HOT-DOGS: A User Friendly Interface for Access to the Hawaii Ocean Time-series Data

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Abstract
The Hawaii Ocean Time-series (HOT) study is an ongoing, 15-year ocean observation program with a large growing data base of physical, bio-optical, and biogeochemical parameters. On approximately monthly intervals since October 1988, a multidisciplinary suite of environmental measurements has been made, discrete samples collected and analyzed, and experiments performed; all HOT data are freely accessible via the Internet from servers at the University of Hawaii (http://hahana.soest.hawaii.edu/hot/hot_gifs.html and http://www.soest.hawaii.edu/HOT_WOCE) and Oregon State University (http://picasso.oce.orst.edu/ORSODO). In order to make these data sets fully available and interactive, we have developed a user-friendly, WWW-based interface called Hawaii Ocean Time-series Data Organization and Graphical System (HOT-DOGS). Independent modules facilitate: (1) data extraction to obtain a text file consisting of one or more data columns, (2) data display to plot selected variables, (3) comparisons of a selected data set, or depth-integral thereof, in time, and (4) time-series analyses of data grouped by depth, potential density or temperature. We believe that this interface will be invaluable for both research and teaching applications.

HOT-DOGS is capable of making a wide assortment of figures. Simple plots of the data can be created using the "Display" modules. As can be seen from Figures A & B, any parameter vs. any other parameter can be displayed. A single cruise or a user-selected range of cruises can be viewed either with or without the historical data set as shown above. Simple mathematical formulas can also be used (Figure C).

Summary plots may be created using the "Standard Depths" modules. Figure D shows a basic plot of mean Primary Production ("Light 12") at our standard sampling depths. As is shown, the standard deviations as well as the data used to make the graph can be displayed. The user also has the option of making comparative plots (Figures E & F). By selecting a range of cruises, stations or months, different years or seasons may be compared. As examples, Figure E displays the summer (blue) and winter (magenta) Primary Production data taken at Station ALOHA and Figure F shows the PC/PN ratio for 1999 (blue) and 2000 (magenta).

Integrals, means/Std Dev & horizons can be calculated using the "Time-series" modules. Figure G shows 0-200m integrated Primary Production (in mg C m⁻² d⁻¹) over a 14-year period. A range of depths, potential densities or temperatures may be selected. The data can further be grouped by month (Figure H), season or year (Figure I).

Every HOT-DOGS module has the capability to output data. Depending on the module, raw data (Display modules) or processed data (Standard Depths & Time-series modules) may be displayed. There are also separate "Data Extraction" modules used to output raw data. These modules create CSV files containing columns of matched data sets that can easily be read into programs such as Microsoft Excel™.

Discussion
HOT-DOGS was initially created to allow researchers and educators easy access to our ongoing 15-year data set. It was assumed that users would use the various modules, become interested in our data set, download the data, and further work on it using a separate program. Simplicity of use and functionality was the goal. The future of HOT-DOGS will probably include more graphical functionality. But it will also likely include more options to change how things are graphed, not just what is graphed. Of course the Internet realm is also continuously changing and HOT-DOGS will adapt to new programming standards. Right now the base code is written in C. The next version will likely be written in Java. Stay tuned for more HOT changes in the future!