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PLENARY LECTURE III

The Climate Crisis and Polar Jet Stream Oscillations

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The climate crisis is the greatest danger humanity has ever faced. Climate change threatens not only global civilization, but possibly the survival of our species along with many others. This presentation begins with a brief overview of global climate trends and predictions.

A brief explanation will be given of the general atmospheric circulation along with some basic mathematical components of climate models. Next comes a presentation of recent research on the response of Earth's polar jet streams to increased greenhouse gas concentrations, based on a latitude dependent, two-layer Energy Balance Model. The model includes separate terms for atmospheric and surface albedos, and takes into account reflections of shortwave radiation between the surface and atmospheric layers. A novel feature of the model is its so-called "cloud factor function," which depends on temperature gradients to represent the zonally averaged location of the polar jet stream as a function of radiative forcing and time. Measurements and predictions of more elaborate climate models are compared.

Returning to the climate crisis in general, it will be observed that technological solutions to the climate crisis are already available. The only barriers to global sustainability are political, and are rooted in global capitalist economics.

Short Biography

David Klein is a recently retired emeritus professor of mathematics at California State University Northridge where he helped to establish a NASA funded Climate Science Program. He earned a B.S. in physics and a B.A. in mathematics from UC Santa Barbara, and received his Ph.D. from Cornell University, specializing in mathematical physics. He has held teaching and research positions at Louisiana State University, UCLA, USC, and was a Guest Scholar at National Tsing Hua University in Taiwan. His research interests have included statistical mechanics, dynamical systems, math education, general relativity, and most recently, climate science.