3B.3

DAPPERM:
A MATLAB INTERFACE TO DAPPER — AN OPENDAP IN-SITU DATA SERVICE

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1. INTRODUCTION

Dapper is a server that provides OPeNDAP protocol access to in-situ data (Sirott et. al, 2004). Existing clients for Dapper include GrADS, NcBrowse (Denbo, 2001), Java Ocean Atlas, and DChart (Sirott, 2006). The Dapper server includes the PMEL EPIC in-situ database, Argo profiles, and the NODC World Ocean Database 2005.

In this paper, we present an easy to use interface from Matlab to Dapper. The interface uses Java tools that were developed for use with ncBrowse and the Java Ocean Atlas, as well as other Java code, Matlab scripts, and the Matlab GUI development tool (GUIDE).

2. DESIGN

DapperM utilizes NdEdit (Osborne and Denbo, 2004) and other existing Java tools to provide a user interface for the navigation and selection of Dapper data. Additional Java code provides access to data structures that make it easier for Matlab script writers to access Dapper data. Design goals include:

- Re-use Java components to navigate and select data from Dapper.
- Create Java wrappers that hide the Java data structures present in the original Java tools.
- Create both Matlab scripts that can directly interact with the returned datasets as well as an easy to use GUI interface.

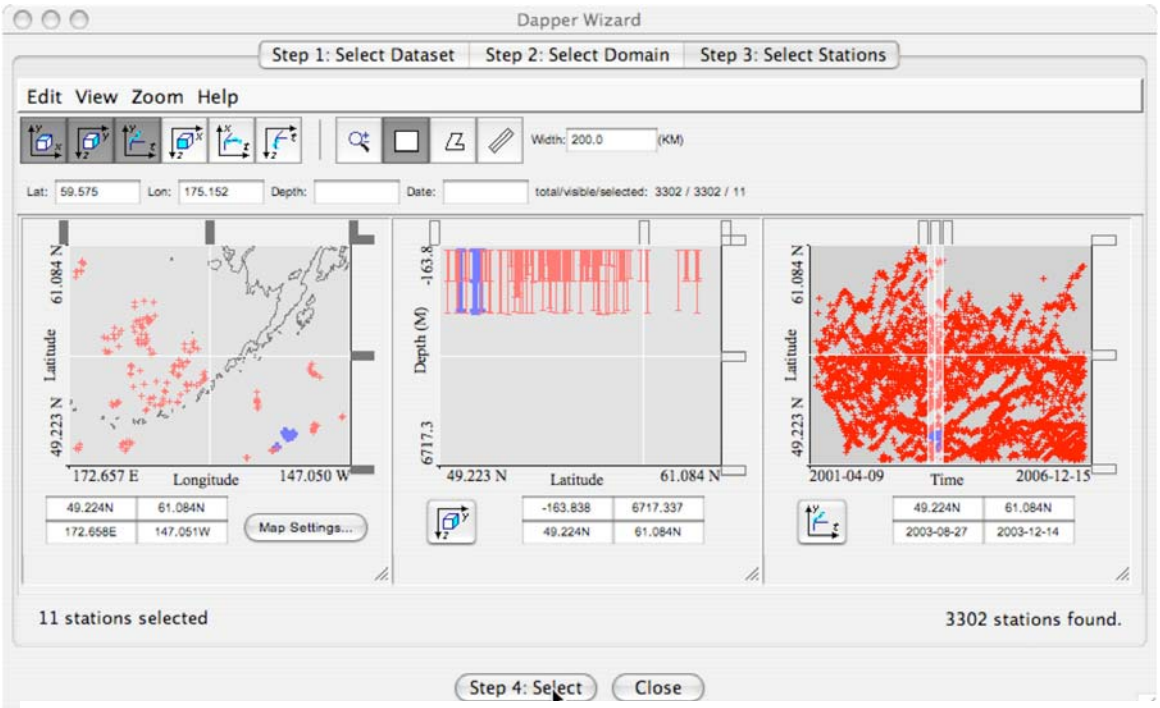

Figure 1: NdEdit window for Dapper fine selection.

3. DAPPERM

Matlab functions provided include:

dpr_attributes. Returns a CellArray that contains the attribute names and values.

dpr_date. Converts milliseconds since 1970 to the Matlab date values suitable for use with datestr() function.

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dpr_dimensions. Returns a CellArray of the dimension names, lengths, and unlimited dimension flag.

dpr_variables. Returns a CellArray of variable names and a reference of the Variable Java object.

dpr_wizard. Opens the DapperWizard and returns a data collection.

dpr_profiles. Given a station, returns all the variables in a matrix that are profiles.

dpr_variable_names. Returns a CellArray with the names and units of all independent variables.

dpr_gui. Matlab GUI interface to the DapperM Java Wizard. This interface provides stand-alone access to the Dapper server and returns data as a CellArray. The CellArray is automatically named as *selection_#*, where # is a unique sequence number.

Selection is a CellArray of dimensions {n,6} where n is the number of stations in the collection.

selection{n,1} = CellArray, variable data
  var{m,1} = variable name
  var{m,2} = data array
  where m is the variable number
selection{n,2} = CellArray, station global attributes
  attribute{j,1} = attribute name
  attribute{j,2} = attribute value
selection{n,3} = longitude (0-360 degrees east)
selection{n,4} = latitude
selection{n,5} = time (MATLAB format)
selection{n,6} = time string

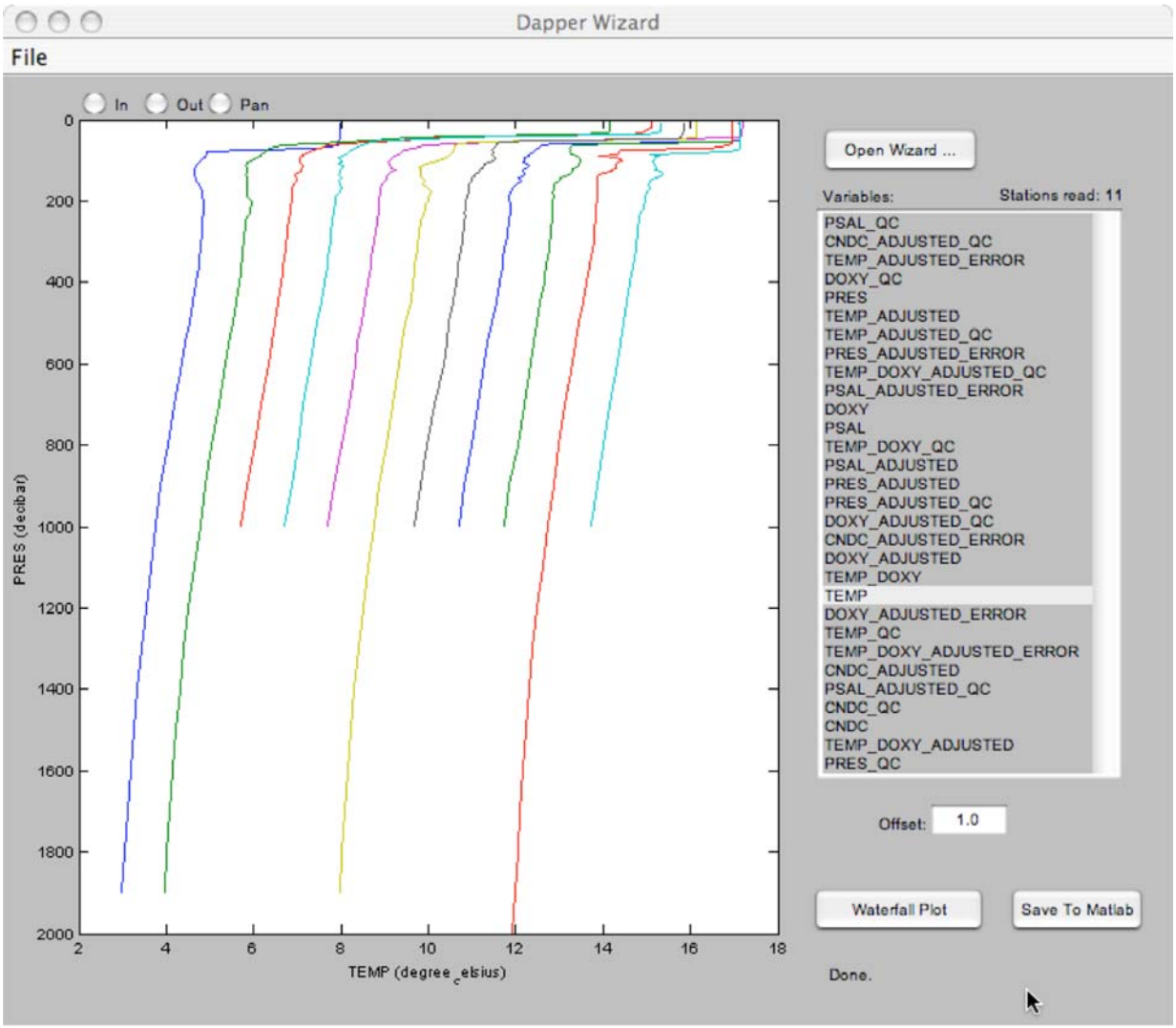
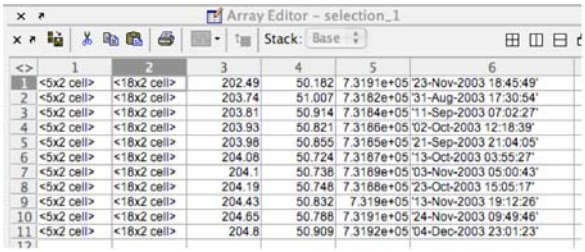


Figure 2: Waterfall plot.

4. EXAMPLE

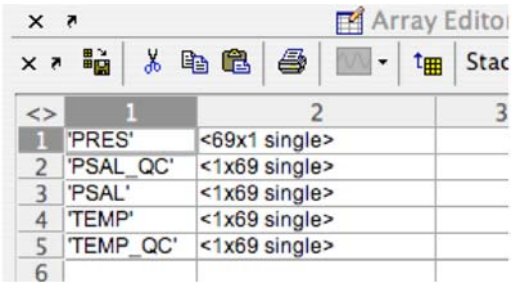
The Argo dataset available from Dapper is automatically updated regularly from Argo data assembly centers. In this example, Argo data from near the Aleutian Islands is selected (Figure 1). NdEdit simplifies the process of limiting the data of interest to a time range of 2003-08-27 through 2003-12-14. Once the data is selected it is returned to the DapperM interface. All variables that are available in the dataset are listed and a single variable can be selected and a waterfall plot (Figure 2) can be created to give a quick look at the selected profiles.

Pressing the "Save to Matlab" button will create the selection_1 CellArray in the users work area. The data is now available to the user. The internal structure of the CellArray is demonstrated in Figure 3. Figure 4 shows the list of variable names and an array holding their values, and Figure 5 displays the metadata.



<>	1	2	3	4	5	6
1	<5x2 cell>	<18x2 cell>	202.49	50.182	7.3191e+05	'23-Nov-2003 18:45:49'
2	<5x2 cell>	<18x2 cell>	203.74	51.007	7.3182e+05	'31-Aug-2003 17:30:54'
3	<5x2 cell>	<18x2 cell>	203.81	50.914	7.3184e+05	'11-Sep-2003 07:02:27'
4	<5x2 cell>	<18x2 cell>	203.93	50.821	7.3186e+05	'02-Oct-2003 12:18:39'
5	<5x2 cell>	<18x2 cell>	203.98	50.855	7.3185e+05	'21-Sep-2003 21:04:05'
6	<5x2 cell>	<18x2 cell>	204.08	50.724	7.3187e+05	'13-Oct-2003 03:55:27'
7	<5x2 cell>	<18x2 cell>	204.1	50.738	7.3189e+05	'03-Nov-2003 05:00:43'
8	<5x2 cell>	<18x2 cell>	204.19	50.748	7.3188e+05	'23-Oct-2003 15:05:17'
9	<5x2 cell>	<18x2 cell>	204.43	50.832	7.319e+05	'13-Nov-2003 19:12:26'
10	<5x2 cell>	<18x2 cell>	204.65	50.788	7.3191e+05	'24-Nov-2003 09:49:46'
11	<5x2 cell>	<18x2 cell>	204.8	50.909	7.3192e+05	'04-Dec-2003 23:01:23'

Figure 3: Selection CellArray.



<>	1	2	3
1	'PRES'	<69x1 single>	
2	'PSAL_QC'	<1x69 single>	
3	'PSAL'	<1x69 single>	
4	'TEMP'	<1x69 single>	
5	'TEMP_QC'	<1x69 single>	
6			

Figure 3: Variable list.

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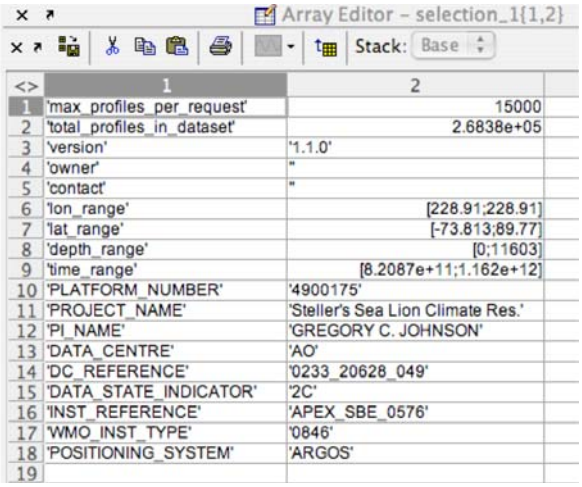

<>	1	2
1	'max_profiles_per_request'	15000
2	'total_profiles_in_dataset'	2.6838e+05
3	'version'	'1.1.0'
4	'owner'	''
5	'contact'	''
6	'lon_range'	[228.91;228.91]
7	'lat_range'	[-73.813;89.77]
8	'depth_range'	[0;11603]
9	'time_range'	[8.2087e+11;1.162e+12]
10	'PLATFORM_NUMBER'	'4900175'
11	'PROJECT_NAME'	'Steller's Sea Lion Climate Res.'
12	'PI_NAME'	'GREGORY C. JOHNSON'
13	'DATA_CENTRE'	'AO'
14	'DC_REFERENCE'	'0233_20628_049'
15	'DATA_STATE_INDICATOR'	'2C'
16	'INST_REFERENCE'	'APEX_SBE_0576'
17	'WMO_INST_TYPE'	'0846'
18	'POSITIONING_SYSTEM'	'ARGOS'
19		

Figure 2: Station metadata.

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