

### **GARP 0110 Fall 2020: Week #9 Cookbook.**

Welcome to Week #9 of our semester!

We start with Big Question #10 this week and our 'mini' section on climate modeling. Zoom Wednesday will look at the big-picture issues of climate modeling and then introduce the Midterm Exam. No additional assignment this week!

⇒ Everything that you need for this week is included in / linked from this cookbook.

Questions / Feedback: [cbraun@westfield.ma.edu](mailto:cbraun@westfield.ma.edu) or [Anonymous](#) (via Padlet)

#### 1) [Week #9 Introduction Video](#)

#### 2) Topics.

1. Review and Reflection
2. Big Question #10
3. Zoom Wednesday: Climate Modeling
4. The Midterm Exam

#### 3) Zoom Wednesdays.

GARP 0110-001: 11:30-12:20  
GARP 0110-002: 12:35-13:25  
GARP 0110-003: 08:15-09:05

Join Zoom Meeting:

<https://zoom.us/j/93899213283>

#### 4) [Week #9 Synopsis Video](#)

**Please contact me for help or clarification of my expectations as needed.  
I'm here to help.**

**Course Schedule.**

| <b>Week</b>   | <b>Dates</b>                             | <b>Delivery Method.</b>                                                                                   | <b>Topic/Theme.</b>                                                                                         |
|---------------|------------------------------------------|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Week 1        | W 9/2<br>F 9/4                           | Zoom Wednesday<br>Asynchronous Online Learning                                                            | Introduction, Course Logistics<br>What is SFFP?                                                             |
| Week 2        | M 9/7<br>W 9/9<br>F 9/11                 | No class (Labor Day)<br>Zoom Wednesday<br>Asynchronous Online Learning                                    | What is Science?<br>What is Science?<br>What is Science?                                                    |
| Week 3        | M 9/14<br>W 9/16<br>F 9/18               | Asynchronous Online Learning<br>Zoom Wednesday<br>Asynchronous Online Learning                            | The Limits of Science<br>The Limits of Science<br>The Limits of Science                                     |
| Week 4        | M 9/21<br>W 9/23<br>F 9/25               | Asynchronous Online Learning<br>Zoom Wednesday<br>Asynchronous Online Learning                            | Presidential Briefing #1<br>Library Session<br>Presidential Briefing #2                                     |
| Week 5        | M 9/28<br>W 9/30<br>F 10/2               | Asynchronous Online Learning<br>Zoom Wednesday<br>Asynchronous Online Learning                            | Science and Society<br>Science and Society<br>Science and Society                                           |
| Week 6        | M 10/5<br>W 10/7<br>F 10/9               | Asynchronous Online Learning<br>Zoom Wednesday<br>Asynchronous Online Learning                            | Climate Change<br>Climate Change<br>Climate Change                                                          |
| Week 7        | M 10/12<br>T 10/13<br>W 10/14<br>F 10/16 | No class (Columbus Day)<br>Asynchronous Online Learning<br>Zoom Wednesday<br>Asynchronous Online Learning | Climate Change<br>Climate Change<br>Climate Change                                                          |
| Week 8        | M 10/19<br>W 10/21<br>F 10/23            | Asynchronous Online Learning<br>Zoom Wednesday<br>Asynchronous Online Learning                            | Climate Change<br>Climate Change<br>Climate Change                                                          |
| <b>Week 9</b> | <b>M 10/26<br/>W 10/28<br/>F 10/30</b>   | <b>Asynchronous Online Learning<br/>Zoom Wednesday<br/>Asynchronous Online Learning</b>                   | <b>Climate Change<br/>Climate Change / Midterm Exam<br/>Midterm Exam</b>                                    |
| Week 10       | M 11/2<br>W 11/4<br>F 11/6               | Asynchronous Online Learning<br>Zoom Wednesday<br>Asynchronous Online Learning                            | Climate Change / BQ #11<br>Climate Change / BQ #12<br>Climate Change / BQ #13                               |
| Week 11       | M 11/9<br>W 11/11<br>F 11/13             | Asynchronous Online Learning<br>No class (Veteran's Day)<br>Zoom Friday                                   | Climate Change / BQ #14<br>Climate Change / BQ #15<br>Climate Change / BQ #16                               |
| Week 12       | M 11/16<br>W 11/18<br>F 11/20            | Asynchronous Online Learning<br>Asynchronous Online Learning<br>Zoom Friday                               | Climate Change / BQ #17<br>Climate Change / BQ #18<br>Climate Change / BQ #19                               |
| Week 13       | M 11/23<br>W 11/25<br>F 11/27            | Asynchronous Online Learning<br>No class (Thanksgiving Break)<br>No class (Thanksgiving Break)            | Climate Change / BQ #20                                                                                     |
| Week 14       | M 11/30<br>W 12/2<br>F 12/4              | Asynchronous Online Learning<br>Zoom Wednesday<br>Asynchronous Online Learning                            | Presidential Briefing #2 / BQ #21<br>Presidential Briefing #2 / BQ #21<br>Presidential Briefing #2 / BQ #21 |
| Week 15       | M 12/7<br>W 12/9<br>F 12/11              | Asynchronous Online Learning<br>Zoom Wednesday<br>Asynchronous Online Learning                            | Special Topics: Solutions<br>Special Topics: Solutions<br>Special Topics: Solutions                         |
| Week 16       | M 12/14<br>W 12/16                       | Asynchronous Online Learning<br>Zoom Wednesday<br>Test # 2 (as scheduled)                                 | Special Topics<br>Special Topics<br>Test #2                                                                 |

## The 21 Big Questions.

|    |                                                                                                        |                     |
|----|--------------------------------------------------------------------------------------------------------|---------------------|
| 1  | Mr. President, isn't global warming the same as climate change?                                        | Instrumental Record |
| 2  | How do we even know that the Earth is getting warmer right now<br>Madame President?                    | Instrumental Record |
| 3  | But I thought the greenhouse effect was natural? How can it be (that)<br>bad if it is natural?         | Greenhouse Effect   |
| 4  | How can such a small amount of CO2 have any impact on the climate of<br>the entire planet!             | Greenhouse Effect   |
| 5  | Mr. President, I always thought that the ozone hole causes global<br>warming and we fixed that?        | Greenhouse Effect   |
| 6  | Mr. President - isn't there still a debate if climate change is really<br>happening and why?           | Humans/Variability  |
| 7  | How long have we been studying this? What do we still not know about<br>climate change?                | Humans/Variability  |
| 8  | Mr. President, how can we be sure that humans are causing the recent<br>warming?                       | Humans/Variability  |
| 9  | They predicted global cooling in the 1970s! Global warming stopped for<br>the last 15 years!           | Humans/Variability  |
| 10 | How can we predict the climate in 100 years when we can't forecast the<br>weather for next week?       | Climate Models      |
| 11 | Are our computer models of climate reliable Mr. President?                                             | Climate Models      |
| 12 | Mr. President, what will the climate be like in 50 or 100 years?                                       | Climate Models      |
| 13 | Mr. President - how big of a problem is global warming? How will this<br>affect us?                    | Impacts             |
| 14 | Madame President, will we have more extreme weather with global<br>warming?                            | Impacts             |
| 15 | Mr. President, surely this can't be all bad - what are the benefits of global<br>warming?              | Impacts             |
| 16 | Madame President, what if this is overestimated and a much smaller<br>problem?                         | Impacts             |
| 17 | Mister President: if all the scientists agree...then why are we still not<br>doing something about it? | Solutions           |
| 18 | But we can't do anything unless China also does it - they are the biggest<br>polluters today!          | Solutions           |
| 19 | Madame President, how can we fix this global warming problem?                                          | Solutions           |
| 20 | Mr. President - how much will this cost to fix and can we even afford to<br>fix it?                    | Solutions           |
| 21 | Mister President, the perfect solution is geoengineering!                                              | Solutions           |

## **1) Review and Reflection.**

Remember John Dewey: *We do not learn from experience, we learn from reflecting up experience.*

### **1.1) The Tiger Puzzle.**

My favorite metaphor for scientific knowledge in-general: the puzzle will never be 100 percent completed, but at some point the picture is clear and responsible actions are warranted. Try this: explain the Tiger Puzzle analogy to your roommate.

### **1.2) Climate Always Changes: Natural Variability vs. Human Forcing.**

This is yet another one of these baffling logical fallacies: climate always changes and therefore what we are clearly experiencing right now has to be a natural variation as well. That's a) dumb and b) also demonstrably false. See <https://www.bloomberg.com/graphics/2015-whats-warming-the-world/> for a nice visual animation.

We now have 7.8 Billion people on the planet and their cumulative impact is clear and obvious.

### **1.3) The Global Cooling Myth of the 1970s.**

No, science did not predict the next ice age in the 1970s. However, these temporary periods of no-warming / slight cooling are very instructive in terms of the overall trends and patterns. Plus they also show that some of our puzzle pieces (see Section 1.1) are not placed yet!

Watch this video for context: [Debunking Cranky Uncle on the hiatus](#) (2:02 minutes)

### **1.4) The Week #9 Review Quiz.**

Please complete [the Week #9 Review Quiz](#) to see how much you remember from last week.

## 2) Big Question #10.

*Mr. President: How can we predict the climate 50 or 100 years from now when we cannot even forecast the weather next week?*

Well, a) climate and weather are different and therefore have different levels of predictability and climate predictions do not need weather detail and b) we actually can forecast weather quite accurately today. More importantly, we can assess whether or not climate models provide us with useful information - they do.

### 2.1) Big Question #10.

- Please review [my Big Question #10 Summary Notes](#) for concise answers, information, additional resources, important figures, and study materials.
- Please watch [Climate Models](#) (Katharine Hayhoe, 8:08 minutes).
- Please review [my Big Question #10 slide deck](#) and make sure that you read and understand the speaker notes below each slide for additional context, questions, and explanations - these notes summarize what I would say in-class. You can move the divider between the slide and the speaker notes so that you can see all of the speaker notes or use the presentation mode.

### 2.2) Test Your Knowledge.

Please complete the [brief Big Question #10 Quiz](#) and make sure that you look at the review questions, terms, and concepts in the Big Question #10 Summary Notes.

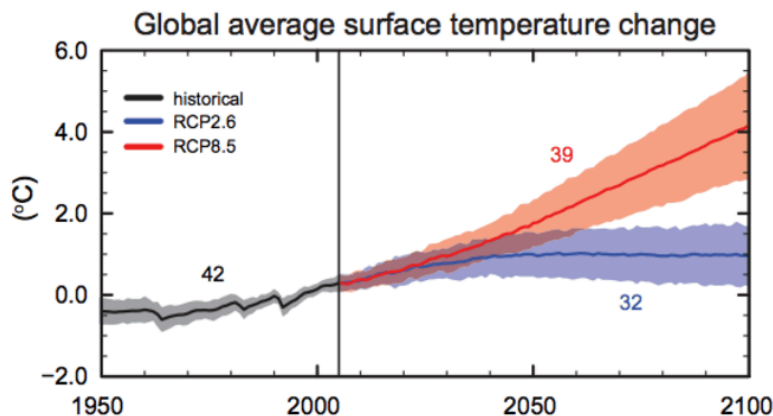


Figure 1. Two possible versions of the future (red and blue). Remember: the future has not happened yet - humans can decide which future will happen. (Source: [IPCC AR5](#))

### **3) Week #9 Zoom Wednesday.**

- Zoom Link: <https://zoom.us/j/93899213283>
- [Week #9 Zoom Wednesday Slidedeck](#)

#### 4) The Midterm Exam.

- [Review Materials](#)
- [Practice Test](#)
- [The \(actual\) Midterm Exam](#)

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