

Preston Hudlow

GEOG 419

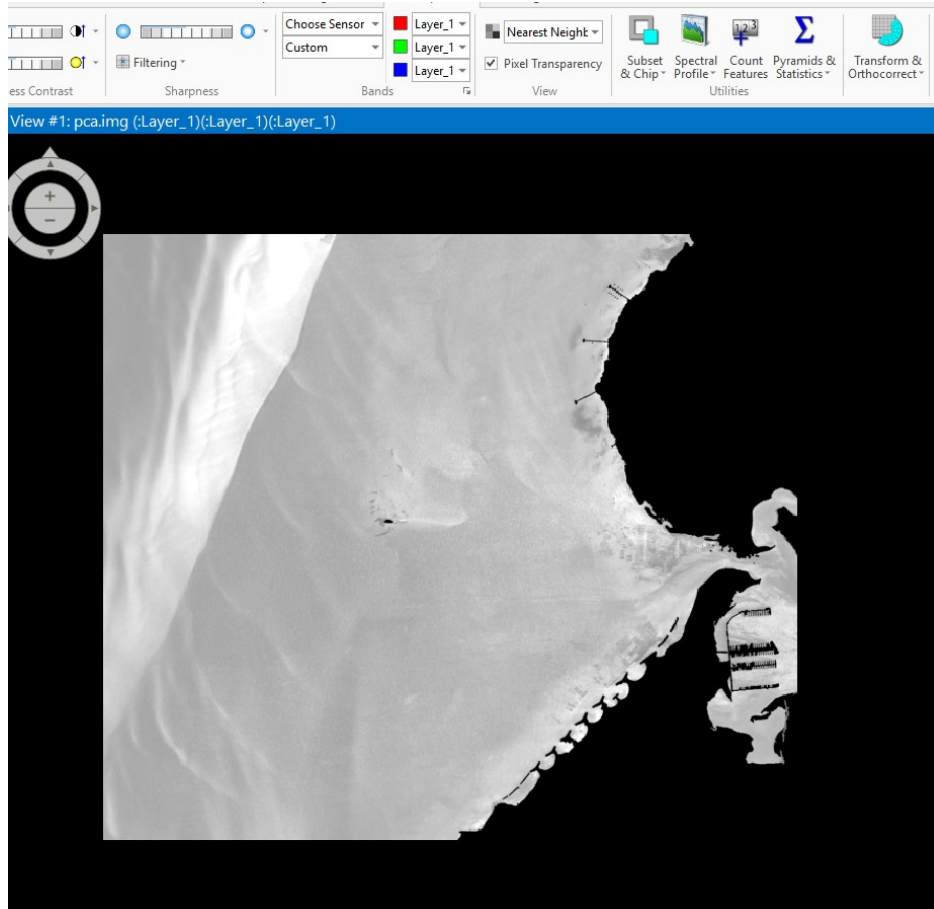
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## Lab 2: Multispectral PCA and Predicting Depth from Reflectance Data

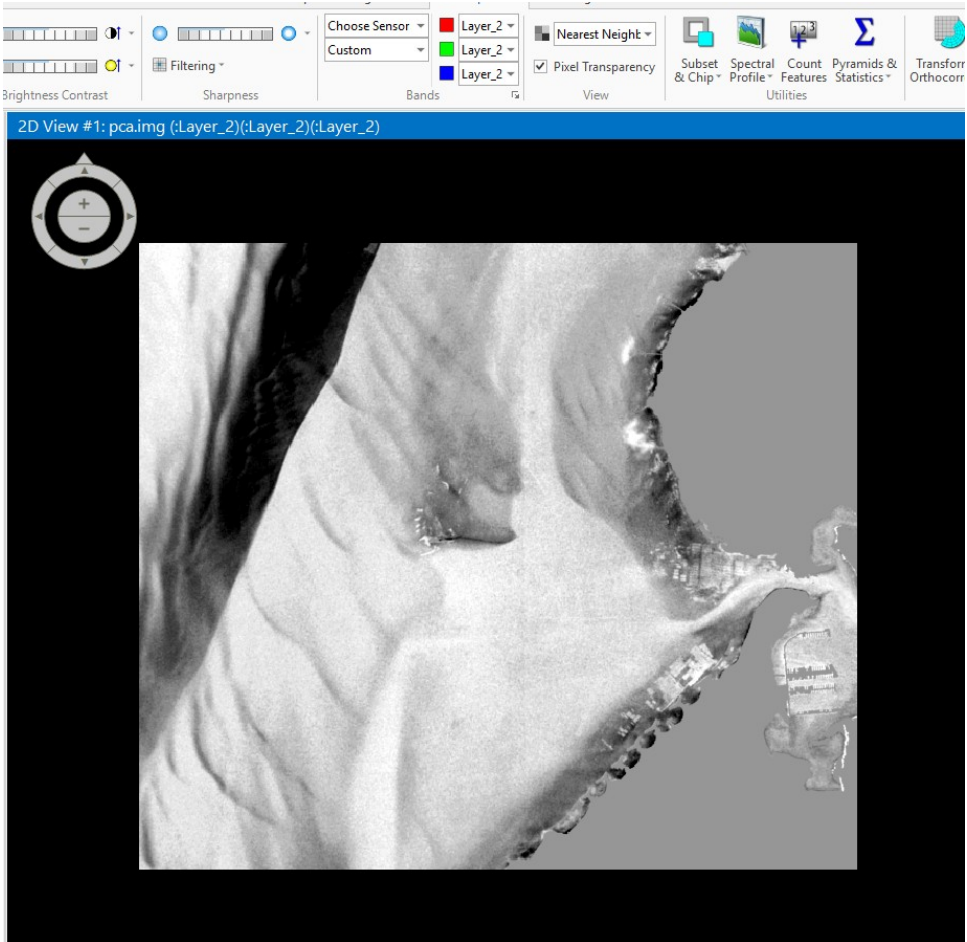
### Q1-2:

- **PC1:** Highlights overall brightness variations, likely corresponding to depth.

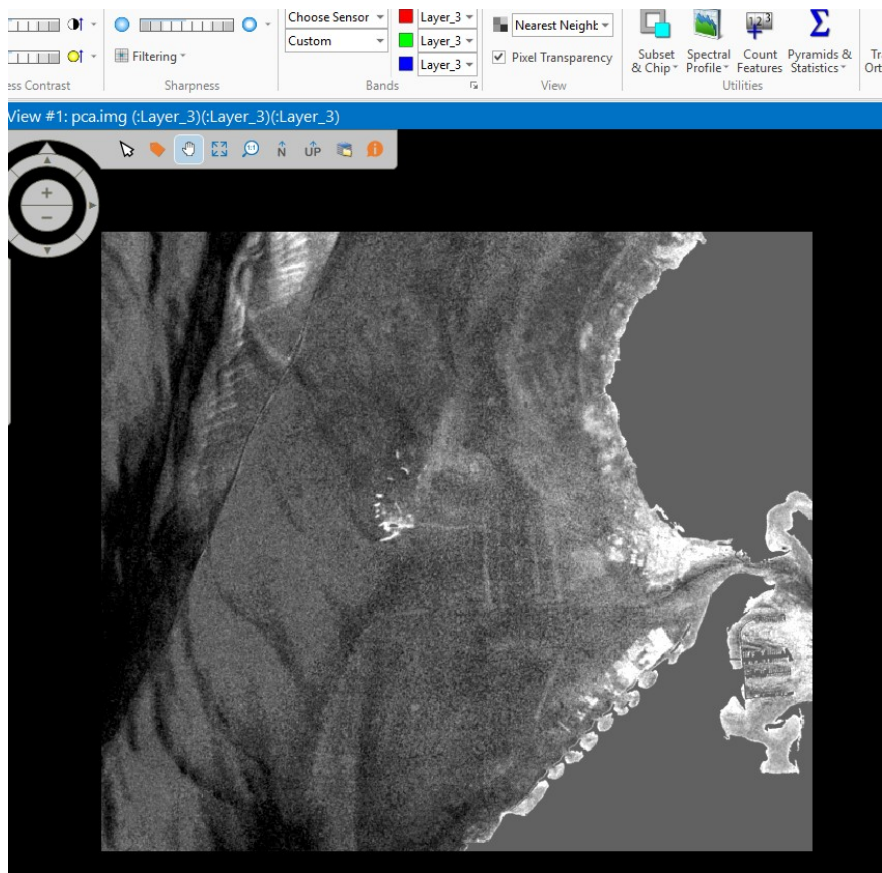


Bright in this PC2 in SF

- **PC2:** Shows contrast variations, which may relate to depthless showing very bright in deep areas.



- **PC3:** Contains variance like texture differences from bottom type features.



good

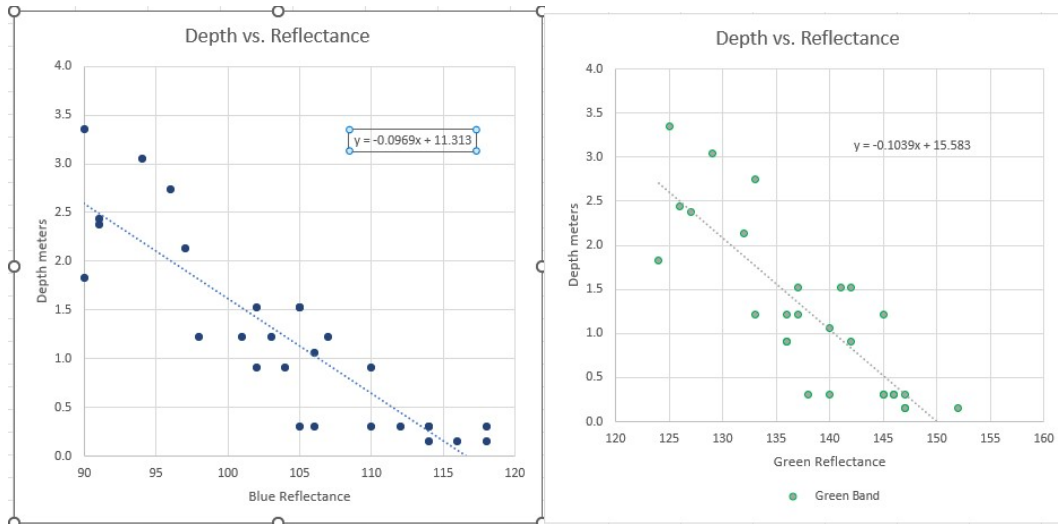
**Q3:** PC1 contains the most variation (99.3%), while PC3 contains the least (0.0008%). PC3 may still contain details like by providing a strong contrast which helps show spatial patterns.

**Q4-5:**

- **PC1:** Likely represents depth, as it explains most variance. Shallow areas have a high contrast.
- **PC2:** Likely relates to bottom type and depthless, capturing variations independent of depth and small-scale textural differences. The deeper the water the higher contrast.
- **PC3:** Likely relates to bottom type, capturing variations of small-scale textural differences.
- Yes, this agrees with F. Khan et al. (1992) as they analyzed principal component analysis (PCA) results from remotely sensed imagery and found that the first principal component (PC1) primarily represented depth, while the second principal component (PC2) corresponded to bottom type.

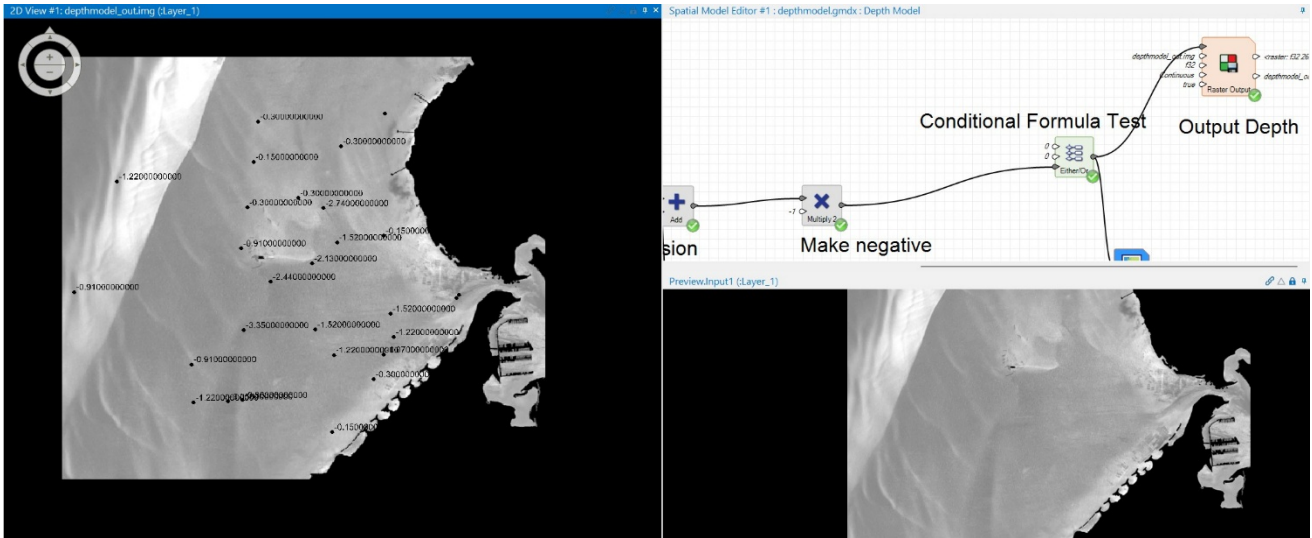
### Q6-7:

- Blue reflectance has a stronger correlation with depth than green, likely due to its deeper penetration by using shorter wavelengths. This meets expectations and has a higher R-value when it comes to determining depth.
- Green still provides useful information but is more influenced by bottom type and does not penetrate as far.
- The inverse relationship confirms that deeper areas reflect less light.



### Q8-9:

- The depth model effectively captures major bathymetric features, such as channels and sandbars.
- Performance in untested areas (e.g., creek and aquaculture beds) varies, likely due to substrate differences or mixed pixels but is relatively close to its adjacent pixel.
- Shallow areas near breakwaters are well represented due to better light penetration



**Q10:**

- Manual processing provides more control and understanding but is time-consuming.
- Graphical modeling is more efficient, making it preferable for large-scale analysis.