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Climate change – exceeding geologic speed limits How it has and will continue to affect our world

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The Earth's surface, active and in flux, is constantly warming or cooling. As continental land masses continue their core-induced slipping and sliding circumnavigating the globe, our ocean currents and atmosphere do likewise. Add the influence of recently-recognized man-induced global warming impacts, and we now find ourselves revealing uncomfortable climate change trends in 'real time.'

Technologies to identify these trends improve daily. We monitor sea-level fluctuation over relatively short periods, no longer relying solely upon the geologic fossil record. For example, the latest U.N. report, compiled from reliable sources, projects global sea level rising as much as 3 feet as early as 2100 due to geometric increases in the rates of our melting polar ice caps. Unfortunately, this phenomenon will (within only 85 years) displace tens of millions of people from coastal areas around the world.

We are witnessing a depletion in the Earth's ozone layer and its associated effects upon regional wind patterns in the southern hemisphere contributing to a warming of regional ocean currents. Such warming might be accelerating the melting of Antarctic ice. However, the trend receiving the most public notoriety is the episodic rise in heat-trapping atmospheric CO_2 levels due to increased global carbon emissions driven by our dependence upon fossil fuels.

Today, scientists project CO_2 levels ballooning beyond the symbolic 400 ppm level, rising up to and through 500 ppm or perhaps even as much as 600 ppm in the not-too-distant future. Although ice core studies and other geo-evidence taught us we had elevated CO_2 levels several million years ago in prehistoric time, we know that such naturally-occurring atmospheric changes were gradual adjustments to Earth's climatic conditions over millions of years - NOT as presently occurring, shockingly accelerated within only a couple of relatively short centuries.

So the real 'breaking news' is the sheer rapid acceleration of the climate changes we're observing – not the partisan bickering and 'deer in the headlights' attitudes over its root causes. The rates and magnitudes of climate change vary across geologic time. For example, Long Island was covered with thousands of feet of glacial ice not millions of years ago, but rather as recently (in geologic-speak) as only 10,000 years ago. Its fairly flat topography today a direct result of those multiple cycles of advancing (cooling) and retreating (warming) glacial ice sheets flowing across the North American continent.

Recent anthropogenic climate changes, while occurring now almost instantaneously in terms of geologic time, cannot be reversed quickly in 'real time.' The damage underway (rising sea-level, longer summers, rapidly melting glaciers, ecosystem disruption, thawing permafrost, air pollution, warming groundwater, water shortages, to name just a few) are not readily reversible. Global temperatures are consistently above average for the past 29 years with this past winter our eighth warmest on record. Increasing weather-related disasters, large-scale wildfires, flooding, severe droughts, heat waves, more intense storms, and even fish and wildlife migratory patterns, will serve to alter human habitat accompanied by associated monetary damages in the tens of billions.

Passivity cannot be sustained and we should stop burdening ourselves with inaction. Instead, we should mitigate how climate change has and will continue to affect our world, seeing it as an growing threat to our overall quality of life. To rein in the growth of greenhouse gases, we must advance sustainable smart growth concepts and seriously consider the will and methodologies for meaningful population restraint. We must 'think forward' and build in more impactful resiliencies beyond our presently popular concept of sustainability. Yes, more building-related green roofs, smart codes, permeable pavements, modified levee designs, smart seawalls, water & energy conservation, green power (wind, hydro, solar, tidal, nuclear), and recycling are all responsive - but we need to do much more.

To move our swelling global population projected to 9 billion by 2050 off of its chronic dependence upon traditional fossil fuel energy models, we must look to ourselves, not our governments. We have to design better buildings, increase resource conservation, revalue our purchasing and manufacturing priorities, and address the inevitable environmental and socioeconomic impacts of widening income disparities increasing across the globe.

But its not all gloom and doom. For example, the global renewable energy market represents a $6 trillion opportunity for those willing to embrace it. And there is good news on the carbon front: larger companies have already invested in renewable energy (Walmart, Apple, Google) and many corporations now routinely operate with an internal price on carbon (ExxonMobil). As such, one can speculate that some sort of a consumptive carbon tax to serve as a catalyst for cleaner fuels is not far off. Just this year, finally, the EPA developed acceptable emission standards aimed at reducing carbon pollution from existing coal-fired power plants – historically our largest source of carbon emissions.

These, and other board-room policy changes, will rebalance our energy mix utilizing a practical market-driven approach. Doing so will effectively, in due time, help to repower our industries with renewable and economically attractive sources of clean energy. Yes, private and public attitude adjustments are certainly welcome, refreshing, and better late than never, particularly to geoscientists, but the elephant-in-the-room is that we must make a leap of faith to find the will and resources to speed these changes now, not later.

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