

Image: <http://www.landsat.org>

Soil Line & Vegetation Indices

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Geography 581

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- Like many mathematical image manipulations, image division simply shows us parts of the image that were not previously visible.
- It's not science, it just shows something different.

Image Division

With topographic features, one object's radiance can be different in two different locations, due in part to Lambert's cosine law (see ch. 1)

Same object, vastly
Different reflectance

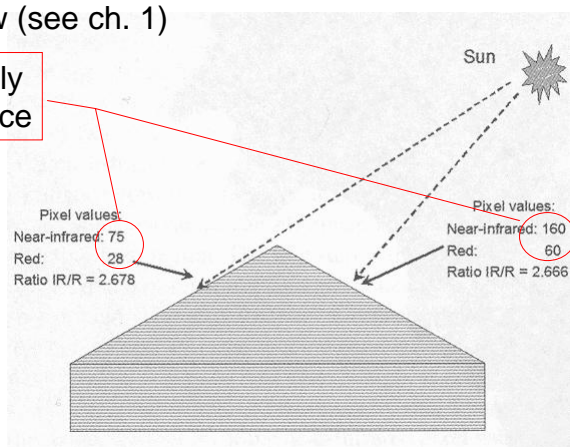
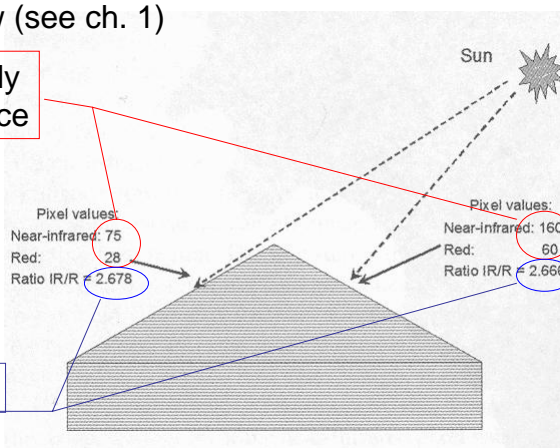


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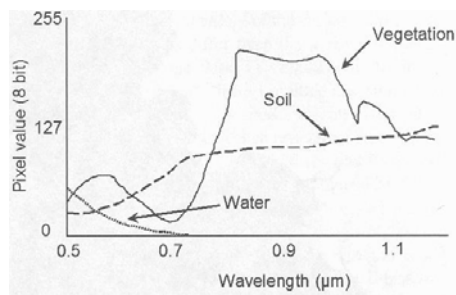
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The ratio remains close

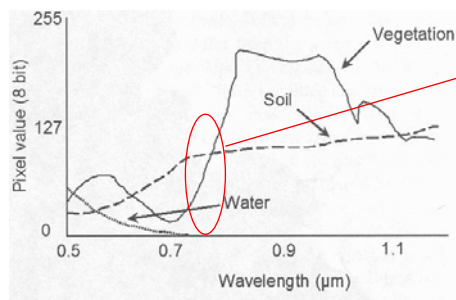
Soil and Vegetation Characteristics

- Soil and vegetation have very distinct reflectance curves.



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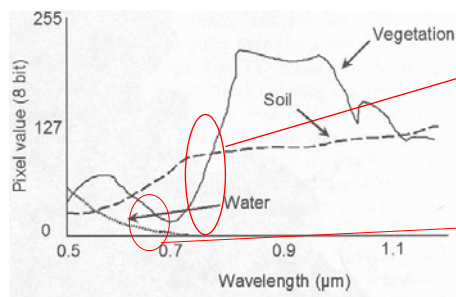
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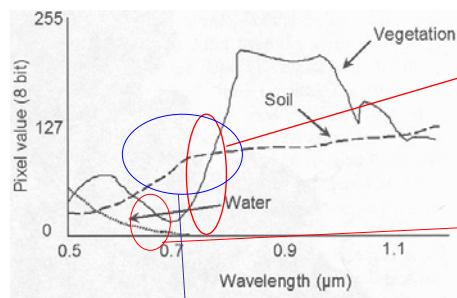


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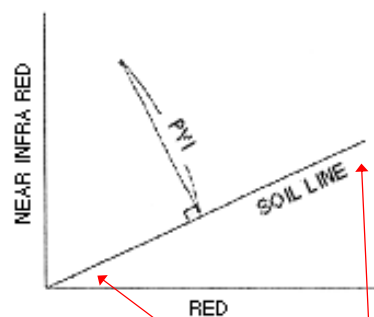
Soil stays relatively linear.

Soil line

- In a NIR:Red plot, soil's reflectance is a straight line, which indicates the line where the vegetation begins.

Vegetation, as discussed earlier, gains significantly in the NIR, but descends in the Red

PVI is a measure of the distance of a pixel from the soil line.



High soil moisture

Low soil moisture

Vegetation Indices

- RVI= NIR:Red ratio transformation
values from 0 to infinity
- NDVI- Normalized Difference Vegetation Index
 $(NIR-R)/(NIR+R)$
values from -1 to +1
-NOT affected by absolute pixel values.
- Visually similar, but NDVI easier to work with because of finite value limits

Vegetation Indices

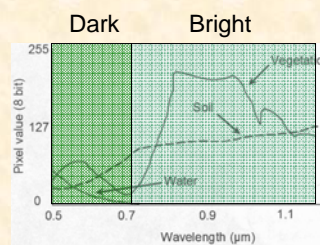
- If Images transformed by vegetation indices are to be used for display purposes, the values will need to be scaled, giving -1 a value of 0 ranging to +1 at a value of 255. (for NDVI)
- This allows two images taken at different times to be analyzed together.

What bands should we ratio to reduce albedo effect and shadows?

- Assuming we want the vegetation to stand out, we should ratio a “bright” band with a “dark” band.

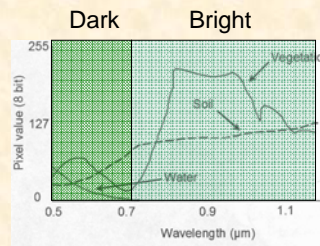
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- TM- TM4/TM3 is traditional
- MSS- MSS7/MSS5 is traditional



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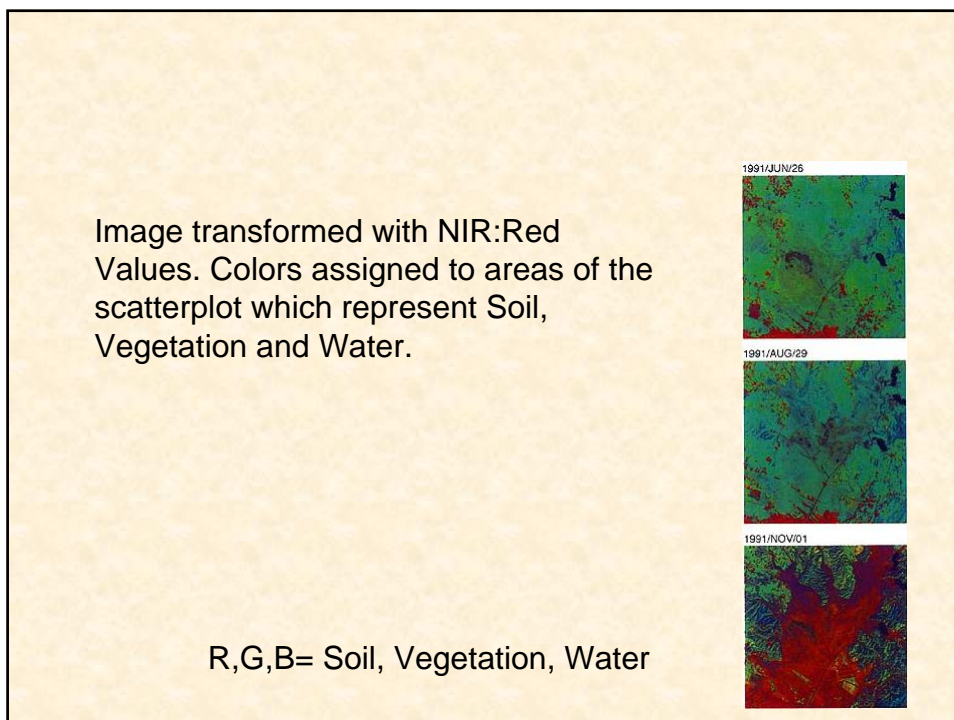
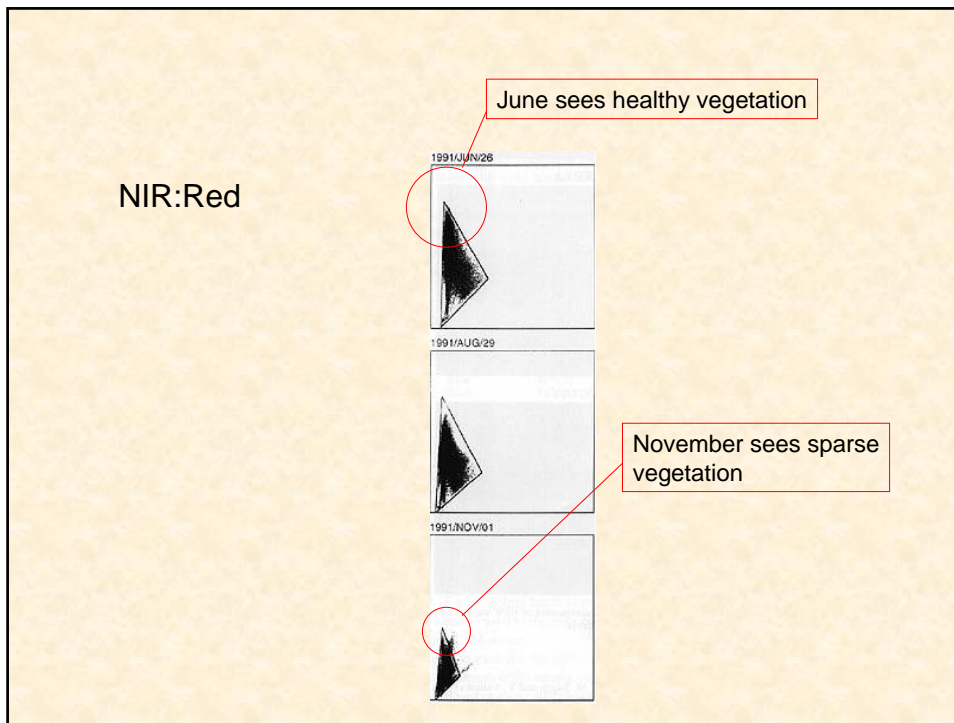
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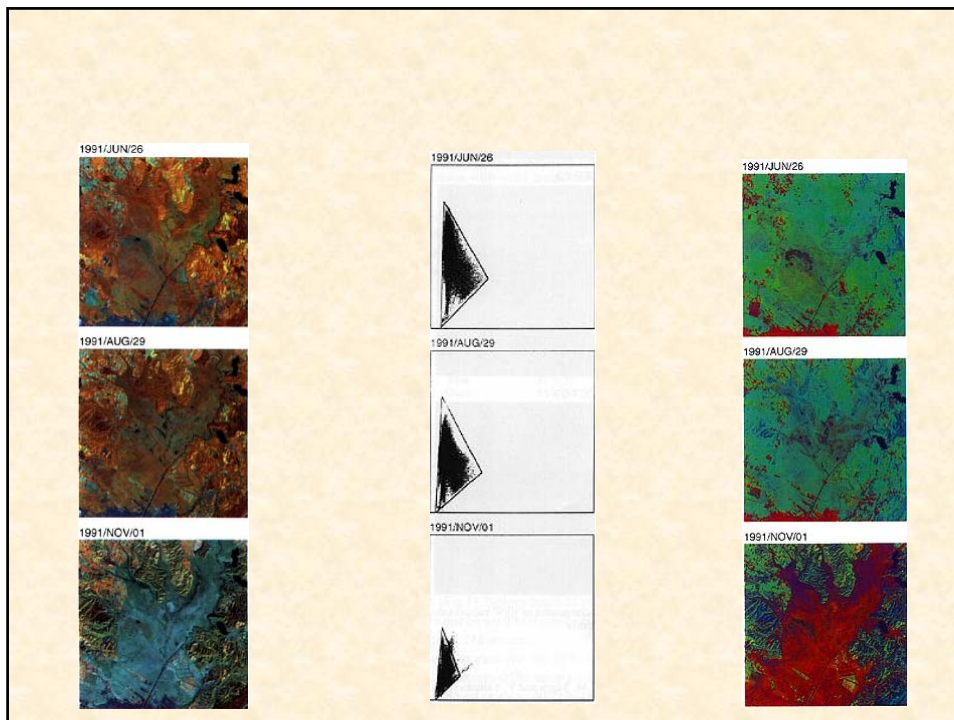
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- RVI is rarely used, having been replaced for the most part by Kauth-Thomas' Tassled Cap.
- Understanding basic Vegetation indices **does** help to solidify the concept of the soil line.



Kushiro Mire, Japan.
R,G,B= TM4,5,3





References

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<http://hyperdaac.webthing.com/html/rsvegfaq.txt>