**Presentation**

This folder contains the R codes to reproduce the analyses presented in the paper: “Causal inference concepts can guide research into the effects of climate on infectious diseases”, by Laura Andrea Barrero Guevara, Sarah Kramer, Tobias Kurth, and Matthieu Domenech de Cellès.

**Installation procedure**

All analyses were conducted with the pomp package version 5.11 in R 4.4.1 (2024-06-14). For reproducibility, the renv package (version 1.0.7) was used to keep track of all the packages’ version. To download and restore these packages’ versions, one should proceed as follows (see https://rstudio.github.io/renv/articles/collaborating.html for further help):

1. Launch the R project \_codes.proj. According to the help page, “renv should automatically bootstrap itself, thereby downloading and installing the appropriate version of renv into the project library.”
2. Use renv::restore() to restore the project library locally.

**Overview**

The files named “f-XX” correspond to R functions; those named ‘s-XX” to supporting R scripts. The main R scripts are named “m-XX” and include:

1. “m-create-check-model.R”: runs deterministic and stochastic simulations and basic checks of the model.
2. “m-create-check-model2coup.R”: runs a deterministic and stochastic simulations and basic checks of the model with coupling.
3. “m-vignette-descendant-bias.R”: codes for section “Vignette 1: Descendants, measurement bias, and the intricate association between environmental variables and incidence rate”
4. “m-vignette-quasi-experiments-code.R”: codes for section “Vignette 2: Climate variability as natural experiments to estimate the individual effect of meteorological variables”
5. “m-vignette-quasi-experiments-figures.R”: codes for main and supplementary figures.
6. “m-vignette-spatial-bias-1-simulate.R”, “m-vignette-spatial-bias-2-gp.R”, and “m-vignette-spatial-bias-3-2coup.R”: codes for section “Vignette 3: Confounding bias and how climate variability can masquerade as spatial spread”
7. “m-vignette-spatial-bias-figures.R” codes for main and supplementary figures.
8. “m-vignette-total-effect.R”: codes for section “Vignette 4: Mediation and the direct and indirect causal effects of temperature on transmission”

For convenience, the models and simulated data are already saved in the folder “\_saved” and the figures in the folder “\_figures”. The folder “\_data” contains the weather and spatial data in Germany, Colombia, and Spain.

**List of functions and additional scripts**

* “f-Pred\_RH.R”: R function to calculate relative humidity (RH) from temperature and dew point temperature.
* “f-CreateClimData.R”: R function to prepare climatic data.
* “f-PlotClimData.R”: R function to plot climatic data.
* “f-CreateMod.R”: R function creating the POMP object for the model.
* “f-CreateMod2coup.R”: R function creating the POMP object for the model with coupling.
* “f-GenStochSim.R”: R function to generate stochastic simulation for POMP model.
* “f-SimulateMod.R”: R function to generate simulations from the POMP models in different locations.
* “f-RunTrajMatch.R”: R function to run trajectory matching for the POMP model with coupling.
* “s-base\_packages.R”: list of base packages used in all other R scripts.