



Streamlining Climate Model Accessibility for Integration into Site-Specific Life Science Research

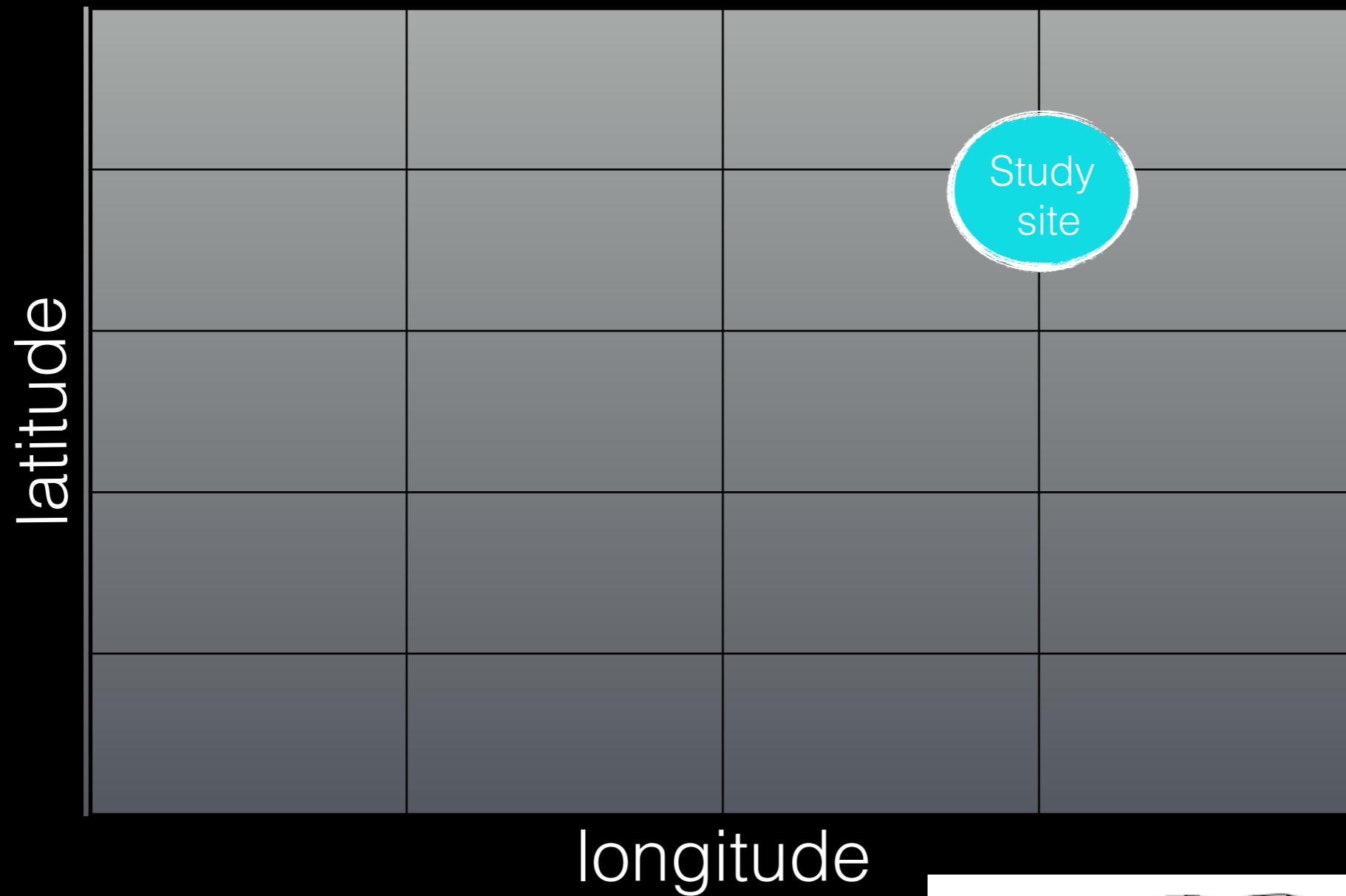
Jenna Baughman and Sara Stoudt

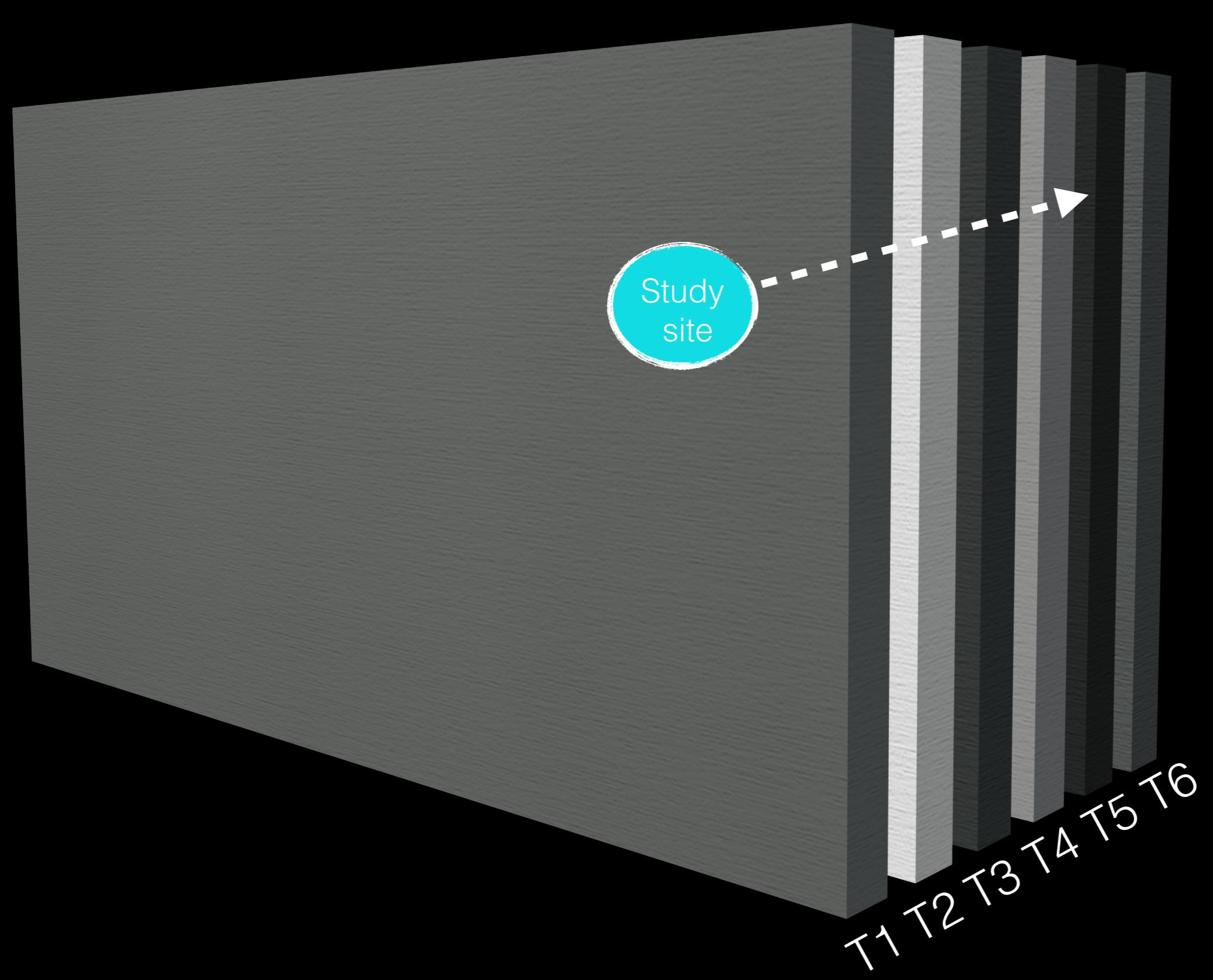


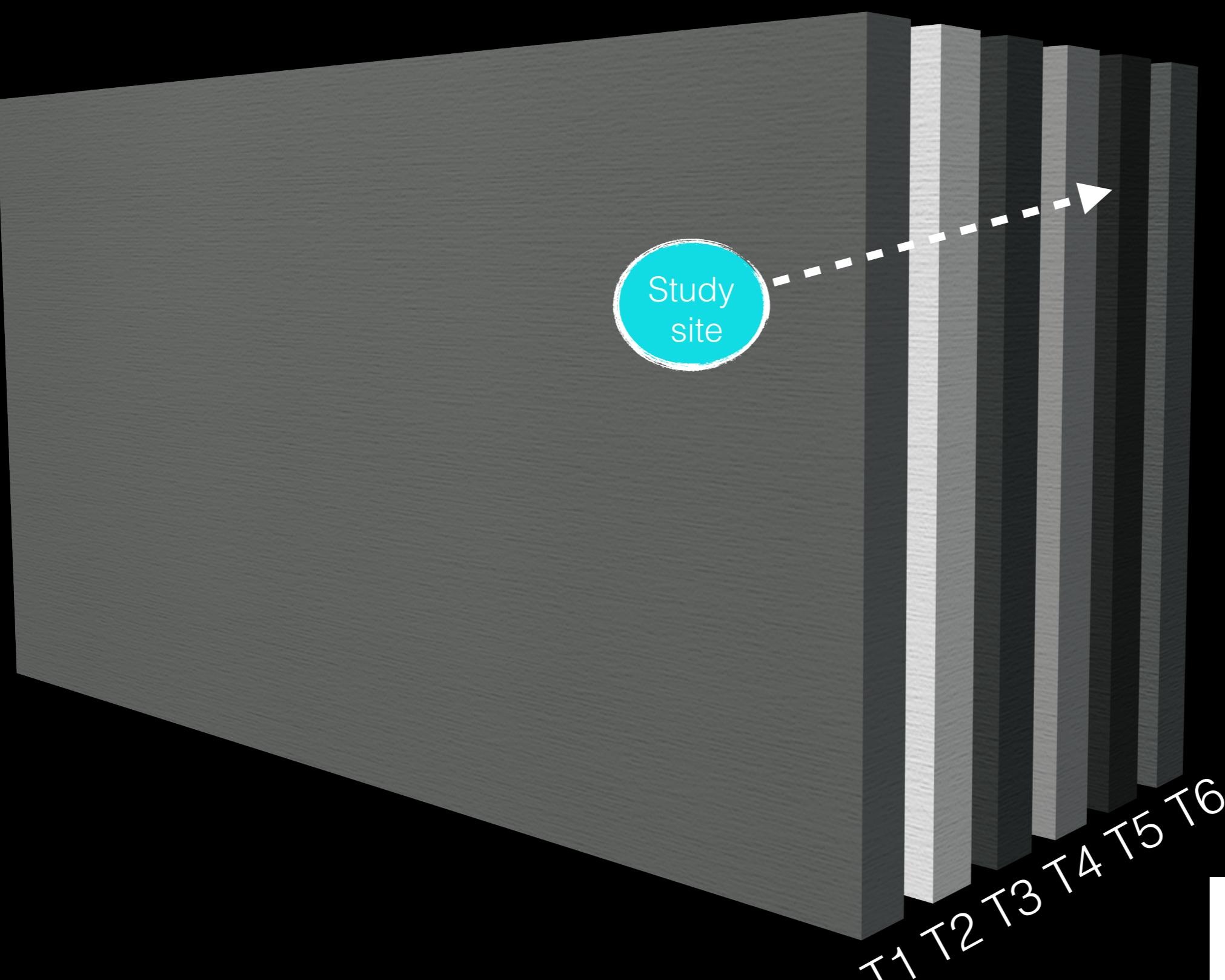


the problem

spatial climate data



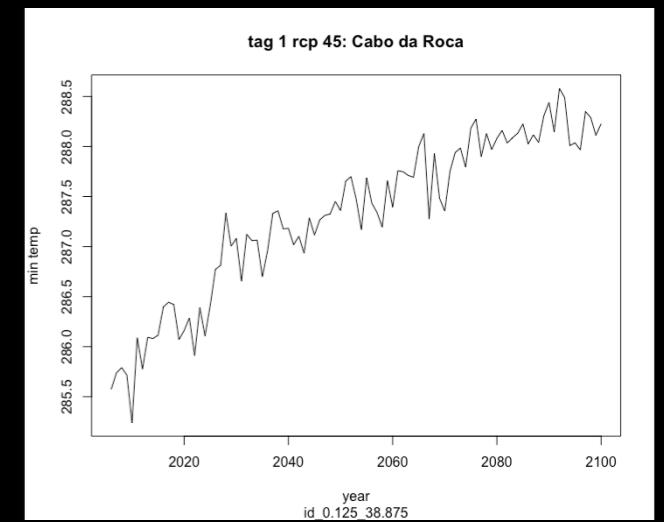
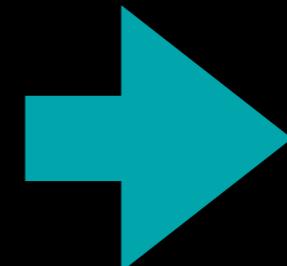


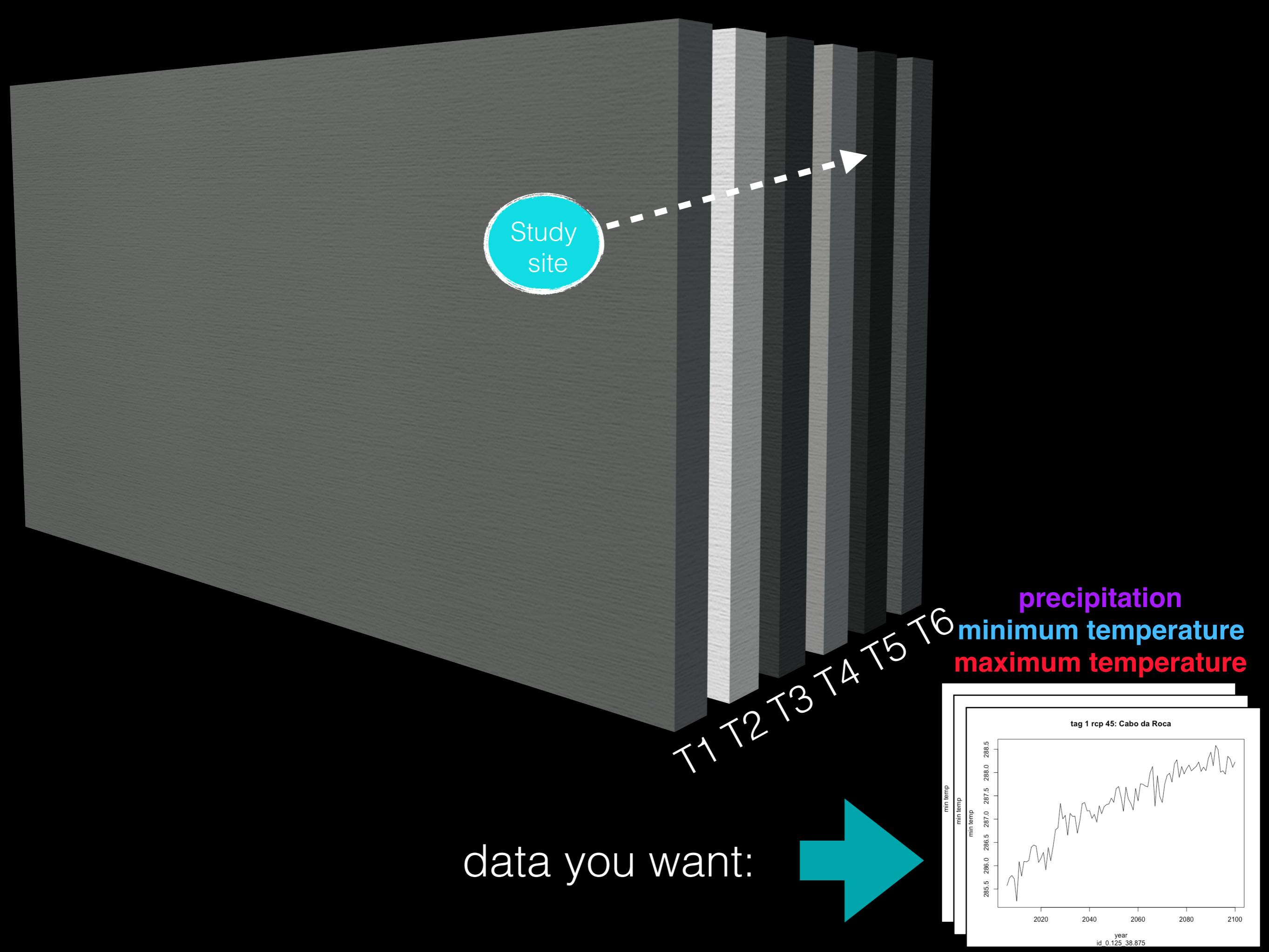


Study
site

T1 T2 T3 T4 T5 T6

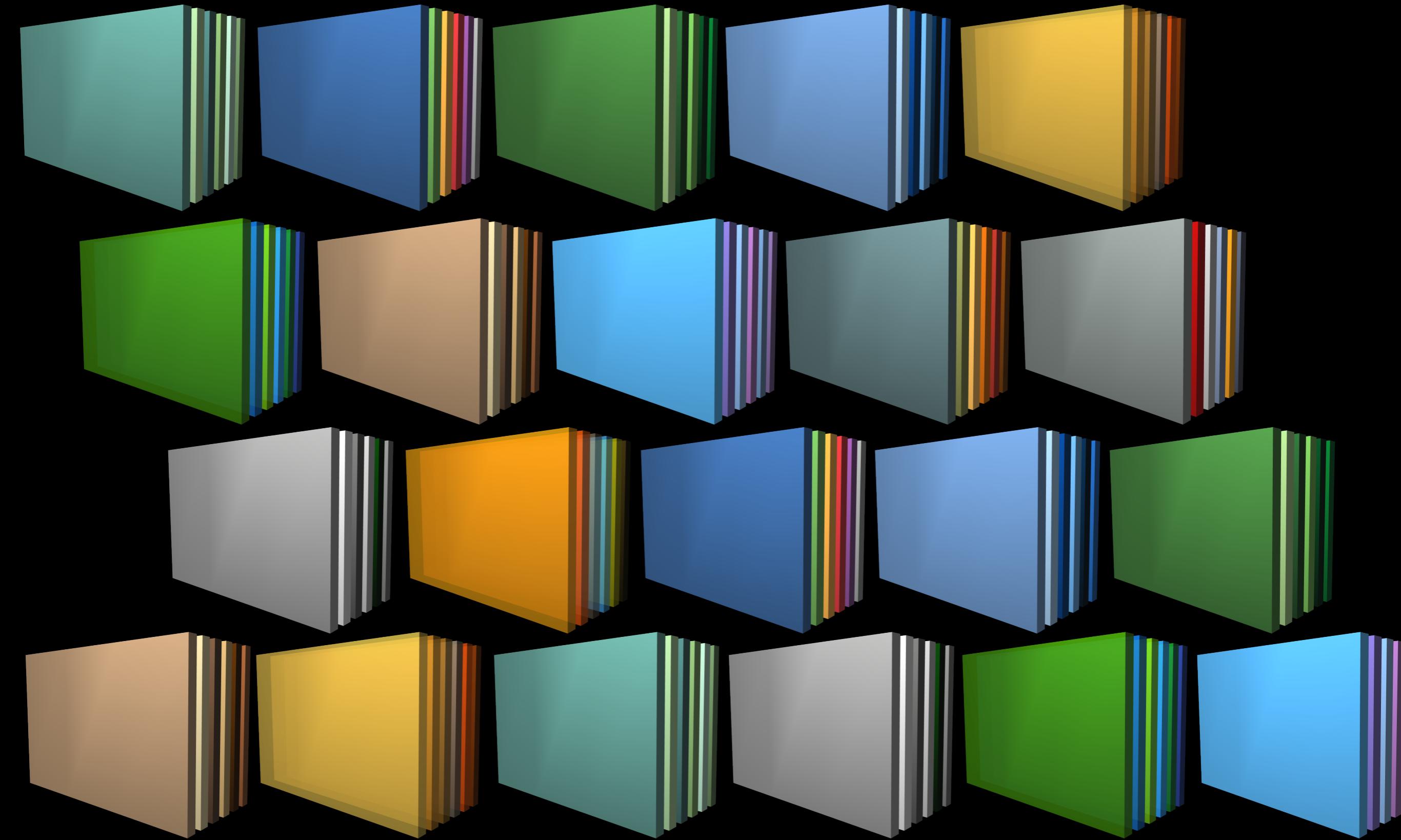
data you want:







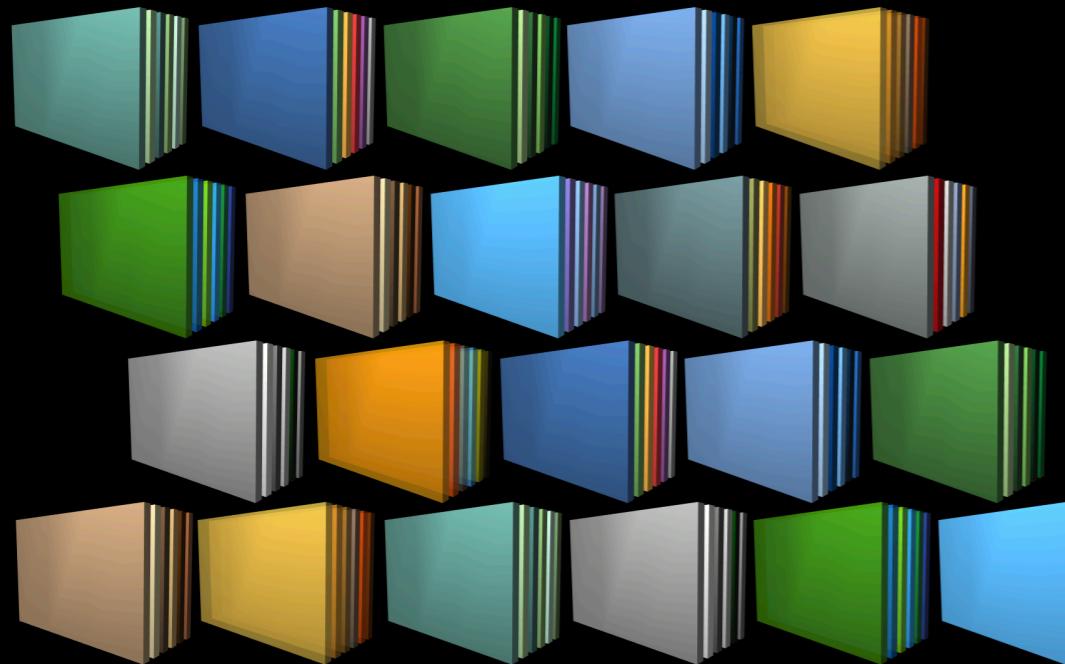
21 climate models



2 climate scenarios + historical

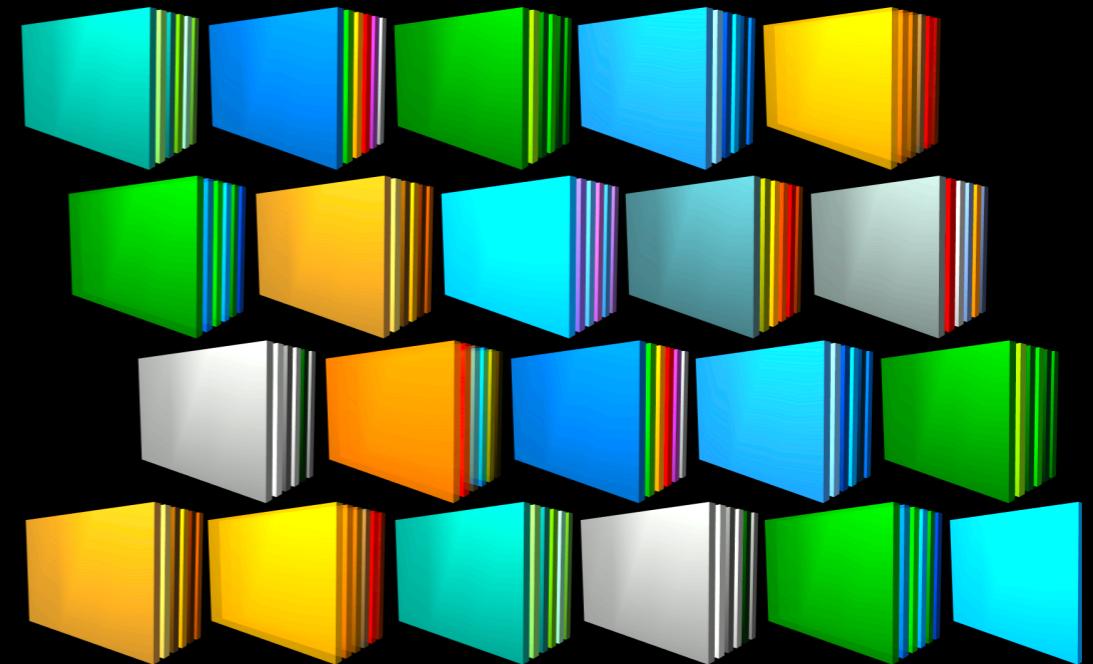
rcp45

21 climate models



rcp85

21 climate models



history

21 climate models

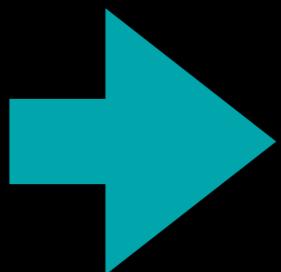


for 3 different
variables

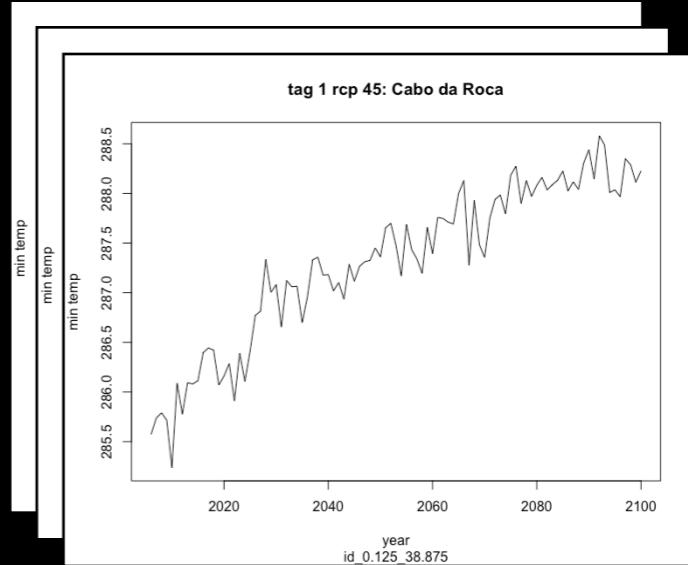
11 TB of data

11 TB of data

all you want:



precipitation
minimum temperature
maximum temperature



Your Site



where we come in

- **our goals:**
 - create a simple method for scanning the 21 climate models for different properties and weather variables over small regions across the globe
 - precipitation, maximum temperature, and minimum temperature
 - historical (modeled) and future scenarios
 - both directional trends and variability shifts
 - make pipeline for obtaining site specific temporal data

sample user case study

- bird researcher in Portugal
- collects daily population data for all birds at a particular site
- wants to know how climate change will affect the populations



user work flow

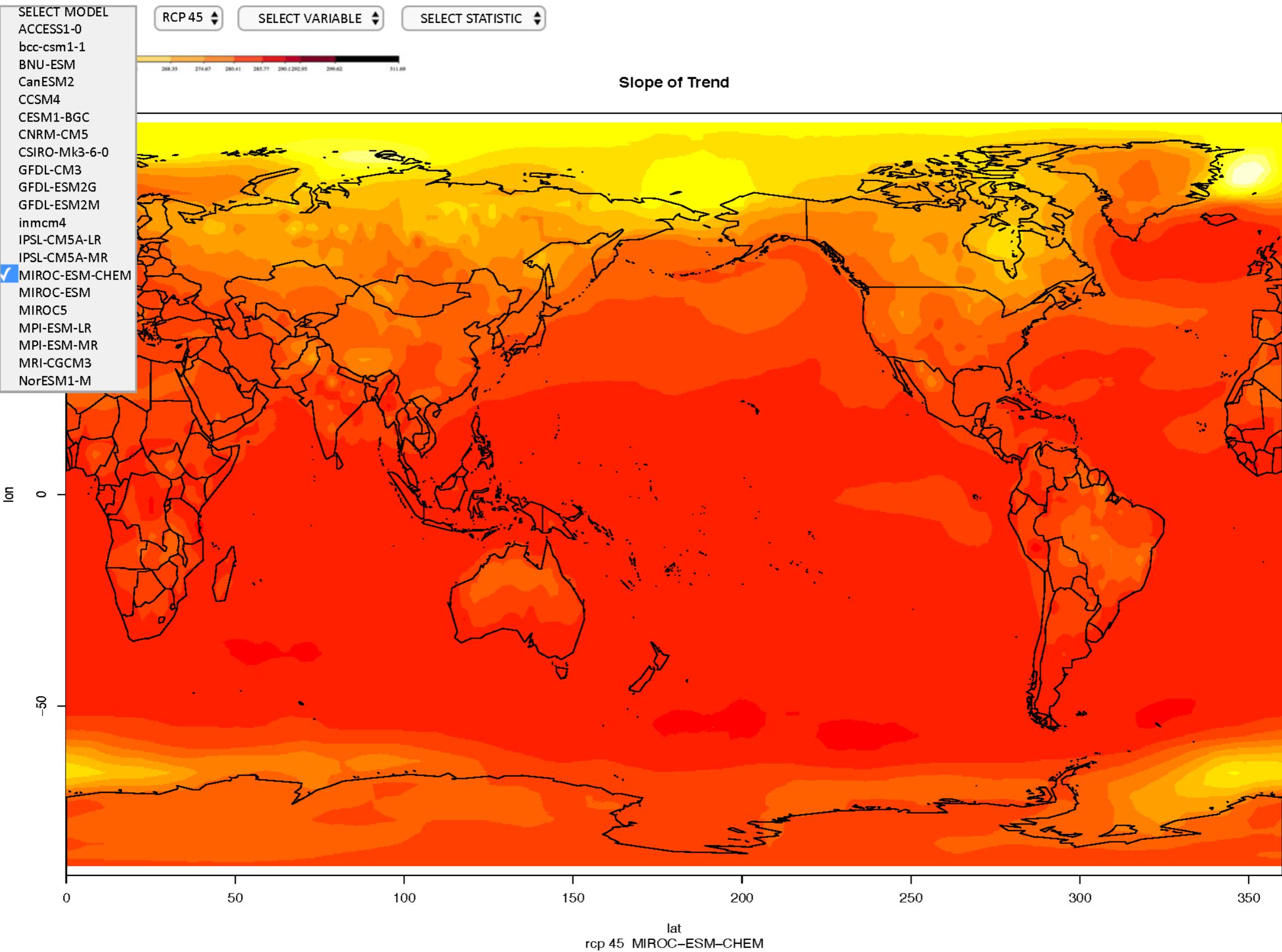


- access to global future climate scenarios for context
- access time series for location of interest
 - precipitation, min/max temperature
- access historical data

user work flow



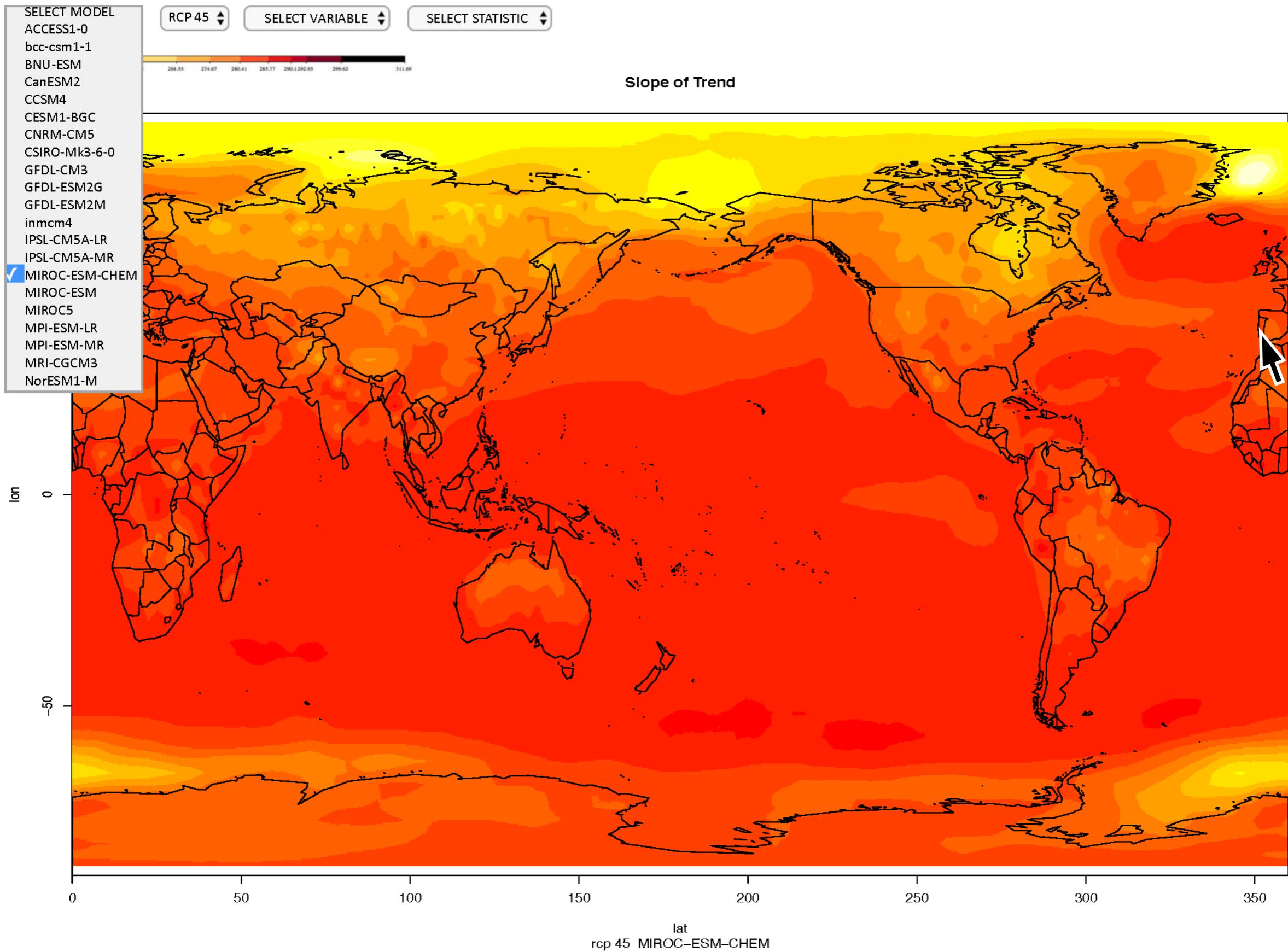
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user work flow



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SELECT MODEL

- ACCESS1-0
- bcc-csm1-1
- BNU-ESM
- CanESM2
- CCSM4
- CESM1-BGC
- CNRM-CM5
- CSIRO-Mk3-6-0
- GFDL-CM3
- GFDL-ESM2G
- GFDL-ESM2M
- inmcm4
- IPSL-CM5A-LR
- IPSL-CM5A-MR
- MIROC-ESM-CHEM
- MIROC-ESM
- MIROC5
- MPI-ESM-LR
- MPI-ESM-MR
- MRI-CGCM3
- NorESM1-M

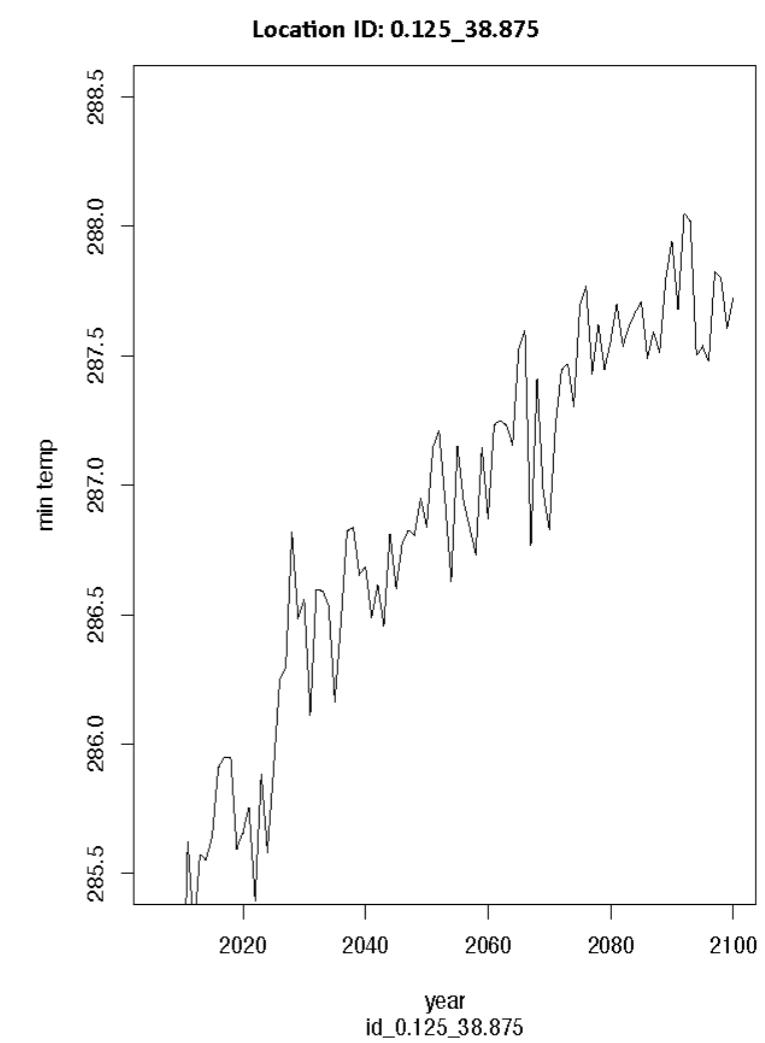
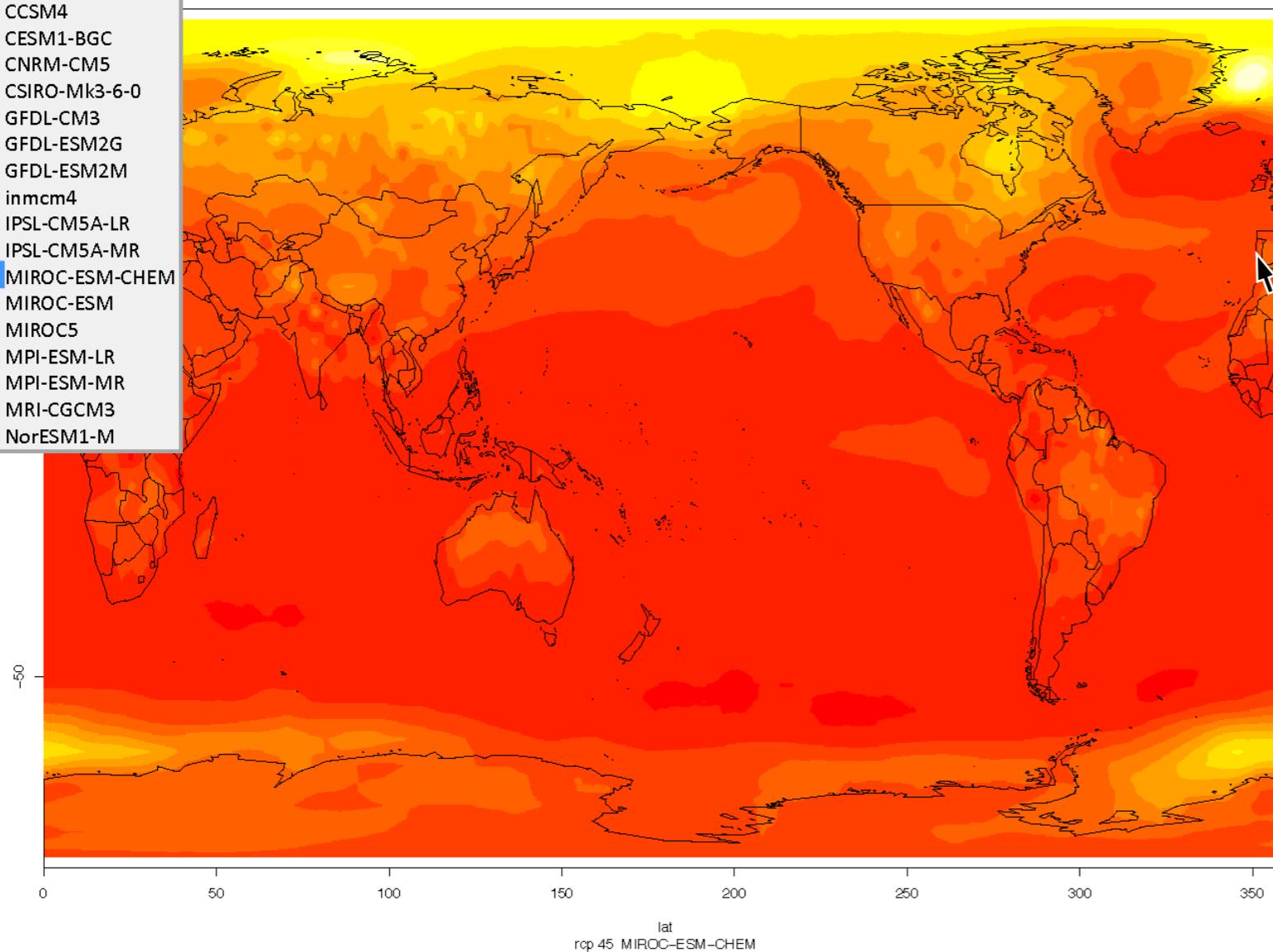
RCP 45

SELECT VARIABLE

SELECT STATISTIC



Slope of Trend



user work flow



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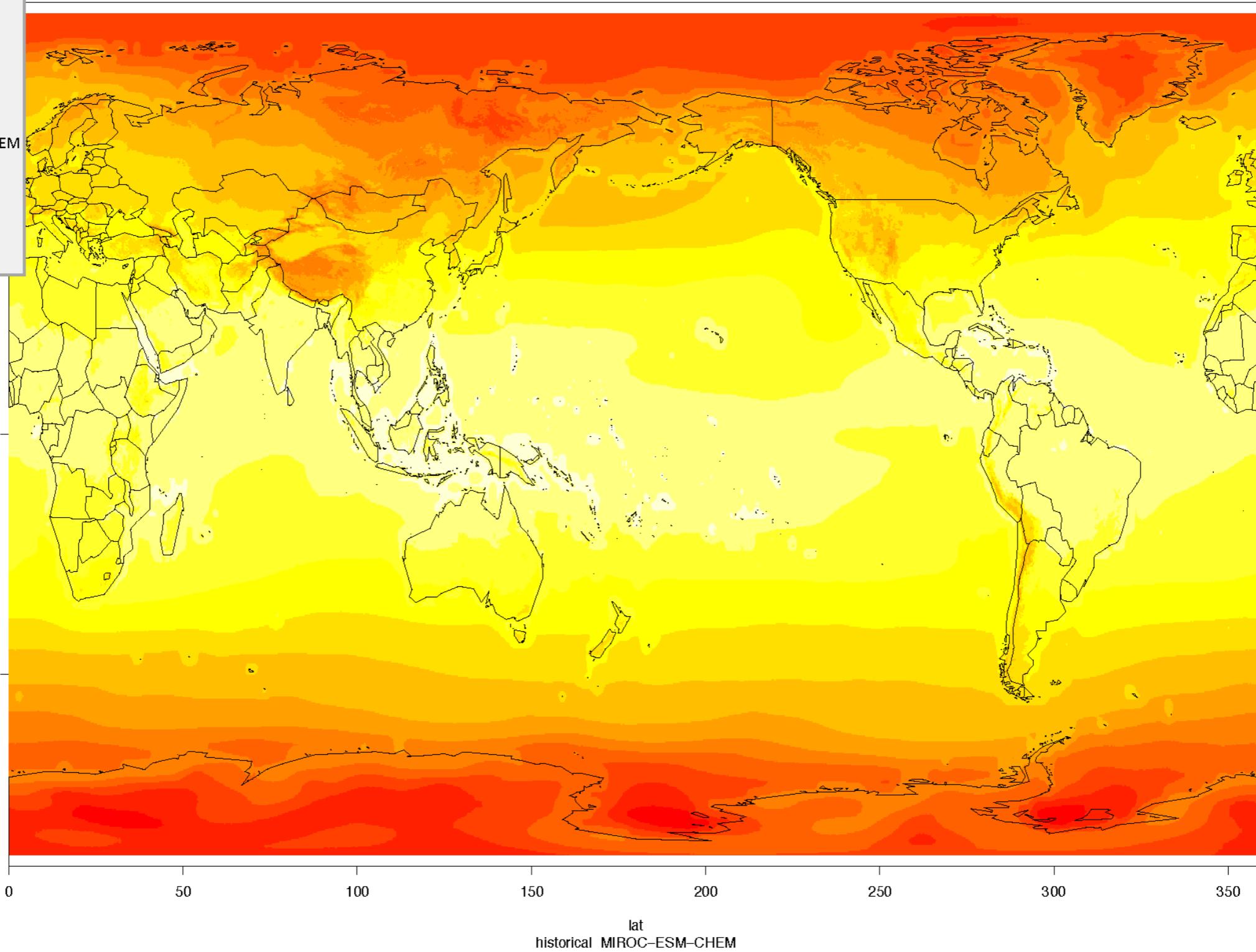
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 - GFDL-ESM2G
 - GFDL-ESM2M
 - inmcm4
 - IPSL-CM5A-LR
 - IPSL-CM5A-MR
 - MIROC-ESM-CHEM
 - MIROC-ESM
 - MIROC5
 - MPI-ESM-LR
 - MPI-ESM-MR
 - MRI-CGCM3
 - NorESM1-M

SELECT VARIABLE ▾

SELECT STATISTIC ▾



Mean Min Temp 1970



current user data pipeline



- scrape data from NASA Earth Exchange
- subset data for grid cell of interest
- pre-processing for summary statistics

future work

- command line program to download data for a region of interest only
 - host full data such that targeted subsets are more easily accessible
- interactive application to streamline this process

moving forward

- Seeking Undergraduate Research Apprentice Program student(s) for Spring '18
- aspiring Data Scientists
 - bash scripting
 - R/Python
 - d3
 - web interfaces
 - cloud computing and database management

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