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NOGGIn - NASA Open-access Geo-Gridding Infrastructure for Co-location and Integration of Observations and Models

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Perhaps the most common challenge to the systematic and routine comparisons of data from the model output/analysis with NASA remote sensing data is that of co-locating diverse datasets, often obtained from instruments with different observation characteristics, for detailed comparison and use, e.g. adaptation to climate change. Indeed, while a myriad of tools exists to locate, access, and visualize observational data, inter-comparison of disparate data sources requires tedious and often computationally intensive gridding or regridding, which is generally implemented in an ad hoc manner by individual users and becomes an obstacle to robust comparisons.
In addition to the duplication of effort stemming from the lack of standard gridding tools, expediency on the part of individual researchers often results in sub-optimal gridded products that (1) limit accuracy due to failure to adequately account for spatial/temporal sampling bias, (2) lack robust gridding uncertainty estimates, and (3) omit the provenance, all of which limit the value of the products to other researchers. Simplicity and familiarity also drive researchers to apply traditional latitude-longitude (lat-lon) grids rather than better alternatives.

Moreover, the trend in the modeling community is to transition to next-generation grid systems, such as geodesic and cubed-sphere, that possess superior quasi-equiareal, scalable characteristics. For higher-resolution models, to maintain numerical stability, the time step used for integration must decrease as the smallest grid length scale decreases. For lat-lon-based grid systems, the degeneracy of meridians at the poles drives computation costs up, and high-frequency signal filtering approaches ameliorating this problem severely constrain parallel performance.

Anticipating the need for converting and adapting NASA Earth science remote sensing data for compatibility with results from these next-generation models, we are developing NOGGIn as an open-access service to enable routine and systematic gridding, co-location, and comparison of remote sensing data that not only makes adapting observations to these grids easy but also addresses a number of gridding issues that currently plague researchers.

We leverage the MODIS Adaptive Processing System (MODAPS) to augment its existing map projection web services and plan to eventually extend NOGGIn as a service in the cloud. We are developing a web client that provides a user interface to these services, making them accessible through a web browser. For even more automated or scripted interaction, a RESTful interface is in the works. In this presentation, we discuss the NOGGIn architecture, our prototypes, and the performance of our initial tests as a translation service.