

# Call for Proposals

This Call for Proposals invites research proposals in the framework of Data Analysis in Environmental Sciences focusing on the three research themes:

**Theme A:** Wildlife predator and prey biomass from across the globe

**Theme B:** Outdoor air pollution and premature mortality rates from multiple countries world-wide

**Theme C:** Long-term observed and projected future temperatures across North America

## A) Theme A

Proposals under this theme must address the following datasets:

Hatton et al. (2015) investigated relationships between predator and prey biomass across different land areas worldwide. One segment of their original data is provided for this data analysis project (**Data\_A.xls**). The data consists of observed predator and prey biomass for the following land areas: (1) Southeast Africa, (2) India, (3) North America (Alaska). Each land area consists of sub-domains for which observation on annual rainfall (precipitation) is given among many other variables. Additional data for this project consist of timeseries of annual total precipitation (units in mm) from 5 Global Climate Models (GCMs) for the period 2006-2100 (**Data\_GCMs.xls**). The data is given for each of the three land areas so that the timeseries represent spatial averages over the whole domain. The five GCMs are selected from the ensemble of GCMs prepared for the Intergovernmental Panel on Climate Change (IPCC) Fifth Report. Each GCM is run using the same RCP8.5 greenhouse gas emissions scenario (for more information see Taylor et al., 2012; Moss, 2010). RCP8.5 can be referred to as a 'high-emission scenario', assuming that the world carbon emissions will continue 'business as usual' without any mitigation efforts.

References:

Hatton I A, McCann K S, Fryxell J M, Davies T J, Smerlak M, Sinclair A R E and M Loreau (2015) The predator-prey power law: Biomass scaling across terrestrial and aquatic biomass, *Science* 349(6252), doi: 10.1126/science.aac6284

Moss RH (2010) The next generation of scenarios for climate change research and assessment. *Nature* 463:747–756. doi:10.1038/nature08823

Taylor KE, Stouffer RJ, Meehl GA (2012) An overview of CMIP5 and the experiment design. *Bull Am Meteorol Soc* 93:485–498. doi:10.1175/BAMS-D-11-00094.1

## B) Theme B

Proposals under this theme must address the following datasets:

Lelieveld et al. (2015) investigated the contributions of outdoor air pollution sources (e.g. PM2.5) to premature mortality across the world. In particular, they analyzed the data for top 15 ranked countries with premature mortality linked to outdoor air pollution in 2010 (**Table 2** in their paper). In addition to this data, the following data sources are available for this project (some datasets have already been downloaded from the links below and saved as spreadsheets):

Population per country (5-yr totals from 1950 to 2015; data is in **Population\_per\_country\_1950\_2015.xls**): [https://en.wikipedia.org/wiki/List\\_of\\_countries\\_by\\_past\\_population\\_\(United\\_Nations\\_estimates\)](https://en.wikipedia.org/wiki/List_of_countries_by_past_population_(United_Nations_estimates))

PM2.5 concentration per country for 2014 (data is in **PM25\_countries2014.xls**): [http://www.who.int/gho/phe/outdoor\\_air\\_pollution/exposure/en/](http://www.who.int/gho/phe/outdoor_air_pollution/exposure/en/)  
<http://apps.who.int/gho/data/node.main.152?lang=en>

Annual totals in PM10 from 1970 to 2008 (data is in **PM10\_annual\_totals\_1970\_2008.xls**): <http://edgar.jrc.ec.europa.eu/overview.php?v=42>

References:

Lelieveld J, Evans J S, Fnais M, Giannadaki D and A Pozzer (2015) The contribution of outdoor air pollution sources to premature mortality on a global scale, *Nature*, doi:10.1038/nature15371

### C) Theme C

Proposals under this theme must address the following datasets:

By investigating the role of natural variability in future North American climate Deser et al. (2015) found that global climate models (GCMs) give the least certain projections in the locations with the largest projected warming trends. Data available for this project consists of annual temperature timeseries from a set of selected stations across Canada (**Data\_stations\_1951\_2000.xls**). In addition, monthly temperature timeseries from 5 different GCMs for the period 2006-2100 (compressed folder **GCMs\_temp\_data.zip**) are given. Each model data is given for the grid cell covering the station location (longitude and latitude) and it represents the average temperature over the size of the grid cell (about 100 x 100 km). The five GCMs are selected from the ensemble of models prepared for the Intergovernmental Panel on Climate Change (IPCC) Fifth Report. Each model is run using the same RCP8.5 greenhouse gas emissions scenario (for more information see Taylor et al. 2012; Moss, 2010). RCP8.5 can be referred to as a 'high-emission scenario', assuming that the world carbon emissions will continue 'business as usual' without any mitigation efforts.

References:

Deser C, Knutti R, Solomon S, Phillips AS (2012) Communication of the role of natural variability in future North American climate. *Nat. Clim. Change*, 2, 775-779, doi: 10.1038/nclimate1562.

Moss RH (2010) The next generation of scenarios for climate change research and assessment. *Nature* 463:747-756. doi:10.1038/nature08823

Taylor KE, Stouffer RJ, Meehl GA (2012) An overview of CMIP5 and the experiment design. *Bull Am Meteorol Soc* 93:485-498. doi:10.1175/BAMS-D-11-00094.1

## Eligibility

The call for proposals is open to all registered students in ENVR300 in term 2 of 2017/18 academic year. The team proposals are to be submitted by filling in the **Application Form**.

## Proposal assessment

The instructors of ENVR300 will review and evaluate only complete proposals. The instructors will evaluate the quality of proposals on a comparative basis (i.e. intercomparing the proposals in the same theme) and will use the following evaluation criteria:

- 1) Research objectives and rationale (How well are the research questions posed? How well is the relevance of the proposed research introduced?)
- 2) Feasibility of the proposed methodology (Is the proposed methodology sound and adequate? Can the proposed methods successfully address the research objectives?)
- 3) Implications of the proposed research (How well does the proposal discuss implications of potential outcomes of the proposed research?)