Reading Guide for October 22

from Henson, *Rough Guide to Weather*

Chapter 4: A primer on climate change

pp. 150–152. *The basics.* This section is a capsule summary of the current understanding of **global warming**. The three key concepts here are:

- What is the evidence that surface air temperatures are increasing?
- What other evidence of warming is there?
- What is the basis of predictions that temperatures will continue to rise?

pp. 152–155. "*What's going on here?*" This gives a reasonably neutral, factual presentation of the science of climate change.

- What do "greenhouse gases" do to warm the atmosphere?
- What would Earth's average surface temperature be if there were no greenhouse effect?
- What appears to be the link between warm temperatures and atmospheric carbon dioxide levels?
- When was it first theorized that increased greenhouse gas emission would raise global temperatures?
- How have tropospheric carbon dioxide levels varied since 1960?

pp. 155–156. "*The downs and ups of global warming*." This describes the climate—political and thermal—of the public understanding of global warming in the 20th and 21st centuries. Red this, but there are no specific facts you need to record.

pp. 156–159. "*News you can use*." This section addresses several frequently-asked-questions about global warming. Better yet, it explains the answers. So, improve your understanding of climate change by answering—and understanding—the following questions.

- Does cold weather mean that global warming is nonsense?
- How can global warming be blamed for both floods and droughts?
- What is the likely change in precipitation here in Wyoming as a result of global warming?

- When will warming be most evident?

- Is it well-accepted that global warming will produce more intense hurricanes?

p. 158. Box "*What puts the Greenhouse in Gas?*" This is about the best readable explanation I have read of why "greenhouse" gases work as they do. I can't top it; just read it.

pp. 159–162. *Wild Cards.* This section discusses some of the variables that have unpredictable or poorly-understood effects on climate.

- Would global warming be prevented if we immediately stopped producing all greenhouse gases?

- Why aren't aerosols expected to be able to counteract the greenhouse effect?

- Can the observed temperature trends be accounted for by variations in solar output?

- What will happen to energy that is being stored in the ocean?

- how do sea ice and temperature influence each other?

- How do forests, temperature, and carbon dioxide levels influence each other?

pp. 162–163. "*Now what?*" This section addresses the future political response to climate change. It is worth reading, if only to think of what society and individuals ought to do, given what we know, what we don't know, and the consequences of different decisions.

pp. 164–165. Box "Forecasts for the twenty-first century." This describes the predictions by climate models for Britain and the U.S. All predict significant warming, but the details are unknown. What will the world of the future be? How can we prepare for it?

pp. 166–167. Box "What you can do about climate change." Think about all of these recommendations. Which ones apply to you? How much difference will each make? Are they worth it? Who bears the costs, and who benefits?

pp. 163–167. *The hole in the ozone and what we're doing about it.* Stratospheric ozone depletion is actually a different issue than global warming. They are both problems thought to be caused by human additions to the atmosphere, and they have both been addressed politically. Beyond that, though, they are different.

The discussion of the ozone hole is difficult to follow. The main things to note are that the "hole" itself depends on the formation of polar stratospheric clouds, which interact with CFC's. CFC's deplete stratospheric ozone worldwide by a slightly different mechanism, which is why they were banned decades ago. The ozone hole was a surprise.

pp. 167–168. "*Why isn't there an Arctic ozone hole?*" This explains the different conditions of the north and south polar regions that cause "holes" with different characteristics.

p. 168. "*Then there's global cooling…*" Well, it turns out that the ozone hole isn't healing as fast as anticipated. Seems the stratosphere gets colder now that its ozone is thinner, making it easier for polar stratospheric clouds to form.