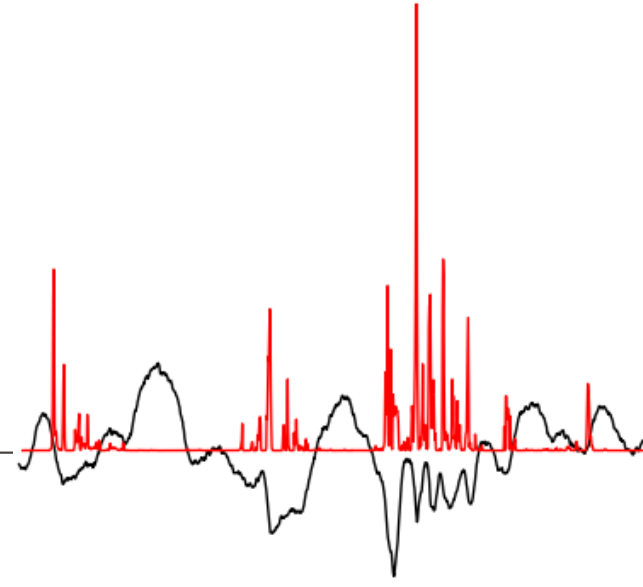
MACHINE LEARNING FOR ENERGY AND CLIMATE

< Projects >



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Main guidelines

Schedule

- Quick presentation: Nov 8th.
- Final project presentation: December 13th.

One problematic, One dataset, One (or more) method(s)

- Quality of the dataset is key
- Results on a clean notebook
- Explain which method(s) you used and why.
- If a method fails, explain why

Project: VRE assessment and forecast

Project objectives:

- Assess the onshore wind or solar photovoltaic hourly production over in metropolitan France regions using climate data and capacity factor observations.
- Predict the Variable Renewable Energy (VRE) power ahead of time.

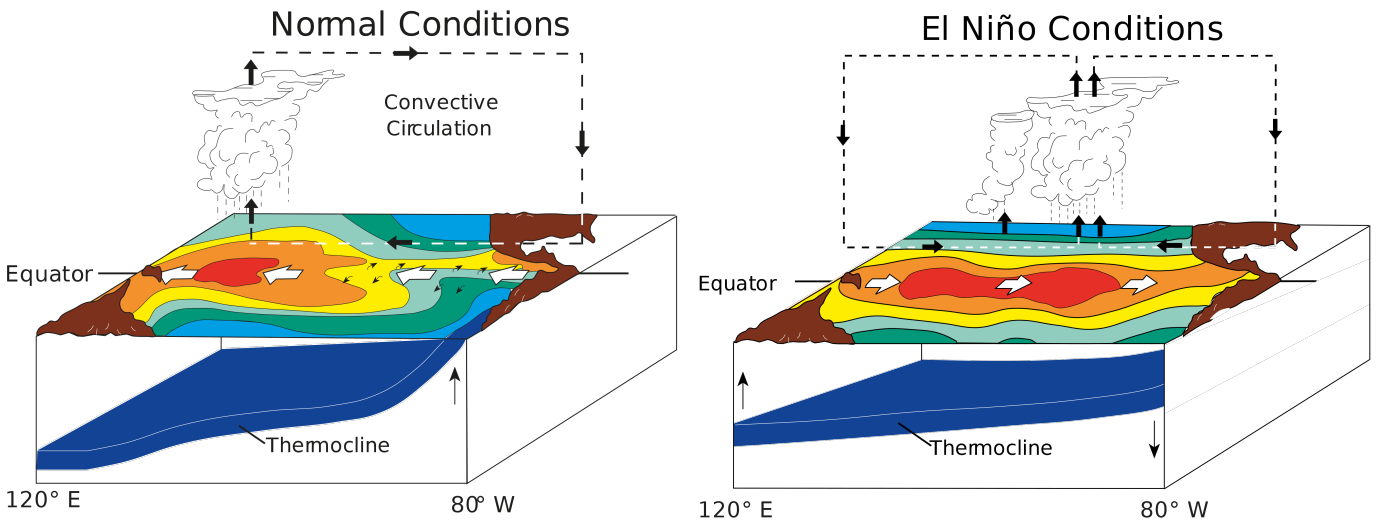
Data set

- Observed monthly VRE capacity factors averaged over metropolitan France regions from 2014 to 2019
- Climate variables of your choice from a global reanalysis with an hourly sampling

First steps

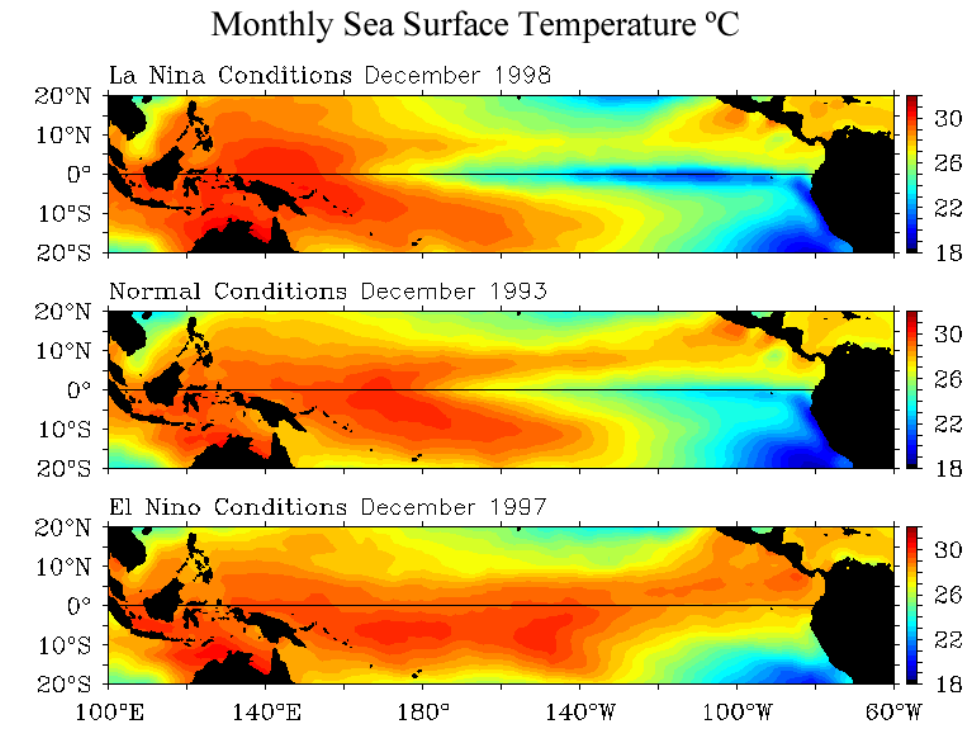
- Choose from solar or wind power
- Read about solar/wind production assessment and forecast
- Estimate the hourly solar/wind production

Project: Forecast of El Nino



- Natural mode of variability of the pacific equatorial ocean
- Big impact on the local economy
- Question: What is the predictability of El Nino?

Data set

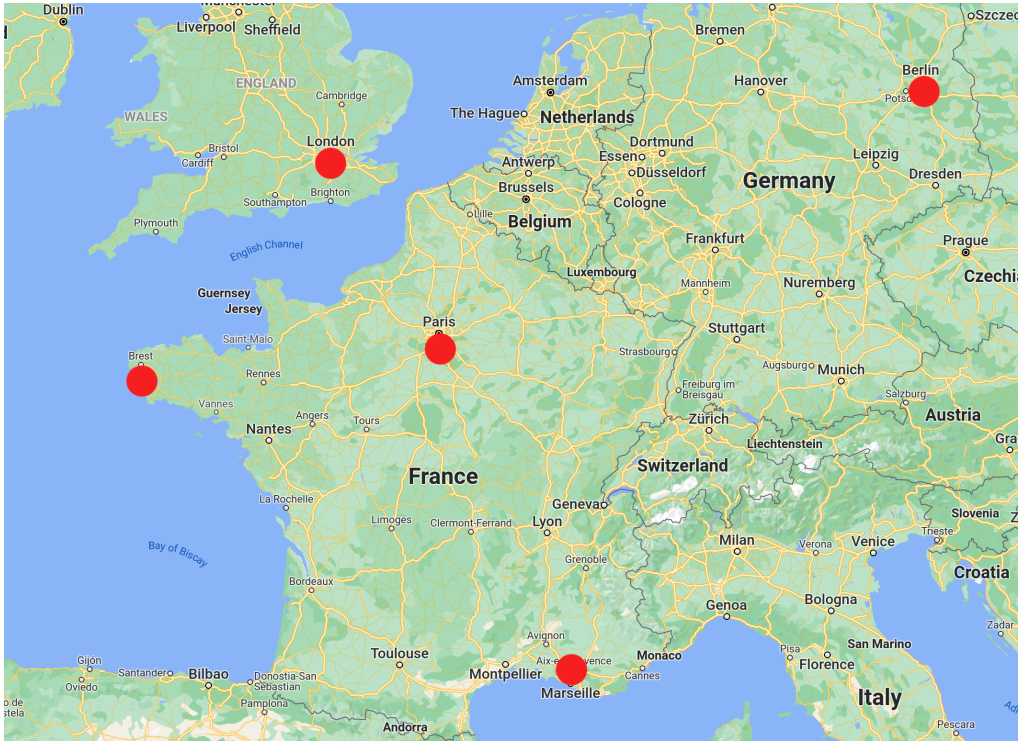


- Variable: Global sea surface temperature (SST)
- Temporal resolution: monthly mean
- Spatial resolution: 1 degree$\times$1 degree

First steps

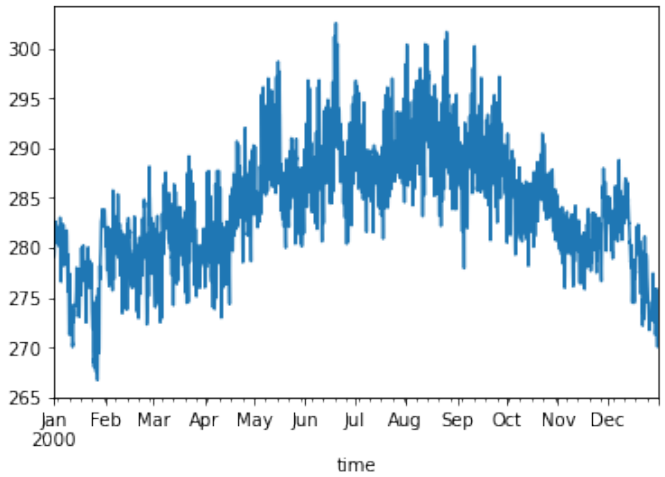
- Read about El nino
- Characterize El nino: i.e. introduce a classifier
- What does it mean “to make a prediction”?

Project: Weather station



- Suppose there are 5 weather stations that monitor the weather: Paris, Brest, London, Marseille and Berlin.
- The weather staion in Paris breaks down
- Can we use the other stations to infer the weather in Paris

Data set



- Surface variables: skt, u10, v10, t2m, d2m, tcc, sp, tp, ssrd, blh
- Temporal resolution: hourly
- Spatial resolution: N/A

First steps

- Look at the correlations between variables.
- What variable do I want to predict
- What time scale am interested in?
- Start with the easy predictions and move on to harder ones
- Are there events that are more predictable than others?