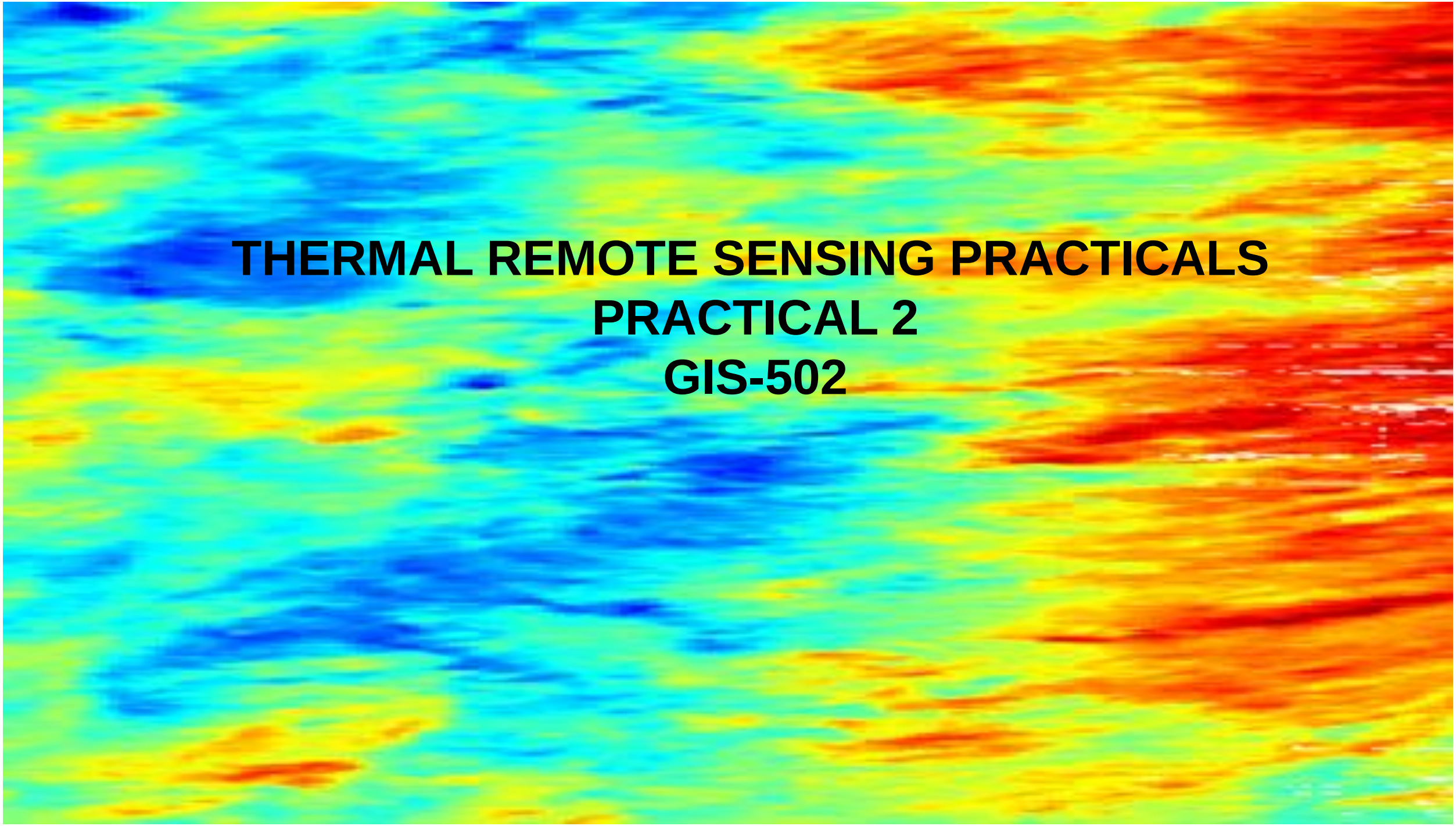
THERMAL REMOTE SENSING PRACTICALS
PRACTICAL 2
GIS-502

The purpose of the project is to get familiar with the theory and use of thermal images for different purposes, relate to fundamental law of remote sensing, and test different methods of visualizing the data. In the first part of the project we will study different thermal images (LANDSAT, MODIS, VIIRS, NOAA AVHRR) for examining relative temperature difference

Open the EarthExplorer and find LANDSAT 8 images of:

A) The ocean of the Indian Penninsula. As cloud free as possible.

B) The eruption in Holuhraun, NE Iceland. At least the vents and lava should be cloud free.

(Here is information on the eruption:

https://www.nat.is/travelguideeng/plofin_holuhraun.htm)

Download the images in full resolution, .tiff format (LEVEL 1 GEOTIFF)

Unzip and save to a folder on the desktop of the computer (you can move to your folder later).

2. Open ArcGIS and import the images, all bands.
Join the bands together by selecting Windows-Image analysis and in the new window, select bands 1-7 of each image (should appear blue on the list once selected) and then select Processing: Composite bands.
If your image is relatively new, you can also select the MTL file that has bands 1-7 already selected.

3. Try different band combinatins for your images, Natural colour (4-3-2), IR (5-4-3), false colour (7 - 5 - 3) and (7 - 6 - 5). You might have to use stretch (Properties, Symbology, Stretch)

Relate what you see to wavelengths of individual bands (from various tables) and the laws of Wien and Stefan Boltzmann. Think about which band combinations work best to study the lava and why? Keep in mind that the lava can be up to 1200°C What works best for the other region? This will be covered as well in the lecture on thermal remote sensing.

4. Now study bands 10 and 11 in particular, and try different stretching methods

Right hand click on the image name on the left hand side, select SYMBOLOGY and then STRETCH: TYPE and try different methods and see how the images changes. Note that you can also invert the scale – which is often done for thermal images to make cold things look white. Just be sure to remember what you do – in order for the interpretation to be correct…

In order to enhance the difference between water masses in the waters of Indian peninsula, try linear stretch STRETCH – CUSTOM – then open Histogram and drag the lines to select a part of the histogram to enhance. Try to use the grey scale as well as possible for this temperature difference, and then change the colour scheme to red-blue instead of black-white.

GIVE YOUR INTERPRETATION
Relate the thermal laws