Marrying Quantitative and Graphic Tidal Analysis Tools with HF Radar Current Map Outputs

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ABSTRACT

Separating off the tidal portion of flow from measured data and resolving it into its individual constituents is an important part of coastal oceanographic analyses. HF radar surface-current maps taken hourly over many weeks or months offer a wealth of tidal information. Recent findings by several groups -- based on HF current maps -- show striking relations for the M2 tidal constituent strengths and ellipse axes with near-shore bathymetry.

We have married the classic and popular Foreman tidal analysis MATLAB package directly to CODAR SeaSonde current map outputs via convenient graphical user interfaces. These algorithms allow one to resolve time series of the total surface-velocity vectors at each map grid point into tidal constituents. Alternatively, the user can click to select specific points where such analyses are to be done, for example at an offshore structure or ADCP mooring. Based on measurements accumulated into a folder over any period of time, the algorithms will display the energy and signal-to-noise ratio of the extracted constituents, allowing the user to select which to retain for further analysis, display, or prediction. Ellipses for any of the constituents can be plotted over the Cartesian grid or at the specific points of interest. Movies of individual or summed tidal components can be made over any period from the past into the future. Finally, these tidal flows can be subtracted from the HF mapped current maps to give the de-tided residual circulation.