Readme

This folder contains the code corresponding to the article "Increasing compound warm spells and droughts in the Mediterranean Basin".

The analysis was carried out using R version 3.6.1 and Python version 3.7.3.

Data download

- retrieval_daily_max_temp_1979_1989.py: Download air temperature for years 1979-1989
- retrieval_daily_max_temp_1989_1999.py: Download air temperature for years 1989-1999
- retrieval_daily_max_temp_1999_2009.py: Download air temperature for years 1999-2009
- retrieval_daily_max_temp_2009_2019.py: Download air temperature for years 2009-2019
- precipitation_hourly_for_one_decade.py: Download precipitation for years 1979-2019 (run separately for each decade)
- pet_hourly.py: Download potential evaporation for years 1979-2019 (run separately for each decade)
- data_retrieval_explanations.py: Details on the download parameters

Data preprocessing

The following files create files for monthly time step and time span based on original files with hourly time step and decadal time span

- pet_hourly_to_monthly_for_a_decade_1979_1988.py: 1979-1988
- pet_hourly_to_monthly_for_a_decade_1989_1998.py: 1989-1998
- pet_hourly_to_monthly_for_a_decade_1999_2008.py: 1999-2008
- pet_hourly_to_monthly_for_a_decade_2009_2018.py: 2009-2018
- precipitation_hourly_to_monthly_for_a_decade.py: 1979-1988
- precipitation_hourly_to_monthly_for_a_decade_1989_1998.py: 1989-1998
- precipitation_hourly_to_monthly_for_a_decade_1999_2008.py: 1999-2008
- precipitation_hourly_to_monthly_for_a_decade_2009_2018.py: 2009-2018

Data processing

- Data_processing_warm_season.R: calculate daily temperature maxima, SPI and SPEI for warm season (May-Oct)
- Data_processing_desesason.R: calculate daily temperature maxima, SPI and SPEI and deseasonalise data year-round

Detection of events

- Koeppen_Geiger.R: creates Koeppen-Geiger study area map, file retrieved from http://koeppen-geiger.vu-wien.ac.at/present.htm
- Koeppen_Geiger_map.R: refinded study area map for the Mediterranean

- Event_calculation_general.R: Detection of compound events and heat waves (load respective workspace and adjust loop accordingly, adjust section at top for either whole or warm season events)
- Event_calculation_drought.R: Detection of droughts (adjust section at top for either whole or warm season events)
- extract_key_variables.R: extract only the necessary objects to reduce required RAM space

Final plots and overview of results

- Results_mediterranean.Rmd: Overview of results for compound events and heat waves
- Results_mediterranean_droughts.Rmd: Overview of results for droughts
- Result_plots.Rmd: Final plots for compound events
- Results_mixed.Rmd: Final plots for singular events
- Analysis_per_country.Rmd: Final plots for analysis per country
- pie_chart.R: Schematic illustration of change vector analysis