

*Kuehnast Lecture Series*

Eleventh Annual Lecture

October 13, 2003

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*Climate Change:  
A View from Underground*

**Dr. Henry Pollack,  
Dept of Geological Sciences  
University of Michigan**

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Temperature changes that take place at the land surface propagate slowly downward into the soil and rocks beneath the surface. Thus present-day subsurface temperatures comprise an historical archive of changes that have occurred at Earth's surface in the past. The pace of heat transfer in rocks is such that the past 500 years of surface temperature history is imprinted on and contained within the upper 500 meters of the Earth's crust, well within reach of many boreholes drilled for resource exploration and scientific purposes. Analyses of temperature profiles in boreholes enable reconstructions of the ground surface temperature history in both the pre-industrial and industrial periods, and therefore help to evaluate the relative roles of natural and anthropogenic climate forcing. Underground temperature measurements made in more than 800 boreholes on six continents show that Earth has warmed about 1 degree Celsius over the past five centuries. More than half of that warming has taken place in the 20th century alone, and about 80% has occurred over the past two centuries.

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Welcome ..... Dr. Mark Seeley  
Professor  
Dept. of Soil, Water, and Climate

N.W.S. Recognition ..... Craig Edwards  
Meteorologist-in-Charge  
National Weather Service  
Length of Service Award ..... Bengtson Family,  
Little Falls, MN

Greetings from Sigma Xi ..... Dr. Karen Ballen  
President, Minnesota Chapter

Departmental Update ..... Dr. Ed Nater  
Head  
Dept. of Soil, Water, and Climate

Introduction of Speaker .. Dr. V. Rama Murthy  
Professor  
Dept. of Geology and Geophysics

Keynote Speaker ..... Dr. Henry Pollack  
Professor  
Dept of Geological Sciences  
University of Michigan

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