INTRODUCTION

The WOCE Data Assembly Center (DAC) for Shipboard Acoustic Doppler Current Profile (SADCP) is co-located at the Japan Oceanographic Data Center (JODC) and at the University of Hawaii (UH) within the Joint Archive for SADCP (JASADCP), a collaboration between the US National Oceanographic Data Center (NODC) and the E.Firing ADCP Laboratory. This poster highlights efforts of the JASADCP in support of the WOCE DAC.

BACKGROUND

From the beginning of WOCE, SADCP data was recognized by physical oceanographers as an important source of in-situ current observations within the upper ocean. Principal investigators with interest in SADCP were identified for most of the WOCE "one-time" and "repeat" hydrographic cruises. SADCP gained momentum in the early 1990s as GPS technology became more readily available for ship positioning and heading, which resulted in data sets of greater quality. However, prior to 1995, a WOCE DAC for SADCP did not exist.

The US NODC focused on this new technology in the early 1990s. In May 1992, NODC held a workshop of ADCP specialists to initiate an archive. It was decided that the JASADCP be established at UH as NODC lends its expertise in data management and the UH ADCP specialists provide scientific overview to ensure data of high integrity for research. By September 1993, a data management scheme was finalized and the NODC adopted the Common Oceanographic Data Access System (CODAS) as the standard for archiving the high-resolution data sets (typically 5-minute time and 8 m depth intervals). The CODAS is a sophisticated system that saves all original data and ancillary parameters as binary blocks (files). To support general use of SADCP data, an ASCII standard subset at hourly time and 10 m depth intervals was designed. By the beginning of 1995, the JASADCP holdings grew to over 30 cruises and the World Wide Web technology was adapted to facilitate access.

In April 1995, the NODC data management scheme was presented at the WOCE Data Products Committee (DPC) meeting. In addition, the JODC, which is the Responsible Oceanographic Data Center for ADCP, showed great interest in creating a WOCE DAC for SADCP and detailed its data management plan. By summer of 1995, the DPC chose to create co-DACs in order to take advantage of both available data management systems.

THE NODC STANDARD SUBSET OF SHIPBOARD ADCP DATA

The NODC provides shipboard ADCP data in two forms: 1) a high-resolution set in CODAS binary format consisting of currents and ancillary parameters at the sampling interval with which the data were recorded and processed and 2) a standard subset of absolute currents at hourly and 10 m intervals which is available as ASCII or NetCDF. If absolute currents are not available due to lack of navigation, then relative currents are provided. If NODC receives data sets that are not of high resolution, then the standard subset may be of a slightly different timing sequence than hourly and the depth spacing may be other than 10 m. For instance, if a data set is received as gridded averages in space, then a nominal time will be assigned. Similarly, if a data set is received with 8 m depth spacing, then this interval is used in the subset. The standard subset includes the hourly means and standard deviations of ship velocity components and the transducer temperature, when available. A description of the methodology and format of the standard subset is given below.

METHODOLOGY

The standard subset will consist of absolute currents if the ship navigation was satisfactory. Otherwise the currents will be given relative to the mean over a reference layer, usually 50 to 150 m.

In the vertical, each velocity profile is linearly interpolated to a regular grid at integral multiples of 10 m. The shallowest level is the first multiple of 10 m that is greater than or equal to the depth of the first good bin of the recorded data, typically a function of the instrument configuration and the transducer depth. The deepest level is that at which at least 50% of the ensembles over the course of the cruise have a Percent Good greater than 30%. For each depth bin, the Percent Good is the percentage of individual pings in an ensemble with valid data. As noted above, for data sets received at NODC in a reduced form (ie., not high-resolution), the original depth interval is maintained.

In time, averages are calculated for one-hour intervals centered on the hour. The time column in the ASCII subset gives the mean of the times of the ensembles that fall into the interval. Hence the mean may be slightly off the integral hour, even when ensembles are evenly available over the entire hour. The mean time may be even less centered in the case where data are only partially available over the interval because instrument recording was turned off (e.g., at port calls). In the case where data are totally unavailable over the entire interval so no mean time can be calculated, a "placeholder" entry is made and assigned a time value exactly at the middle of the interval, i.e., on the hour, followed by bad value flags for the longitude, latitude and velocity fields. It is left to the user to manipulate the time column if a truly even time grid is desired.

At each level, a bad value flag is given if less than 50% of the ensembles in the hour have valid data. Bad value flags (99999) for velocity components also occur at depth layers where less than 50% of the ensembles in the interval contribute to the average because of low percent good and other editing criteria, or in the case of absolute currents, occur over the entire depth range because ship velocity was not available as a reference.

The transducer temperature is provided as a mean and standard deviation over the hour. The ship velocity is provided as means and standard deviations of the components over the hour and is derived from the final absolute ship velocities of each ensemble as stored in the CODAS high-density database. The ship velocity information allows one to see at a glance if the ship was on-station, underway, or both over the hour.

WHAT IS THE DATA QUALITY?

The various WOCE Data Assembly Centers (DACs) have specific criteria for evaluating and flagging data. The Hydrographic DAC, for example, has well-defined WOCE standards for data reduction and flagging of CTD data. For the shipboard ADCP, the processing and quality assessment have been left to the data originator. For the majority of cruises, the data were processed and documented by E.Firing's group at the University of Hawaii. Profiles were screened objectively and subjectively, but personnel and methods changed over time. For data contributed by other institutions, the data originators were instructed to contribute only processed and documented data sets. Once these data arrive at the ADCP DAC, a general review of the data is undertaken, but no specific flagging system is added.

The heterogeneity of operational conditions--ship speed, sea state, and distribution of acoustic scatterers--makes it difficult to quantify the data quality for a given cruise. Conditions and data quality can vary greatly during a single cruise. Data quality also varies with depth in each profile, with problems being most common in the top bin and towards the end of the profiling range. The data user is therefore

referred to the documentation file accompanying each cruise for notes about adverse conditions and corresponding data quality problems at specific times during a cruise. Additional quality information is available in the high-resolution data set stored in Common Oceanographic Data Access System (CODAS) blockfiles. For each depth of each profile, a flag byte shows the results of editing, partly by hand and partly mechanized. A "percent good" byte records the percentage of single ping samples accepted by the ADCP for averaging at each depth bin in each ensemble-average profile (typically 5 minutes, the shortest interval for which data are saved). Both the flag byte and "percent good" (> 30%) are used when extracting data for the ASCII standard subset (hourly, 10 m bins). For more insight and control, users may wish to extract data from the CODAS directly, using their own criteria.