

Remarks from The MODIS Land Discipline Leads

Chris Justice & Miguel Roman

Land Response to the RFI

- 14 responses on science opportunities offered by the Terra Aqua orbital drift
 - 4 on fire science
 - 1 on ecosystem function
 - 1 airborne campaign support
 - 2 on land surface temperature inc. impacts in urban heat stress
 - 2 on lake water temperature variability
 - 1 on radiative fluxes, convection and atmospheric motion vectors
 - 1 on midlatitude and mountain cold season diurnal effects
 - 1 on volcanic summits decreasing orographic cloud
 - 1 on diurnal cycle data assimilation
- The response was from both the broader science community and the MODIS Land Science team – there were two international submissions requesting TERRA extension
- I guarantee the interest is much broader – as in general people don't understand what didn't know about the RFI process – we did not alert the large broader Terra user community

Diurnal variability of ecosystem processes

Jinfeng Xiao, UNH

The time window (~1:30 – 3:50pm) that Aqua will cover from 2022 to 2026 happens to largely coincide with “midday depression” of ecosystem processes exhibiting substantial declines in photosynthesis and ET. On the other hand, the time window (~10:30am to ~9:00am) of Terra will likely capture the timing of peak (or near peak) photosynthesis and ET during days with midday depression. By lumping the MODIS observations from Terra and Aqua from the past to 2026 together, we will be able to explore how plants use water and absorb C in response to environmental stresses during the critical times of day at the global scale.

New science using the AIRS, AMSU, MODIS, and CERES data with the Terra and Aqua orbital drift

Xubin Zeng U. Arizona

- Understanding the zenith angle dependence of surface albedo – the orbital drift will enable better solar zenith and view angle sampling.
- Diurnal sampling of organized convection conditions and boundary layer conditions associated with precipitation.
- The drifting orbit of Aqua in combination of NOAA satellites (both NOAA-20 and NOAA-21) would enable us to retrieve 3D Atmospheric Motion Vectors from different satellite orbits. Water vapor data can then be used to retrieve the 3D AMVs. Both NASA/Aqua and NOAA satellites have hyperspectral infrared and microwave sounders. AIRS and AMSU from Aqua, and CrIS and ATMS from NOAA satellites are used to retrieve water vapor

Measuring Diurnal Variations in Cold Season Atmospheric and Surface States in Mid-Latitude, High-Altitude Complex Terrain

Feldman et al. Lawrence Berkley Nat.Lab

- During the period of orbital drift, a number of science objectives are uniquely enabled.
 - Measuring “spectral snow albedo and surface temperatures of snow, vegetation, and soil covering the diurnal cycle” will provide new constraints on estimates of evapotranspiration and how it is impacted by land use and of measurements of snowmelt, ice melt, and sublimation from snow and ice (using AMSR-E), as well as the diurnal evolution of the lower atmosphere (using AIRS).
 - providing much more information on rates of snow accumulation, the tracking of snowmelt (using MODIS and relationships to soil moisture (using AMSR-E), and how all of these interact through surface energy budget considerations (using CERES).

Benefit the NASA-funded BioSCape airborne campaign

Anabelle Cardos U.Buffalo

NASA Airborne and Biodiversity Field Campaign October – November 2023.

BioSCape consists of 13 NASA-funded research projects and 2 South African-funded partner projects. Many of the research projects in BioSCape are planning on using MODIS data for their BioSCape research. MODIS provides critical coverage and time series across the study region, and forms the backbone of many studies looking at change over time. These studies need to be able to directly compare data collected by MODIS Terra and Aqua with the overpasses of the planes during the campaign. Requesting Aqua Terra data continuity through Dec 2023 – for fire and burned area product continuity

Discipline Leader Priority - Terra Data Continuity

- Most of the MODIS land products have been successfully transitioned to VIIRS which provides continuity with MODIS Aqua
- Some of the land products depend on using AM and PM data – Fire, Albedo, BRDF (inputs are Surface Reflectance)
- There is a broad use of MODIS Terra Data by the applications community
- NOAA has no 10.30 AM overpass – it has been using METOP AVHRR (8.20 am)
- NASA had NO PLANS for Terra Data Continuity
- The Land Community proposed two options – Sentinel 3 (current- 10.00h) and MetOp SG (2024 – 9.30)
- NASA is funding prototyping of a NASA S3-based Surface Reflectance and Fire (FIRMS). Both ESA and EUMETSAT supportive
- Extending Terra the mission will allow time to develop an alternative data stream and evaluate the differences – the orbital drift of Terra to S3 overpass time will be critical to understanding and quantifying the dynamic data continuity (Giglio presentation)