

## Rock Outcrop Normalized Difference Ratio

This ratio is a normalized difference ratio of Landsat 7 ETM+ bands 5 (SWIR) and 2 (VIS-green) to identify limestone outcroppings. Limestone and dolomite have greater reflectance in band 5 relative to band 2, while andesite and other igneous materials have greater reflectance in band 2 relative to band 5. This ratio can essentially be used to distinguish sedimentary from igneous parent material.

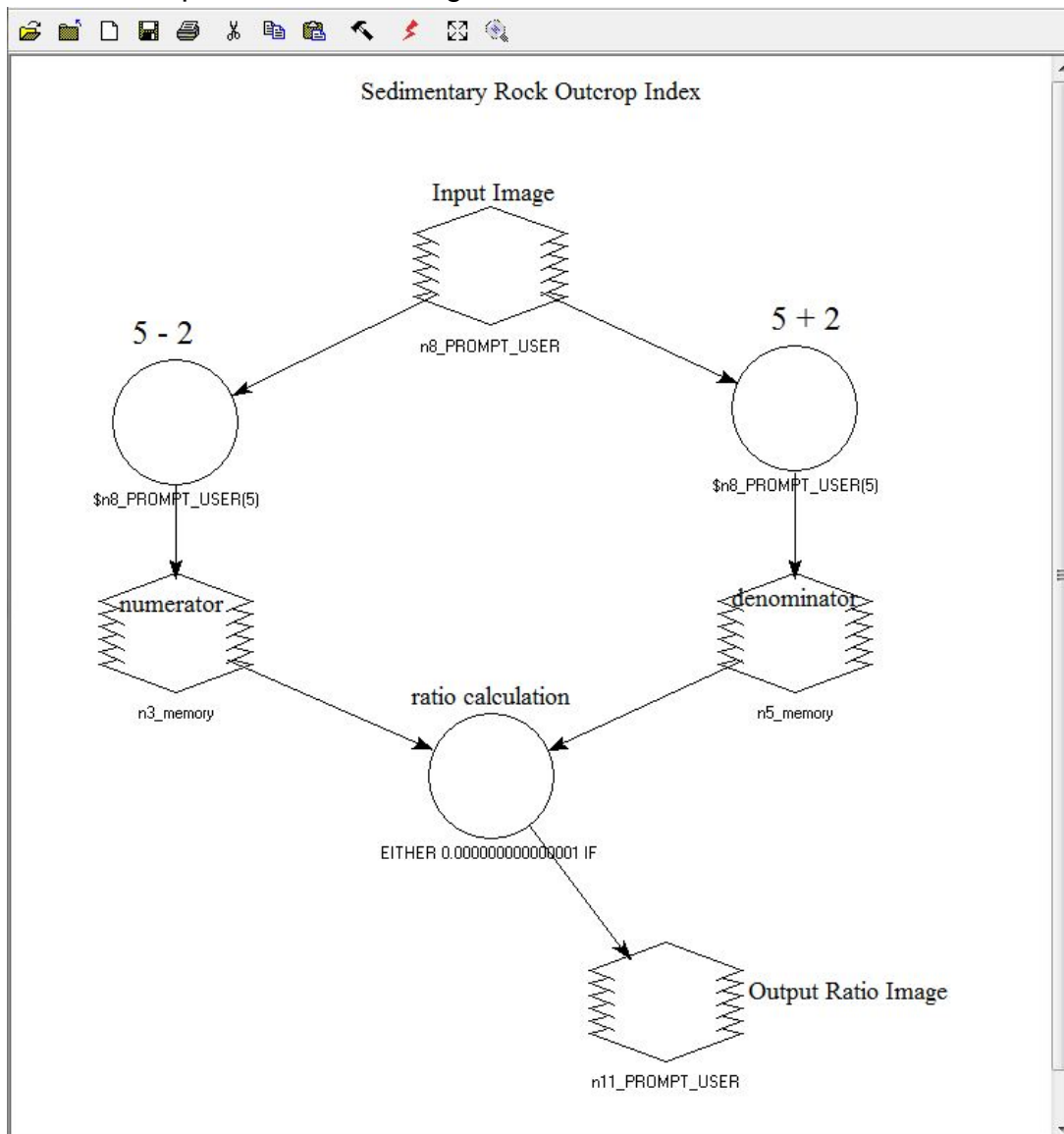
**File:** rock\_outcrop\_5\_2.gmd (ERDAS Imagine Model Maker model, v. 2014 and prior)\*\* OR  
rock\_outcrop\_5\_2\_modeler.gmdx (ERDAS Imagine Spatial Modeler model, v. 2013 and later)\*\*

**Input:** Landsat 5 or 7 image containing at least bands 2,5\*

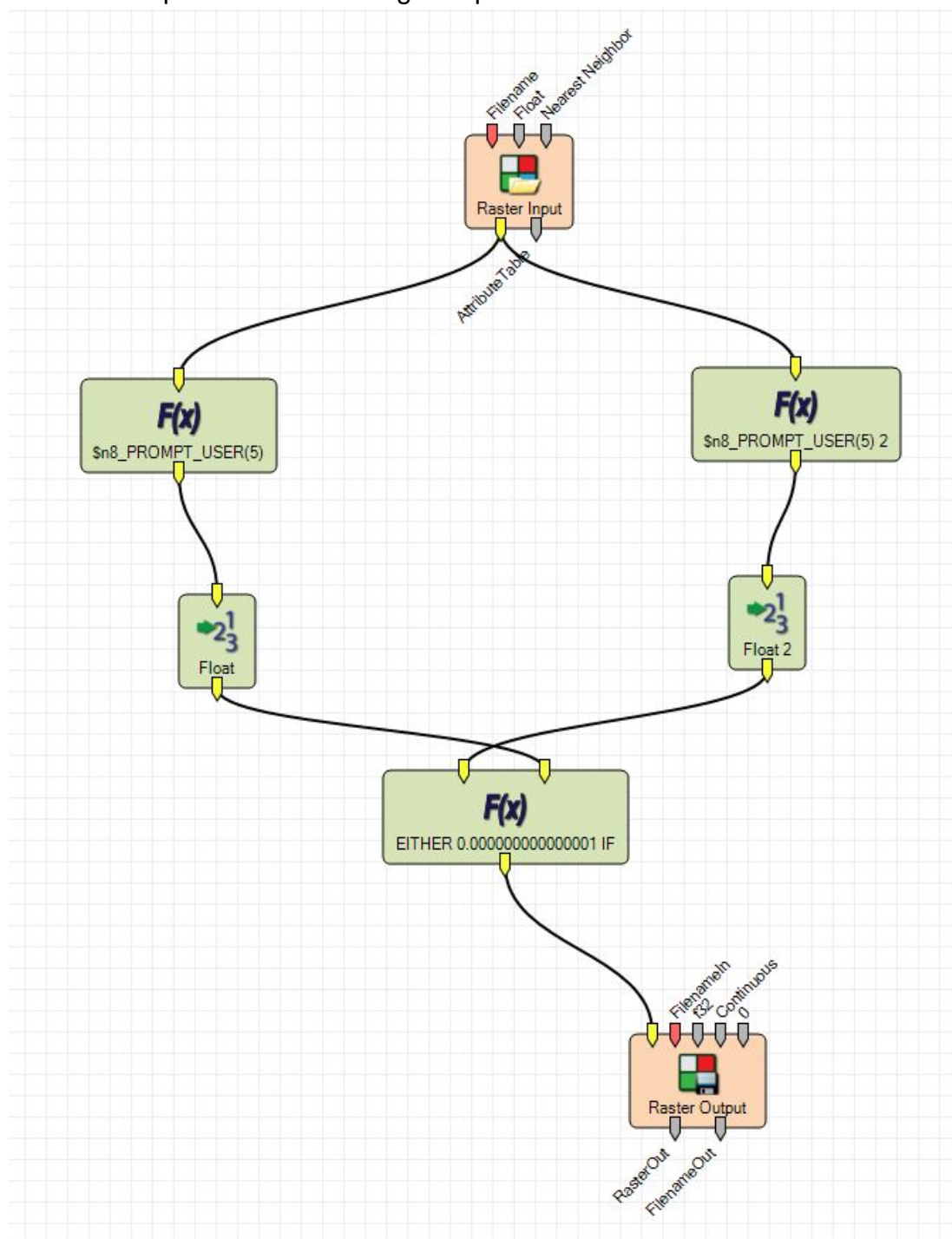
**Output:** single layer image with data values ranging from -1 to 1; Pixels with higher values can be interpreted as pixels with higher possibility of limestone or dolomite influence and pixels with lower values can be interpreted as pixels with higher possibility of igneous material influence.

You will be prompted for the input image, and to name the output image.

The model open in ERDAS Imagine Model Maker:



The model open in ERDAS Imagine Spatial Modeler:



Example normalized rock outcrop ratio output image over hillshade. Bright pixels with higher pixel values can be interpreted as areas with a higher possibility of limestone or dolomite influence and dark pixels with lower values can be interpreted as areas with higher possibility of igneous material influence:



**Reference:** Bodily, J.M., 2005. Developing a digital soil survey update protocol at the Golden Spike National Historic site. M.S. Thesis, Utah State Univeristy, Logan.

\*Remember ratios must always be calculated on images which have had an atmospheric correction or image standardization applied. Resources for image standardization:

<http://earth.gis.usu.edu/imagestd/>

\*\* ERDAS Imagine Model Maker files (.gmd) can be opened in ERDAS 2014 and all previous versions of Imagine using Model Maker. Starting with ERDAS 2013, the ERDAS Imagine Spatial Modeler is available and requires the .gmdx file type. The results produced by the model should be the same for either model interface. At some version after 2014, the Model Maker and .gmd files will be obsolete.

While these ratios were developed for Landsat bands, they could be modified and used with data from any sensor with bands capturing the same part of the electromagnetic spectrum as the indicated Landsat bands.

<b>Enhanced Thematic Mapper Plus (ETM+)</b>	<b>Landsat 7</b>	<b>Wavelength (micrometers)</b>	<b>Resolution (meters)</b>
	Band 1	0.45-0.52	30
	Band 2	0.52-0.60	30
	Band 3	0.63-0.69	30
	Band 4	0.77-0.90	30
	Band 5	1.55-1.75	30
	Band 6	10.40-12.50	60 * (30)
	Band 7	2.09-2.35	30
	Band 8	.52-.90	15