

MODIS C61 Reprocessing Proposed Changes to the Science Algorithms

1. Introduction

The proposed C61 changes for Land were largely meant to address several calibration related inconsistencies for both Terra and Aqua, in C6 land processing, like:

- Aqua Reflectance bands needed change to RVS approach, which was put in forward processing for C6 on July 27, 2016.
- Terra forward LUT in C6 are incorrect for the period 2012 – 2017 because of error in generating the LUT at MCST, affecting bands 1 and 2. This was fixed in C6 forward processing for days after 2017043.
- Land reprocessing in C6 started with characterization and correction for polarization until 2014. There after no incremental assessment or update put in operation.
- Gain changes put in for reflectance bands of Terra MODIS were derived through cross calibration with Aqua. But this did not take into consideration the issue with Aqua RVS correction.

Some of the changes, related to core MCST calibration updates for L1B, were implemented as part of C6 itself, and put in C6 forward processing. In addition, the C61 L1B also incorporates a correction algorithm to fix the cross-talk effects observed in the PVLWIR bands (27-30) that largely impacts the Atmosphere products and does not have much bearing on the land processing, except indirectly, through the cloud mask. For C61 land processing, a new set of correction factors were delivered to account for the inconsistencies in the polarization correction that are present in C6. These included:

- A new set of polarization correction coefficients, for Terra, derived from the work done by the Ocean color group (OBPG).
- New set of gain and detrending factors for both Terra and Aqua

In C61, no major science change to most of the existing land products were proposed with the exception of a few. All the major C61 land changes are discussed in brief below.

2. Major Changes to Land Products

Some of the Land products/Algorithms that had substantial changes in C61 reprocessing have been summarized below:

- Snow (MxD10):

MODIS Land C61 Changes

- Minor code change to L2
- Addition of a new Cloud Gap Filled Daily L3 Snow product (MxD10A1F)
- LC (MCD12Q1 and MCD12Q2):
 - Minor fix to UMD Land Cover Class in C6 MCD12Q1/C1
 - Known issue in C6 MCD12Q2
- VI (MxD13 Suite):
 - Bug fixes for:
 - VI usefulness bit reset
 - Address an issue related to spikes of large VI values
 - Code changes to improve product quality
 - Improved logic for compositing to optimize NDVI under 30VZA for good quality data.
 - Backup EVI equation updated to use the EVI2.
- All VI changes were implemented and put in place for C6 forward processing.
- Evapotranspiration (MxD16) and GPP/NPP (MCD17):
 - Use Climatology LAI/FPAR as back up to the operational LAI-FPAR
- DSR/PAR (MCD18): Science Test
 - Change in resolution of tiled product from 5km to 1km
 - Add CMG products
- MAIAC (MCD19):
 - Add 250m resolution bands
 - Generate MCD19A3 as daily product
 - Addition of MAIAC MCD19A1/A2 CMG products.
- JPL LST (MxD21):
 - Use GEOS data replacing MERRA2

MODIS Land C61 Changes

- Add CMG products (MxD21C1/C2/C3)
- VCF:
 - Fix for LWM in the intermediate process.