Iceland Mosaic

Overview of Procedures

In this assignment the goal was to gain further experience of EASI scripting for the production of a Landsat imagery mosaic. This process required preparation leading up to the final product including unpacking the landsat scenes, combining the desired bands, reprojection, and the mosaicking process.

The study area chosen for this assignment was the country of Iceland; totaling 13 scenes to cover all 103,001 square kilometres. This is a geologically young island with fascinating features such as world renowned fjords, year round glacial caps, and over 30 volcanic systems (Iceland, Wikipedia, 2012) . Iceland also has the distinction of being directly above a plume hotspot and the geologic rift between the Eurasian plate and the North American plate, making it a geologically active area (Geology of Iceland, Wikipedia, 2013).

The 13 Landsat scenes were acquired through the Earth Explorer interface at the USGS website. In this search scenes were sought that fit a number of parameters. Namely, they had to fall within a range of 20 years between 1993 to present, within the months of June through to September, and contain cloud coverage of less than 20% of the total image (which is a challenge the further away from the equator). Once downloaded these scenes were unpacked to a single folder location with an EASI script.

To create PIX files of these scenes the desired bands had to be transferred from their location in this folder to an empty PIX file. This step was also completed using scripting, though two versions were created. For a comparison a true colour representation was considered that would retrieve bands 3,2,1; while a false colour composite was also compiled that used bands 7,5,4. The false composite with infrared bands was a conscious effort to choose wavelengths that would be the best at penetrating atmospheric conditions, which became a concern when trying to select images with limited cloud cover.

Once the PIX files were created they were then reprojected using the REPROJ command in EASI. The choice of the output coordinate system was carefully considered to best represent this land mass. For instance the maintenance of an accurate coordinate system is difficult for Iceland whose tectonic plates are moving apart at an annual drift of 1 cm. Any high precision points for a country wide network are fraught with deformation due to plate tectonics, earthquakes and volcanic eruption (Valsson, 2011). Therefore the Iceland projection ISN2004 was used for this reprojection. It is a local system that takes these matters into consideration; including the integration of a semi-dynamic datum that was originally developed for use in New Zealand and Japan, countries also faced by active geological features.

The final script in this process was reserved for the mosaic procedure. The main command used was AUTOMOS, the parameters of which ranged from input and output location to types of colour balancing and cutline methods. For this script the input files and the output mosaic were not hardcoded into the script, instead it required this information as user inputs when running the script. That way the mosaic script could be used for other file sets that might have been prepared differently, or for this assignment differing locations for true color and false colour PIX. There are however two final versions of the mosaic script that were utilized. One creates a mosaic without any colour balance information and is still very much applicable to any PIX dataset (figures 2 & 3). The other requires another user input as it uses an adaptive method of colour balancing with reference to a specified image. This proved to be the best method as an exemplary scene with limited atmospheric conditions and a variety of land features could be chosen from the set as the reference to adjust the others. The results of this are seen in figure 1, which has produced a slightly more coherent and almost more detailed result.

	Acquisition Date	Landsat Scene	Path	Row	Source	Spatial Resolution	Image Swath	Temporal Resolution	Spectral Range
Scene 1	5-Jun-2000	LE71501420000157EDC00	215	14	Landsat 7	30 m (60 m - thermal, 15-m pan)	183 km	16 days	0.45 - 12.5 μm
Scene 2	16-Sep-2000	LE71601520000260AGS01	216	15					
Scene 3	23-Sep-2000	LE71701520000267EDC00	217	15					
Scene 4	26-Jun-2000	LE71801320000178EDC00	218	13					
Scene 5	9-Aug-2001	LE71901420001251EDC00	219	14					
Scene 6	19-Sep-2000	LE72210142000263AGS00	221	14					
Scene 7	19-Sep-2000	LE72210152000263AGS00	221	15					
Scene 8	6-Jun-2000	LE72220132000158EDC00	222	13					
Scene 9	30-Aug-1994	LT52170141994242KIS00	217	14	Landsat 5	30 m (120 m - thermal)	185 km		
Scene 10	30-Aug-1994	LT52170151994242KIS00	217	15					
Scene 11	15-Sep-1994	LT52170161994258KIS00	217	16					
Scene 12	12-Aug-1994	LT52190151994224KIS00	219	15					
Scene 13	24-Jul-2006	LT52230142006205KIS00	223	14					

Data Sources

Vectors derived from Natural Earth 1:10m http://naturalearthdata.com
Landsat Imagery obtained through the U.S. Geological Survey Earth Resources Observation & Sciences Center (EROS) http://earthexplorer.usgs.gov

PCI Geomatica 2012, EASI and Focus for generating imagery. ESRI ArcMap 10.0 and CorelDRAW X6 for poster design.

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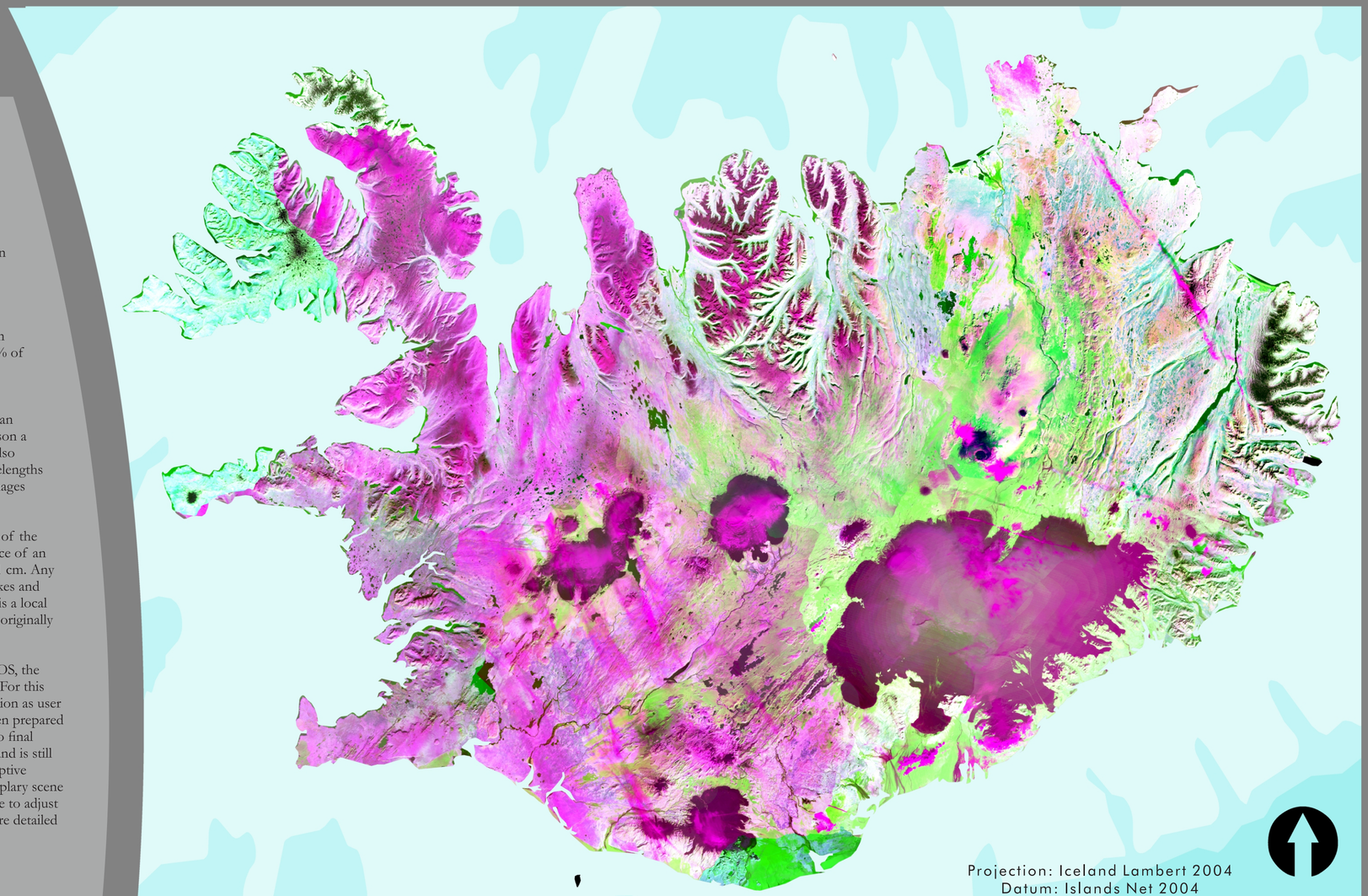

Figure 1. False colour composite 7,5,4 with adaptive colour balance in reference to an image.

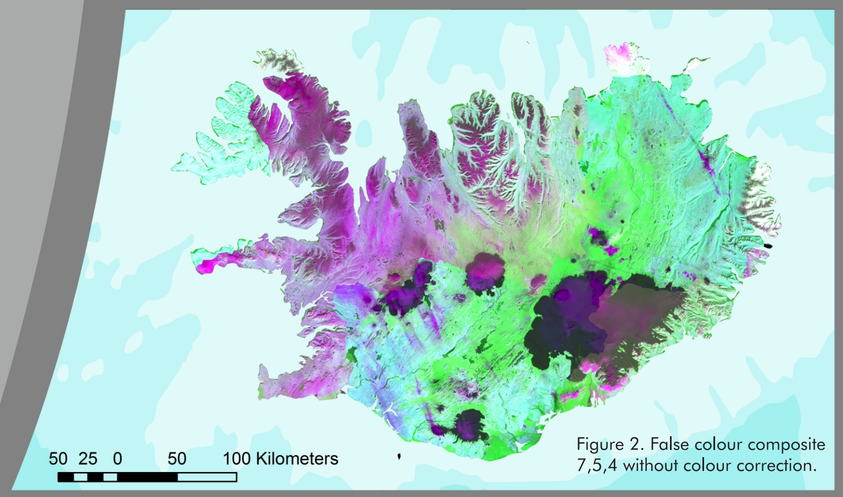

Figure 2. False colour composite 7,5,4 without colour correction.

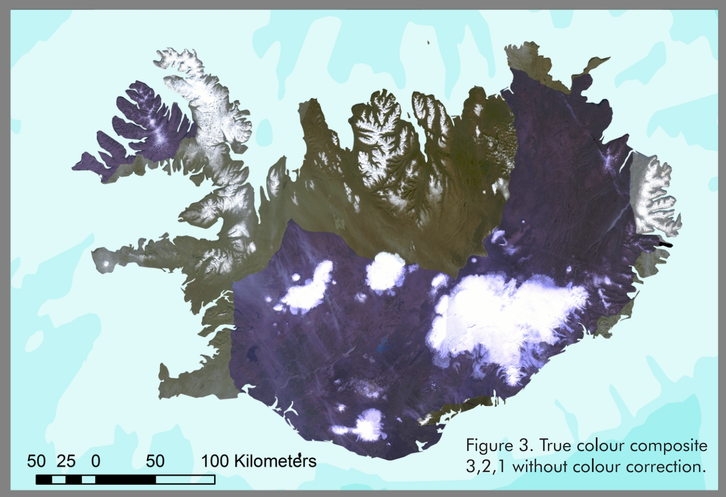

Figure 3. True colour composite 3,2,1 without colour correction.