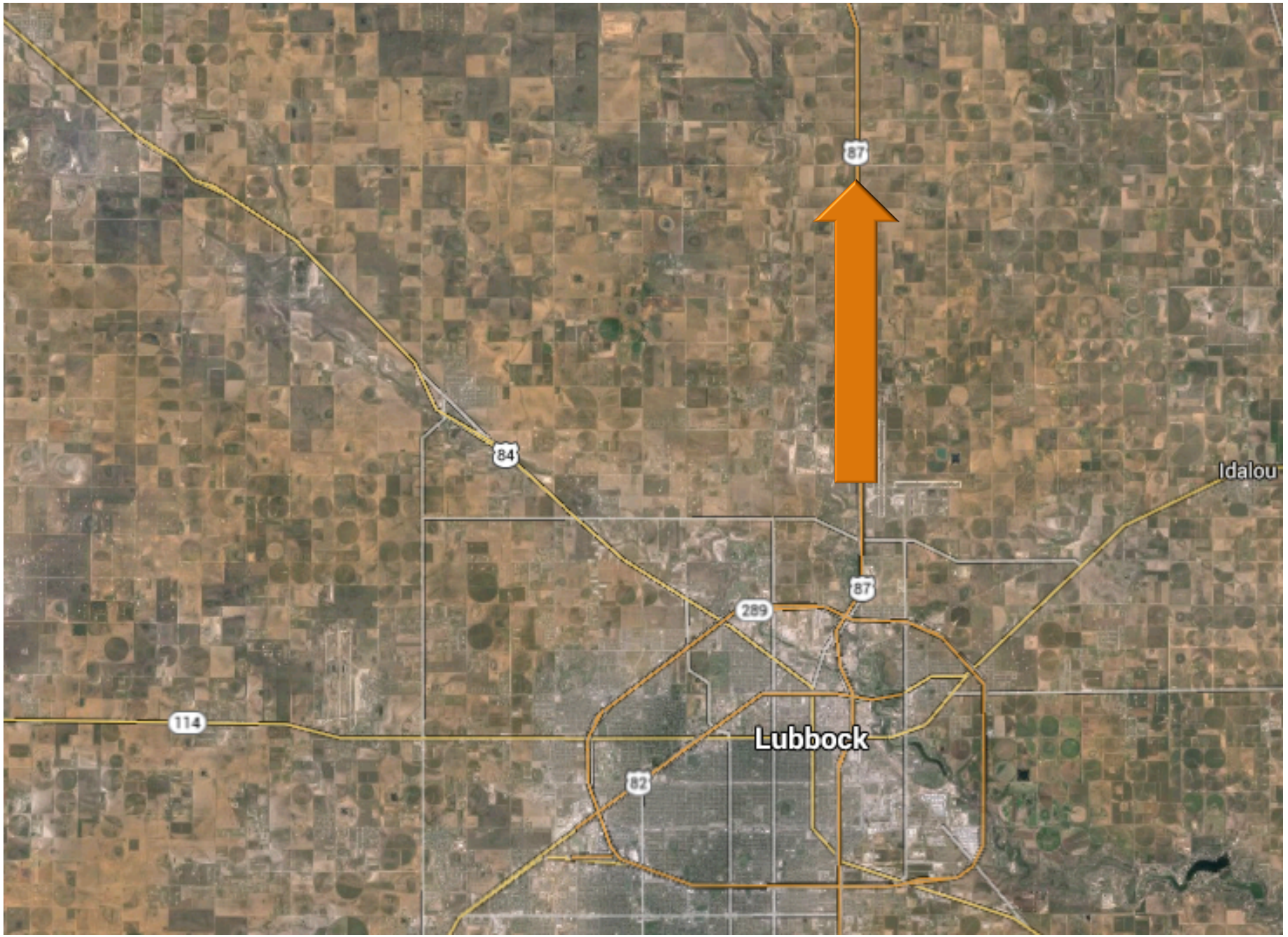
Climate Exercise – Day 1

KATHARINE HAYHOE

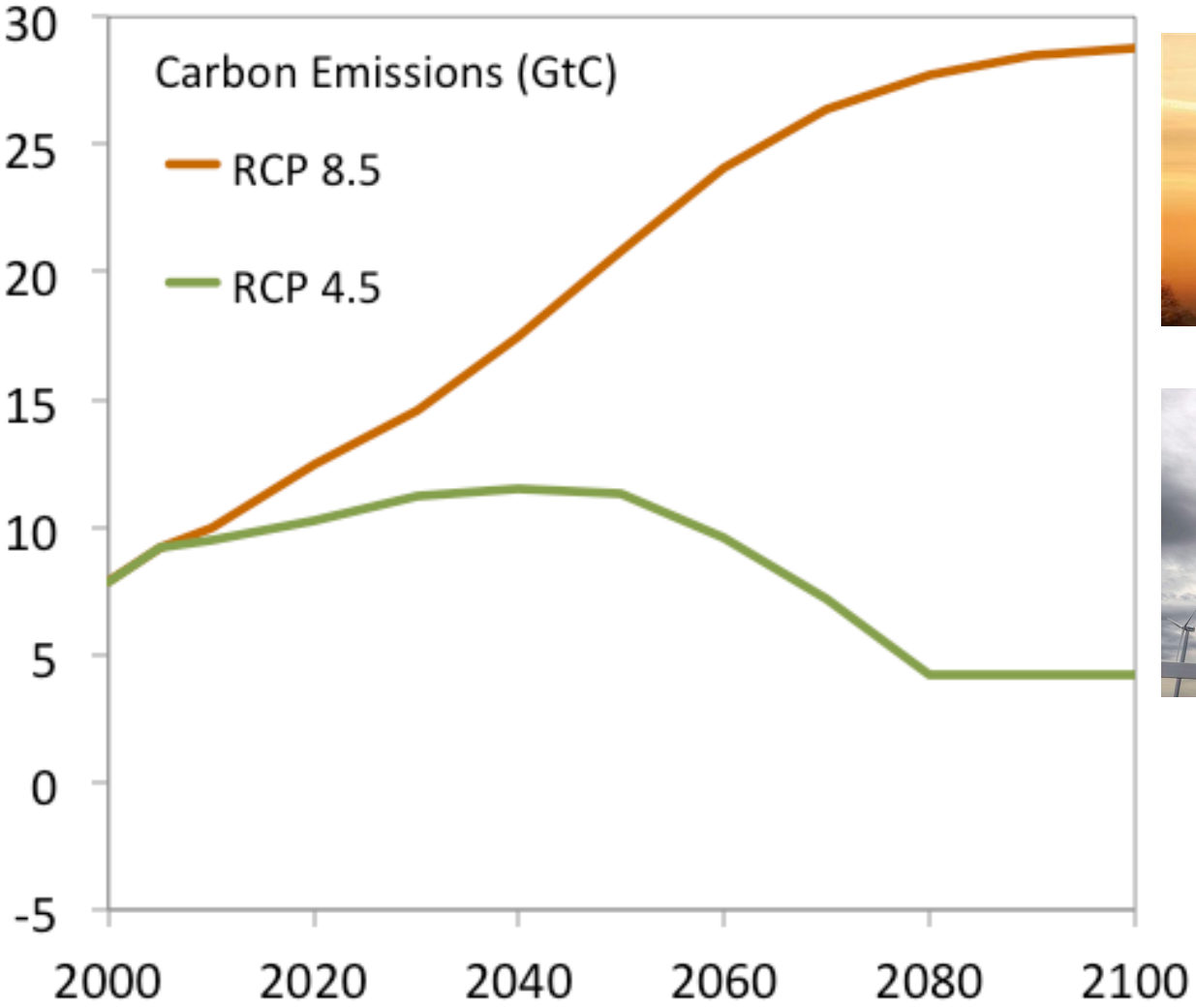

87
84
Idalou
87
289
114
Lubbock
82

Planning for the future
based on the past
is like driving down the road
looking in the rear-view mirror.

WHAT ARE **INDICATORS**?

- *Indicators* are metrics that can be used to understand how climate conditions are changing.
- We are using indicators based on maximum and minimum temperature and precipitation.
- This code allows you to calculate three types of indicators:
  1. Annual or seasonal averages
  2. Days per year above or below a threshold
  3. Record hot, cold, and wet conditions each year

We calculate indicators for 2 futures



THE STEPS FOR TODAY

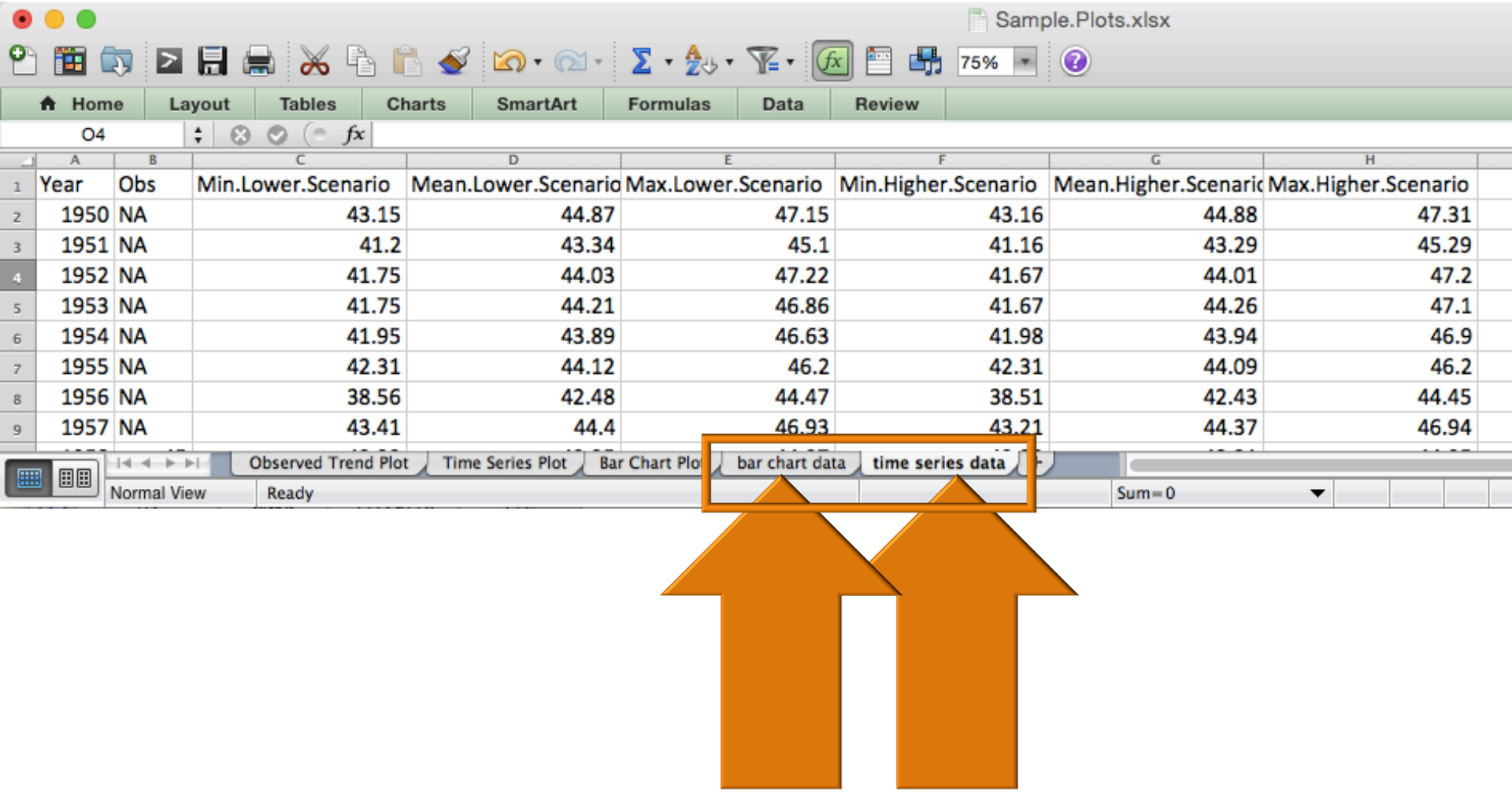
- STEP ONE: Open the statistical programming package R on your computer. Follow the instructions so the program knows where to find the directories it will need. The information you will need to enter should be written on the whiteboard here in the room.
- STEPS TWO and THREE: Calculate climate indicators using two types of data: (1) weather station data for one of 64 different stations around India, and (2) gridded data covering all of India.

JUST FOLLOW THE INSTRUCTIONS
AND ASK FOR ASSISTANCE IF YOU NEED IT!

IF YOU HAVE TIME …

- STEPS FOUR and FIVE: Plot the weather station projections using Excel, and plot the gridded data using a program called Panoply.

SAMPLE.PLOTS -> 3 TYPES OF EXCEL PLOTS



Year	Obs	Min.Lower.Scenario	Mean.Lower.Scenario	Max.Lower.Scenario	Min.Higher.Scenario	Mean.Higher.Scenario	Max.Higher.Scenario
1950	NA	43.15	44.87	47.15	43.16	44.88	47.31
1951	NA	41.2	43.34	45.1	41.16	43.29	45.29
1952	NA	41.75	44.03	47.22	41.67	44.01	47.2
1953	NA	41.75	44.21	46.86	41.67	44.26	47.1
1954	NA	41.95	43.89	46.63	41.98	43.94	46.9
1955	NA	42.31	44.12	46.2	42.31	44.09	46.2
1956	NA	38.56	42.48	44.47	38.51	42.43	44.45
1957	NA	43.41	44.4	46.93	43.21	44.37	46.94

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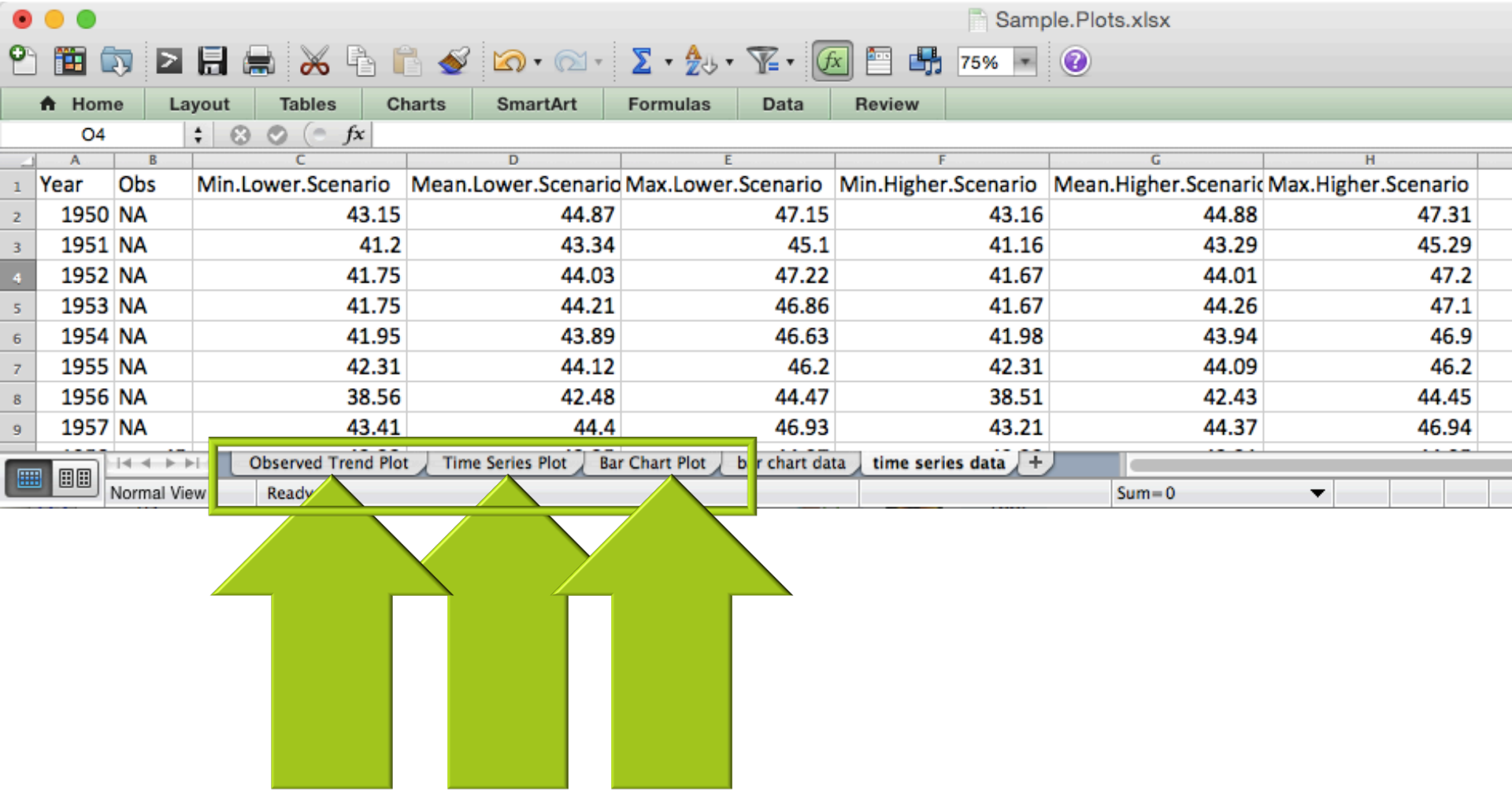

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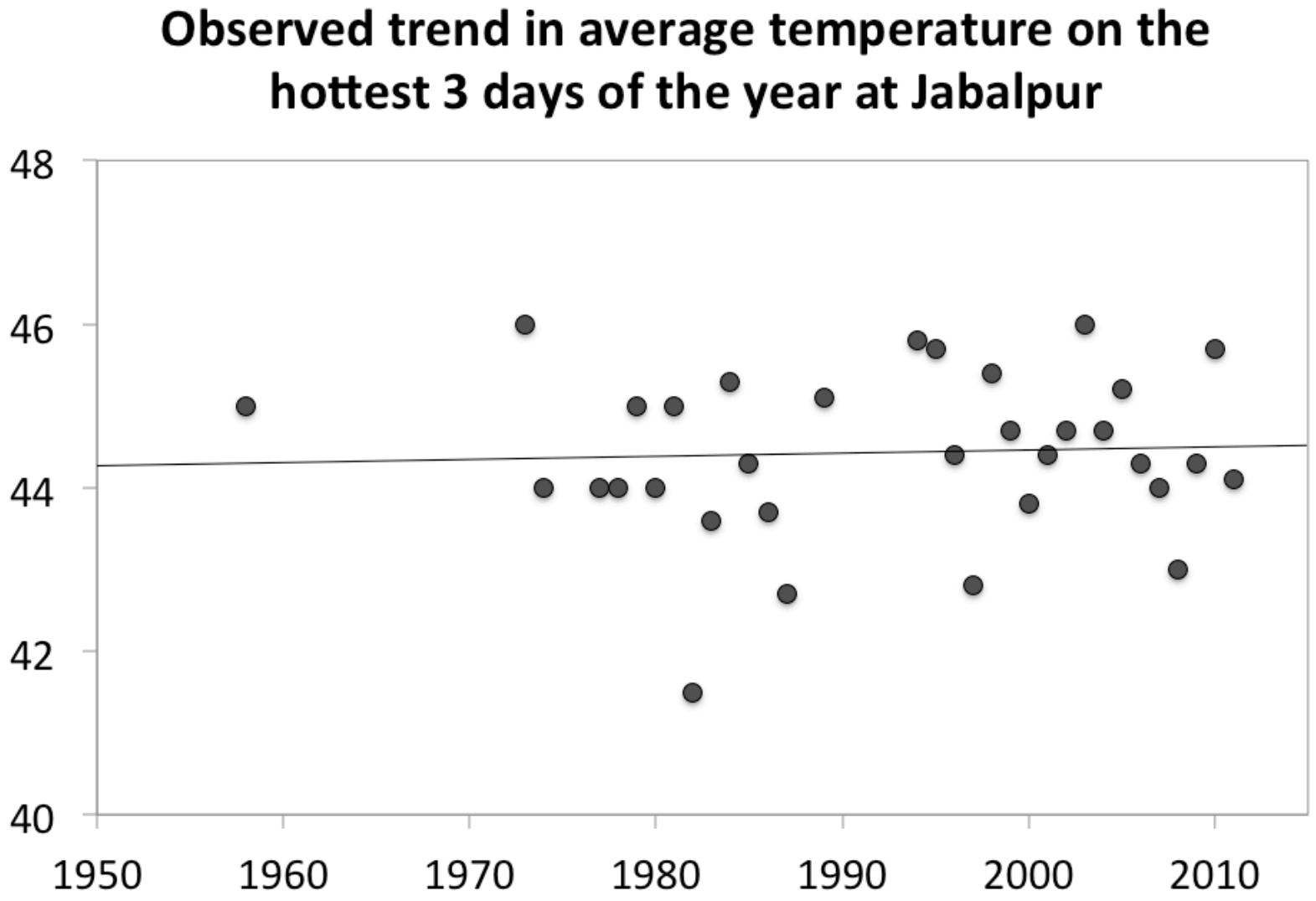

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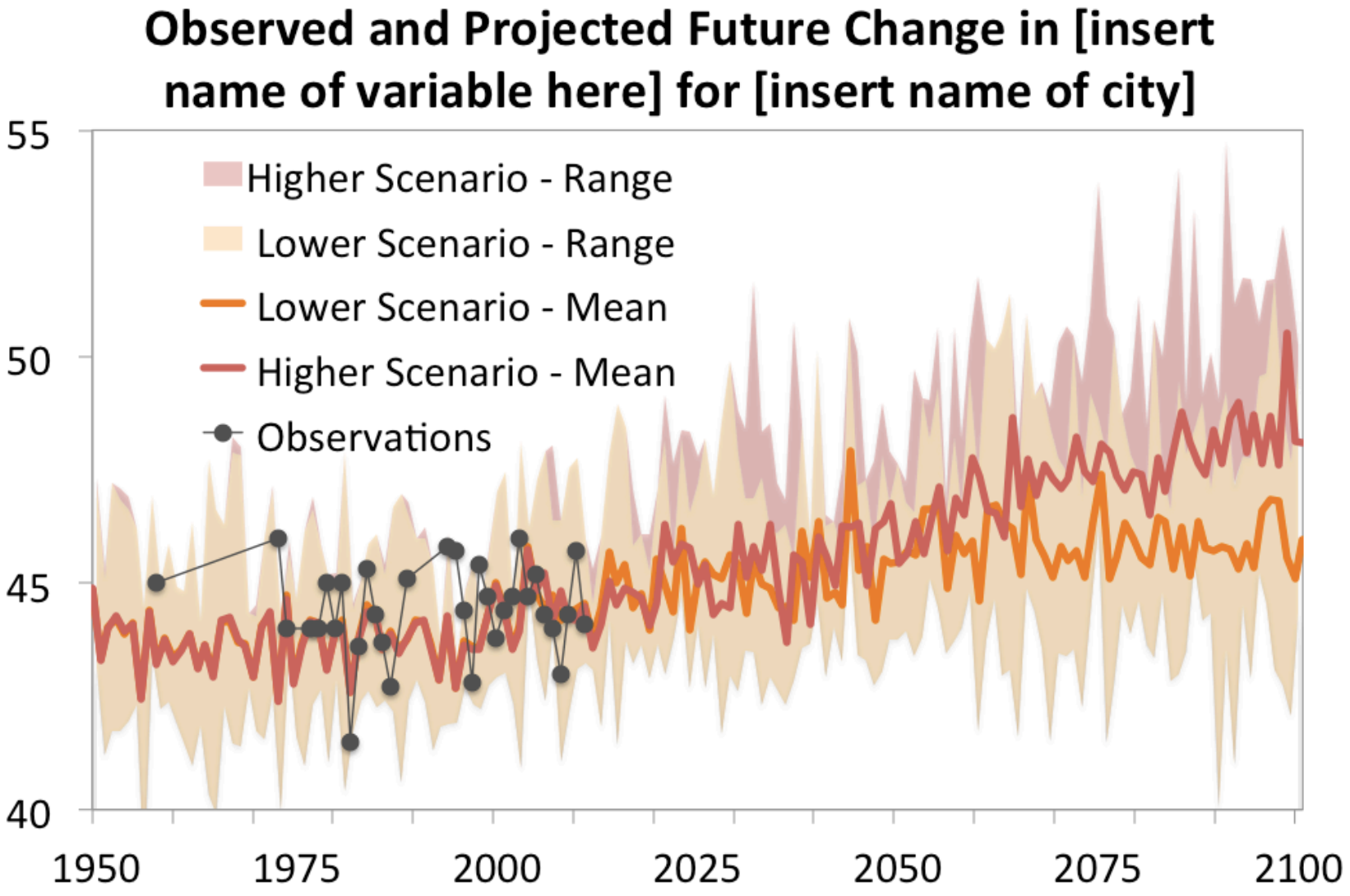

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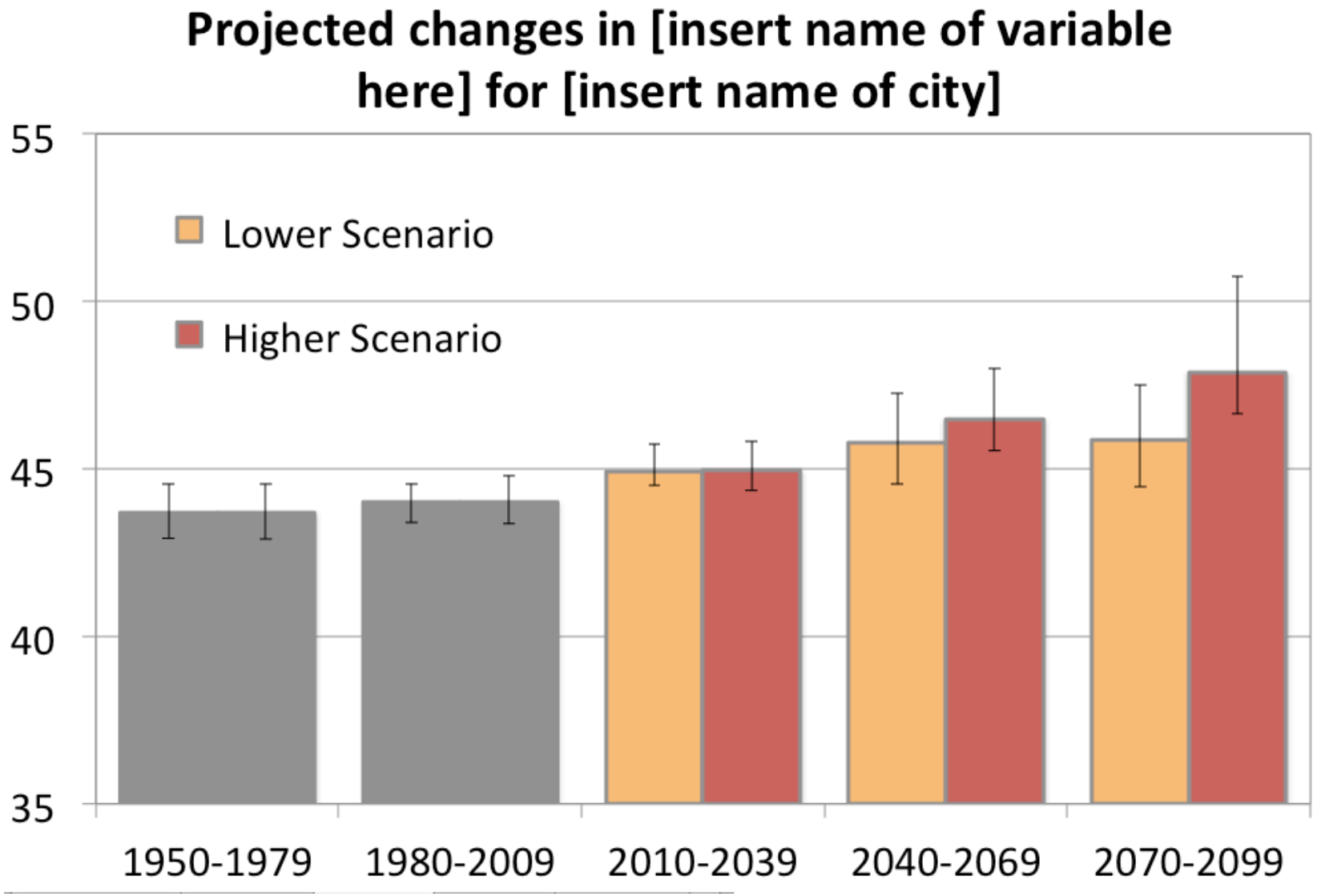
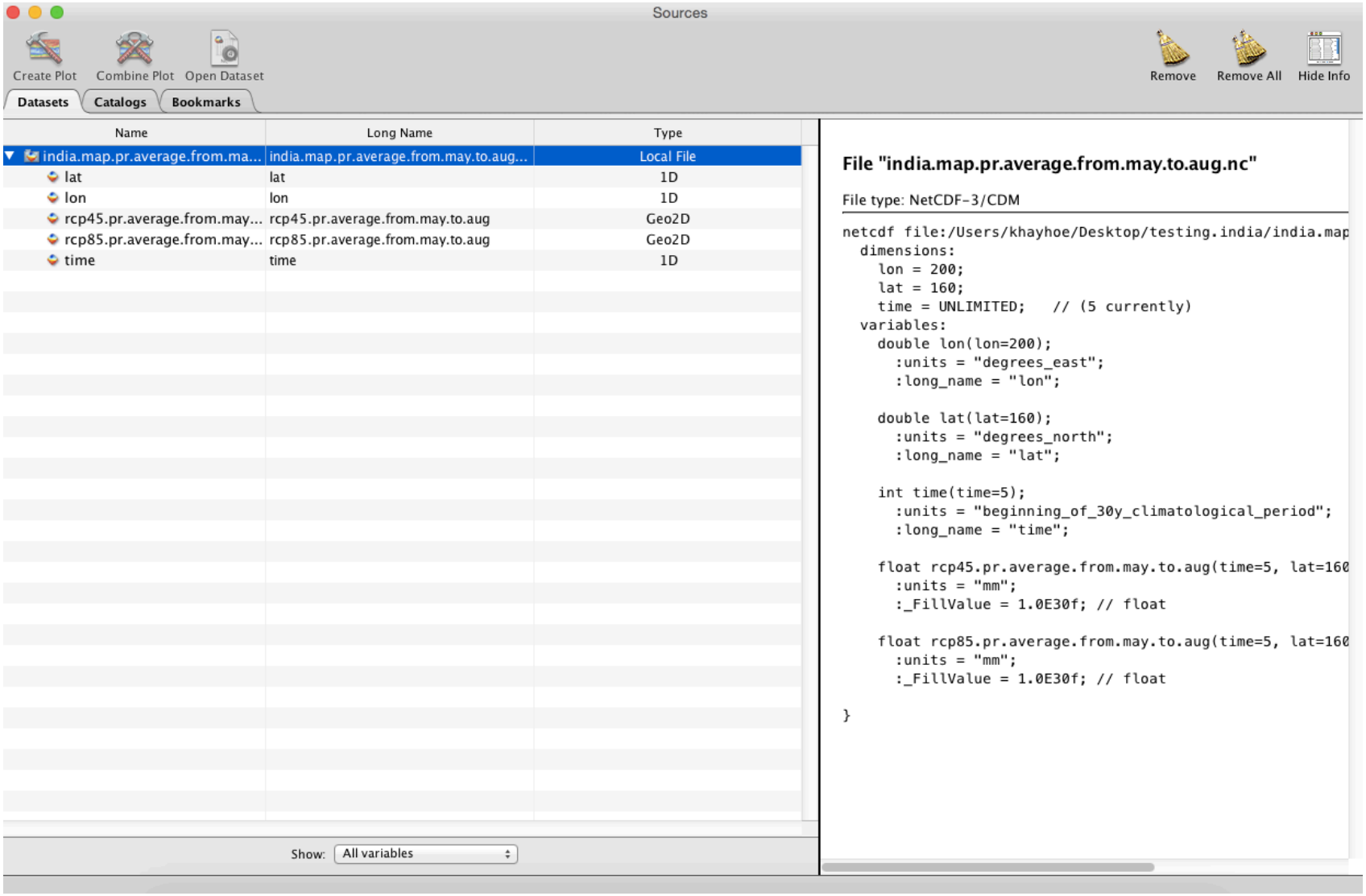


PANOPLY -> MAPS



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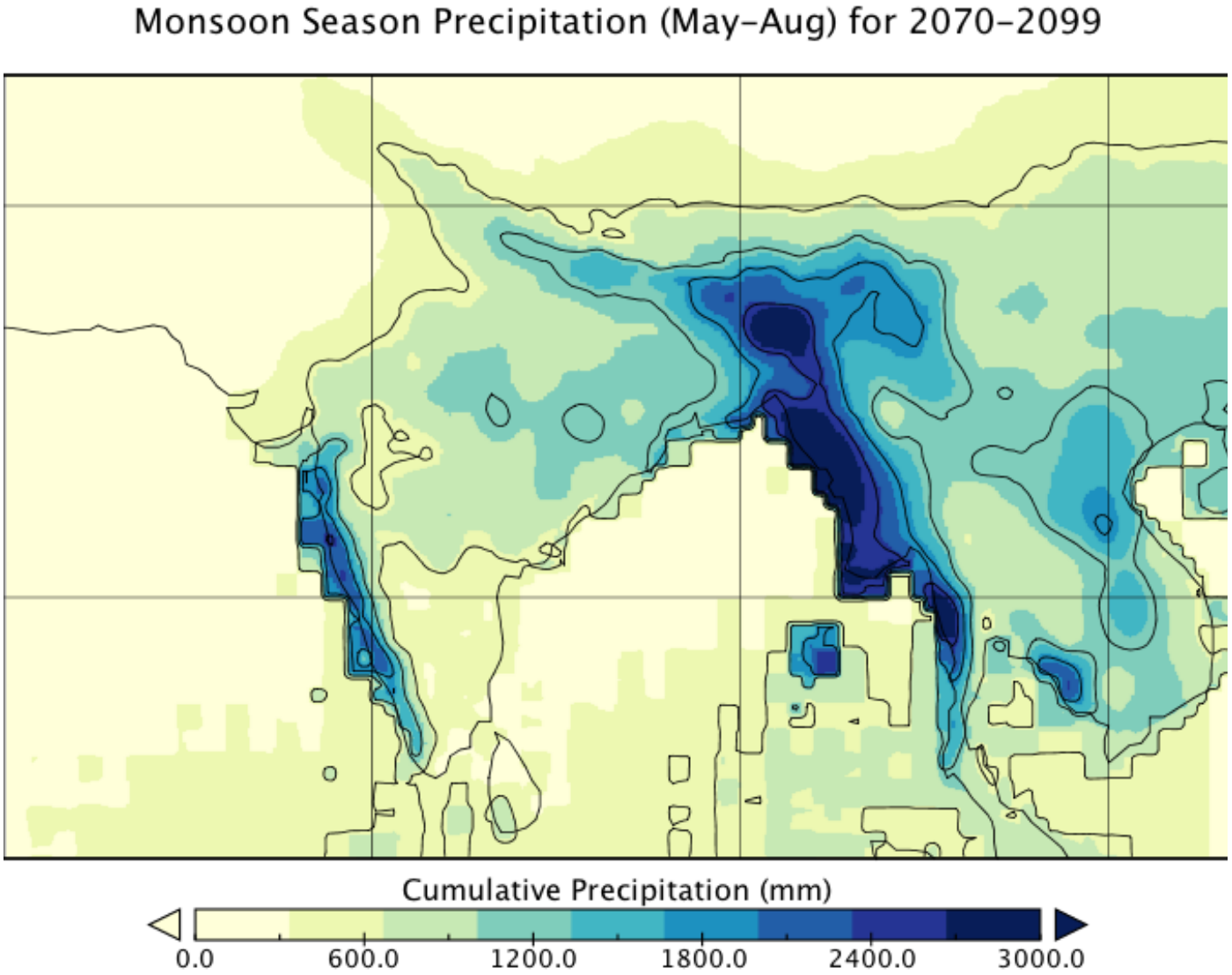

IF YOU HAVE TIME …

- STEPS FOUR and FIVE: Plot the weather station projections using Excel, and plot the gridded data using a program called Panoply.
- STEPS SIX and SEVEN: Explore the differences between station data versus gridded data, and calculate many more indicators.