Climate Change Extreme Weather: Lessons from the Great Easter 1913 Flood

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"Those who cannot remember the past are condemned to repeat it."

George Santayana, Reason in Common Sense



George Santayana, *Time* magazine, Feb. 3, 1936 (Wikicommons)

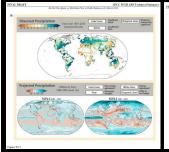
I. Climate change extreme
weather
II. Benchmarking "extreme": the
Great Easter 1913 storm/flood
III. Could it happen again?
IV. Consequences if it recurred
in the same places
V. Take heed

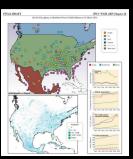
I. Climate change extreme weather





Observed trends in precipitation

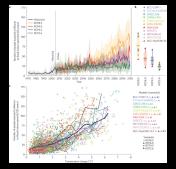




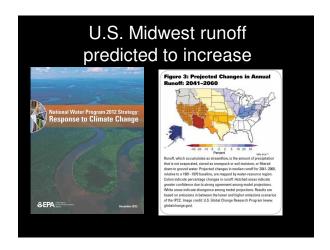
PCC WGIIAR5 TS p 65

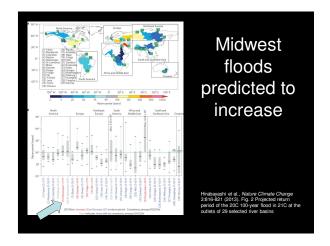
IPCC WGIIAR5 Ch26 p85 Fig 26-

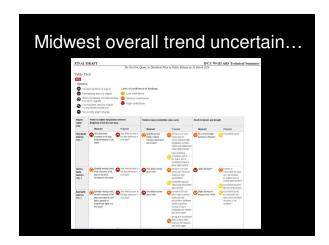
Global flood risk under climate change

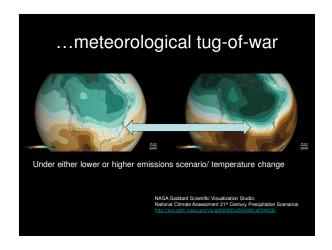


Hirabayashi et al., Nature Climate Change 3:816-821 (2013). Fig. 3 Global flood exposure for the 20C 100-year flood, or phone, in millione







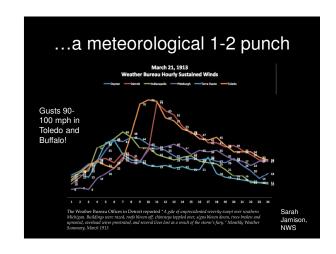




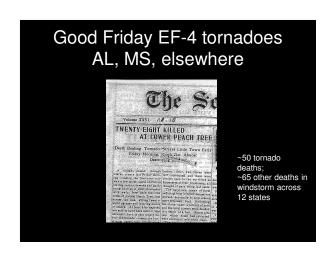
II. Benchmarking "extreme":
the Great Easter 1913 storm
system and flood—
the U.S.'s most widespread
natural disaster and
Ohio's/Indiana's disaster of
record

(and the monumental national calamity you've never heard of)









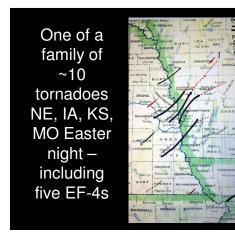
Holy Saturday, 3/22 quiet and clear

– total lunar eclipse



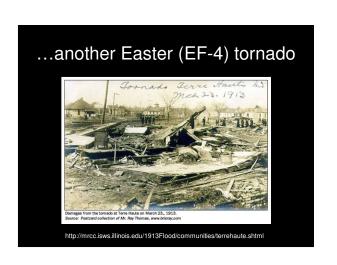








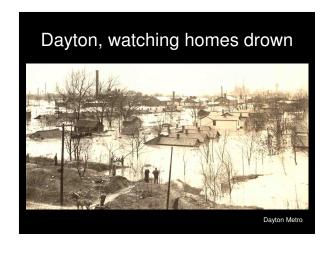
Not four hours later, in pitch darkness around 9:45 PM, in Terre Haute, Indiana...



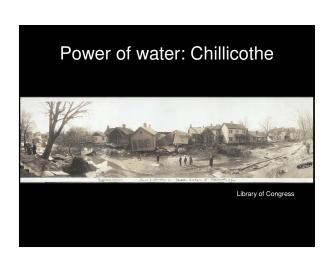


Also Easter Sunday 3/23, torrential rains began to fall...and fall... through Thursday 3/27











Entire state of Ohio devastated

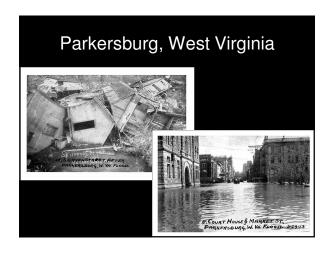
- Ohio Gov. James Cox: "The property loss may be safely estimated to be greater than \$300,000,000" (actually ~\$200 million)
- Cox: "the disaster in Ohio ... was greater than that of the San Francisco earthquake"
- Ohio death toll ~600 (Red Cross 10/1913)
- 20,200 houses destroyed; another 35,500 houses damaged; 16,000 families assisted
- 1.25 million Ohioans afflicted (out of 4.75 million state population)

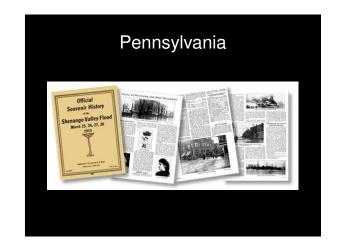




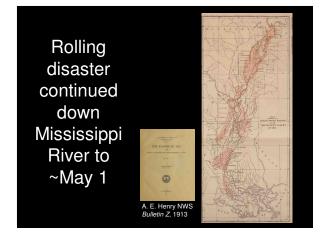




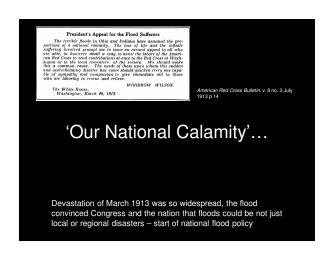




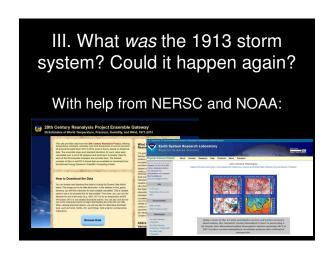




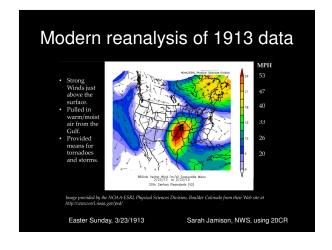
1913 storm and flooding
was U.S.'s *most widespread
natural disaster*
~1,000 dead; \$300 million
across 15 states
= ~\$115 billion in 2013 dollars
= Hurricane Katrina centered on
the industrial north!

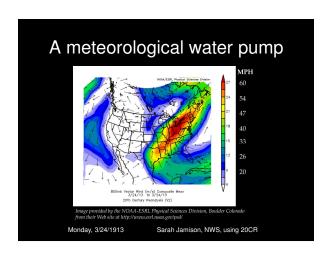


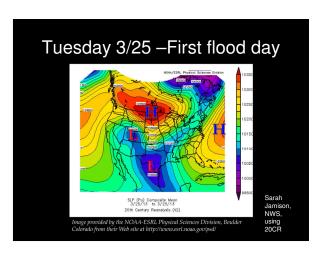


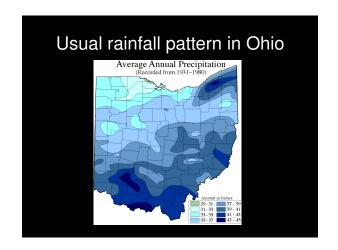


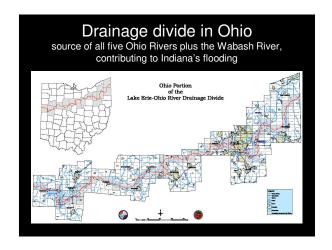






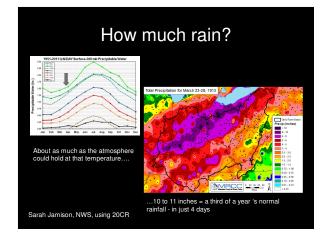






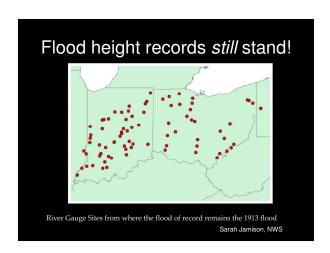
Heaviest rain 3/23-27

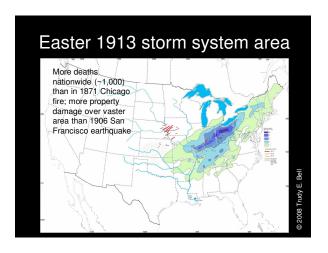
— right over
Lake Erie/
Ohio River drainage divide

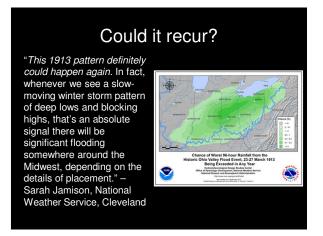


Intense rainfall in that position→

- Ensured flooding was statewide
- Waterways flooded source to mouth, even where flooding did not normally occur
- · Water rose with speed of flash floods
- Walls of water swept down onto Tiffin, Sandusky, Chillicothe, etc.
- Also contributed to Indiana's flooding (source of Wabash in on the divide)



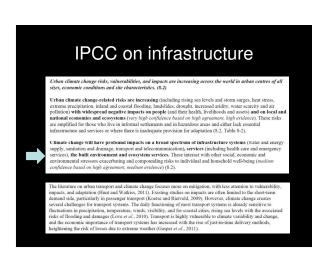


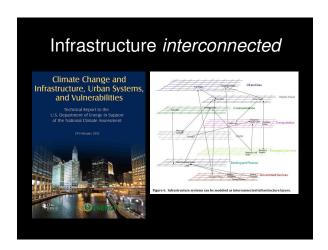


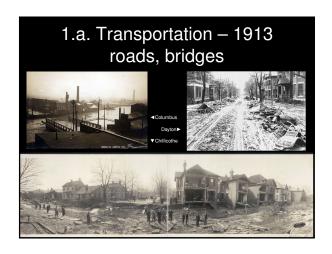
IV. What would be in harm's way if the 1913 storm system and flood were to recur in the same places *today?*(Not a computational simulation; an overlay of 1913 data onto current (~2010-2014) people, places, things)

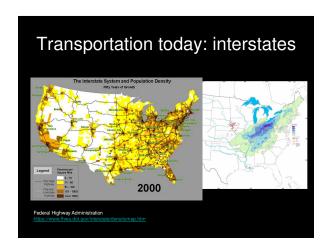


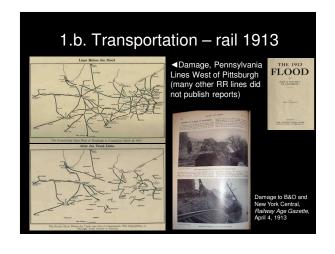


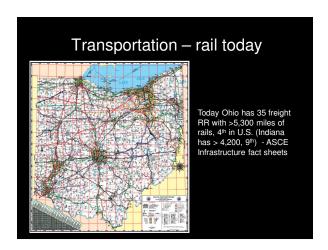






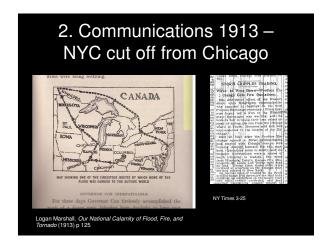


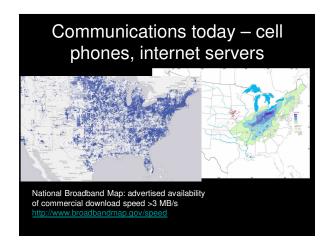


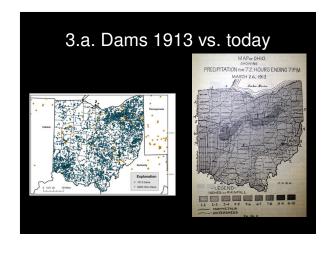


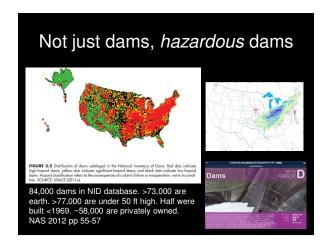


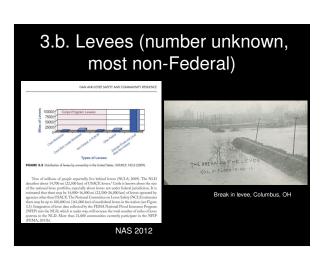








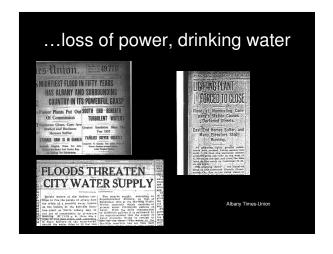




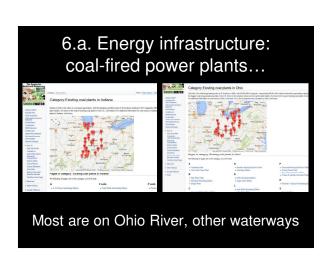




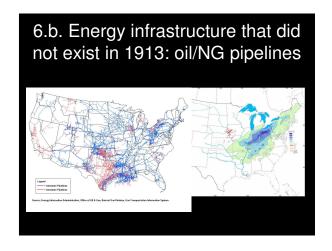


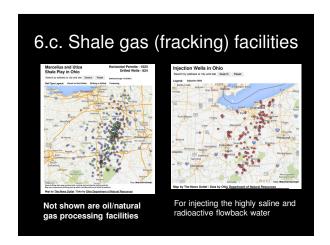


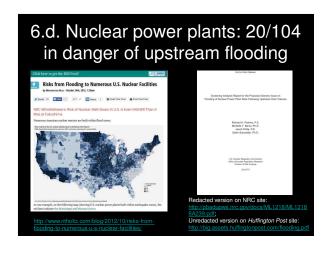


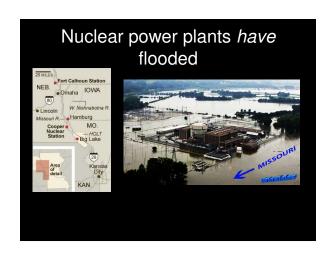


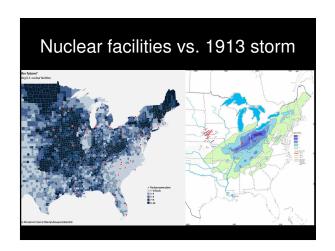




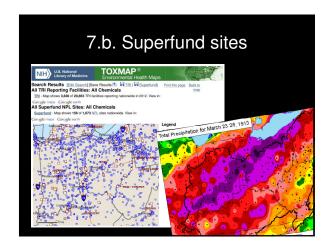












Risks new today in 1913 redux

- · Greater population density
- Physical destruction of infrastructure amounting to *trillions* of dollars
- Risk of widespread exposure to chemical toxicity from toxic waste sites (heavy metals from coal ash) and to nuclear radiation (fracking waste, nuclear power plants)

Lessons from 1913

- As monumental and horrific as the storm system and flood were in 1913, they would wreak far greater destruction today, with truly national repercussions
- Why is the 1913 Great Easter natural disaster so forgotten?? Partially intentional...

