Abstract View

Volume 3, Issue 1 (January 1973)

Journal of Physical Oceanography
Article: pp. 139–155 | Abstract | PDF (1.17M)

A Statistical Method for Analyzing Wave Shapes And Phase Relationships of Fluctuating Geophysical Variables

Joshua Z. Holland

Center for Experiment Design and Data Analysis, Data Service, NOAA, Rockville, Md. 20852 10 April 1972

DOI: 10.1175/1520-0485(1973)003<0139:ASMFAW>2.0.CO;2

ABSTRACT

A system of computational techniques was developed to detect a variety of structural features in geophysical time series containing turbulent or wave-like fluctuations. Individual probability density functions and moments for each variable, joint density functions (JDF's) and moments for many pairs of variables, and conditional means of other variables as functions (CMF's) of each pair were computed in each band, and contour charts drawn for JDF's and CMF'S. A smoothing function over nine joint class intervals was used to suppress accidental irregularities, principally in the 1–10 min band.

The final result has been to fix the origin of a one-dimensional coordinate system at the point in time at which one of the fluctuating variables crosses its mean value with a positive rate of change at the point of observation. The unit of time adopted is the period required for the selected variable to return to that initial phase. The range of fluctuation periods contained in the data series is controlled by band-pass filtering so as to isolate physically similar regimes. A compact, composite time-domain picture of all the measurable changes occurring during the passage of the average fluctuation of a selected reference variable is obtained.