

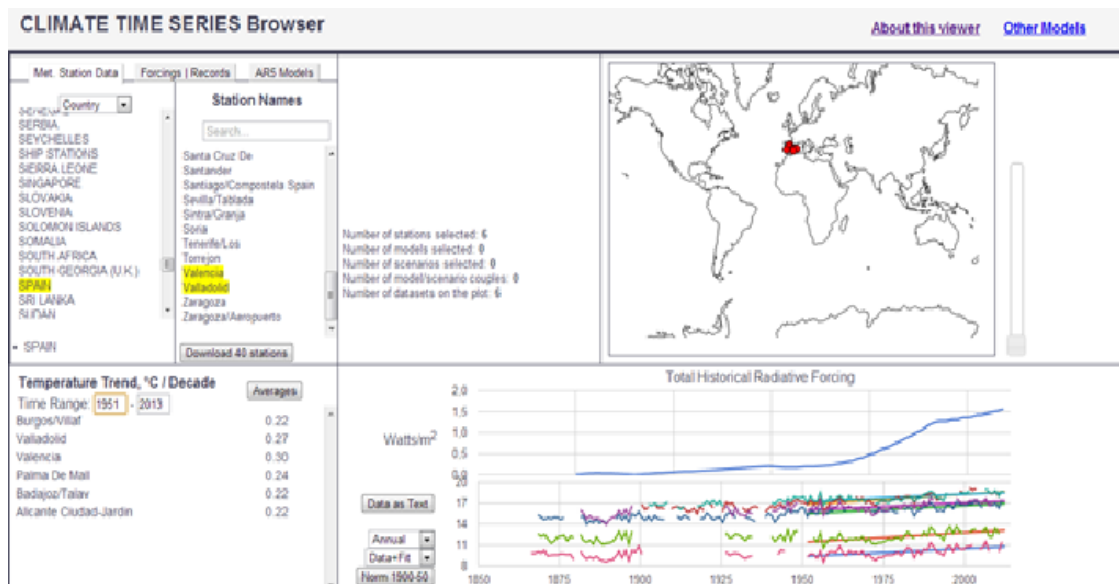
TERM PROJECT: TEMPERATURE CHANGE IN SPAIN

My work consists of estimating the temperature change relative to the global mean change, in a region. I have chosen Spain because is my country and I am interested in knowing more about it.

The search criteria for my stations has been to find time series long enough to get a meaningful trend (dates from 1951 to 2013).

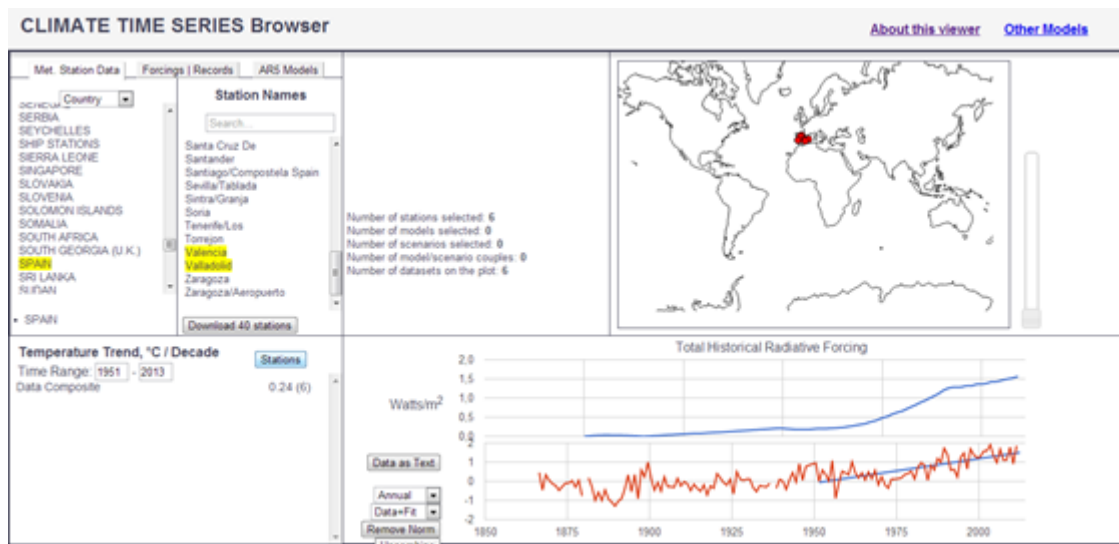
The result has been 6 meteorological stations around Spain: Alicante, Badajoz, Burgos, Palma de Mallorca, Valencia and Valladolid.

In the picture we can see the temperature trend ($^{\circ}\text{C}/\text{Decade}$) in each of the stations.



The temperature difference among the stations of Spain is 0.07 (the higher temperature trend is 0.3 in Valencia and the lower is 0.22 in Burgos, Badajoz and Alicante). That is the reason because I can say that the stations are a homogeneous group.

If I normalize and combine them, I get a value of 0.24 $^{\circ}\text{C}/\text{Decade}$ for the temperature trend.



The next step is figure out what climate models are good for my stations.

This table shows the climate models that fit better to my study. They are bcc-csm1-1, BNU-ESM, Can ESM2 and IPSL-CM5A. I have used the historical model scenario because it is a reconstruction of both the anthropogenic and the natural climate forcings.

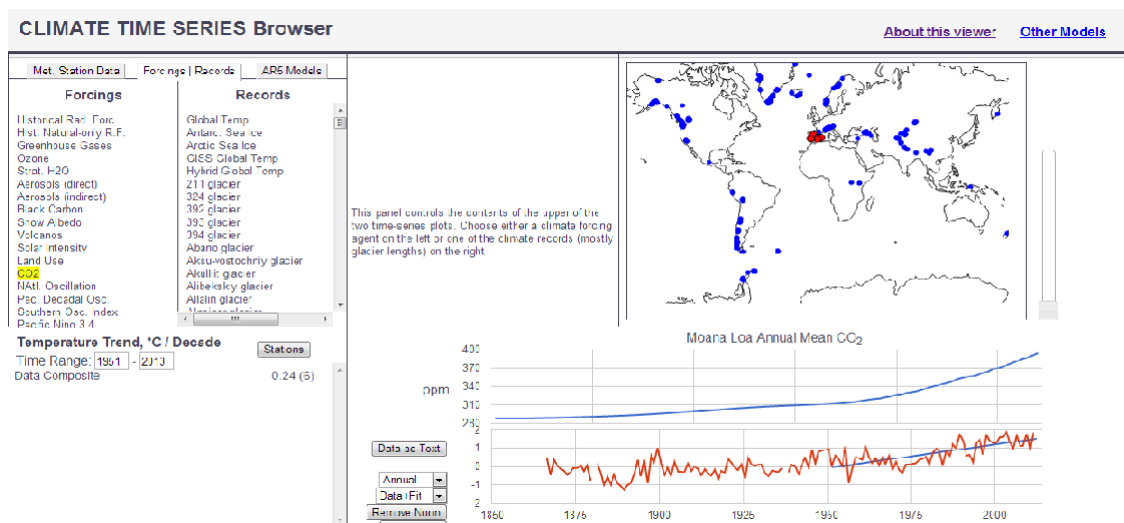
	Burgos/Villaf	Valladolid	Valencia	Palma De Mall	Badajoz	Alicante	
	0.22	0.27	0.3	0.24	0.22	0.22	
bcc-csm1-1	0.23	0.31	0.29	0.26	0.3	0.23	0.27
BNU-ESM	0.25	0.3	0.26	0.22	0.29	0.21	0.25
CanESM2	0.2	0.19	0.2	0.12	0.16	0.14	0.17
CCSM4	0.09	0.11	0.1	0.08	0.15	0.09	0.1
CNRM-CM5	0.04	0.04	0.06	0.03	0.07	0.06	0.05
GISS-E2-H	-0.02	0.04	0	-0.01	0.03	0	0.02
CSIRO-Mk3-6	0.02	0.01	0.05	0.02	0.04	0.01	0.01
IPSL-CM5A	0.26	0.31	0.26	0.21	0.28	0.26	0.26
MIROC-ESM	0.1	0.02	0.08	0.11	0.02	0.06	0.06
MRI-CGCM3	0.13	0.13	0.16	0.1	0.17	0.12	0.14
NorESM1-M	0.16	0.18	0.15	0.13	0.2	0.15	0.16

If I have to choose one climate model, I will choose the BNU-ES Model.

As a result of the study I can conclude that in 50 years the temperature will increase 1.2 °C and in 100 years it will increase 2.4 °C.

Assuming the average temperature in Spain of 10.7 °C, in 50 years the average temperature will be 11.9 °C and in 100 years it will be 13.1°C.

In that picture we can see the evolution of the CO2 concentration.



In 1900 the CO2 concentration was 295.552 ppm, in 1950 it was 311.53 ppm, in 2000 it was 369.52 ppm and in 2012 it was 393.82. In the recent decades, the increase of CO2 has been higher than in the past. If the CO2 keep increasing, the temperature will increase higher than 0.24 °C/decade. That is the reason because I have chosen the historical model scenario.