Are we already beyond climate tipping points?
A MAHB Dialogue with Paleo-Climatologist Andrew Glikson

Geoffrey Holland

"There is hardly any future for many species and for human civilization under mean global temperatures of more than 2 degrees Celsius, let alone under more than 4 degrees Celsius, which is where we are heading..." - Andrew Glikson

Geoff Holland - You have written that the scale and rate of greenhouse warming have been underestimated. Can you summarize what that means in layman's terms?

Andrew Glikson - The scale and rate of the rise in atmospheric greenhouse gases and of temperatures are far greater than people generally realize and the consequences, and the danger they pose is far greater, in terms of droughts and fires, turning much of the Earth into a tinderbox. Furthermore we're seeing extreme weather; hurricanes, cyclones, floods, accelerated ice melt and sea level rise, all happening much more frequently, pushing large parts of the continents toward uninhabitability.

GH - Climate denial has become a massive, counter-productive force obfuscating scientific consensus. Is there any basis for being skeptical about what the science is telling us about climate change?

AG - The short answer is NO. Climate change denial is well-financed by vested interests and a monstrous lie, contrary to the basic laws of physics and to direct observations around the

world, and endangering the future of life and of civilization. None of the evidence and projections appears to form a priority consideration on the part of those in power—in parliaments, in corporations or among the wealthy elites and vested interests. Furthermore, according to the International Monetary Fund (2017), the world governments are subsidizing fossil fuels by $5.2 trillion, equal to roughly 6.5 percent of global GDP.

Having for all intents and purposes given up on the habitability of large parts of the Earth and on the survival of numerous species and future generations—the actions and inactions of the "powers that be" constitute the ultimate crime against life on Earth

GH - How does excessive greenhouse heat trapped in the Earth's atmosphere impact ocean surfaces, particularly those of relatively shallow coastal waters, and how does that translate into excessive rainfall, and extreme weather events like super-hurricanes?

AG - The greenhouse concentration in the atmosphere absorbs and reflects back a large part of the infra-red thermal radiation from the Earth, which results in further warming of the land as well as water surfaces. The water mix and the heat are transferred through the water column. This would substantially elevate the frequency and intensity of extreme weather events, the consequences of which will likely be well beyond anything previously seen.

GH - Sea level rise caused by climate-driven melting of Earth's icecaps could accelerate rapidly in coming decades. Just how bad could it get, and what will it mean for people living on our planet's coastal areas?

AG - Sea waters are undergoing thermal expansion and the Greenland and Antarctic ice sheets are melting at an accelerated rate; at present more than six times the rate in the 1970s. Sea levels have already risen by some twenty centimeters, and are bound to rise by close to or more than a meter by late in this century, affecting coastal communities and many big cities. Hundreds of millions of people could be displaced as they flee the rising waters, which will overwhelm many of the world's great cities, including New York, London, Shanghai, and Melbourne.

GH - In your recent book, *The Plutocene*, you warn that the impacts of climate change, could be further exacerbated by some kind of nuclear conflict. Can you elaborate?

AG - Agriculture and food supplies in many parts of the world may be reduced or collapse under global warming conditions and extreme weather events. Once populations come under stress and the civil order is disrupted, the probability of internal and external conflicts increases, including the potential for wars and the use of nuclear weapons. The hapless inhabitants of

planet Earth are given a non-choice between runaway global warming, extreme weather events and the coup-de-grace of a nuclear conflict, followed by further warming due to accumulated greenhouse gases. This is not a future any caring person should wish for.

GH - In the polar latitudes, methane trapped in permafrost and shallow ocean sediments is beginning to melt. Could that lead to a runaway feedback loop, and if so, what could than mean for life on Earth?

AG - Methane release from permafrost and from ocean-bottom methane hydrates (clathrates) is already in the process of bubbling out, with consequent rise in atmospheric methane from below 800 ppb (parts per billion) to near 1870 ppb. Further open-ended rise in methane could drive a runaway greenhouse feedback loop raising global temperatures to extreme levels of above 4 and even above 6 degrees Celsius.

GH - What do you see as some viable strategies for decreasing our dependency on these polluting forms of energy?

AG - There are now nearly eight billion humans living on Earth, who are still largely dependent on coal, oil, and other polluting, fossil forms of energy. Science and technology have now developed sources of energy such as solar, wind, wave, hydro-power, hydrogen and so on allowing civilization to replace fossil fuels and carbon emissions, if it wants to survive. CO2 draw-down methods are essential for lowering the dangerous greenhouse levels in the atmosphere, which are generating amplifying feedbacks from land and oceans.

GH - How does the human diet dependent on the massive consumption of animal flesh contribute to greenhouse warming?

AG - Human diet is a factor but <u>not</u> the most important factor in CO2 and methane emissions. Many people around the world live on vegetarian diets. Even just cutting meat consumption in half, if enough people took that step, could have a positive impact.

GH - What troubles you the most about the trends you are seeing in the science?

AG - There is hardly any future for many species and for human civilization under mean global temperatures of more than 2 degrees Celsius, let alone under more than 4 degrees Celsius, which is where we are heading according to the IPCC under business-as-usual emission trajectories. In the meantime, too many members of the species appear to be more concerned with the World Cup than with Planetary survival.

GH - What can we do as individuals to address these climate issues, and contribute to a more positive future?

AG - We are facing a global climate crisis and the possible demise of civilization. Individuals need to support and vote-in political forces committed to abrupt cuts in carbon emissions and to alternative energy sources – solar, wind, wave, hydrogen, battery storage and, not least, CO2 draw-down techniques – so-called negative emissions. We will not survive what we have unleashed unless we stand together and demand urgent remedial action from our governments. **Time is running out!**

Andrew Yoram Glikson is an Earth and paleo-climate scientist based at Australia National University in Canberra. Since 2005 he has been studying the relations between climate, fire and human evolution. He is active in communicating nuclear issues and climate evidence through papers, lectures, conferences and presentations. He is the author of the following books:

- The Archaean: Geological and Geochemical Windows into the Early Earth
http://www.springer.com/gp/book/9783319079073
- The Asteroid Impact Connection of Planetary Evolution
http://www.springer.com/gp/book/9789400763272
- Asteroids Impacts, Crustal Evolution and Related Mineral Systems with Special Reference to Australia
http://www.springer.com/us/book/9783319745442
- Climate, Fire and Human Evolution: The Deep Time Dimensions of the Anthropocene
http://www.springer.com/gp/book/9783319225111
- The Plutocene: Blueprints for a Post-Anthropocene Greenhouse Earth
http://www.springer.com/gp/book/9783319572369
- Evolution of the Atmosphere, Fire and the Anthropocene Climate Event Horizon
http://www.springer.com/gp/book/9789400773318
- From Stars to Brains: Milestones in the Planetary Evolution of Life and Intelligence
https://www.springer.com/us/book/9783030106027