

Living *on* the Real World

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LoTRW disclaimer

“False facts are highly injurious to the progress of science, for they often endure long; but false views, if supported by some evidence, do little harm, for everyone takes a salutary pleasure in proving their falseness.” Charles Darwin *The Origins of Man*, Chapter 6



Over 800 posts since August 2010,
(~ one every three days)

LoTRW themes

- Geosciences have been at the heart of U.S. science policy since the country’s founding
- Geosciences and policy more important today than at any time in history
- Of the three real-world realities, the third is the most important

Geosciences have been at the heart of U.S. science policy since the country’s founding

U.S. Military Academy – 1801



U.S. Survey of the Coast -- 1807



Great expeditions

- Lewis and Clark 1804-1806
- Zebulon Pike 1806-1807
- Charles Wilkes 1838-1842
- John Wesley Powell 1869



the Morrill Act



- "An Act Donating Public Lands to the Several States and Territories which may provide Colleges for the Benefit of Agriculture and the Mechanic Arts,"
- each state provided 30,000 acres of Federal land for each member in their Congressional delegation.

Post Civil-War science agencies

- **Army Signal Service 1860**
- Navy Hydrographic Office 1866
- US Geological Survey 1879
- US Coast and Geodetic Survey 1878 (1807)



Geosciences and policy more important today than at any time in history

Four trends are driving change in environmental intelligence

- **Two challenges**
 - Resource scarcity, vulnerability to hazards, and environmental degradation
 - Increasing need for holistic solution
- **Two opportunities**
 - Increasing diagnostic power of Earth observations
 - Increasing analytical capabilities: exascale computing, big data, data analytics, cognitive computing

These are triggering seismic shifts

- Relation between the public, private, and academic sectors
- Relation between established service providers and newcomers
- Private weather sector vs. big data
- Commercial sales of observing hardware vs. data streams
- Earth- vs. planetary missions
- Rapidly growing importance of international markets

Over the next 20 years, the world will spend \$100T on critical infrastructure:

- Water infrastructure \$25T
- Agricultural investment \$15T
- Energy \$50T
- Natural hazard losses \$10T



The world will lose between \$4T-\$20T in value of ecosystem services (by 2030)

China is competing for this business

U.S. edge?

- Innovation, but also
- Societal benefit
 - Governance
 - STEM education
 - Funding
 - 3-fold solutions



Lost if we hit the "Pause" button



Of the three real-world realities, the third is the most important

Reality #1. Physical

(old) climate never changes

(new) climate always changing, sometimes abruptly

(old) global air's assimilative capacity is infinite

(new) global air's assimilative capacity is finite

(old) weather is unpredictable

(new) weather is more predictable than we thought

Reality #2. Social

- Not just a handful of scientists... but 300M Americans, 7B people worldwide
 - Get the policies right
 - A culture of innovation
 - K-12 public education, especially
 - critical thinking
 - STEM

Reality #3. Spiritual

(want proof?)

Google: "Mideast rumors"

LoTRW approach

“Be the change you want to see in the world.”



*Lastly, I would address one general admonition to all; that they consider what are the true ends of knowledge, and that they seek it not either for pleasure of the mind, or for contention, or for superiority to others, or for profit, or fame, or power, or any of these inferior things; **but for the benefit and use of life;** and that they perfect and govern it in charity. For it was from the lust of power that the angels fell, from lust of knowledge that man fell; but of charity there can be no excess, neither did angel or man ever come in danger by it.”*

-- Francis Bacon

