HQ Perspective on MODIS Science Team

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- Follow on from the 2009 ROSES Program Element A.41 should be coming in ROSES 2013 (TBD)

- use of data and derived products from two of the EOS satellites, Terra and Aqua, and their measurement sensors

- a continuation of the research using Terra and Aqua – in 2009 it emphasized new opportunities for scientists to analyze and exploit EOS data, develop new products by combining multi-sensor and multi-platform data or by developing an innovative approach to data retrievals with a focus on integrative research from these and other satellite (EOS) data to provide answers to NASA's Earth Science Research questions

Terra and Aqua – Overarching Objectives

- As Terra and Aqua continue to mature and move into the extended mission phase, less emphasis will be placed upon algorithm refinement, and more emphasis will be directed to multi-sensor product development, accompanied by active utilization of these data and products in scientific research, modeling, synthesis, and diagnostic analysis to answer Earth science questions

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- Suggestion was made in 2008 to port the algorithms over to MO&DA for the missions as part of mission extension proposals.
  - Missions say they have no money to support algorithms, even simple "crank turning"
  - Some algorithms were "orphaned" in 2009 competition – no proposals received
  - Complaint from panels in last review that algorithm refinement received bulk of funds, no funds for other science/research

Five types of proposals were solicited:

2.1 Multi-Platform and Sensor Data Fusion

2.2 Science Data Analysis

2.3 Algorithms – New Data Products

2.4 Algorithms – Existing Data Product Refinement

2.5 Real- or Near-Real-Time Data Algorithms

Plus requirement for uncertainty quantification (?)

Did this work?

Multi-Platform and Sensor Data Fusion

- Studies utilizing Terra and Aqua data in conjunction with appropriate data from other sources and satellites for interdisciplinary studies of the Earth System.

- Multi-mission and multi-sensor innovative research that can be used to quantify change, characterize processes, and examine function within and among Earth's terrestrial, aquatic, atmospheric, cryospheric, and solid Earth components over time.

- Issue: panel concluded that model output satisfied the requisite "mission" or "sensor" requirement

Science Data Analysis

Analysis of Terra and/or Aqua data to answer disciplinary or interdisciplinary Earth science research questions using NASA EOS research sensors listed in announcement.

Proposals addressing Terra and Aqua instrument-specific algorithm maintenance/refinement that require research efforts for maintenance and refinement.

Straightforward?

Algorithms – New Data Products

- advance a new data product that has passed through an Algorithm Theoretical Basis Document (ATBD) review to implementation as either a core or experimental EOS data product, or b) introduce a new data product/algorithm development that will yield a new ATBD for peer-review.

- Calibration and validation activities – scientific justification compelling and focus of the proposed data product or algorithm, suite of algorithms or instrument(s).

Algorithms – Existing Data Product Refinement

- Maintain or modestly refine derived product for any of the currently-approved ATBD algorithms. Emphasize instrument-specific algorithms and necessary supporting calibration/validation activities.

- Proposed supporting calibration/validation activities were minor investments given the maturity of the existing algorithms, and may involve a single or multiple data products and/or instruments. The scientific justification for such improvements had to be compelling and the focus of the proposed data product or algorithm, suite of algorithms or instrument(s).

- Radiative transfer theory improvements, in the form of implementation of existing, newer, or faster radiative transfer codes to replace existing Look Up Tables.

Real- or Near-Real-Time Data Algorithms

- Some of the Terra and Aqua observations have been utilized for operational purposes such as emergency response and/or weather forecasting (e.g., Direct Broadcast and Land, Atmosphere Near-real-time Capability for EOS (LANCE) (http://modaps.nascom.nasa.gov/LANCE/))

- Proposals to enhance, refine, or develop near real time algorithms for application and operational usage will be considered.

Requirements - Error and Uncertainty Analysis

- *All proposals submitted in response must quantify errors and uncertainties associated with the proposed efforts (e.g., data products, scientific data analysis, etc.).* The error and uncertainty discussion must be clearly identifiable in a separate section within the proposal body.

- Proposals to conduct rigorous estimation of error in Earth System Data Records used by NASA communities were solicited in 2010 through the Earth System Data Records Uncertainty Analysis targeted program element

  - Is this the best model, apart from the records themselves?

ATBD/Data Product Review

- Review of algorithms for the new and alternative MODIS algorithms
  - Current algorithms/products – Algorithm refinement PIs to provide
    - compelling justification for the importance/utility of the algorithm and (as needed) improvements;
    - plan for transition to core production (recognizing infusion of new knowledge)
    - data product documentation broadly reviewed by user communities (web-based posting for review/comments?)
    - regular data product/algorithm reviews – maintain, refine, review as needed
  - New algorithms/data products – draft new proposal, documentation and requirements, follow with review and endorsement by user communities
  - Three new algorithms reviewed in 2009 – Ustin (Canopy Water Content), Liang (Surface Radiative Flux), Lyapustin (Multi-angle atmospheric correction)
  - Is there a need for periodic review of ATBDs/Algorithms off-cycle of the competition?
  - Would this help a potential "transition to operational status"

Terra and Aqua – Instrument or Measurement Teams

Additional detailed guidance for the Instrument and Science Measurement Teams are provided in program element. Proposed studies may be relevant to more than one team. Proposals should request membership on the team that, to the best of their knowledge, is most relevant to their research (No exclusion).

Measurement Teams Solicited:

3.1 Land Measurements Team (LCLUC)

3.2. Ocean Biology & Biogeochemistry Measurements Team (aka OCRT)

3.3 Cryospheric Sciences Measurement Team

3.4 Atmospheric Science Measurement Team

3.5 Geodynamics and Geohazards Research Team

3.6 Biodiversity and Ecological Forecasting Team

3.7 Sea Surface Temperature Science Team

Historical Philosophy: Continuing/evolving measurement streams, there will be one science team, competed periodically, that provides scientific guidance to present and future missions and for the utilization of past data sets

- Support and focus on Earth System Data Records

- One data system to ensure a "seamless" time series

- Scientific guidance and priorities must represent broad user community

- Future MODIS Team Meetings – structure and function given advertised dollars, change in size and issues

- NPP VIIRS continuity, DS missions, CI missions, international missions

Issues for MODIS Team

- More interdisciplinary algorithm development approaches, Terra/Aqua intersensor science
- Certain algorithm developers and validation investigators should address important deficiencies in key data products (uncertainties)
- Algorithm developers represent broader community needs by working with them
- Algorithm refinement PIs need to provide compelling justification for the importance/utility of the algorithm improvements and/or new data products + plan for transition to core production (recognizing infusion of new knowledge) – move to MO&DA in mission extension proposals
- Established process for regular data product and algorithm reviews – done for three new ATBDs, but is a cycle needed off the recompete cycle? Need to maintain, evolve, refine, review as needed – would this help transition to mission extension?
- MODIS website – updates needed?
- Sync of program element competition with Senior Review
- Future MODIS team meetings – frequency, format? Transition of few/ some/many team members and scientific interest to NPP sensors and data?
- Science of Terra and Aqua/NPP Science Team in ROSES 2013