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THE STRUCTURE OF ICE ERAS AND SUBSETS VIEWED AS A HIERARCHY

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Abstract. I recently realized that the structure of ice eras, ice epochs and ice-age cycles [w] that I have been investigating can be viewed as a "hierarchy" as defined by Pattee [p] and by Allen [ta]. Reviewing the articles on hierarchy in Systems Research opened the possibility of using the concept of hierarchy find the path to the consideration of more important components of the climate system. This leads to looking for the conditions approaching a bifurcation point. Does the approximately biennial large variation Northern Region annual mean temperature mean we are approaching a bifurcation point, or does it means that there is more linking of the surface atmosphere with the bienial varaiation in the stratosphere? Also how do we take into consideration the extreme high and low temperatures for short periods within years of high average temperature? Is there any possibility that the filtering of data for spurious points exists as it did in the measurement of the ozone layer which led to sevraly years delay in finding the hole in the ozone layer? [n,sci]

Comparison of the average surface temperature for the Northern Region for the lat twenty years with (a) warming researchers projections, and with (b) John Hamaker's predictions of warmling going into glaciation, does not confirm either of the above.

The observed data on annual mean surface temperature for the Northern Region is getting warmer, but the upper limit of the annual curve approaches a curve closer to some of the computer simualtions of the CO/2 greenhouse effect, while the lower asyumptote approaches the curve predicted by Hamacker using his thesis on the glaciation cycle.

Will the rising level of atmospheric carbon dioxide knock us out of the 6th Ice Epoch into the next (7-th) Hot Epoch or push us into the 24-th Ice Age Cycle glacial period? Either of these would probably initially kill off several billion people, and the second after hundreds of thousands of years might generate superpeople with higher IQ than we have.

Hierarchy

In my 1990 paper on climate change [w1] I was using the concept of "hierachy" without explicitly using the word heirarchy. *** Since 1973 when Pattee published the book, Hierarchy Theory systems literature has had much use of the concept of hierarchy. For example van Gigch made many references to hierarchy in Applied General Systems Theroy in 1974. [v]

Carbon Dioxide and Other Greenhouse Gasses
Rising Level of Atomospheric CO/2

We started making systematic measurements of atomospheric concentration of carbon dioxide in 1958 when it was 315 ppmv (parts per million volume). It had gone up to 354 ppmv by 1989. Back in 1800 it was 280 ppmv. The principal sources of increased CO/2 are burning of fossil fuels [c] and deforestation. There are two major theories of what the rising CO/2 will do: (1) the major research centers on climate favor a simple warming theory in which the rising CO/2 increases the temperature of the atomosphere through the greenhouse effect [d], and (2) there are individual scientists and engineers who think that the rising CO/2 will cause warming for a while, and then when sufficient extra water vapor gets to the polar regions and the cloud albedo increases that more snow and ice will form leading to glaciation spreading down from the polar regions [e].

[c] Congress of the United States, Office of Technology Assessment, 1991, Changing by Degrees - Steps to Reduce Greenhouse Gases OTA-O-482. Washington, DC: Government Printing Office S/N 052-003-01223-5
[d] National Research Council, Carbon Dioxide Assessment Committee, 1983, Changing Climate . Washington, DC: National Academy Press.
[e] John Hamaker and Don Weaver, 1982, The Survival of Civilization . Burlingame, California: Hamaker-Weaver Publications.

Warming Theory
Glaciation Theory
History of Glaciation
Ice Eras, Ice Epochs, and Ice-Age Cycles

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5 inches for Fig. 1 here.

Fig 1. A series of time charts, each one embracing a fraction of the one above, depicts the swings between cold and warmth that have characterized the climate of the earth for billions of years. Adapted from Chorlton and the Editors of Time-Life Books [f] Permission being requested.

[f] Windsor Chorlton and The Editors of Time-Life Books, 1983, Ice Ages . Alexandria, Virginia: Time-Life books, pp. 20-21.

Last Ice-Age Cycle

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3 inches here
for Fig. 2

Fig. 2. Smoothed Vostok temperture record.
From C.Lorius et al [g] Permission being requested.

[g] C. Lorius, N.I. Barkov, J.Jouzel, Y.S.Korotkevich, V.M.Kotlyakov, and D. Raynaud, 1988, "Antarctic Ice Core: CO/2 and Climatic Change Over the Last Climatic Cycle." EOS June 28, 1988, pp. 681, 683-684.

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Definition of "Hierarchy" at page xiv: We see most important complexity as related to the interaction of different levels of organization; in order to give complexity proper account in our scientific models, those models are almost required to be

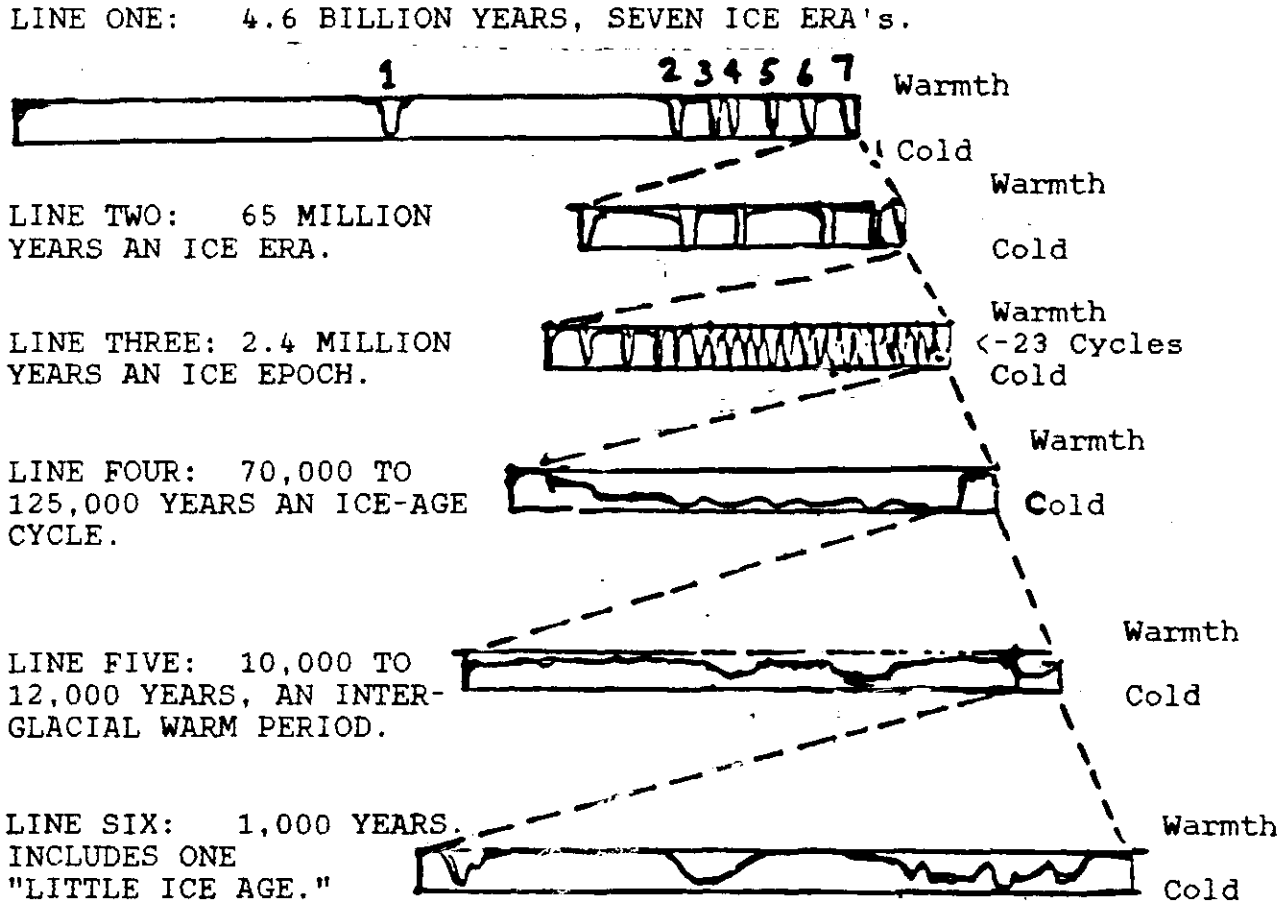
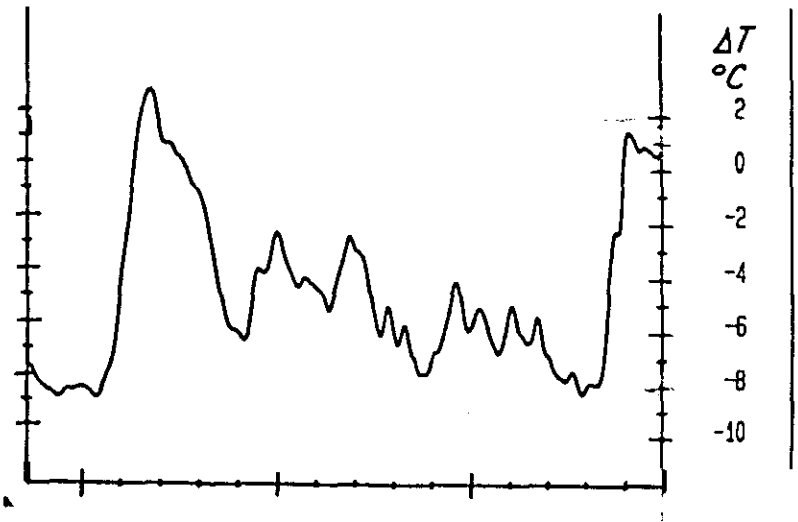
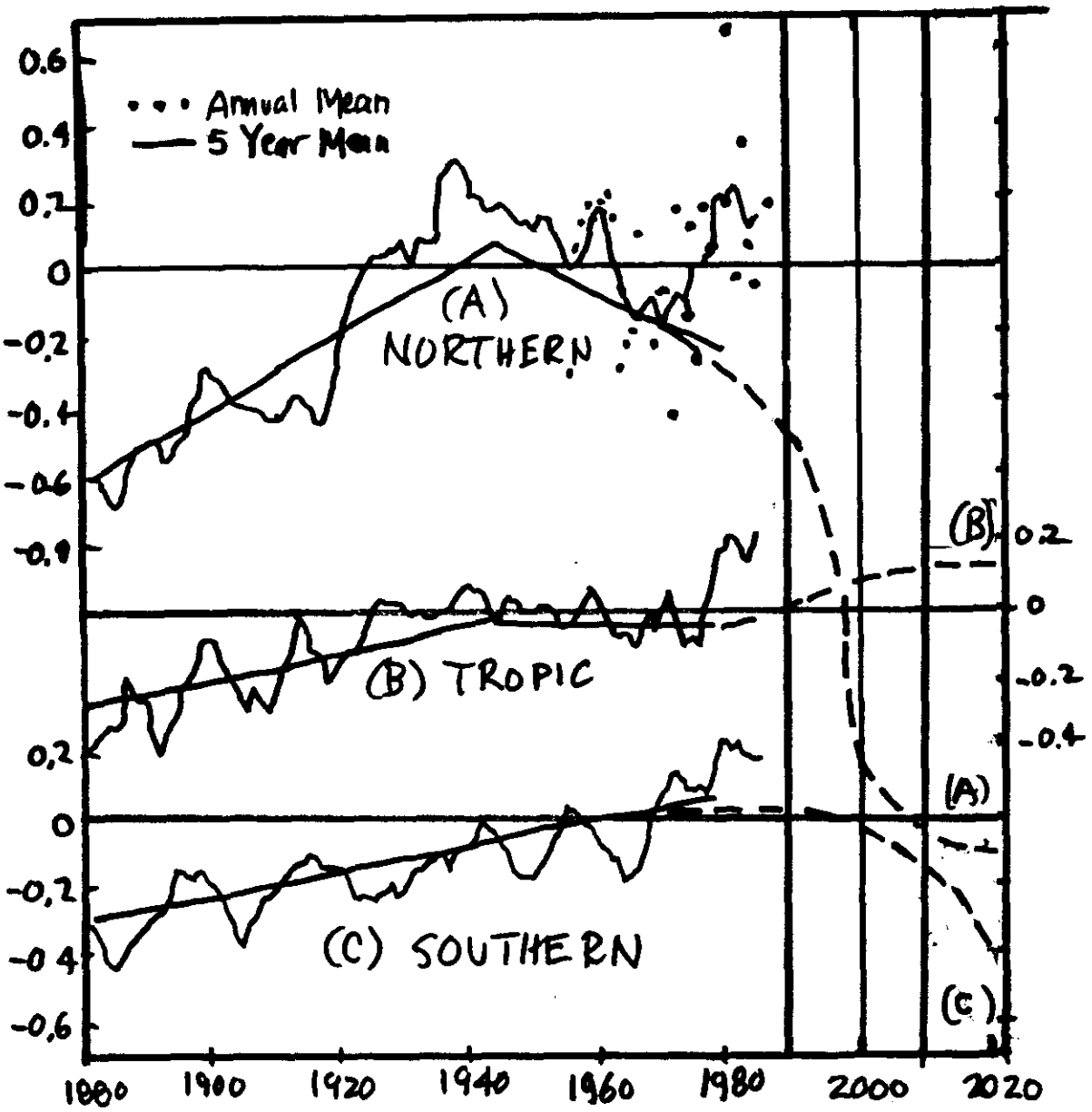


Fig. 1. A series of time charts, each one embracing a fraction of the one above, depicts the swings between cold and warmth that have characterized the climate of the earth for billions of years. Adapted from Chorlton and Editors of Time-Life Books [ ].



1987 DATA


0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
• • • Annual Mean
— 5 Year Mean
(A) NORTHERN
(B) TROPIC
(C) SOUTHERN
0.2
0
-0.2
-0.4
(B)
(A)
(C)
1880
1900
1920
1940
1960
1980
2000
2020

hierarchical. We suggest that there is something about either our facility for observation or that which generates our observations which gives patterns that generally remain opaque unless we model using hierarchies. By hierarchy is understood a sytem of behavioral inteconnections wherein the higher levels constrain and control the lower levels to various degrees depending on the time constants of the behavior. .... Since bulkier structures in biology generally behave more slowly, not only do slow entities constrain fast, but also large entities usually constrain small. ... etc....

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