CASE STUDY

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Country Mapping through GXL and Rapid Eye Image Processing

Leveraging GXL's rapid processing capability made it possible to optimize image selection from over 50,000 archive RapidEye images.

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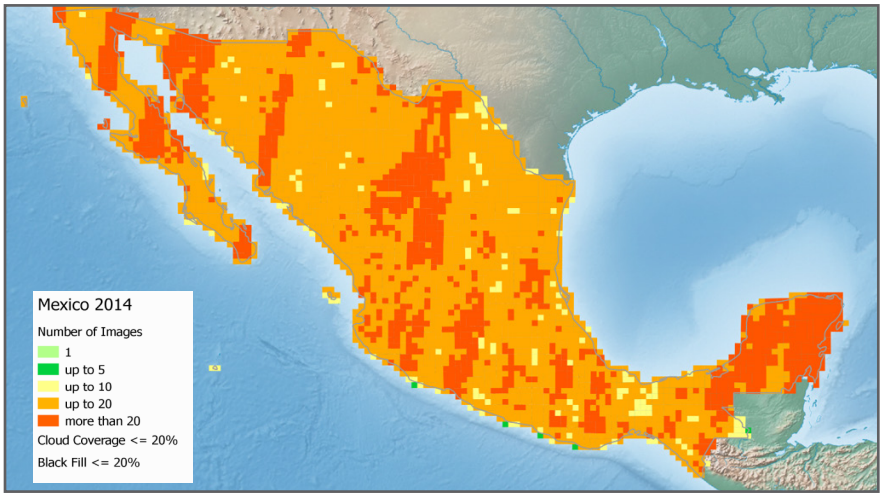
Rapid Mapping using GXL and RapidEye Imagery at CONABIO, in Mexico

CONABIO was created in 1992 in response to the need to improve knowledge of environmental issues affecting climate change. The Geomatics Division of CONABIO leverages Remote Sensing as a tools to better understand changes in Mexico's biodiversity and ecosystems. Country level mosaics make this type of analysis possible, whereby the data can be shared between government organizations. CONABIO chose to create the highest resolution mosaic to date, a 5 metre seamless mosaic, from 4,500 RapidEye Images. CONABIO needed a solution to make it possible to work with terabytes of data and derive a useful product for a reasonable cost. Automation, accuracy and quality were required, which was made possible through the use of the GXL system provided by PCI Geomatics, and the imagery collected by RapidEye.

Massive Archives

The RapidEye constellation makes it possible to collect massive amounts of imagery, which is critical to ensure cloud free images are available for analysis. This graphic depicts the archives available over Mexico for 2014 - imagery from 2011 to 2014 were used in the final CONABIO Mexico mosaic.Through the use of the GXL system, candidate images were selected based on cloud coverage and seasonality. Over 50,000 candidate images were assessed, of which the best 4,500 were selected for the final mosaic. By taking this approach, high quality mosaicking results were achieved.

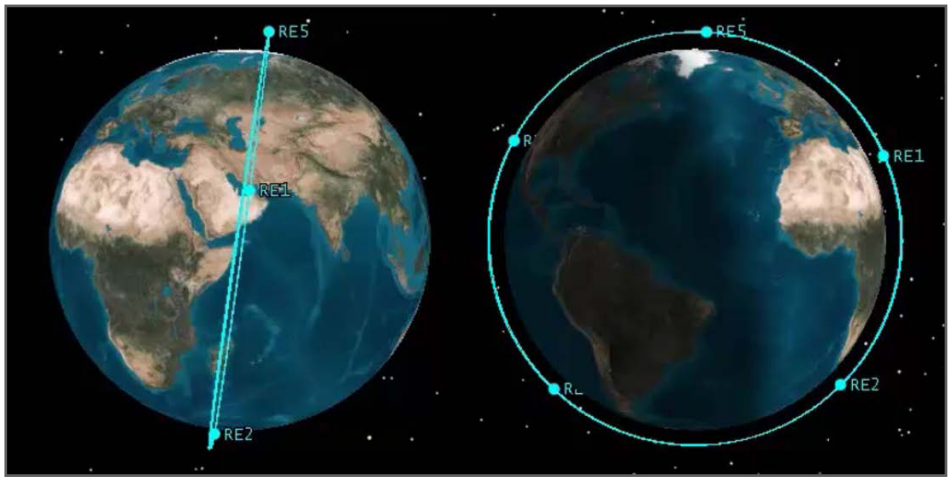


Why RapidEye?

The RapidEye constellation consists of five satellites with an orthorectified resolution resampled to five meters. The constellation collects up to 6 million square kilometers a day, making it possible to cover large areas in a short time. Most importantly, the RapidEye sensors contain a unique spectral red-edge band, which is sensitive to detecting and measuring chlorophyll in flora.It is known that the health of any plant depends on a proper supply of nitrogen. Unfortunately, nitrogen levels cannot be measured through remote sensing and require the costly deployment of field technicians to determine. While the red edge band cannot detect nitrogen levels, it can detect chlorophyll levels. Oftentimes, where chlorophyll levels are low, nitrogen levels are also low, identifying these areas using the high-resolution of the RapidEye sensors can pinpoint which specific areas require extra attention on the ground.

Constellation

The RapidEye constellation collects imagery on a daily basis from its sunsynchronous orbit, 630 kms above the earth, with each sensor having the capability to store up to 1,500 kms of imagery. The ground segment includes a receiving station in Svalbard, Norway to store the massive amounts of data collected on a daily basis. Without this archive, country-wide mapping would not be possible.



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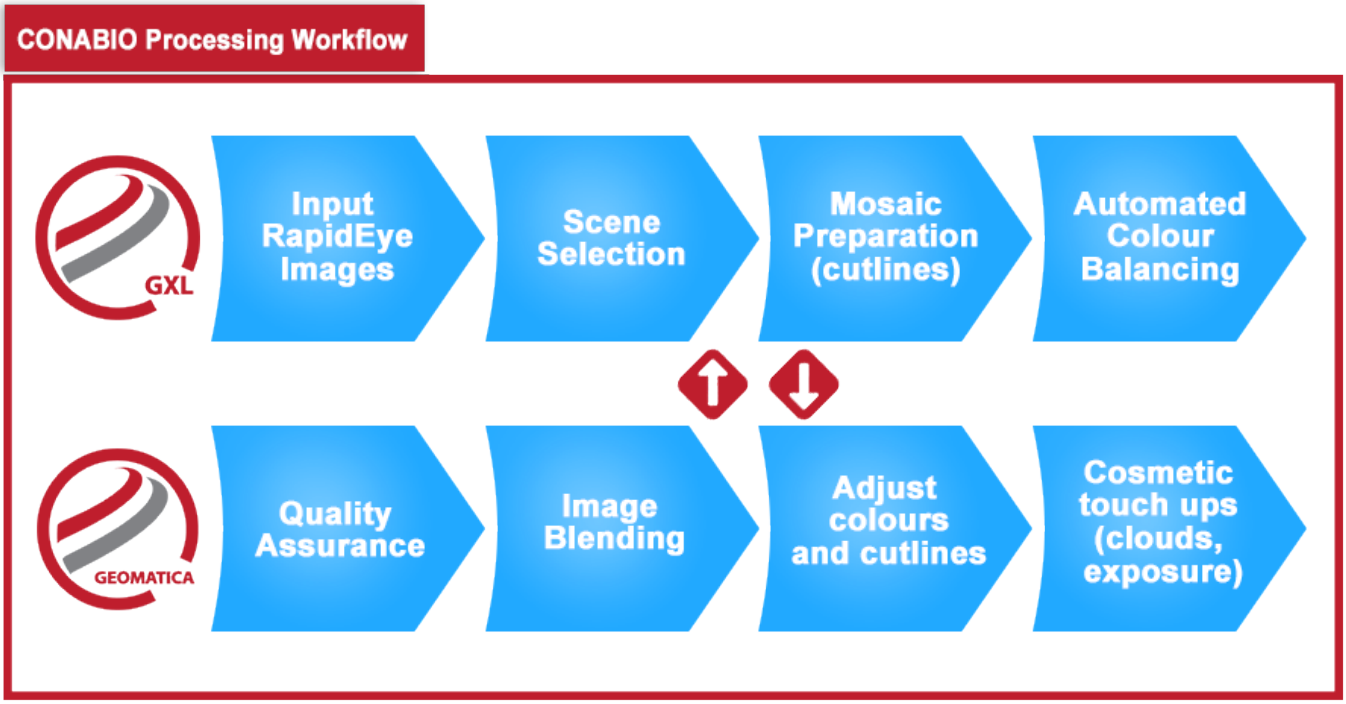
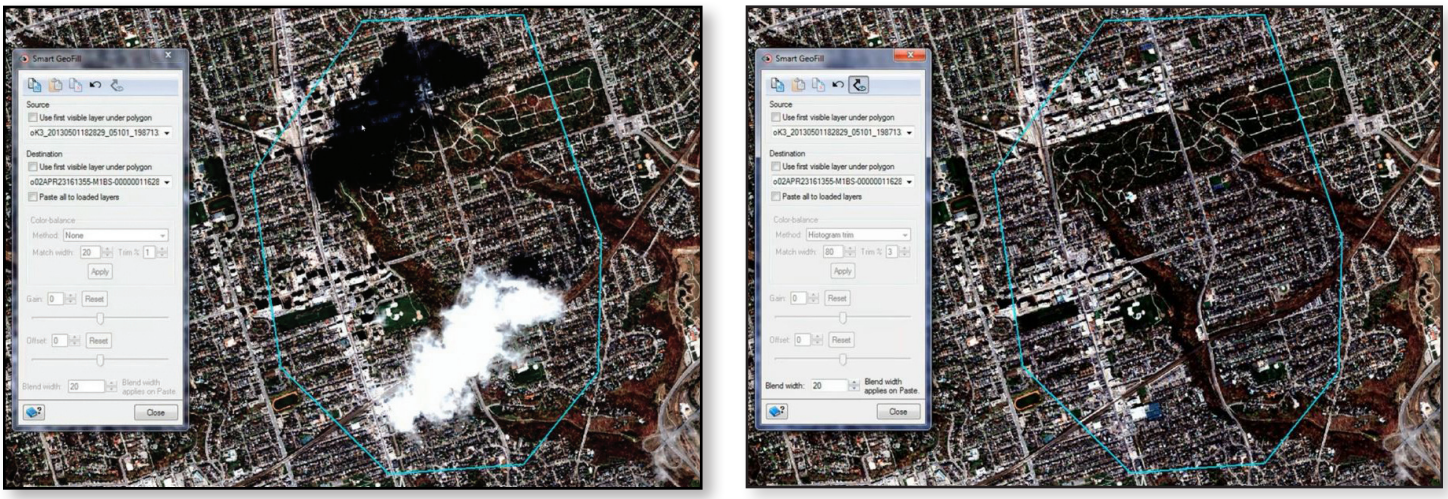
Workflow within GXL and Geomatica

In order to process these large datasets, CONABIO made used of a computer cluster to leverage the parallel processing power and scalability of the GXL system. Narrowing the list of candidate images from 50,000 to 4,500 was achieved through careful evaluation of metadata and the calculation of coverage maps via Python scripts. The workflow then consisted of loading the best candidate images, creating cutlines, automatic colour balancing, and creating the final mosaic. The real power of the workflow was the ability to iteratively process the complete set of images a matter of hours and work in both GXL and Geomatica on an iterative basis until the best result was achieved.



Post Processing - Exposure Correction and Cloud Removal

Through the use of the GXL system, CONABIO was able to produce the mosaic of Mexico and attain very high quality levels through automation. Given that the imagery used in the mosaic is optical imagery, small issues are unavoidable and still require attention to reach the highest level of quality possible. Examples include small clouds, as well as issues with exposure (over or under exposed). Using innovative and intuitive tools in Geomatica CONABIO applied cosmetic touch ups to deal with these problem areas, and easily create cloud-free mosaics.



Using the Smart GeoFill tool, CONABIO was able to paste cloud-free portions of images into the final mosaic.

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Sample results from the completed mosaic - La Paz, Mexico - Cutlines have been optimized, colors adjusted, clouds removed and exposure corrected using a combination of GXL automation and Geomatica for cosmetic touch ups.

Results

The final mosaic that CONABIO has created has been produced in record time - in only a few short months, the GXL system was installed in Mexico City, training was provided, imagery was integrated, and the workflow was executed with GXL and Geomatica to produce the mosaic.

About Conabio

CONABIO was created by the Inter-ministerial Commission of Mexico in 1992 to promote and coordinate knowledge and sustainable use of Mexico's biological richness. It acts as a bridging institution between academia, the government and civil society. The Geomatics division was created in 1998, and makes extensive use of satellite remote sensing to monitor Mexico's biodiversity at a national scale. Find out more at: http://www.conabio.gob.mx.

About PCI Geomatics

PCI Geomatics is a world-leading developer of software and systems for remote sensing, spatial image processing, and photogrammetry. With more than 30 years of experience in the geospatial industry, PCI is recognized globally for its excellence in providing software for accurately and rapidly processing satellite and aerial imagery. There are more than 30,000 PCI licenses, in over 150 countries worldwide. Find out more about PCI Geomatics at www.pcigeomatics.com.

View The Mosaic Online

Click here to view the mosaic

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