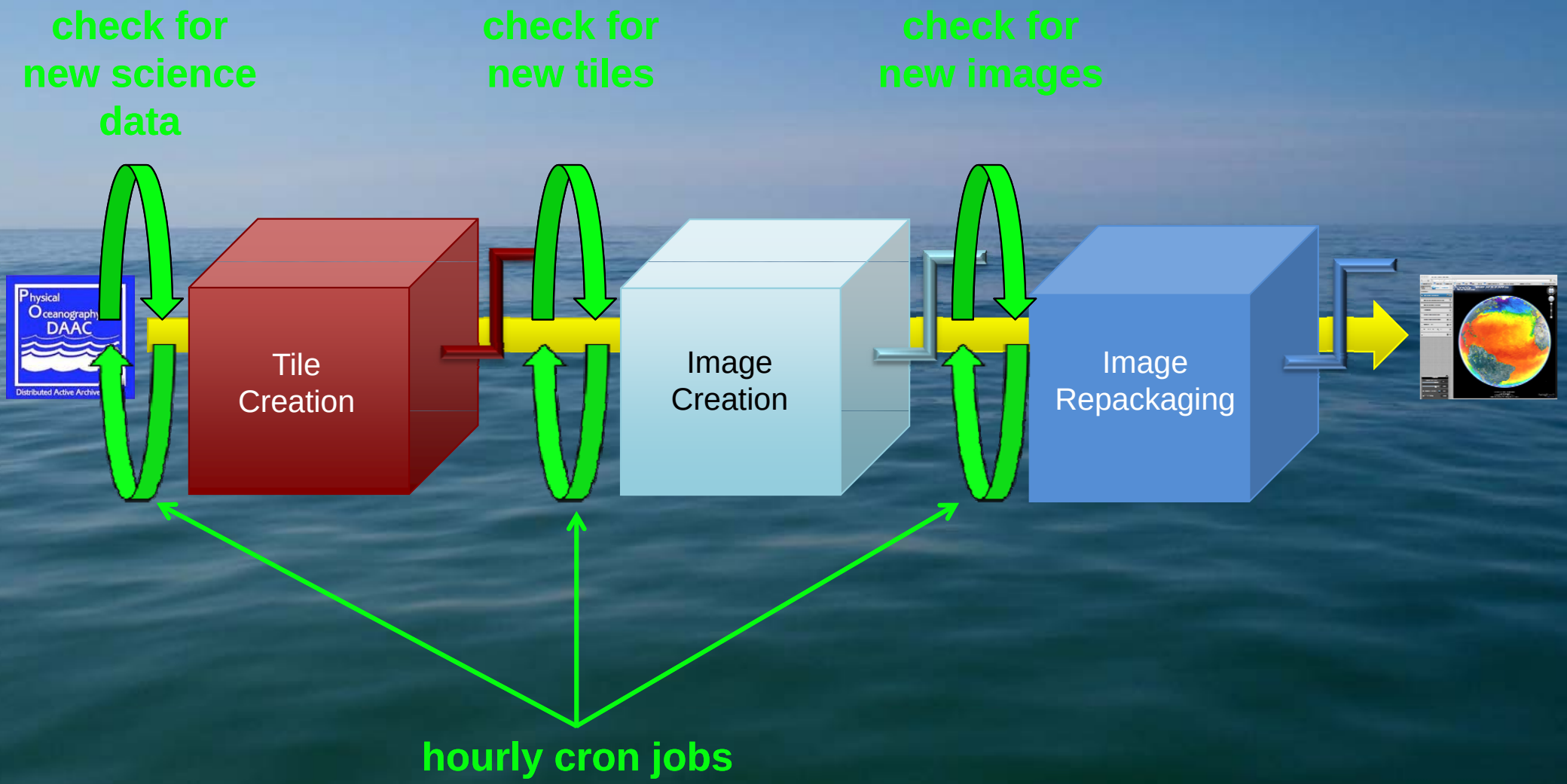
Floating-point Tiles to Images



- Converts imagery into format suitable for efficient web access
  - Currently KML pyramids

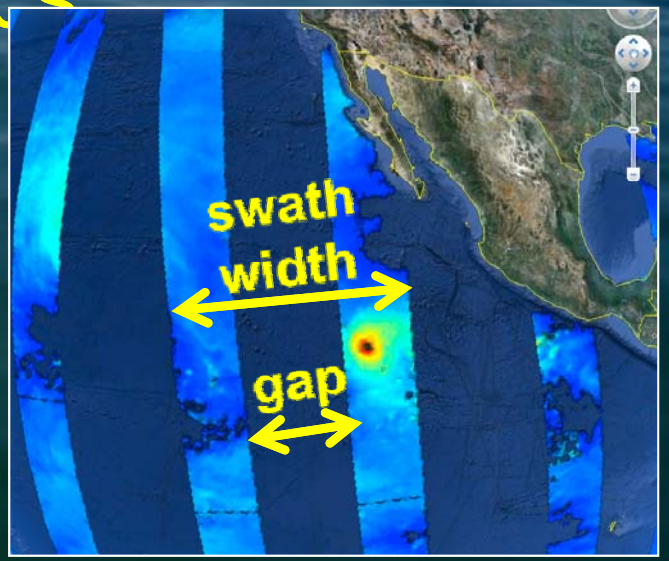


Current System Control



Some Known Limitations

- Differences in L2 and L3 time resolution
  - Current categories are day, night, daynight
  - L2 tiles retain time stamp in filename
- Binding tiles to equirectangular grid
  - Polar grids better for data at extreme latitudes
- Handling unique characteristics
  - Properly interpreting geometry
  - Destriping
  - Currently occurs in readers



Additional Processing Considerations

- Reprojection (again)
  - Assumption: resampling data more than once does not significantly degrade image quality
- Filling areas of missing data
  - Spatiotemporal functions
- Advanced averaging
  - Time adjusted for synoptic images

Future Plans (Short-Term)

- Transition image repackaging to Tiled WMS
  - Developed at JPL
  - Resolves KML pyramid limitations (I/O, flexibility)
  - Server already installed
  - More information on Tiled WMS and sample clients: ***Interactively Browsing NASA Imagery in Full Resolution*** (Ryan Boller, Geospatial Session)
- Ingest imagery into PO.DAAC archive with metadata and provenance information

Future Plans (Long-Term)

- Vector data pipeline upgrades
  - Transition from KML placemarks
  - Possible enhancements to Tiled WMS package
- Enable dynamic specification of scaling, colorizing, projection, and time range
  - Increased latency, maybe exposed as separate service
- Explore better/alternative ideas to reprojecting
  - Plotting L2 footprints

Random Ending Thoughts

- Fuzzy definition of “high resolution” warranting this approach
  - Straight WMS may be better suited at lower spatial resolutions
- Single pipeline framework may not allow all of the flexibility required by users
- More control = more specialized processing
- This is all a work in progress, any comments/suggestions/critiques appreciated!

Questions?