



Reprocessing SuperDove/Dove-R Archive with band alignment improvements

External Content

Authors

Mariana Curdoglo

Key Contributors

Matt Irons

Stakeholders

Product Engineering: Mya Weisman

Program Management: Mariana Curdoglo

Product Marketing: Jenna Mukuno

Customer Success Manager: Andrea Steffke

Technical Program Manager: Christian
Grumbach

Background

Planet continually invests in the latest software advancements to improve the PlanetScope image quality. Over the past year, Planet has pursued a number of enhancements to ensure the clarity, consistency, and reliability of PlanetScope imagery.

The SuperDove (PSB.SD) sensor plane consists of eight horizontal stripes that capture eight different spectral bands. To form one image, multiple frames are registered and composited together to create one image available for download. Any misalignment between these eight spectral bands creates fundamental image quality issues, which can be seen in PlanetScope imagery. In 2021, Planet built a new registration and compositor method, which was released on March 1, 2022. All images acquired after March 1, 2022 have less than 0.5 pixels of misalignment between all band combinations. Previously, the publication threshold for misalignment was less than 0.66 pixels. This means that between older and newer images, there is a division of band alignment image quality.

Planet has made a choice to reprocess the full SuperDove and Dove-R archive (all images taken by these satellites before March 1, 2022) in order to provide consistency and the best possible band alignment for all images. Reprocessing will apply to all PlanetScope scene based products. We expect the reprocessing for SuperDoves to finish by the first week of December, 2022. After this, we will reprocess the full Dove-R archive.

Benefits of Reprocessing

Poor band alignment results in unusable data. Which means any analysis requiring radiometric values is affected by band misalignment.

Better band alignment across the PlanetScope SuperDove and Dove-R archive ensures clarity, consistency, and reliability of all PlanetScope use cases. This not only enhances the appearance of true- and false-color composites, but improves the accuracy of derived data. More precise band alignment across the SuperDove and Dove-R archives enables spectral analysis at the full resolution of the PlanetScope constellation. Band alignment 1) enhances visual appearance, 2) improves simple ratio calculations, and 3) improves machine learning models.

Band alignment enhances the appearance of true- and false-composites. It decreases “blurriness” and allows users to see a greater level of detail in the image. Figure 1 shows a visual example of before and after of an urban area . Notice higher level detail of buildings that is now noticeable. This same area is shown in false infrared composite (NIR, R, G) in Figure 3.



Figure 1: RGB composite. Left - Before reprocessing. Right - After reprocessing

Figure 2, is an additional example of the improvements. Notice the greater detail you can observe with your eyes over the ridge of the mountain. Even though saturation is noticeable, you can now derive more context on what is occurring on the ridge.

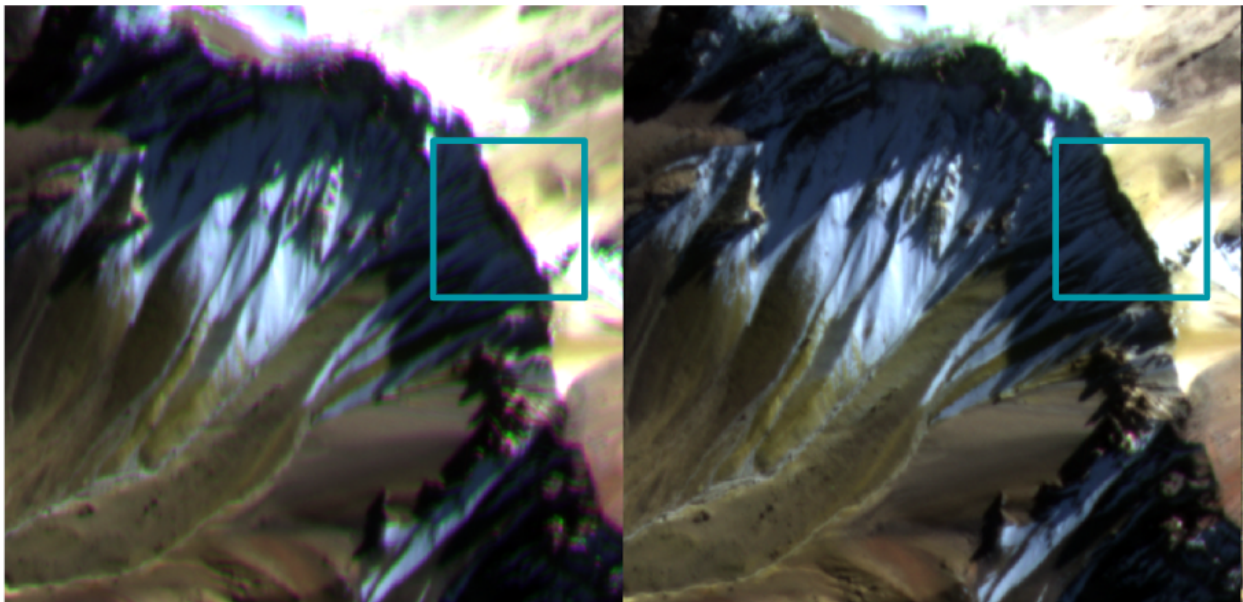


Figure 2: Left - Before reprocessing. Right - After reprocessing

Decrease in misalignment improves simple ratio calculation. Any calculation that relies on relative brightness of different spectral bands benefits from this improvement. All images will show an increased accuracy of ratio calculations. Using a stack depth of images over an area will yield better time series analysis. This includes simple ratios like Normalized Difference Vegetation Index (NDVI) or Maximum Chlorophyll Index red-edge (MCI_{re}). Figure 3 visually is showing four images of the benefit.



Figure 3: Images 1 and 2 are showing before and after of false infrared composite. Images 3 and 4 show NDVI values. Using the green box as context, notice the edges of healthy vegetation is prominent in image 4 than in image 3.

Figure 3 image 4 is a good example that should also benefit more sophisticated analyses like principal component analysis and land cover classification and machine learning algorithms. These imagery improvements should improve the value of the PlanetScope archive for both commercial and research purposes.

Quality Category Changes

Because of the across-the-board improvement in band alignment, Planet is as a result changing the threshold for quality_category “test” and “standard” property.

Previous threshold:

- “standard” = less than 0.4 pixels
- “test” = less than 0.66 pixels
- Anything more than this was not published

New threshold:

- “standard” = less than 0.4 pixels
- “test” = less than 0.50 pixels
- Anything more than this is not published

What is important for you to know?

- Reprocessing will likely move some number of images from “test” to “standard”.
- Reprocessing will likely move some number of images from “standard” to “test”.
- After reprocessing, radiometric values will not be exactly the same because of the improved band alignment (e.g if you re-download an image you had previously downloaded, you may see that the band alignment values are different).

Updated Publication Rates

The new registration and compositor method does a better job of rectifying imagery. This means that we will likely see a 10-15% increase in published imagery for SuperDove, after reprocessing all of SuperDoves..

What is important for you to know?

- Reprocessing will result in an increase in the number of SuperDove images in the archive, as images which previously did not meet quality category standards are improved.
- Reprocessing will likely also unpublish a small number of images, which no longer meet the higher quality category standards.

Important Note for the Subscriptions API

The subscriptions API matches the “start_date” and “end_date” of a subscription to PlanetScope “published” metadata rather than “acquired” metadata. This means that subscriptions API customers may end up downloading “older” imagery, which gets caught by the subscriptions API due to its reprocessed published date.

Scenario:

A subscriptions start date is set for 2022-09-01 and to an end date of 2022-12-31. An image was published on 2022-10-01, due to reprocessing, but was acquired on 2020-10-01. If this image meets the subscriptions request (e.g matched quality category of standard) this two year old image will be delivered.

Planet is aware that this isn't an accurate match and is working towards making sure that "start_date" and "end_date" in the subscriptions request matched a scene "acquired" field versus the "published" field.

PSOrthoTile Information

In rare cases, a PlanetScope image that is made up of a PSOrthoTile will be unpublished. Though you can view the full ortho tile in Planet Explorer, when you download the GeoTiff, a portion of the tile may be missing.

FAQ

How will I know if a SuperDove image has been published for the first time vs Reprocessed?

The best way to figure this out is by looking at the "acquired" and "published" property in the scene metadata. If the "published" date is from ~September 30, 2022 to ~ November 30, 2022, but the "acquired" date is from before March 1, 2022 it is likely to have been published for the first time.

Who should I reach out to if I have an issue I suspect is a result of reprocessing?

Please contact your Customer Success Manager if you see any issues with reprocessing. If you don't have a CSM, please reach out to supprt@planet.com.