Analysis of temperature trends in coastal edge stations between 1950 and 2013

In my term project- for personal reasons - I analyzed the temperature trends of coastal regions with and without anthropogenic sources. The aim was to reveal the presence of anthropogenic effects, which overwrite the regional climatic conditions.

Coastal regions are very sensitive to the effects of global climate changes. The raising sea level caused by the global warming induced melting of the polar and highland ice cover endangers the coastal biome. This threatens the people and the ecosystem existing in these areas, causing severe damage in the ecological network. The increased amount of water can flood wetlands, which besides providing habitat for protected and unprotected species. Furthermore these lands serve as sinkholes; therefore their existence has a great importance in the fight against floods.
Before anthropogenic global warming, species were subjected mainly to regional pressures, such as overhunting and the destruction of their habitat. The acceleration of anthropogenic global warming since the industrial revolution, has led to climate change, which influences the safety of species. The rising temperature on a local and global level is making it harder for species to maintain reproduction.
Further problems are caused by the storms from seas and oceans, and the resulting floods. These besides directly threatening human lives, ruin agricultural plantations and infrastructure, which can result in lack of food and in long term force emigration.

This analysis was based on the temperature records in the Climate Time Series Browser [1], which is using all of the monthly weather station temperature data from the National Climatic Data Center (NOAA). For the analysis 75 stations have been considered [2]. Although the list for the selected vegetation type “coastal edges” includes 122 stations(Figure 1), 47 of them was disregarded based on my criteria, to have data at least in the half of the investigation period (1950-2013). The Climate Time Series Browser calculated 0.18°C per decade temperature trend for the corresponding stations.

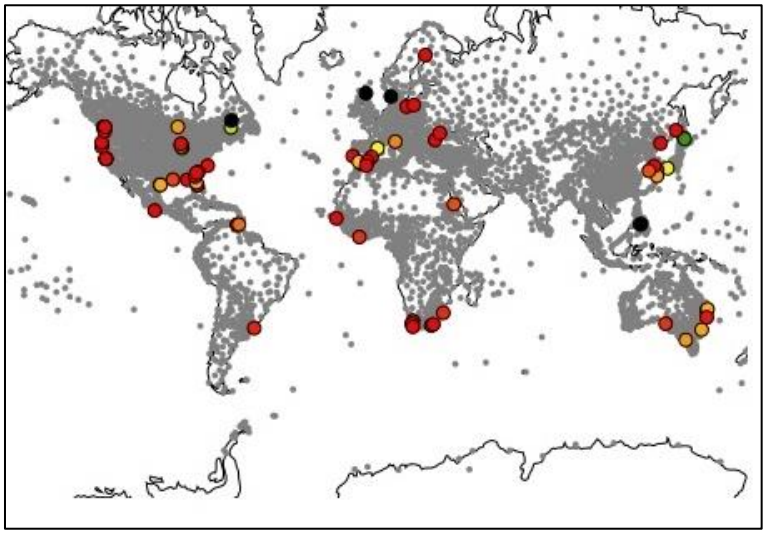

Figure 1: Location of the stations

Based on these data a comparison for the coastal edge areas in the CCSM model was prepared, with “Historical” and “HistoricalNat” forcings (without a human impact). The results clearly show that in the investigation period the increase of the mean temperature of the coastal regions is 0.14°C/decade. In comparison without anthropogenic effects this value would be 0.00°C/decade (Figure 2).

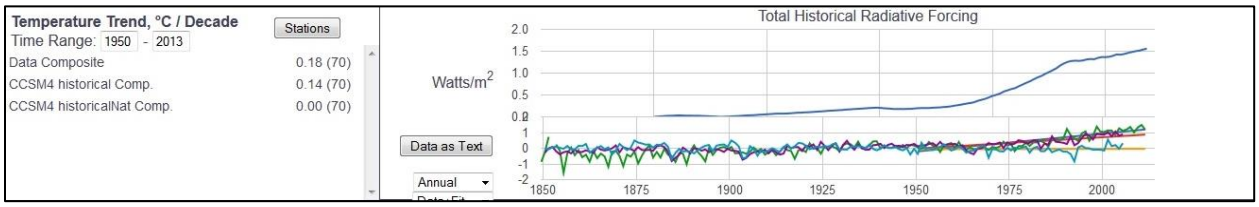

Figure 2: Temperature trends for the period of 1950-2013

On some stations there would be a negative trend, if there won’t be any anthropogenic impact. (e.g. Alamade/Nas - CCSM4 Hist 0.05, CCSM4 HistNat**: -0.10.)** The real values occasional have big difference to the scenarios: e.g. Alicante Ciudad-Jardin: 0.22, CCSM4 Hist: 0.08, CCSM4 HistNat: 0.04.

In the next years the increase of anthropogenic impact is foreseen. For next 35 years there is a warming forecast for a range between 0.8 and 2.6°C, depending on the measures taken to stop the global warming [3]. This is a responsibility shared by all of us.

References:

1. Climate Time Series Browser, http://climatemodels.uchicago.edu/timeseries/
2. Link to my selected stations in the Climate Time Series Browser, http://climatemodels.uchicago.edu/timeseries/#GvLpLGGDJOBuDeXjCEhHPKkLFfEQuNPbCnGYWdBfCfDjKLDDvDuOiEwYBpECyEzBBwEfCBxJtBBfCyCtMBnMyKBtEjBiCvKtCGgJbFiFClBeEgOFCBFLrV
4. http://www.greenfo.hu/hirek/2013/07/28/beelozi-az-alkalmazkodast-a-klimavaltozas, 11.12.2013