4.14   **NDEDIT: INTERACTIVE DATA SELECTION TOOL**

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1. INTRODUCTION

NdEdit is an interactive Java tool for selecting or subsetting data from large in-situ data collections. The user can graphically view the locations of selected data sets in any 2D view of space and time (e.g., latitude-longitude map view or latitude-time view) and using graphical filters, can identify a desired subset of the data displayed. For example, a researcher can define a narrow filter band in the time dimension to restrict the number of data points shown in the latitude-longitude view to this time domain. Actions such as filtering, selecting or zooming in one 2D view are duplicated in the other 2D views. Data sets in the filter region can be deleted or retained. NdEdit also features coastline and bathymetry display in the longitude-latitude view, 2D view zooming and user-settable horizontal and vertical axes. Other tools allow data selection for further processing by other applications. For example, the section tool allows a researcher to drag a multi-segment band (user-settable width) through a data set to create custom vertical sections or select data along a particular depth contour.

2. TERMINOLOGY

NdEdit has three primary graphical components for working with large data collections; cut panels, data items, and filters. A cut panel is a 2-dimensional view (or slice) of a 4-dimensional data set. NdEdit can display up to 6 different cut panels: Longitude/Latitude, Time/Latitude, Time/Longitude, Latitude/Depth, Longitude/Depth, and Time/Depth. A data item is a single file (or station) from a particular dataset. A data item might be a single CTD profile, a sea-level time series at a particular location, or a time series for a particular current meter. Data items are displayed visually as a small cross symbol in an NdEdit cut panel or as a line for time series or depth ranges. Filters are used primarily to reduce the number of data items displayed in a cut panel by restricting the range of an orthogonal axis. There are four filters in NdEdit that correspond to the four dimensions of the input data—latitude, longitude, depth and time. For example, you can reduce the number of points plotted in the latitude/longitude cut panel by restricting the range of the time axis or depth axis. Filters are changed in NdEdit visually by manipulating on-screen controls or by typing in explicit range values. The ranges of all the filters in NdEdit are collectively called the filter region. Items in the filter region can be deleted or retained (i.e., deleting everything outside the filter region) to further reduce the number of displayed data items.

3. USER INTERFACE

The NdEdit user interface consists of a standard document-like window with menubar and toolbar. The content area of the window is dedicated to showing the various cut panels. Cut panels are depicted as small, resizeable sub-windows with labeled axes, symbols for data items, and rectangular handles on the perimeter of the plot frame to manipulate the filter region. The filter region is shown as white rectangle within the interior of the axes frame.

The NdEdit toolbar contains tools useful for hiding/showing the cut panels and manipulating the data items displayed in the cut panels. In addition, to the six buttons that show or hide the cut panels, there are buttons for zooming and three selection tools for highlighting data items for further processing (e.g., writing an EPIC pointer file or defining selections in other tools that have incorporated NdEdit as a component.)

The Zoom Tool allows you to change the cut panel axes to encompass a wider or narrower range. You can use the zoom tool in two ways; you can drag a zoom rectangle around a particular region of a cut panel or click the mouse at a location you would like to zoom into. To zoom out, press the Alt (Meta or Option) key and click the mouse. The Rectangle Tool is used to select data items in a rectangular area. Click and drag the mouse to define a selection rectangle. You can also use this tool to select individual stations by single clicking on the cut panel. The Polygon Tool is used to select stations in an irregular area. You define a polygon by click-dragging individual line segments of the polygon's perimeter. The Section Tool is used to select stations within a certain geographic distance along a line. By using multiple segments, you can create section lines that follow features of the cut panel such as a coastline or an isobath.

4. APPLICATIONS OF NDEDIT

NdEdit is written in the Java programming language and adheres to the component specification for a Java Bean. As a Java Bean component, NdEdit can be readily incorporated into other java-based data selection and analysis tools. Currently, NdEdit is used as a data selection tool in NOAA's Climate Data Portal (Soreide *et al*., 2001) and for creating custom sections in Java OceanAtlas, an oceanographic data visualization tool (http://odf.ucsd.edu/joa/jsindex.html). NdEdit can also be used as stand-alone data selection tool in conjunction with PMEL's EPIC data archives.

The Climate Date Portal consists of both server and client software to provide access to geographically distributed climate data servers. NdEdit allows users to

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quickly subset and select data files that may come from multiple online data collections. Java OceanAtlas is a section-oriented application primarily intended for visualization of in-situ oceanographic profile data. NdEdit has been incorporated into JOA to offer custom section creation from the extensive EPIC CTD and hydrographic data holdings of PMEL. Using either EPIC command line tools or the EPIC Web Browser (Zhu *et al.*, 2001), JOA users first identify a data set of interest. Using JOA's built-in NdEdit component, users can further refine their selection using filters and plot zooming, and using the selection tools create custom sections of individual profiles.

5.   DATA INPUT/OUTPUT

As a stand-alone utility, NdEdit is designed to work with "pointer" files created for PMEL's EPIC data archive and analysis system (http://www.epic.noaa.gov/epic/). An EPIC pointer file is a formatted list of data items with information on location (longitude/latitude), date or date range, and depth or depth range. A pointer file also includes a path to find the actual data file on a local disk or disk mounted over a network.

As a component used in other data selection and analysis tools (e.g., Climate Data Portal), NdEdit has APIs to directly put data into NdEdit's *PointerCollection* object. It is the containing applications responsibility to converts it's metadata standards to NdEdit's PointerCollection format.

In stand-alone mode, NdEdit can write EPIC standard pointer files useable by the EPIC library of analysis routines. As a component of other applications, it is the containing application's responsibility to convert NdEdit's PointerCollection object to a format it can utilize.

6.   LOOKING TO THE FUTURE

In the near future, NdEdit will be repackaged to better support stand-alone users. Initial users have also provided important feedback that will lead to a more intuitive filter interface as well as other improvements to the user interface. Also planned are new filter types such as presence/absence of measured variables or ranges of values of a measured variable.

7.   REFERENCES

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