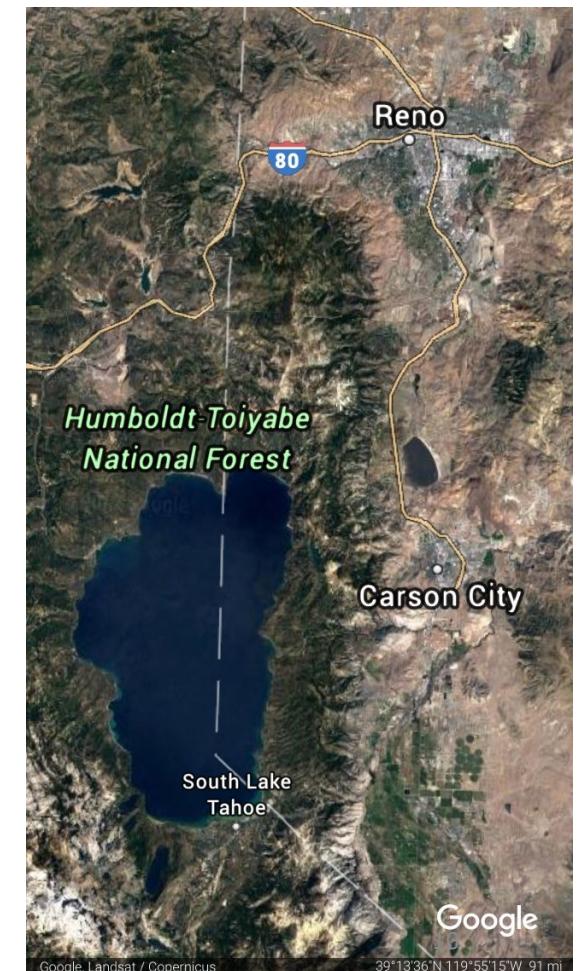


Application: Lake or not Lake

Lake detection in MODIS thermal images around Lake Tahoe

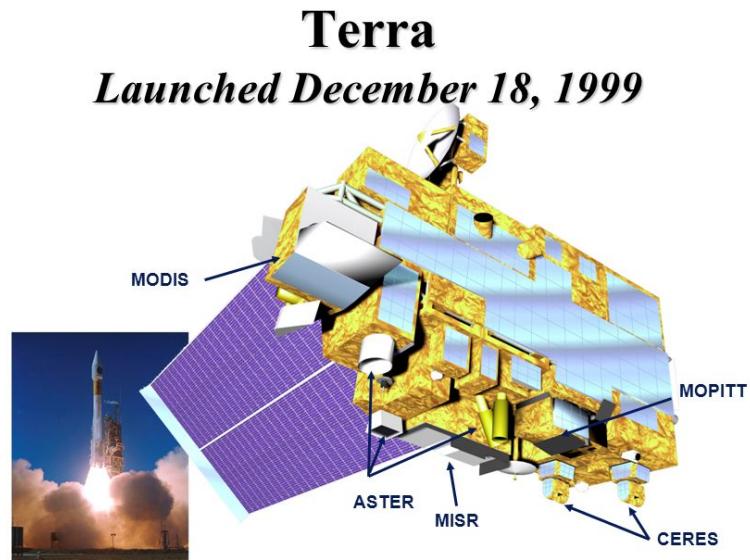
Lake Tahoe (California)



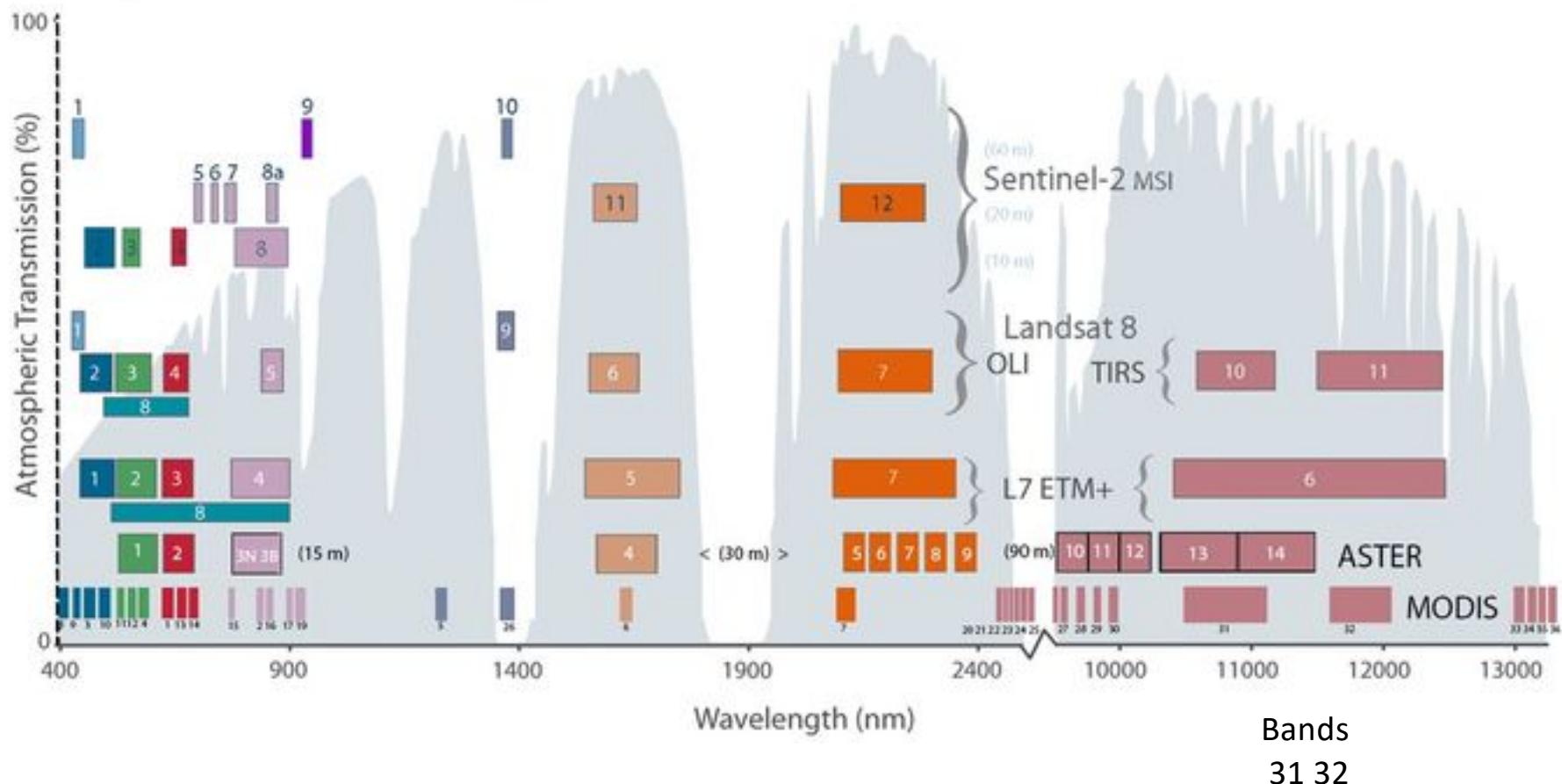
MODIS/Terra (1999)-Acqua(2002)



- Moderate-Resolution Imaging Spectroradiometer
- Since 1999 ! NASA EOS/JAPAN
- Polar orbit 705 km, Noeud descendant à 10:30 (Terra), ascendant 13:30 (Acqua)
- 10 bands between 6.5 and 14.4 μm
- 1 km spatial resolution, 1-2 days revisit time
- Atmosphere, Land, Oceans/ water cycle
- Provides operational products of both LST and emissivity.
- <https://modis.gsfc.nasa.gov/>
- <https://earthdata.nasa.gov/>



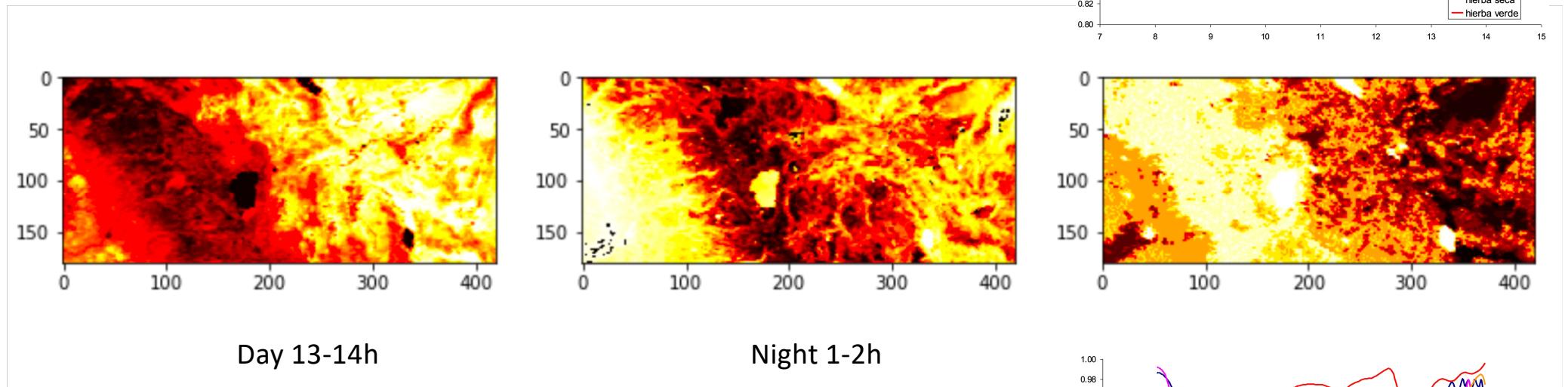
Comparison of Landsat 7 and 8 bands with Sentinel-2



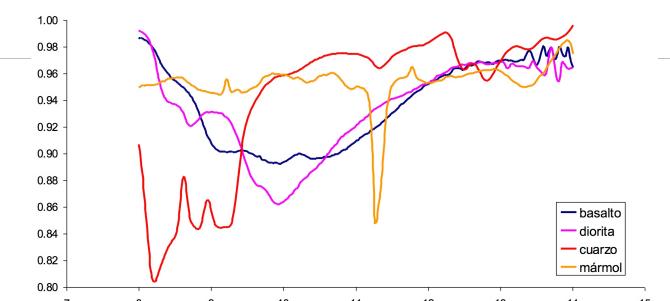
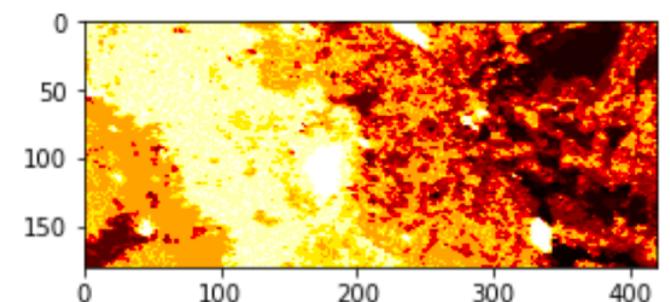
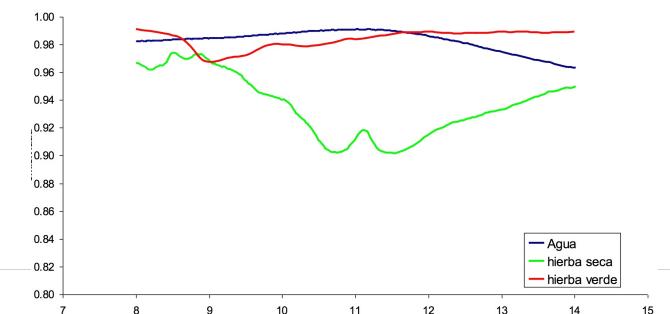
Manipulating Raster data: Rasterio

- GDAL= Geospatial Data abstraction Library (in C)
- Rasterio = idem but more Pythonic
(<https://rasterio.readthedocs.io/en/latest/intro.html#philosophy>)
- Model of data = dataset object
(<https://rasterio.readthedocs.io/en/latest/quickstart.html>)
- Access to data & GeoTiff information: number of bands, image band dimension, georeferencing (coordinate reference system, transformation matrix, ...)
- Geometric transformation

Land Surface Temperatures



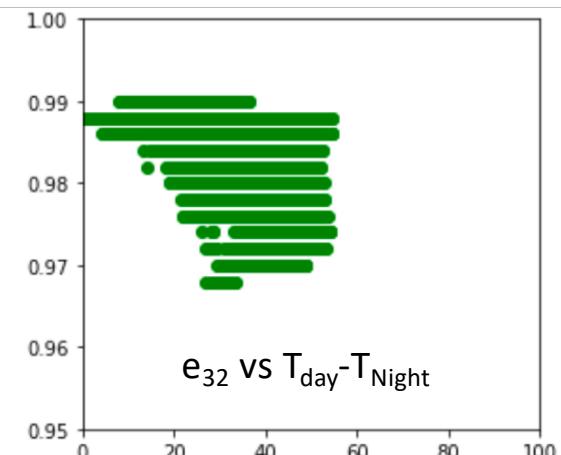
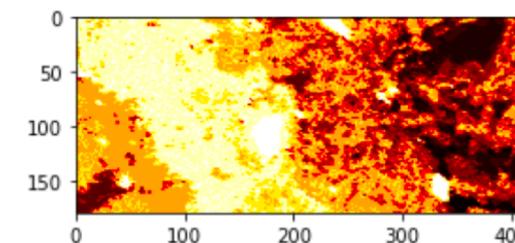
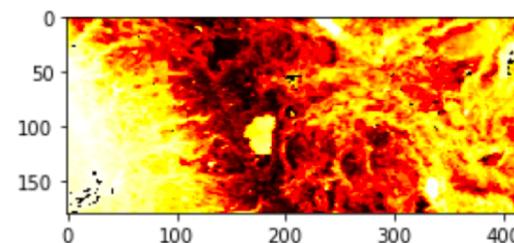
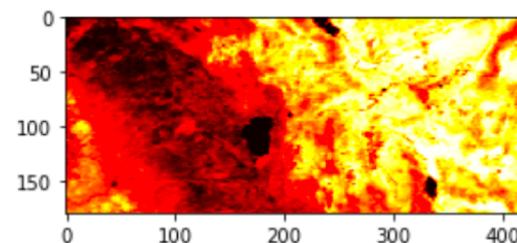
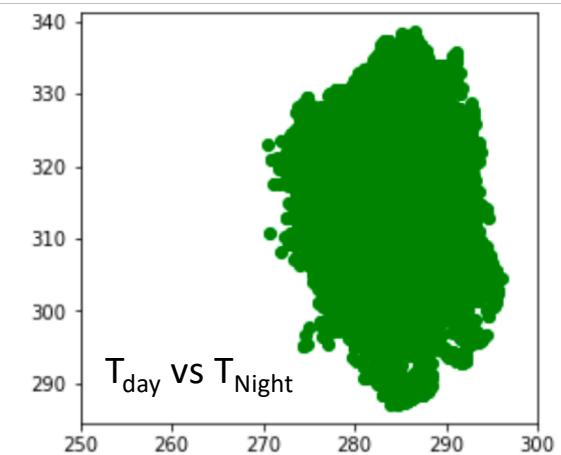
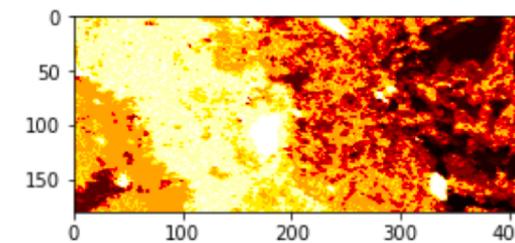
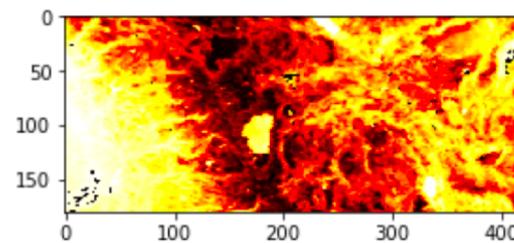
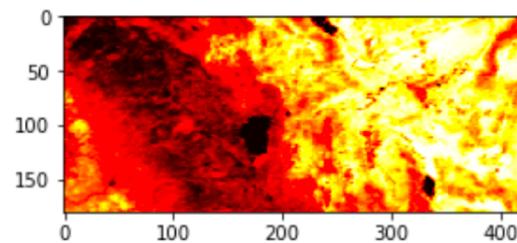
Features= temperatures and emissivity in bands
Difference in thermal inertia
Difference in emissivity
Understand the data, keep an eye on physics



Where are the lakes here ?



Features for the classification



Preparing and importing labels

- Labels Y_i for the learning dataset
- For each pixel in an image: Lake=1, not Lake=0
- A priori knowledge to import: may be a long, delicate, approximative...task
- Vector shapefiles on raster with QGIS
- Import shapefiles of lakes in raster mode with fiona

