Big Question #12: What will the climate be like in 50 or 100 years?	
Well, the future has not happened yet, so we have a choice here. The largest uncertainty of future climate predictions comes from humans - population dynamics, technologies, economic activities, and lifestyle choices can put the Earth on different paths towards different future climates. These different choices are called, for climate modeling purposes, emission scenarios or representative concentration pathways (RCPs).	
Slide Deck	Video: Climate Models / Impacts

1) The Big Picture.

The future has not happened yet, so we have a choice in the matter. In the best-case scenario the future for our grandchildren will not be all that different from what we consider 'normal' today. In the worst-case scenario, much of Boston will be underwater by 2100.

- Each of these futures - and any future in-between these extremes - is equally probable from a scientific perspective.
- However, most of the 7.8 billion humans on the planet do not have a voice or choice in this decision.

This is worth watching: IPCC Emissions Scenarios for beginners (4:54 minutes, YouTube).

Here you need to understand how we predict the future: what we need is some types of future scenarios that represent the range of different futures that we may face. This started with the so-called emission scenarios, then became the so-called RCPs (Representative Concentration Pathways) and now we have so-called SSPs (= Socioeconomic Pathways).

It is important to note that all of the four RCPs, for example, are equally-probable. The widely-cited RCP 8.5 is, for example, 'worst-case' business-as-usual scenario in which there are no climate policies. Its purpose, therefore, is to look at the risks, especially associated with climate extremes.

Each of these scenarios are basically narratives of how the world may evolve in terms of 'soft' factors such as collaboration, empathy, etc. and 'hard' numbers such as demographic trends, productivity, urbanization, education, access to health, etc. in every country. SSPs on purpose do NOT include any climate policies and that makes it possible to test impacts of different policy choices.

2) Resources.

- National Climate Assessment 2014 Appendix 3 Climate Science Supplement: Supplemental Message 5
- National Climate Assessment 2014 Appendix 4: FAQ N
- Special Report on Emissions Scenarios (Wikipedia)
- The Beginner's Guide to Representative Concentration Pathways (Skeptical Science)
- Judith Curry (5 October 2010) What constitutes "dangerous" climate change?

3) Videos.

- What is a Climate Model? (9:00 minutes)
- Climate Models vs Real World (2:41 minutes)
- How Climate Scientists Predict the Future (9:12 minutes)

4) Interactives.

- Future Climates: Explore the Possibilities (UCAR/NCAR)
- Compare IPCC Scenarios (UCAR/NCAR)
- The Greenhouse Gamble (MIT)
- Mapped: How every part of the world has warmed – and could continue to warm (CarbonBrief)

The Supertanker Analogy: Because of their immense size, supertankers turn very slowly. To avoid a hazard, the pilot has to begin turning the supertanker well before the hazard is actually reached. By the time the ship is upon the hazard, it's too late to avoid. (Source)

5) Review Questions.

1. Explain the concept of emission scenarios or RCPs in climate prediction.
2. Explain the supertanker analogy in the context of climate change over the next 50 or 100 years.
3. The climate in 50 or 100 years is largely dependent on our choices today. Explain and discuss this statement.

6) Terms and Concepts.

- Climate change vs. climate change impacts
- Emission scenarios
- Representative Concentration Pathways (RCPs)

7) Topics for Discussion.

The stated objective of the United Nations Framework Convention on Climate Change (UNFCCC, signed and ratified by the USA) is to *'prevent dangerous anthropogenic interference with the climate system.'* In your opinion - what degree of global warming is acceptable and at what point do you think global warming could become dangerous?

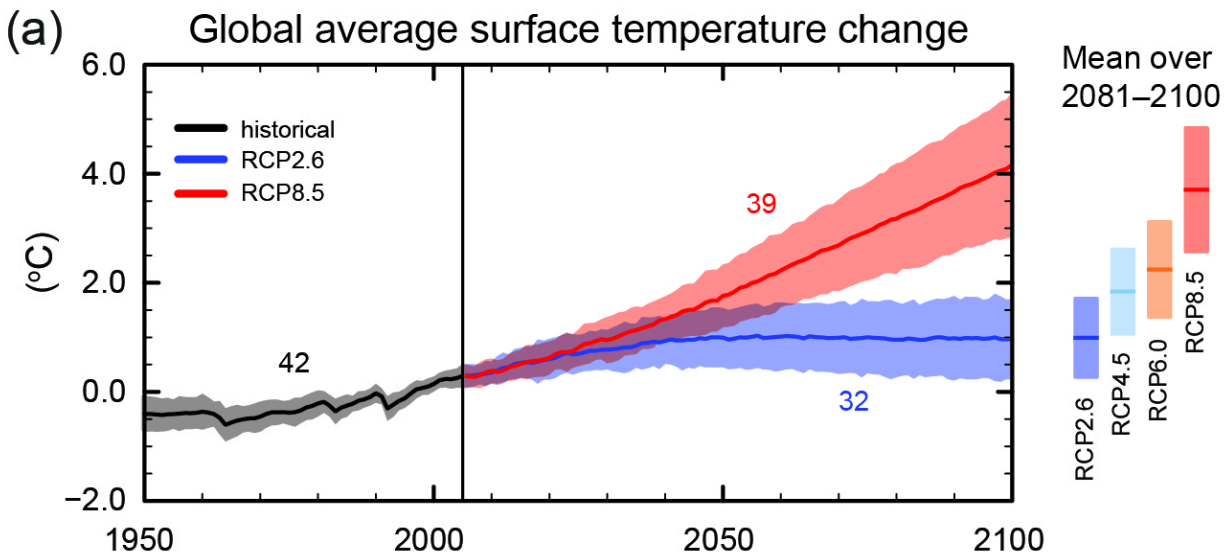

Figure 1. The most recent and most comprehensive climate change predictions for the 21st century highlight the spread between the 'best-case' future and the 'worst-case' future. Source: http://www.climatechange2013.org/report/reports-graphic/report-graphics/

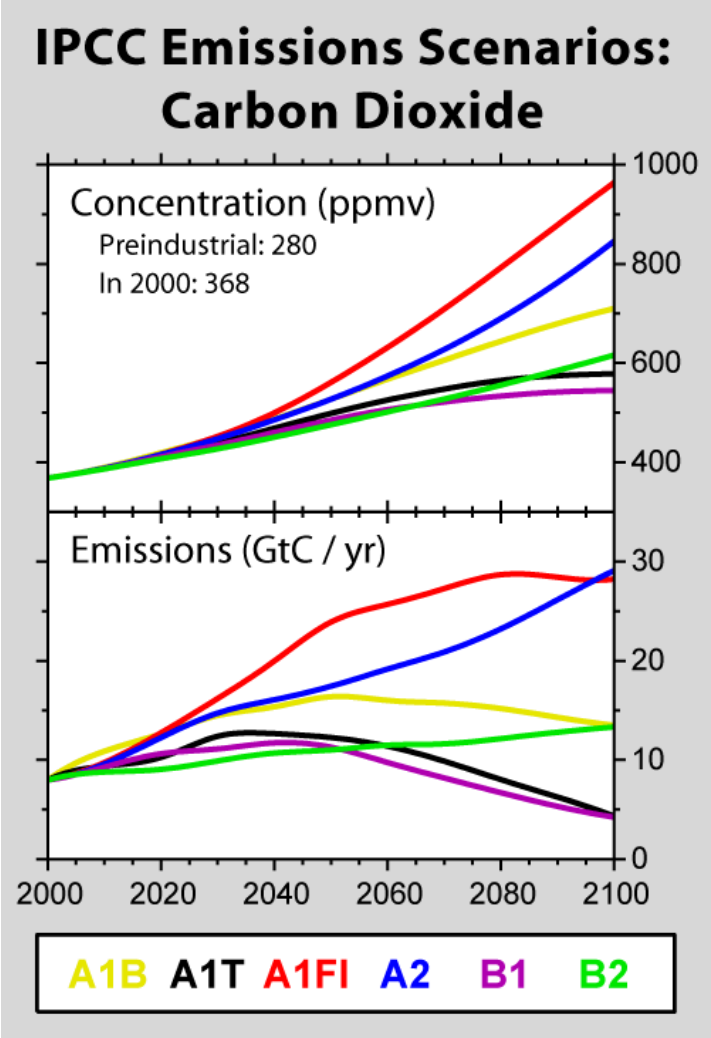

Figure 2. IPCC Emission scenarios for CO2.
http://www.globalwarmingart.com/images/e/e9/Carbon_Dioxide_Emissions_Scenarios.png

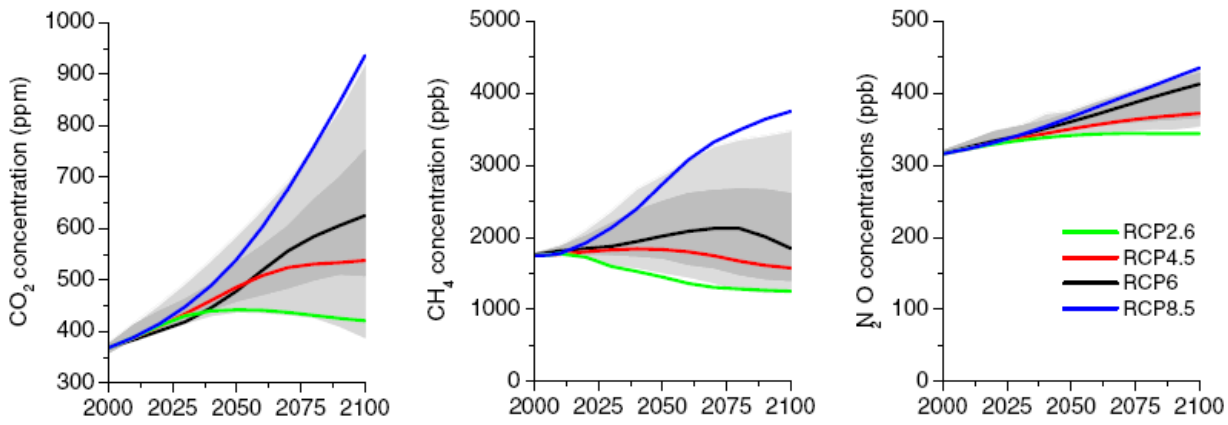

Figure 3. IPCC RCPs for the 21st century (Source)