

## Common Climate Myths

- (1) Climate is only a function of the atmosphere
- (2) Climate is static
- (3) Climate is always stable (insensitive to forcing)
- (4) Weather and Climate are different
- (5) Climate change has begun

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## Introductions: Learning Outcomes Climate Literacy

- I. Appreciation of climate science as a “systems” science**
  - Climate science is a complex and interdisciplinary subject
  - Physics, Chemistry, Biology
- II. Spatial and seasonal climate patterns**
  - Atmospheric Global Circulation
  - Interplay of Oceans, Land Surface and Cryosphere
  - Microclimates
- III. Timescales and Drivers of Climate Variability and Change**
  - Modern Climate Variations
  - Paleoclimates
- IV. Relevance to variety of real world questions and problems**
  - Emphasis on hydroclimatology, ecology

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## Working Definition(s) of Climate

- Comes from the Greek word...  
“inclination”  
*Inclination of sun to earth’s surface determines climate*
- **Empirical Definition:** Describes climate statistically using meteorological observations and “expectations”
- **Dynamic Definition:** Seeks to explain the climate through coupled spatial/time varying forces of the Earth System


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## Development of Climate Science


- 19<sup>th</sup> century – early 20<sup>th</sup> century: isolated studies.
- Middle 20<sup>th</sup> century – 1980s: development into a mature science.
- In the past two decades: earth system approach.
- Multidisciplinary & interdisciplinary.

**How scientists study climate change:  
Observations ← → Theory**

“Your tools are terribly antiquated and imprecise”



Climate Modeler



Field-Observer/Geologist

“You produce junk and waste a lot of money”

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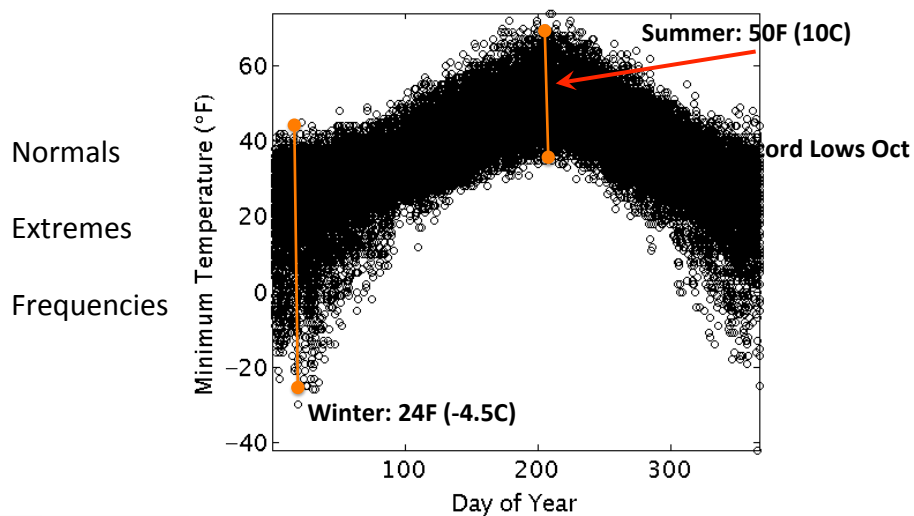
## Definitions

- **Weather:**
  - State of the atmosphere at a particular point in time.
  - Look outside
- **Climate:**
  - the accumulation of “weather” (atmospheric state) over a longer time period
  - Look outside for a real long time and do statistics
  - Means, variance, likelihood

“Climate is what you expect...  
 ... Weather is what you get”  
 ...almost...

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## Moscow Daily Minimum Temperatures



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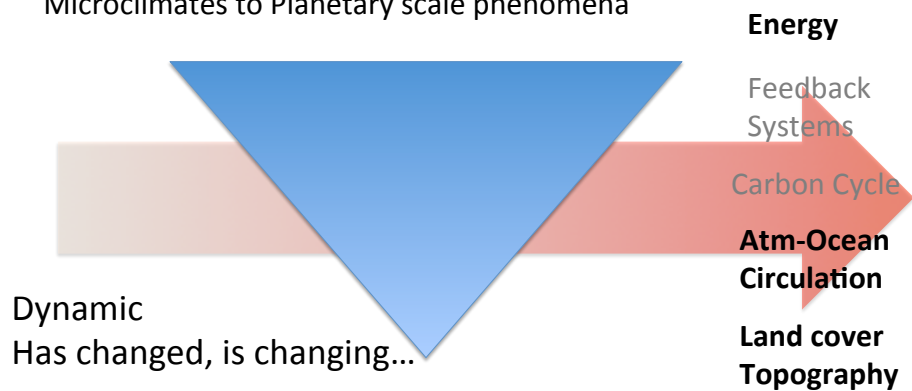
## Uses of the Term Climate

- **Describe the meteorological statistics (static)**
  - “Moscow averages 50” of snow per year”
  - “The median coldest night in Moscow each winter is -5F”
- **Describe deviations from statistics over an extended time period (>2 weeks, interannual variations, oscillatory)**
  - “Moscow received 4” more precipitation than *normal*”
- **Describe longer term changes (multi-decadal to millennial)**
  - “By the end of the 21<sup>st</sup> century projected change in climate are for Moscow to receive an average of 15” of snow per year.”

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## Climate Science: Hierarchy of Scale

- Observations, Theory, Modeling
- Earth System Science: sum > individual parts
- Microclimates to Planetary scale phenomena



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