What The Press Doesn't Tell You About Climate Change

Hawley K. Rising III, Ph.D.

3/24/2019

Humanist Society of Silicon Valley

Overview

- Statistics & Votes – The Press Model
- Dynamics & Determinism – Attractiors and Gaia
- Tipping Points & Basin Boundaries – How bad can they be?
- Poles & Ice – A Change in the Weather
- Diets & Die Offs – What about population?

Statistics and Votes

- We hear the following:
  - 97% of scientists believe in climate change
  - February was the 3rd hottest month sssssssssssssssssssssssssssssssssssson record
  - February was the wettest month on record
  - As the climate warms, the likelihood of extreme events increases
- These are statistics, and in the case of the first, polls
  - We hear this because this is what the press is comfortable with (sports coverage)
  - We also hear this because it is the most defensible for scientists aware of deniers
  - We hear it because it is the easiest to explain

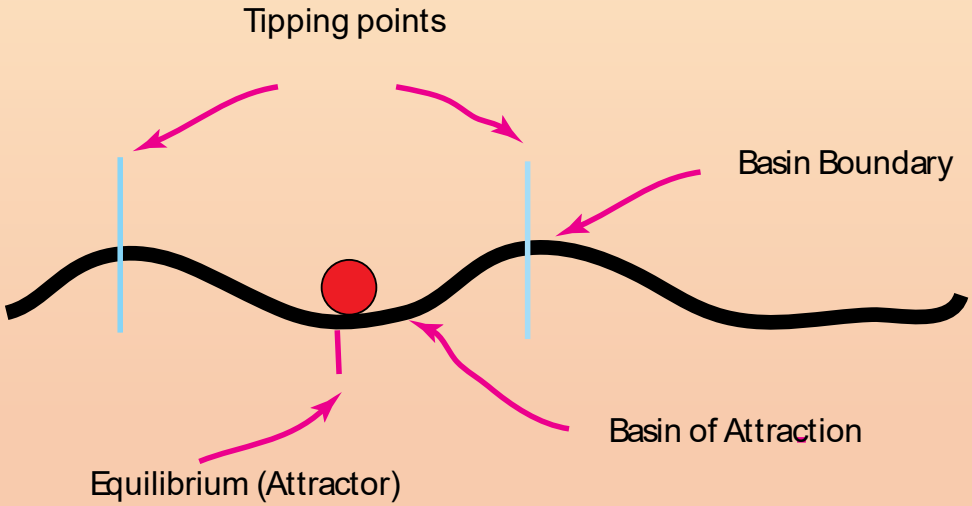
It isn't wrong, but it leaves people believing that all that will happen is a sea level change and some record-breaking storms

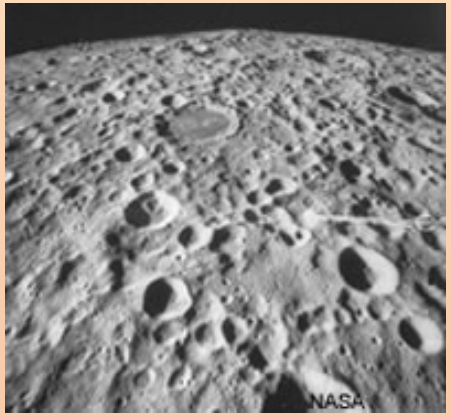
But First…

State space as a landscape with our climate as a rolling ball!

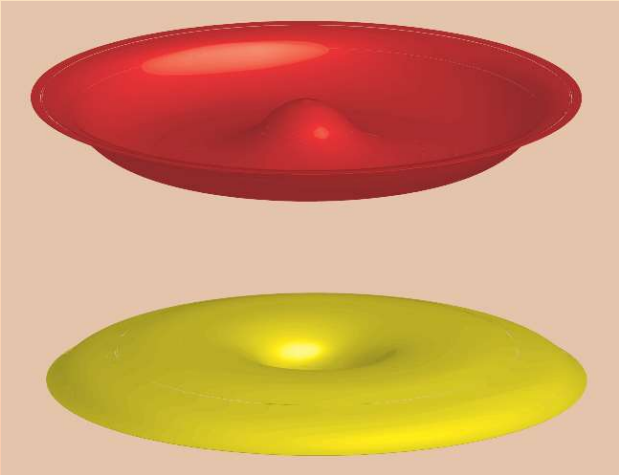
Basic Attractors and Basins of Attraction

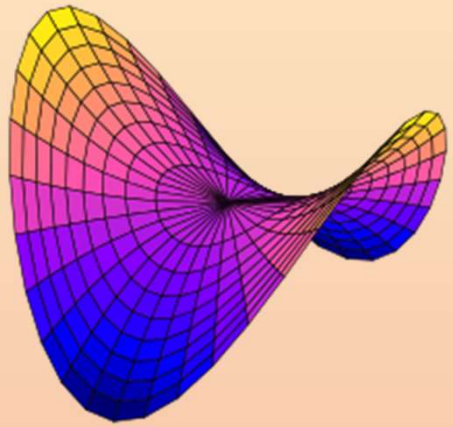
State space is a space with a dimension for each aspect of the system. A system is represented by a point. Its evolution is a path, and a basin of attraction is a well in which it stays unless it is pushed out.

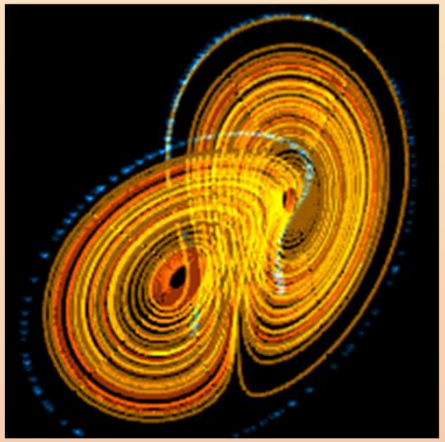




Attractors come in all shapes







Malin Christersson, Lorenz Attractor

A system that is in equilibrium that will stay that way is in an attractor. The equilibrium is the "normal". If the system moves to a new attractor, it is in a "new normal." Or it can be in a state of change to one. If it's in a very complicated attractor, then change is the "new normal."

Climate, Weather, and Dynamical Systems

- The Gaia Hypothesis and Earth as a self-regulated organism
  - Moving from the attractor within the basin reverts to the attractor
  - Move far enough and you climb out of the basin to the boundary
- The Attractor at Infinity
  - Venus and the runaway climate
  - Frozen methane, fires, and atmospheric change
- Determinism and dynamics
  - The anatomy of a climate change hurricane
  - The California fires, a short history.

The Gaia Hypothesis and Attractors at Infinity

The Gaia Hypothesis: The earth is self-regulating – like a living Being

This would be true if the climate were in a basin of attraction.

Until 50 years ago, Venus was where we expected to see life: It was about the same size as Earth, and a similar distance from the same sun. It was clouded.

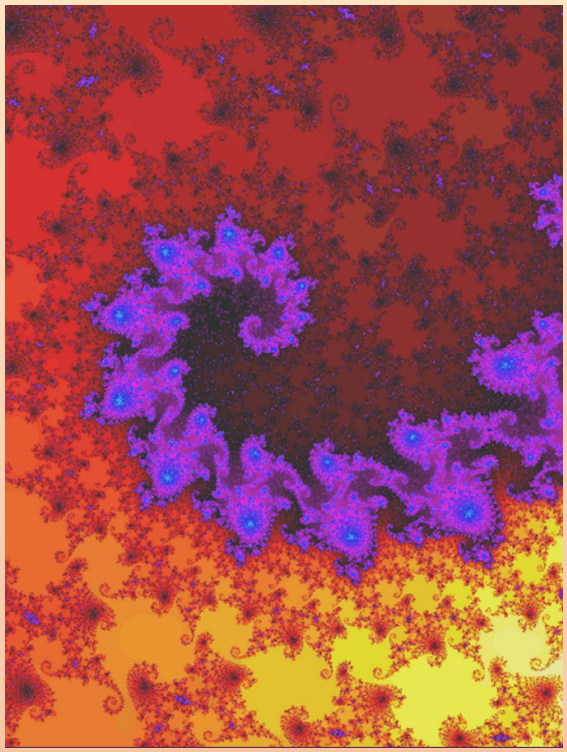
Venus is hot enough to melt metal on the surface. Why?

It's atmosphere is heavy insulation, sulphurous and carbon compounds.

We have frozen methane, we have trapped sulphur in our plants and surface minerals. If the earth failed to self-regulate, this would be, "The Attractor at Infinity."

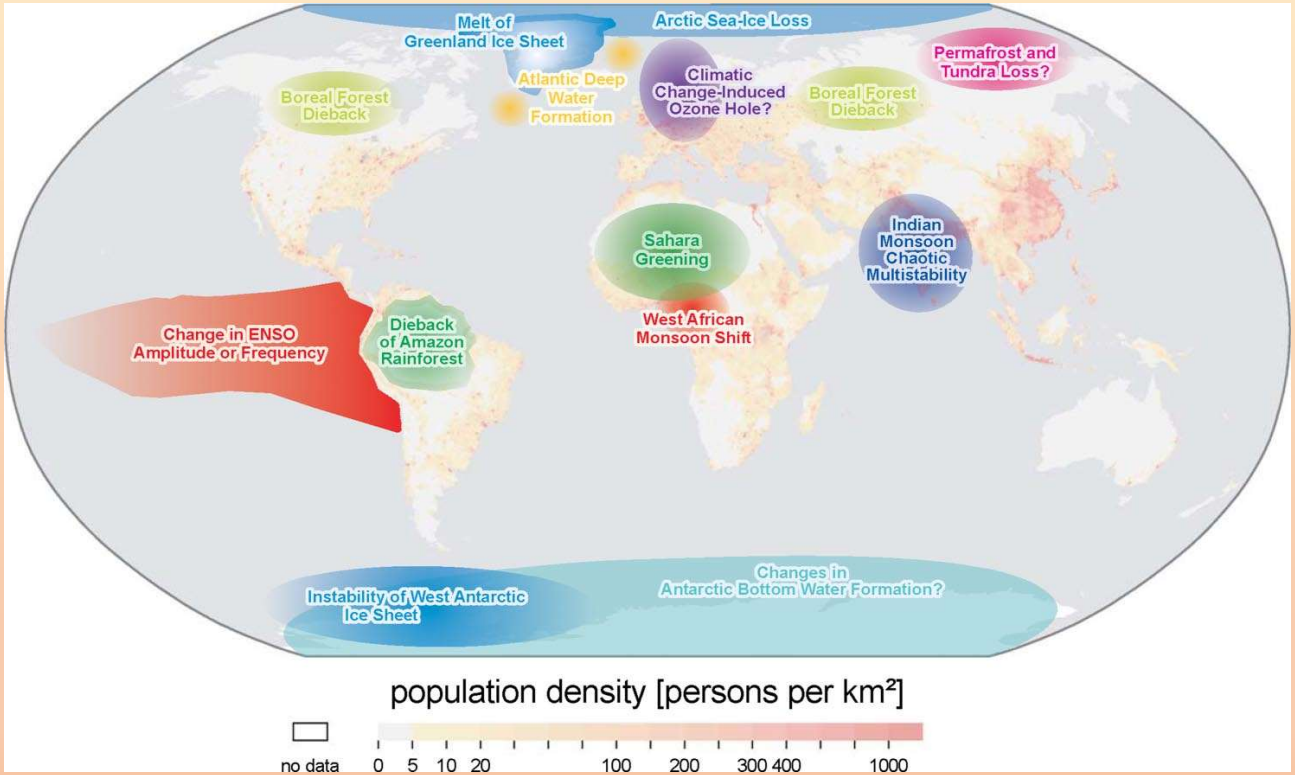
Tipping Points and Basin Boundaries

- Complexity and permanent change
  - A tipping point is essentially moving up and over a basin boundary
  - Basin boundaries can be complicated
- How bad can it be?
  - Take a look at the Mandelbrot Set →
- You can't always return!
  - We have never lived in any other basin



David Dewey www.ddewey.net/mandelbrot

Tipping Points and Basin Boundaries 2



Lenton, et al. Tipping Elements in the Earth's Climate System. PNAS 105(6) pp. 2786-1793, Feb. 12, 2008

All of these things affect the weather

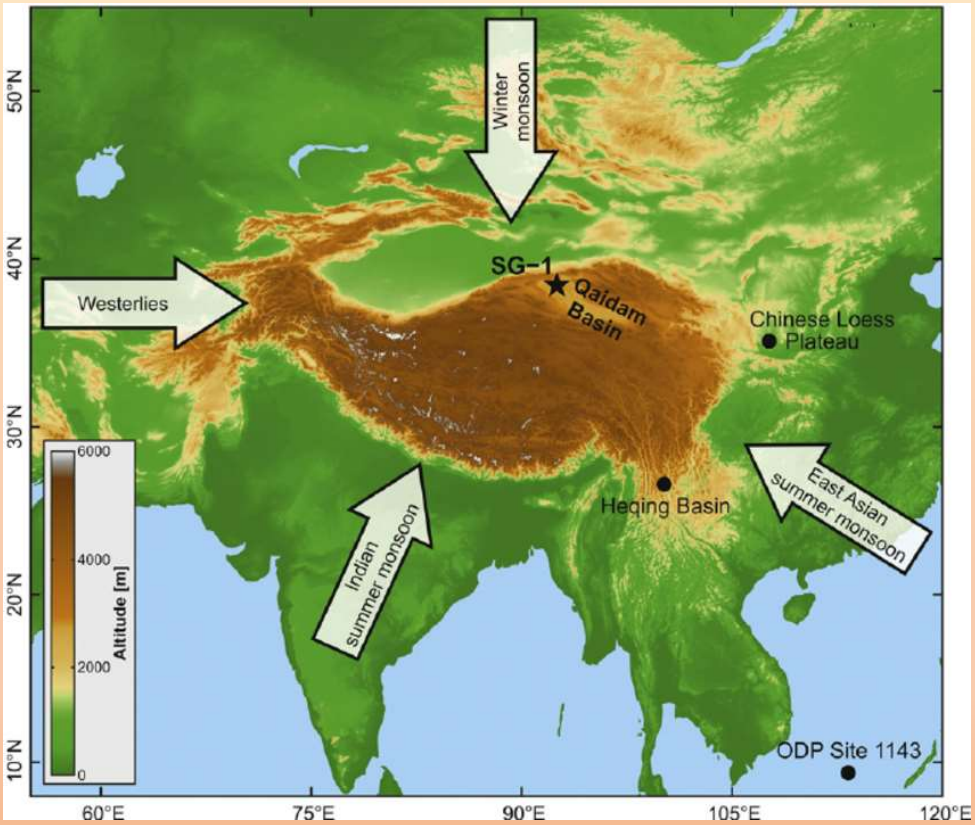
- Heat and cold affect where the lows and highs are
- The earth spins, forming cells and currents
- When you change the hot and cold places, the currents change
- What's affected?
  - Monsoons
  - Cyclones
  - Snows
  - Rivers
  - Ocean currents
- Everything. The new set of seasonal currents becomes the "new normal"
- Return? If you cool back down the normal will not be this normal again.

Glaciers, Ice Caps and the Weather

- Arctic, Antarctic, Greenland Ice Caps – Ice caps you hear about
  - Rivers and Sea Level – what you hear about. Rivers Start in Tibet.

- The Tibetan Plateau – The third pole. When it was permanently snow covered, it had a "Polar Vortex". Now it is seasonal.
- Previously responsible for:
  - The Sahara Desert, the Kyzyl Kum Desert, the Taklamakan Desert
  - Loess Soil over China → fertilization in the Amazon
  - The Asian Brown Cloud? Depends on when it started, it's like a red spot.
- The Monsoon System
  - The Weather? The cold in Tibet shapes the Summer and Winter Monsoons
  - The Monsoons, plus the Arctic Oscillation shape the Diablo and Santa Ana winds.

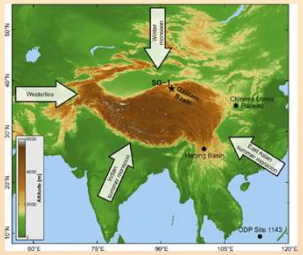
Winds on the Tibetan Plateau

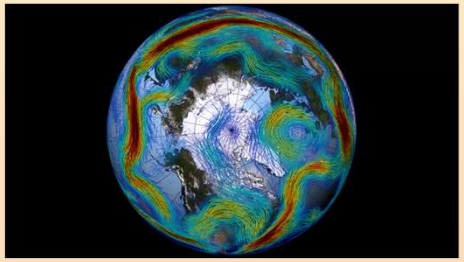


Herb, C. et al. Quaternary Research 84:457-466, December 2015, Fig. 5

- When ice melts it changes sea level.
- When glaciers disappear they end regular water supplies.
- But when weather poles stop being poles, the whole earth's weather will change.

Determinism and Weather Events





NOAA – Rossby Waves

abc7chicago.com

- The Summer Monsoon switches to the Winter Monsoon late.
- This causes the snow cap in Siberia to be late and heavy.
- This causes the Arctic Oscillation to contract.
- This causes an especially strong high pressure mass over Canada.
- This causes stronger Diablo and Santa Ana winds, and late first rain.
- This causes dry tinder, power lines to blow down, and fire.

- What happens if the Tibetan Plateau completely melts?

- Statistical views of climate change are not the whole picture

Please Let's Talk About Population

- Vegan Theory and Climate Change: What you eat changes the climate (25% to 37%)
- The Great Die Off and the Little Ice Age (Koch et al. 2019)
  - Great Die Off was 60 million.
  - 100 times that number have been added since the end of the Little Ice Age
  - Rebuttals: Cocolitzli (Acuna-Soto et al.), Berkeley group "a fraction of a small part."
- Does Diet as a solution tell us something about population?
  - If our traditional diets cause that much change, are there too many people?
- Forcible displacement current and future
  - 70 million currently forcibly displaced.
  - 40% of Bangladesh will need to move just due to sea level rise
  - The food production tipping point: Changing local climate tends to destroy food.
  - Will peoples and governments react well to population pressure on climate?
- 9 Billion?
  - Is any solution sustainable if it does not deal with population growth?

Summing up

- Scientists don't vote, they collect data, analyze, and prove theories.
- Events happen for deterministic reasons.
- Not everything is reversible, even if it is in theory.
- Weather matters, even for climate, and weather and climate interact.
- Watch anything that is going to lose its stability.
- Failing to talk about population is a recipe for failure.
- Read "Tipping Elements in Earth Systems Special Feature", PNAS, December 8, 2009.