

## Fire and Ice

Many years ago, when we first noticed that the Arctic Ocean was melting, I went straight to the real question; what happens when it does. A blue ocean at the north pole surrounded by a continental land mass would become a fourth northern climate zone as the Arctic Ocean became seasonally warmer than the land surrounding it. In summer, it will absorb solar energy. This heat will be dissipated into the atmosphere as water vapor. In the fall, as the sun heads south, and the continents that surround the Arctic Ocean freeze, this residual moisture plume will start an early snow. I've watched it unfold over the next thirty years.

Currently, this moisture plume is being overwhelmed by our massive cloud of CO<sub>2</sub>, keeping the surrounding continents warmer than ever, but it's snowing on the remaining ice cap, which insulates it. This causes the ice to melt faster, but deprived of heat from the melting ice, the atmosphere above the ice cap is actually colder. Controlled by variations in topography and albedo, the polar vortex is swept south and winter cold snaps in northeastern North America and Siberia are becoming more extreme.

If you've ever seen a pond or lake melt in the spring, the melt starts at the edge, but as the ratio of ice to water reaches a certain point, the ice in the middle melts from the bottom up and the ice cap is suddenly gone. This will be a major tipping point, resulting in more winter snow, greatly increasing the contrast with the rapidly increasing heat from the south.

Over the next few decades, it seems obvious that this contrast will result in much more severe weather in the Northern Hemisphere, but at some point in the not too distant future, greenhouse gasses will subside. We'll either get our shit together, we'll burn up all the available carbon, we'll burn or blow ourselves up, Mother Nature will kick us out, or some combination of them all. At this point a blue Arctic Ocean surrounded by colder land masses will likely turn into the great snow machine of the Fourth Northern Climate Zone. As the Southern Hemisphere continues to warm, we're moving into a level of extreme atmospheric turbulence as we enter an age of fire and ice. Which will win, the fire or the ice? A lot depends on the permafrost. Will the new moisture plume coming off the Arctic Ocean be strong enough to re-coat the permafrost with new snow, or will the heat win out, greatly increasing the time it takes for greenhouse gasses to subside?