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1. Overview of NICFI Basemaps

Planet has entered a comprehensive partnership with KSAT and Airbus to provide users all over the world access to mosaics produced using Planet imagery to combat deforestation and forest degradation. The basemaps cover the area between 30N & 30S comprising the countries highlighted in the graphic above. During the contract, users can expect to see bi-annual mosaics between the period of December 2015 to August 2020, followed by monthly mosaics from September 2020 onwards for the next couple of years.

2. Basemap Production Algorithm

Up until May 2017, we have incorporated Rapideye data into the mosaics to make sure coverage is optimum. Superdove data is included in mosaics from 2020 onwards, due to the amalgamation of sensors into the mosaic, additional normalization and harmonization are required to correct for the differences between each of these sensors.

More details are available in Planet’s master Product Specifications: https://assets.planet.com/docs/Planet_Combined_Imagery_Product_Specs_letter_screen.pdf

The biannual and monthly mosaics delivered as part of this contract are optimized for the time intervals and area of interest for the project. While they are broadly similar to Planet’s standard normalized analytic product, they differ in a few key ways.

These differences have been expanded upon below:

a. Scene Selections

Apart from the standard scene selection algorithm, for these mosaics we have included a metric that looks specifically into the number of ground control points (GCPs) used by our rectification process when taking scenes into consideration. The metric is useful in making a relative ranking of rectification confidence for scenes at a particular location. Based on this, we are able to select scenes that have a higher location confidence which would minimize any issues seen with band misalignment and positional accuracy.
In order to increase coverage in particularly cloudy areas, these mosaics also utilize scenes that have been marked as “test” quality. Every scene in Planet’s catalog can be classified as “Test” or “Standard” quality. The main difference between these two states is the amount of GCPs that can be applied to a scene in order to ground-lock it, a “test” quality scene contains usable data and it is preferable to include “test” quality scenes in cloudy areas as they will have passed the base level of rectification before proceeding to be published onto our platform.

b. Atmospheric Correction

In our standard basemap, the atmospheric correction algorithm applied tends to over-correct scenes, especially in the tropics. This happens when the MODIS based atmospheric optical thickness estimates are incorrect or unavailable. These overcorrections lead to invalid values in the scenes, which then affect the mosaic. Hence, for this mosaic, we have based the corrections on seasonal models of Landsat data by applying normalization and harmonization of TOAR scene data to SR corrected Landsat data. This process does not change the end values of the mosaic.

More information can be found in our surface reflectance white paper: https://support.planet.com/hc/en-us/articles/360012629573-Planet-Surface-Reflectance-Product

c. Cloud Masking

We have applied an additional cloud masking step beyond the standard process. Before late 2018, we use our unusable data mask (UDM) to remove any pixels marked as clouds.

UDM: More information on our UDM can be found on page 91 of our product specifications: https://assets.planet.com/docs/Planet_Combined_Imagery_Product_Specs_letter_screen.pdf

Late 2018 onwards, we are using the usable data mask (UDM2) to remove any pixels that have been flagged as cloud shadows as well as clouds.

UDM2: https://developers.planet.com/docs/data/udm-2/
d. Normalization

In order to remove any additional variability between scenes, we have updated our standard landsat based reference datasets to create tropics optimized normalization targets. By doing this, issues with unmasked clouds in exceptionally cloudy areas can be avoided.

3. BRDF Effects

Over large, dark areas, such as the Amazonian rainforest shown below, an alternating pattern of light and dark diagonal stripes are visible in Planet's normalized surface reflectance mosaics. Example below:

![Image of BRDF Effects](image_url)

This artifact occurs due to the viewing geometry of Landsat satellites used as our normalization target basemap and it is known as BRDF (Bidirectional Reflectance Distribution Function). BRDF is a mathematical description of how light reflects off a surface, given a ray of light hitting a surface and how an observer (or camera, satellite) perceives it from their viewpoint. The BRDF effect arises because Landsat satellites capture images at a small $7.5^\circ$ angle from “straight down”/nadir.
This results in a slight effect in the measured surface reflectance values. On the captured image, the area slightly closer to the satellite records a slightly different amount of light than the area on the far side. While this difference is fairly small, a striping pattern becomes noticeable when scenes from neighboring satellite paths are viewed side by side over a dark area such as the forest above. While Landsat’s surface reflectance algorithm, LaSRC, does not remove this effect, the huge advantage to Landsat is that it provides one of the longest time series of surface reflectance data of the Earth.

Using seasonal data (e.g., fall, summer) over many years, Planet is able to create nearly complete, cloud free global Landsat mosaics for a normalization target. Basing normalization on LaSRC-processed Landsat data also allows direct interoperability with standard Landsat products. While removal may seem desirable, it can be time consuming, introduce its own biases in scientific analyses and leads to less compatibility with standard Landsat data.

4. Basemap product naming convention

*Bi-Annual:* planet_medres_normalized_analytic_YYYY-MM_YYYY_MM_mosaic

*Monthly:* planet_medres_normalized_analytic_YYYY-MM_mosaic

5. Additional Support

Please contact our 24/7 support service by sending your request to nicfi-servicedesk@ksat.no.