A19: Estimating Fire Severity with the difference Normalized Burn Ratio (dNBR)

Your results should be delivered as an HTML webpage generated using R Markdown or Quarto. Make sure to include all code and results. Provide text to describe your methods and results. This should read like the Methods and Results sections of a paper.

Grading Criteria

- Correctness and completeness of code (16 Points)
- Description of process and results (12 Points)
- Map layouts (8 Points)
- Webpage formatting (4 Points)

The 2016 Sand Fire occurred in the Angeles National Forest east of Los Angles, California. It began on July 22, 2016. The fire was not contained until August 3, at which point it had burned an estimated ~35,000 acres. You have been provided with two Landsat 8 Operational Land Imager (OLI) scenes. These data were collected at a 30 m spatial resolution and have the following band designations: Band 1 = Blue Edge, Band 2 = Blue, Band 3 = Green, Band 4 = Red, Band 5 = NIR, Band 6 = SWIR1, Band 7 = SWIR2. The pre-fire scene (**sand_fire_pre_4_17_2015.tif**) was collected on April 17th, 2015 while the post-fire scene (**sand_fire_post_4_12_2017.tif**) was collected on April 22nd, 2017. These data have been processed to surface reflectance. Use these data to calculate the normalized burn ratio (NBR) pre- and post-fire and difference normalized burn ratio (dNBR).

$$\text{Normalized Burn Ratio (NBR)} = \frac{NIR - SWIR2}{NIR + SWIR2}$$

$$\text{difference Normalized Burn Ratio (dNBR)} = \text{Pre-Fire NBR} - \text{Post-Fire NBR}$$

Reclassify the resulting dNBR values into burn severity categories as represented in the following table.

Unburned	< +.1
Low Severity	+.1 to +.27
Moderate Severity	+.27 to +.66
High Severity	> .66

Create a single layout that includes the following maps. Make sure to include useful legends for maps 3 through 6.

1. Pre-fire image using the following false-color composite (Red = SWIR2, Green = NIR, Blue = Green)
2. Pre-fire image using the following false-color composite (Red = SWIR2, Green = NIR, Blue = Green)
3. The pre-fire NBR
4. The post-fire NBR
5. The dNBR index result
6. The classified dNBR result