A hybrid dynamical-statistical downscaling approach for climate change impacts analysis on high resolution in the Greater Athens Area (GAA)

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1. Motivation

Attica Region climate change adaptation plan

- Lack of high resolution (1km) climate change projections
- Lack of a high resolution gridded observational dataset

→ Production GAA.HRES (1km)

2. Data

- Daily observations of temperatures (TX, TN, TG) and precipitation (PR) for the period 1981-2000 for 9 stations
- WRF simulation for the year 1995 (1km) driven by ERA-INTERIM
- EURO-CORDEX simulations (~12km)

3. Methodology

Interpolation using Generalized additive Models (GAM)

$$y = f_1(lon_i, lat_i) + f_2(alt_i) + f_3(pdfSim_i)$$

4. Results

- Comparison of GAA.HRES vs stations not included in the interpolation (1995) indicates relative low MAE and RMSE for TX and relative low NRMSE for PR.
- Next steps involve implementation of the methodology for the period 1981-2000 and consequently bias adjustment of the RCMs simulations

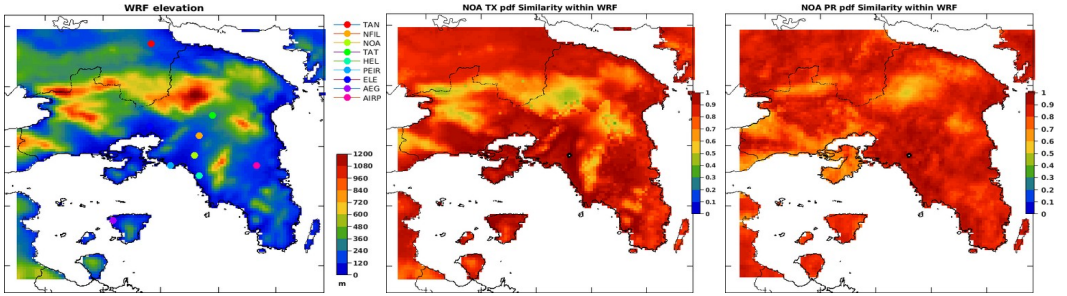


Fig 1. WRF height and locations of the stations (left), TX pdf similarity (middle) and PR pdf similarity (days with PR>0.1mm) (right) for the closest grid point to NOA station location with the rest of the grid points in WRF

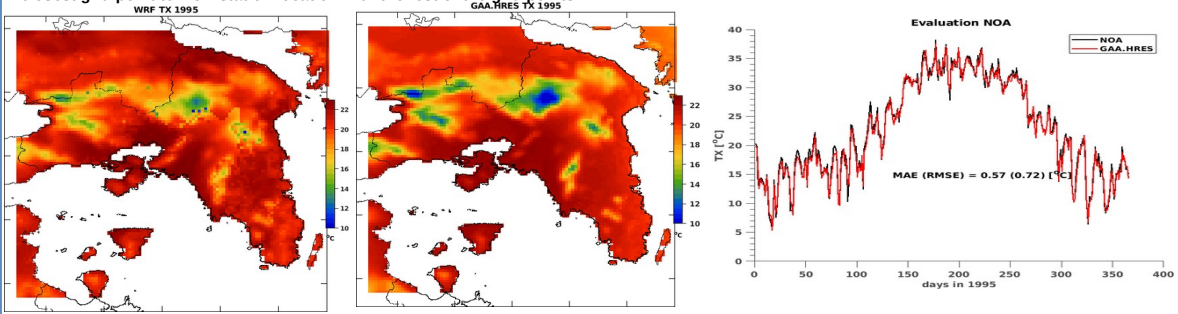


Fig 2. Average annual TX: WRF (left), GAA.HRES(middle). On the right the evaluation of GAA.HRES against NOA station daily TX when NOA station data are not included in the interpolation

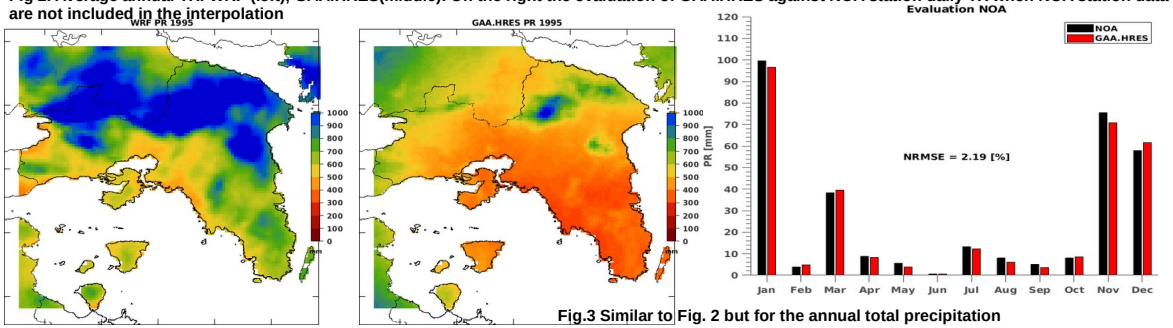


Fig.3 Similar to Fig. 2 but for the annual total precipitation