

Proposal to support a Climate Center summer visitor to study linear and nonlinear modeling of high-resolution proxy time series

Yochanan Kushnir, Division of Ocean and Climate Physics

1. Scope

This is a request for supporting a Climate Center visitor during summer of 2002 to study the application of time series modeling, using linear and non-linear methods, to long time series of proxy data, in particular, tree-ring records.

The visitor is Professor Michael Stiassnie of the Department of Civil Engineering in the Technion, Haifa, Israel. Professor Sitassnie is an applied mathematician with an expertise in hydrodynamics of water waves. He has worked in areas of meteorology and oceanography of the marine surface interaction over the oceans. In recent years, he worked on problems in non-linear hydrodynamics, such as the use of fractal models to estimate the energy spectrum of water waves. He is interested in collaborate with the scientist in the Climate Modeling Group (Y. Kushnir) and the Tree-Ring Laboratory (E. Cook) along the lines described below.

1. Objectives

Modeling the temporal behavior of climate time series helps in identifying the signature of climate variability, its causes, and when the need arises, to interpolate and extrapolate the data. Application of linear and nonlinear methods to models long records of proxy data can aid in determining a wider range of variability patterns than can be found in the instrumental record. When several proxy records are used together, time series modeling can be used to extract climate signals from others non-climatic variability in the record. Moreover, modeling the temporal signals in a spatially distributed proxy dataset, where time is the common variable, can help us glean the spatial pattern of climate variability. We would like to explore the use of new methods of time series modeling, linear and non-linear, to determine the signal of climate variability in high-resolution proxy data, such as tree rings, and ice-cores.