NavView User Guide – 18 ADCP

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18. ADCP

This document describes the configuration and operation of the NavView ADCP Current Profiler module.

18.1 OVERVIEW

The ADCP module interfaces to Acoustic Doppler Current Profiler (ADCP) devices using the PD0 message. It parses the data from the instrument and displays in an intuitive and easy to understand interface for vessel officers or surveyors, see Figure 18-1.

FIGURE 18-1 LAYERS WITH PROFILE VIEW

The NavView current profiler allows the user to select a layer size to fit their needs, many small layers for fine grained data to feed into calculations, or just 3 layers for the water column for a quick display. The profiler module allows multiple profile calculations to be set up, pointing to the same instrument, configured to average in different ways, so the instrument can be set up with fine grained layers, and NavView can handle the data with fine grained layers for calculations, while at the same time averaging it all together for display.

18.2 ADCP DEVICE CONFIGURATION

18.2.1 ADD ADCP DEVICE

The ADCP profile module relies on a device capable of outputting the RDI PD0 message. This is interfaced into NavView using the TrdiPD4 device driver (TRDI ADCP).

1. Add device by clicking on Devices in the Configure section of the Setup ribbon, see Figure 18-2, alternatively devices can be accessed from the Project Explorer view, see Figure 18-3. This opens the I/O Devices window.

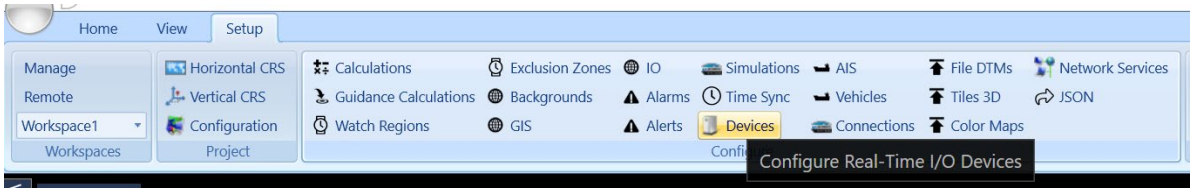

FIGURE 18-2 I/O DEVICES – SETUP RIBBON

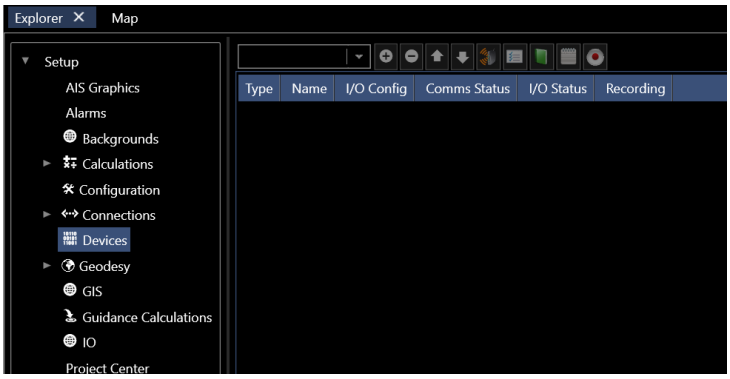

FIGURE 18-3 I/O DEVICES – PROJECT EXPLORER

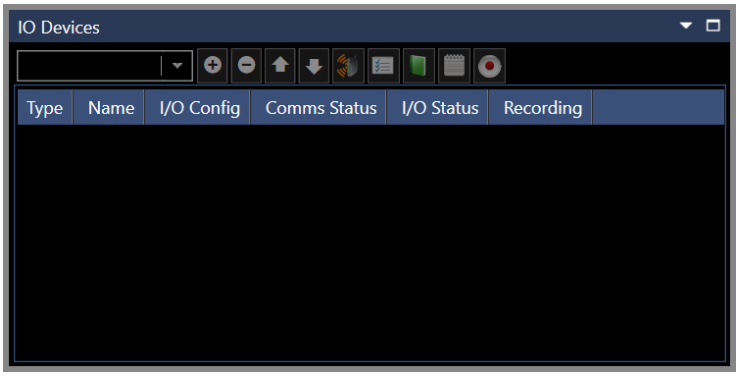

FIGURE 18-4 I/O DEVICE WINDOW

2. From the drop-down, select the TRDI ADCP device, see Figure 18-5

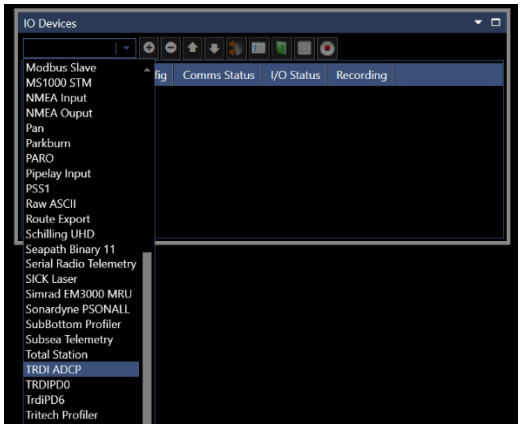

FIGURE 18-5 I/O DEVICE SELECTION

3. Click the  to add the device, this will open the Configure Device I/O window, see Figure 18-6.

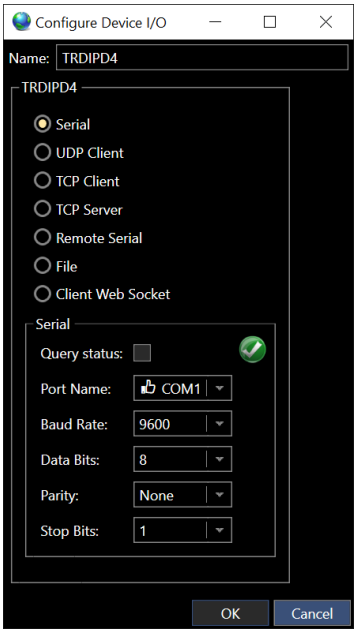

FIGURE 18-6 CONFIGURE I/O DEVICE WINDOW

Note: Refer to Device section in the NavView User Guide for I/O configuration.

4. Configure the ADCP device, click the  configure device/device settings button on the device page to open the Configure Device window, see Figure 18-7.

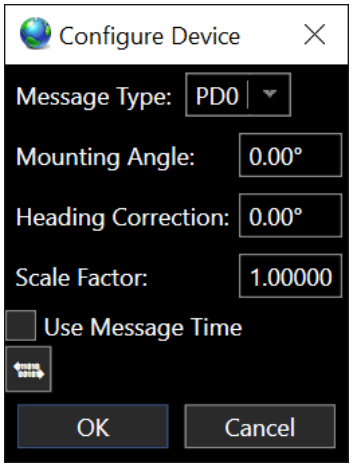

FIGURE 18-7 TRDI DEVICE CONFIGURATION

- **Message Type:** From drop-down select PD0
- **Mounting Angle:** Enter ADCP mounting misalignment
- **Heading Correction:** Enter value from DVL calibration, if not calibrated use default 0.00°
- **Scale Factor:** Enter value from DVL calibration, if not calibrated use default 1.000
- **Use Message Time:** If checked, the timestamp of the data will be what comes in on the DVL message. If unchecked, the data will be timestamped by NavView at time of arrival

18.2.2 RDI DEVICE COMMUNICATION

NavView can send commands to an RDI ADCP Device using its command language. A console is available, allowing the user to manually send any command to the device and a wizard is also available with presets to quickly configure the device. The device control panel can be accessed from the following places: Button on the configure device window, button on the live current meter configuration window and from the current meter display window.

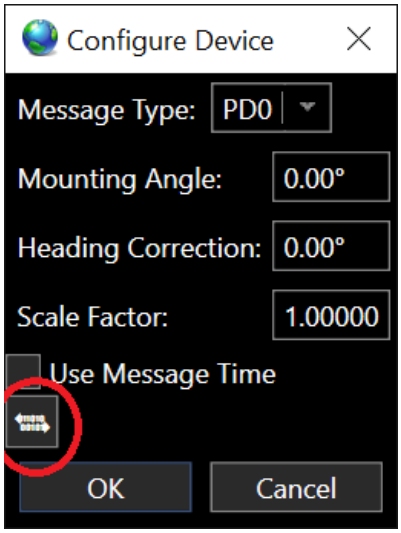

FIGURE 18-8 BUTTON TO ACCESS ADCP COMMAND CONSOLE

The command console is shown below in Figure 18-9 and its options are described below.

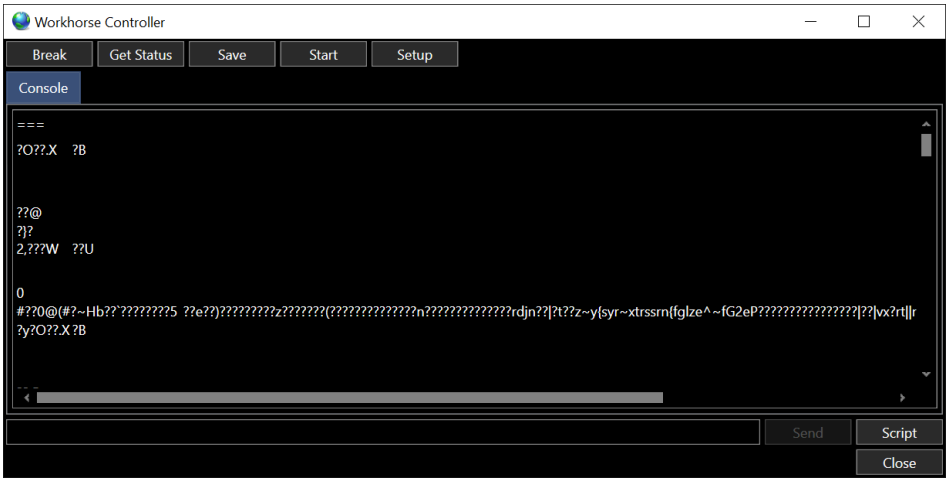

FIGURE 18-9 ADCP COMMAND CONSOLE

- **Break:** The break option sends a software communication break to the instrument. If the instrument is pinging, the break will cause it to stop, and put it into command mode, so that the instrument can be configured

Note: That NavView will not send a hardware pulse break, only a software break. Older versions of RDI firmware may not be able to receive the software break.

Note: When the console window is opened, a break is automatically sent to the device to put it into configuration mode.

- **Get Status:** Sends a series of commands to the instrument to query its status. The response is displayed in the console window
- **Save:** Sends a 'CK' command to the RDI device, which will save any changes made to its memory so that they will persist after a hardware restart
- **Start:** Sends a 'CS' command to the instrument, which causes it to start pinging. To send further commands, a break must be sent again
- **Setup:** Opens the Setup wizard. The wizard contains default settings for various working depths.
    I. From drop-down menu select a preset approximate range to seabed, see Figure 18-10 and Figure 18-11

Note: The Preset Range to Seabed unit is controlled by the working Horizontal CRS.

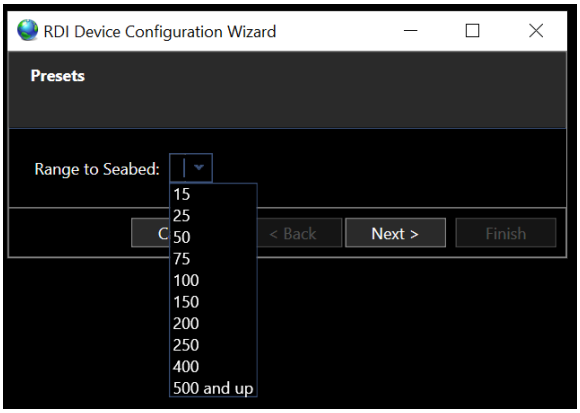

FIGURE 18-10 RANGE TO SEABED – HORIZONTAL CRS WGS84 UTM- METERS

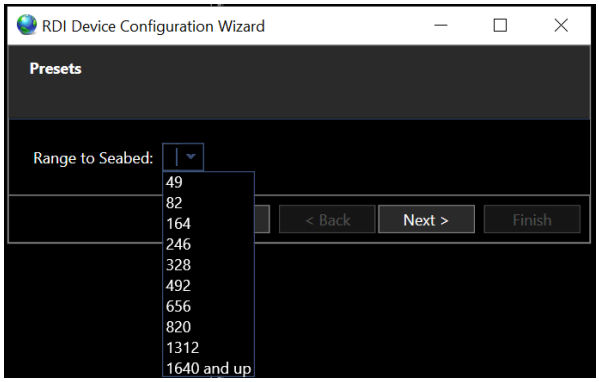

FIGURE 18-11 RANGE TO SEABED – HORIZONTAL CRS NAD27 BLM- FTUS

II. Click Next to confirm the selection, this opens the Basic Configuration dialogs
III. Basic Configuration , this allows the user to set the following, see Figure 18-12

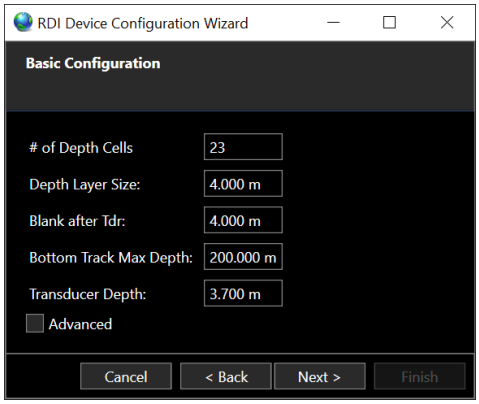

FIGURE 18-12 RDI DEVICE CONFIGURATION - BASIC CONFIGURATION

- **# of Depth Cells:** Number of uniformly spaced segments in the profile
- **Depth Layer Size:** Depth of each Depth Cell
- **Blank after Tdr:** This is useful if the device does not extend beyond the keel of the vessel, in which case current returns at the transceiver may suffer from noise and turbulence. The default blank after Tdr is 4.0 m
- **Bottom Track Max Depth:** The bottom track max depth limits the bottom track waiting time, which improves the update rate. At each preset range, the bottom track max depth defaults to twice the preset
- **Transducer Depth: D**efault of 3.7 m, but can be modified to fit user needs

To access the advanced options in the wizard page, click the **Advanced** checkbox. The following advanced options are then provided:

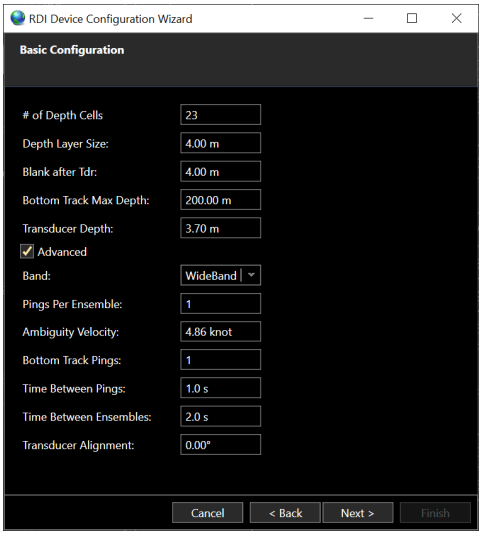

FIGURE 18-13 RDI DEVICE CONFIGURATION - ADVANCED CONFIGURATION

- **Band:** Wideband or Narrow Band. Wideband is used for closer ranges, while narrow band is selected by default for long range (deeper) setups
- **Pings Per Ensemble: D**efaults to 1, this can be used to set the instrument to average over several data points before sending an update. NavView can handle averaging within its own calculations, so it is recommended to leave Pings Per Ensemble to 1
- **Ambiguity Velocity:** Velocity threshold the ADCP cannot accurately determine the direction of the current, leading to ambiguity in its measurements
- **Bottom Track Pings:** Determines transducer speed and range to bottom, default is 1
- **Time Between Pings:** Default to 1 second of waiting before starting the next ping
- **Time Between Ensembles:** Defaults to 2 seconds before starting the next ensemble (group of pings)
- **Transducer Alignment:** Angular transducer alignment correction factor. This can be used to apply rotation to the data output by the instrument

IV. Click **Next**

V. The Actions page has the following two options, see Figure 18-14

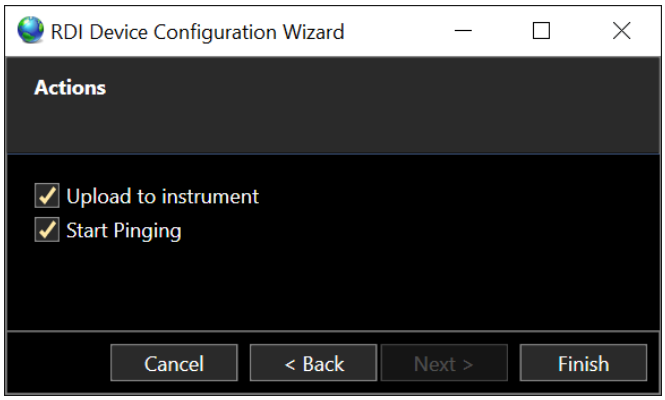

FIGURE 18-14 RDI DEVICE CONFIGURATION - ACTIONS PAGE

- **Upload to instrument:** If this option is checked (default), when the finish button is sent, a group of commands will be sent to configure the device with the options which have been selected in the wizard
- **Start Pinging:** If this option is selected, the CS command will be sent to the device, so that it will start pinging

VI. Click **Finish**

18.3 LOGGING ADCP PROFILES

To log ADCP profiles to a file select the “Manage Continuous” button from the Setup ribbon, ADCP section, see Figure 18-15. This opens the Manage ADCP Logging window, see Figure 18-16

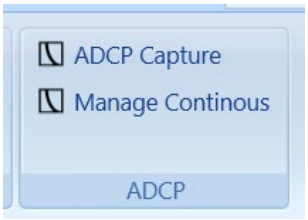

FIGURE 18-15 ADCP - SETUP RIBBON

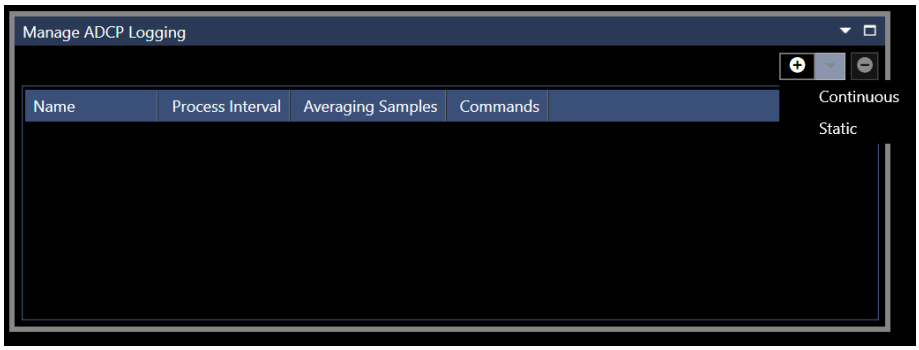

FIGURE 18-16 MANAGE ADCP LOGGING WINDOW

The two types of current profiles which can be added are Continuous or Static.

18.3.1 CONTINUOUS PROFILE

To add a continuous profile select the **Continuous** option from the drop-down list of options, see Figure 18-16. This opens New ADCP Profiler Wizard window where all settings for the profile can be configured, as shown in Figure 18-17.

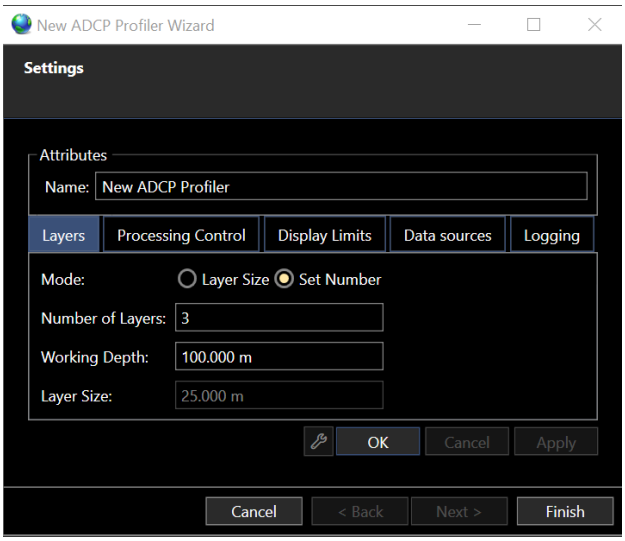

FIGURE 18-17 NEW ADCP PROFILE WIZARD - SETTINGS

a. **Attributes**
   - **Name:** Select a name for the profile, which can be used to easily identify it

b. **Layers Tab** (see Figure 18-17)
   - **Mode:** Layer size or Set Number. With this option, the layer size can either be defined by setting the desired number of layers or a set number for the water depth. If the set number is selected, the Number of Layers and Working Depth options will be enabled. If the Layer Size option is selected, the Layer Size settings will be enabled below
   - **Number of Layers:** Specify the desired number of layers for the working depth. This will be used to calculate a layer size, however if data comes in from the instrument that is deeper than the set working depth, extra layers will be automatically added so that no data is missed
   - **Working Depth:** Set the working depth, which is the expected depth where the system will be working. This does not affect the instrument itself. It is used in conjunction with the Number of Layers to calculate a layer size
   - **Layer Size –** Here a layer size in distance units can be manually specified for the profile

c. **Processing Control Tab**

The processing control tab of the continuous profile configuration is shown below in Figure 18-18

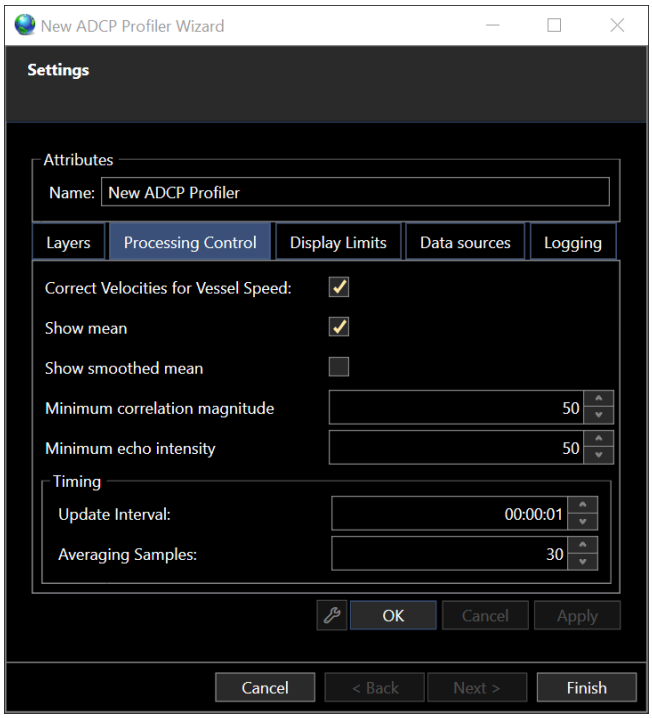

FIGURE 18-18 NEW ADCP PROFILE WIZARD SETTINGS - PROCESSING CONTROL TAB

- **Correct Velocities for Vessel Speed:** With this option enabled, if a vessel speed source is specified, the speed of the vessel will be subtracted from the current data, such that the currents reported are the true water currents. With this option turned off the vessel speed is not removed and raw current is displayed, so if the vessel is moving, this will affect the result
- **Show Mean:** On the chart page, the “Show Mean” option will show the data averaged over a period of time, rather than the immediate data
- **Show Smoothed Mean:** With this option, the current profile will be smoothed for display to remove any spikes at various depths
- **Minimum Correlation Magnitude:** Data from the instrument includes certain statistics such as the correlation magnitude which has a range of 0 to 255. This minimum value will reject any data with a correlation smaller than the amount set. This can be used to reject poor quality data
- **Minimum Echo Intensity:** Data from the instrument includes the statistic of the echo intensity, where weaker return signals may be erroneous data. The echo intensity is on a scale from 0 to 255. This minimum value allows NavView to reject any data that is not strong enough to be considered good quality data
- **Timing Update Interval:** The update interval determines how often the calculation will be updated by NavView. At each update time, all new data from the instrument will be processed into the calculation
- **Averaging Samples:** The averaging samples option allows NavView to average out the current data per depth bin/layer. If set to 30 samples, then observations from the instrument will be averaged, as a running average. If the instrument is set to update at 1Hz, the data can be noisy, so NavView can smooth that result out with the running average

d. **Display Limits Tab**

The display limits tab of the configuration is shown below in Figure 18-19 and the options are described below

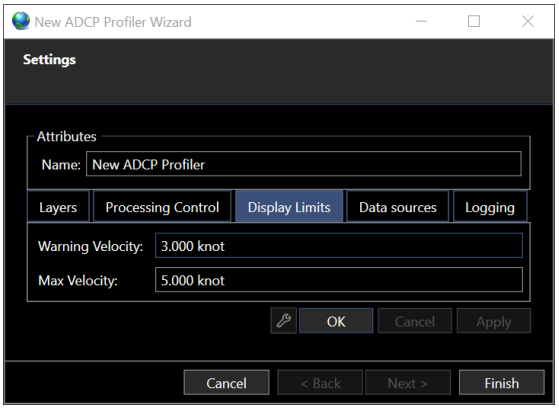

FIGURE 18-19 NEW ADCP PROFILE WIZARD SETTINGS - DISPLAY LIMITS TAB

- **Warning Velocity:** Any current data with a magnitude greater than the value set here will appear in yellow to warn the user

- **Max Velocity:** Any current data with a magnitude greater than the value set here will appear in red to the user on the layers page. This value also sets the maximum range of the current meter chart

e. **Data Sources Tab**

The data sources tab is shown in Figure 18-20. This tab allows all data sources for the current profiler calculation to be set

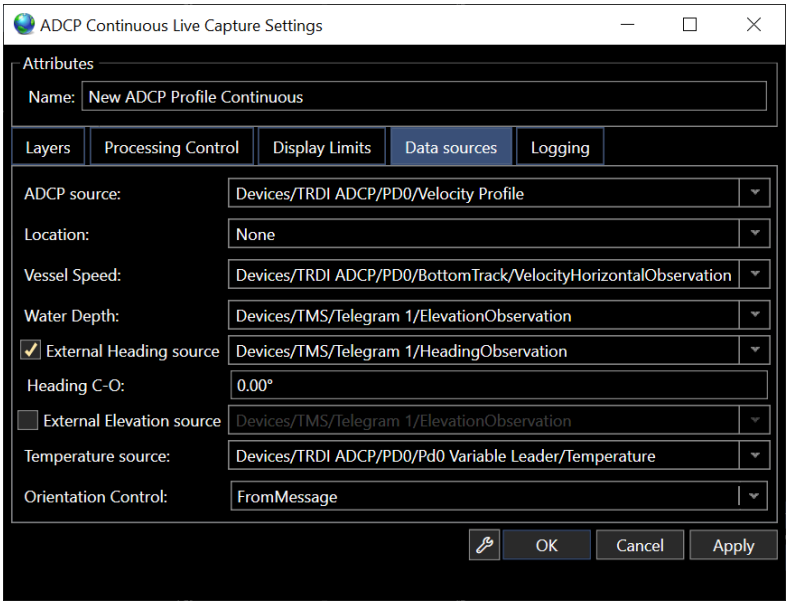

FIGURE 18-20 NEW ADCP PROFILE WIZARD SETTINGS - DATA SOURCES TAB

- **ADCP Source:** This data source requires a PD0 configured device
- **Location:** Set to any position source, such as Vessel CRP or GPS. This is used to save a location with the current profile data when logging and for display of the current in the 3D View
- **Vessel Speed:** Set to a Velocity Horizontal data source within NavView, such as a GPS VTG string, or INS speed output. This speed is optionally applied in the calculation to correct the raw current data
- **Water Depth:** The water depth option expects any elevation type observation from within NavView. This is used to display the water depth on the main current profiler screen and is also used to reject data deeper than the water depth, as it would likely be erroneous data
- **External Heading Source:** The heading source can be optionally selected (selected by checkbox). If the data is already corrected at source, and currents are coming in as geographic coordinates, then no external heading source is required. If the ADCP instrument is publishing instrument or ship referenced velocities, then the heading source is required
- **Heading C-O:** Applies a correction factor to the external heading source, if the ADCP instrument is not aligned with the heading source

- **Temperature Source:** RDI ADCP device has internal temperature sensors. Select the source here so that the temperature can be displayed on the main screen
- **Orientation Control:** From the drop-down menu select whether to use the ADCP orientation from the data string or force it to use up or down orientation

f. **Logging Tab**

NavView can log all live current meter data to a file located in the project folder>Local>"Station">AdcpData

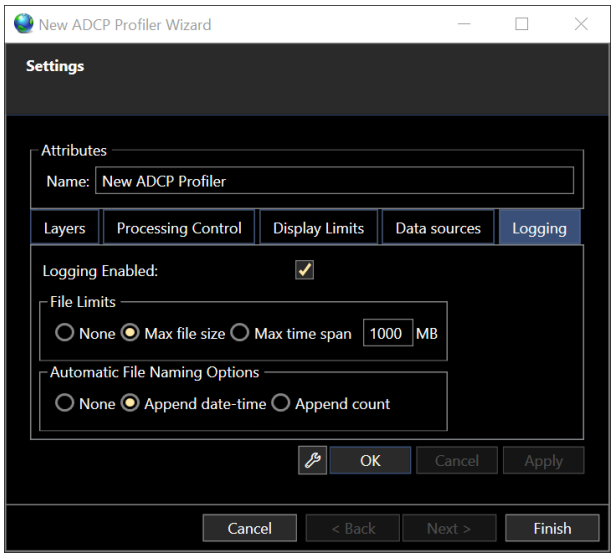

FIGURE 18-21 NEW ADCP PROFILE WIZARD SETTINGS - LOGGING TAB

- **Logging Enabled:** Turn logging on and off
- **File Limits**
  - **None:** File will continue to grow indefinitely
  - **Max File Size:** A new file will be created when the max file size in MB is reached
  - **Max Time Span:** A new file will be created when the time span is reached
- **Automatic File Naming Options**
  - **None:** Nothing appended to the logged file
  - **Append Date-Time:** A datetime in a standard format will be appended to each new file
  - **Append Count:** A count of files since the logging session started will be appended to the filename

Note: Access to the Workhorse Controller is by selecting  in the Data sources and Logging tabs.

Clicking **Finish** will add the profile to the Manage ADCP Logging window, see Figure 18-22.

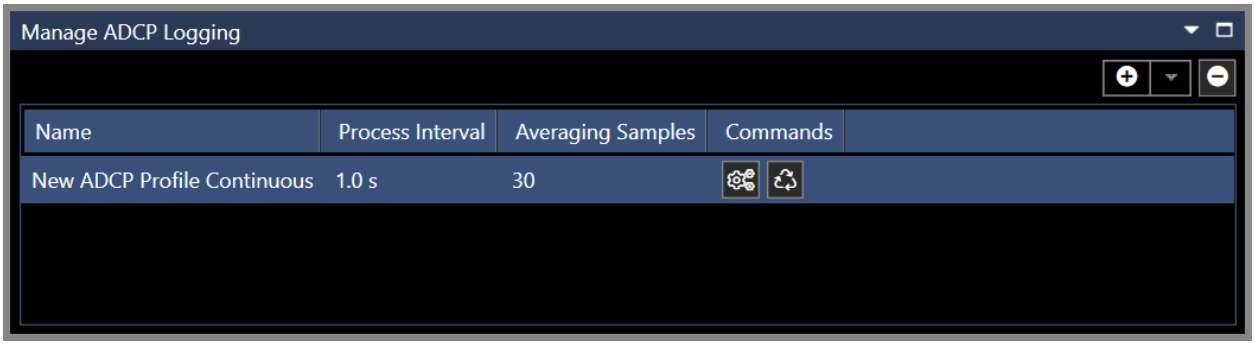

FIGURE 18-22 MANAGE ADCP LOGGING WINDOW – CONTINUOUS PROFILE ADDED

18.3.2 STATIC PROFILE

To add a Static profile to the Manage ADCP Logging list, select the Static option from the drop-down list of options, see Figure 18-16. This opens New ADCP Static Profile Wizard window, **Attributes**, as shown in Figure 18-23

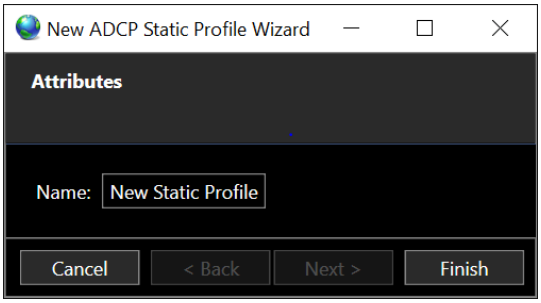

FIGURE 18-23 STATIC PROFILE - ATTRIBUTES

1. Specify a name for the static profile.
2. Click Finish to add profile to the Manage ADCP Logging window.

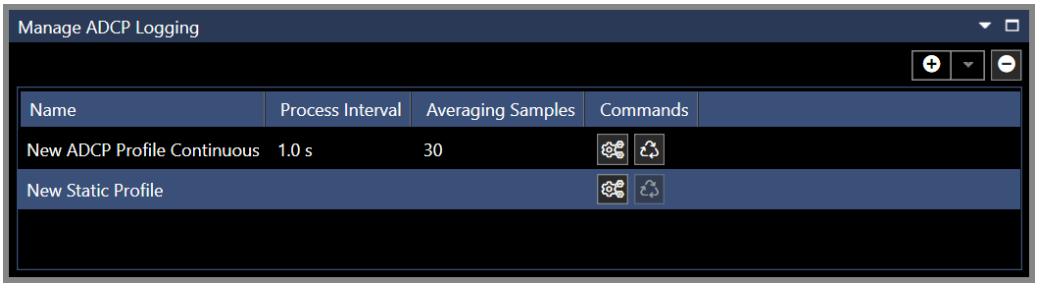

FIGURE 18-24 MANAGE ADCP LOGGING WINDOW – STATIC PROFILE ADDED

3. To configure the Static profile, click the Edit Profile Settings button  . This opens the Edit Static Profile Dialog, see Figure 18-25.

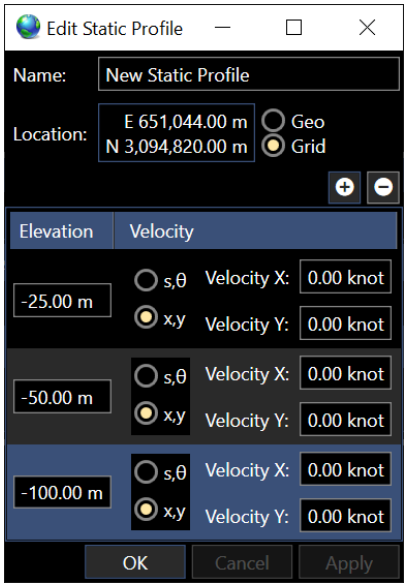

FIGURE 18-25 EDIT STATIC PROFILE

- **Location:** The location can be specified. This is used for displaying the current profile on the 3D Map view

Layers can be manually added to the static profile using the  and  buttons. Within each layer the following options are available.

- **Elevation:** The elevation reference for the layer, inverse of depth
- **Velocity:** Velocity can be defined either as s, θ (speed, direction) or as X,Y where X is velocity in the east direction, and Y is in the north direction

18.4 ADCP CAPTURE

To start, pause, finish and save a ADCP profile, click on the ADCP Capture button in the ADCP section of the Setup ribbon, see Figure 18-26. This opens the ADCP Live Capture Settings window, see Figure 18-27.

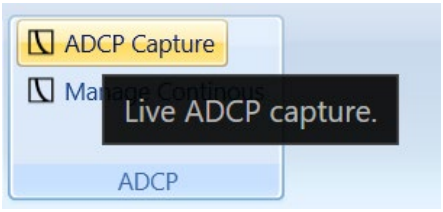

FIGURE 18-26 ADCP CAPTURE - SETUP RIBBON

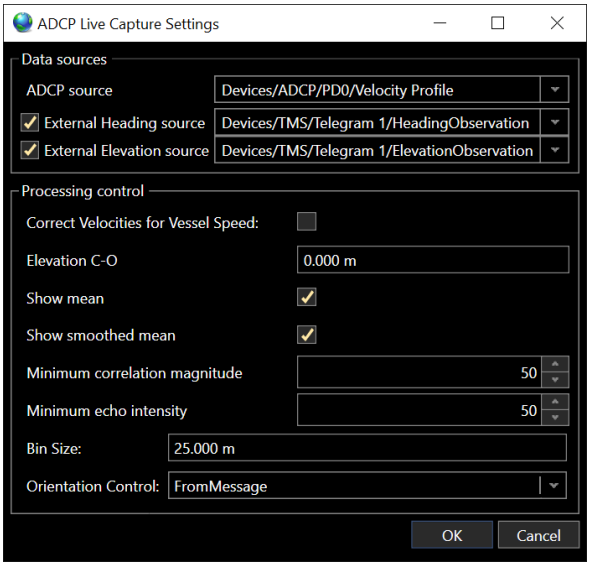

FIGURE 18-27 ADCP LIVE CAPTURE SETTINGS WINDOW

- **Data Sources**
  - **ADCP source:** From drop-down list select the ADCP device
  - **External Heading source:** If using an external heading source, check the box and select source from drop-down list
  - **External Elevation source:** If using an external elevation source, check the box and select source from drop-down list
- **Processing control**
  - **Correct Velocities for Vessel Speed:** Check the box to apply vessel speed to current
  - **Elevation C-O:** Enter value to apply external elevation source vertical offset from ADCP device
  - **Show mean:** On the chart page, the “Show Mean” option will show the data averaged over a period of time, rather than the instant data
  - **Show smoothed mean:** With this option, the current profile will be smoothed for display to remove any spikes at various depths
  - **Minimum Correlation Magnitude:** Data from the instrument includes certain statistics such as the correlation magnitude which has a range of 0 to 255. This minimum value will reject any data with a correlation smaller than the amount set. This can be used to reject poor quality data
  - **Minimum Echo Intensity:** Data from the instrument includes the statistic of the echo intensity, where weaker return signals may be erroneous data. The echo intensity is on a scale from 0 to 255. This minimum value allows NavView to reject any data that is not strong enough to be considered good quality data
  - **Bin Size:** Enter bin size (of elevation) to average data from DVL device

- **Orientation Control:** Choose whether to use the ADCP orientation from the message or force it to use either up or down orientation. i.e if using a RDI DVL use From Message

1. Click Ok, this opens the Live ADCP Profile window, see Figure 18-28

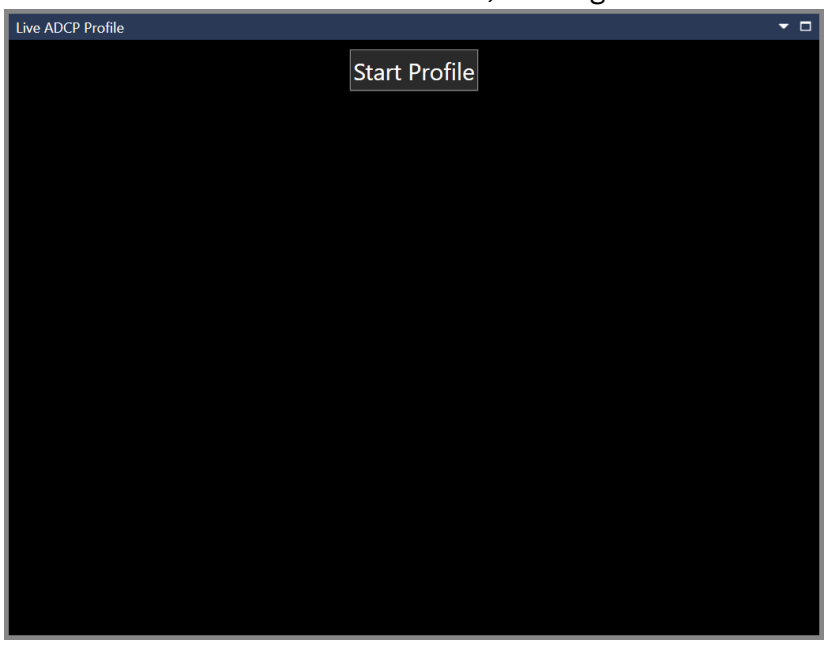

FIGURE 18-28 LIVE ADCP PROFILE – START PROFILE

2. Click Start Profile, this opens the profile chart showing live ADCP data, see Figure 18-29

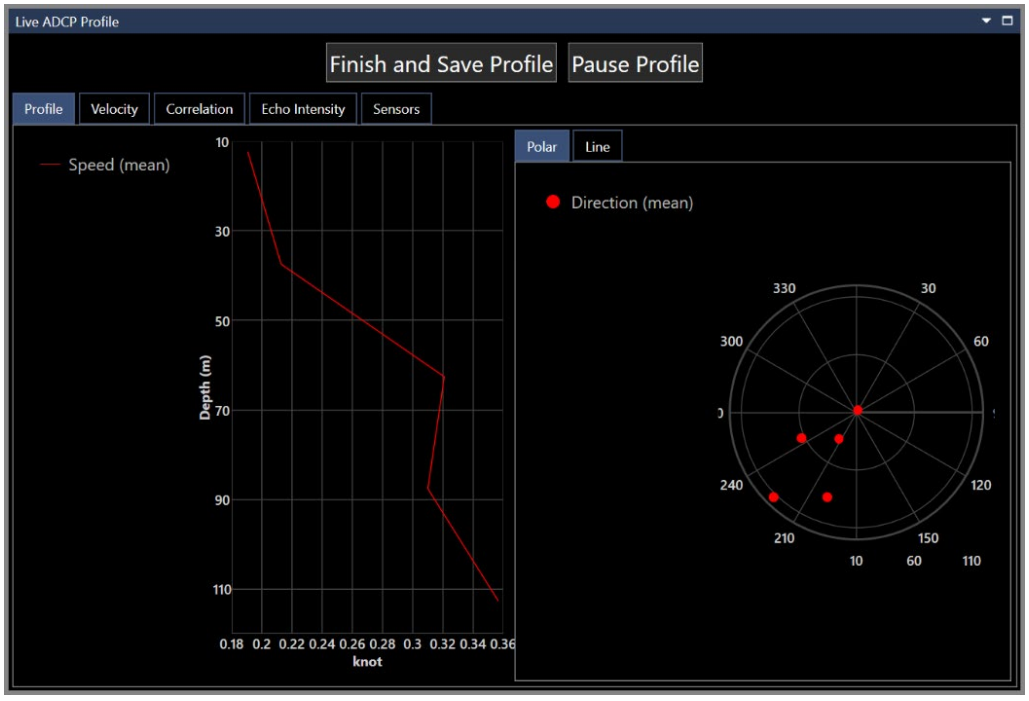

FIGURE 18-29 LIVE ADCP PROFILE – CHART VIEW

3. When profile is completed click on Finish and Save Profile, this opens a summary window, see Figure 18-30, click on the X in upper right corner of the window. This is saved for viewing using View ADCP Profiles.

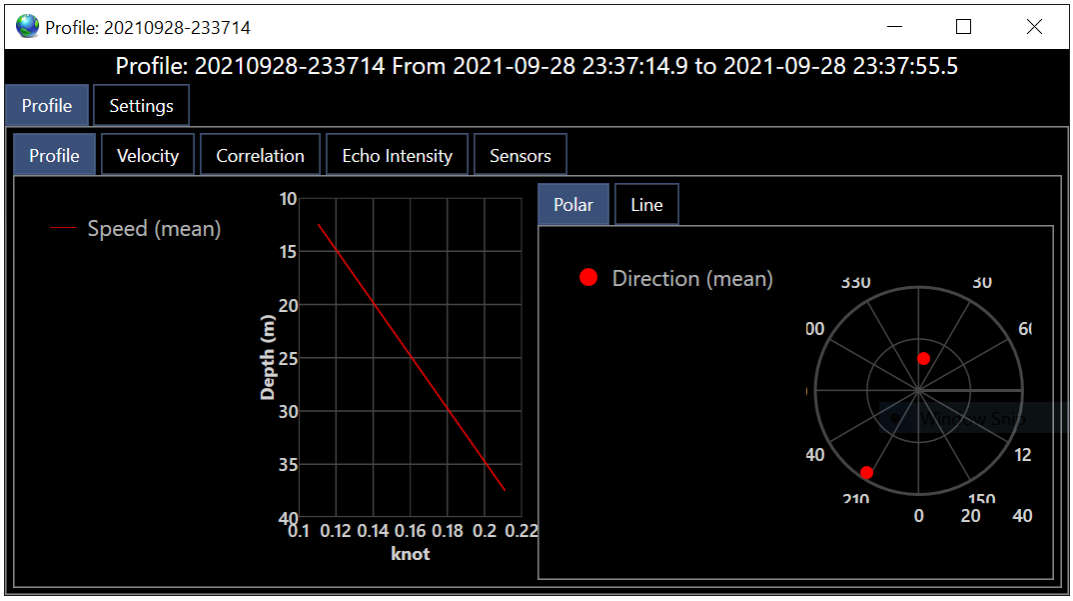

FIGURE 18-30 LIVE ADCP PROFILE SAVED

18.5 ADCP VISUALS

ADCP profiles can be viewed from the View ribbon, ADCP section, see Figure 18-31.

FIGURE 18-31 ADCP PROFILES - VIEW RIBBON

18.5.1 VIEW SAVED ADCP PROFILES

Select **ADCP Profiles** from the ADCP section in the View ribbon, see Figure 18-31, to view saved captured profiles, see Figure 18-32.

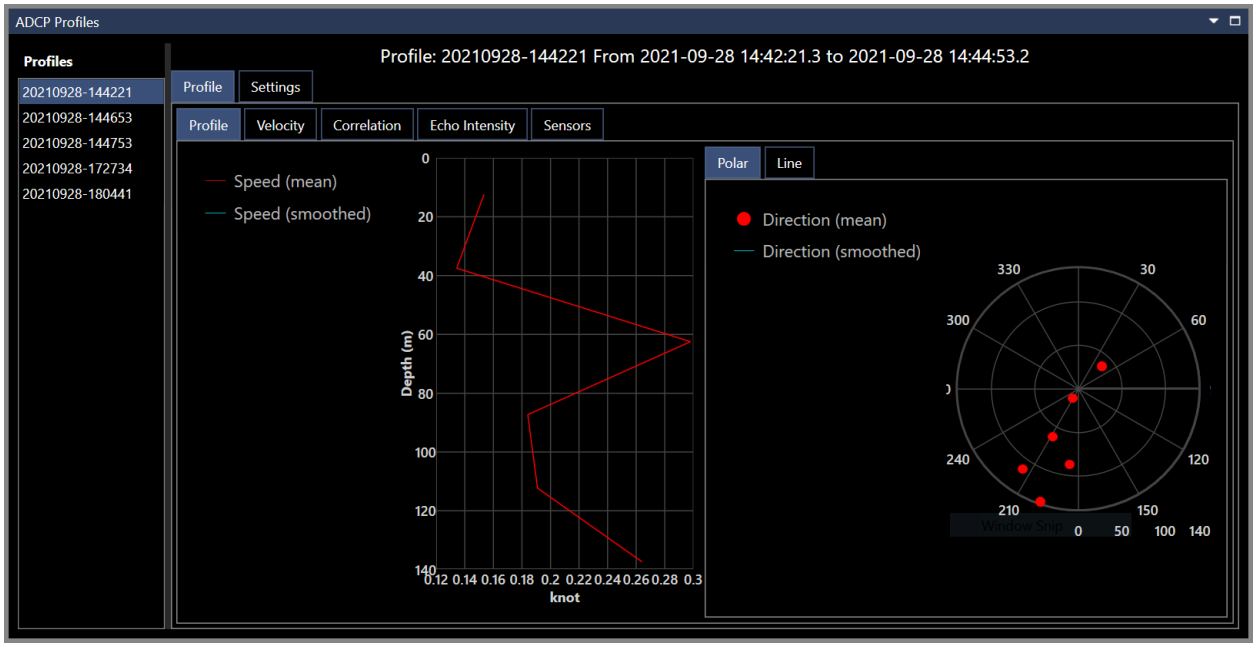

FIGURE 18-32 ADCP PROFILES - VIEW WINDOW

Select the saved profile from the profiles listed in the left panel to display.

18.5.2 VIEW LIVE ADCP PROFILE

Live ADCP profiles can be viewed from the View ribbon, ADCP section.

Select New ADCP Profile Continuous Status from the ADCP section in the View ribbon, see Figure 18-31, to view live profiles, see Figure 18-33.

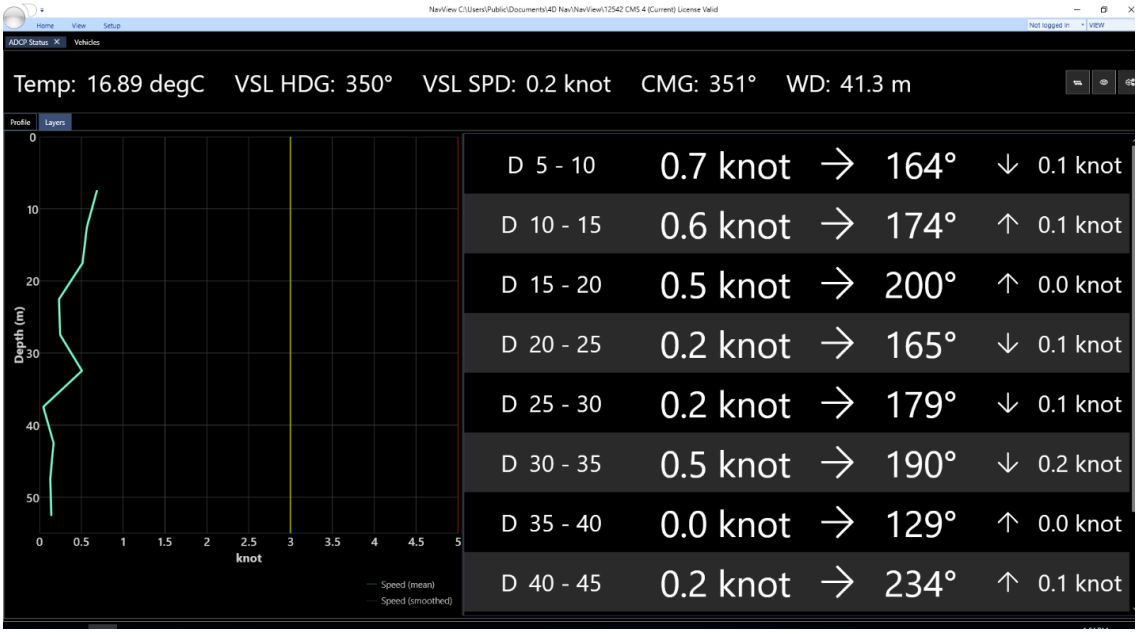

FIGURE 18-33 ADCP PROFILE WINDOW - LAYERS TAB

The top section of the view shows some summary details such as temperature, vessel heading, vessel speed, and course made good (CMG) and the water depth.

Toolbar for configuration 

-  Edit device settings, see Figure 18-9
-  Edit view settings for this window

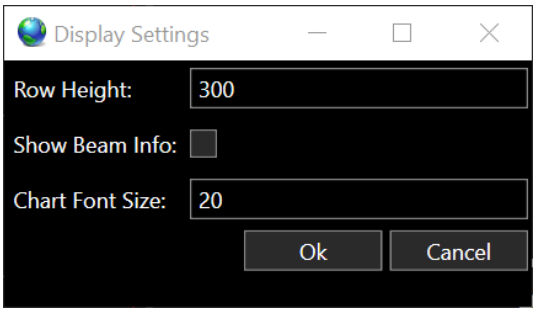

FIGURE 18-34 DISPLAY SETTINGS OPTIONS

  - **Row Height (Pixels):** Controls how large each row will be shown in the layers tab. Default is 300 pixels but if using many small layers, a smaller layer height may be desired so that all layers can be displayed on screen at once
  - **Show Beam Info:** Adds extra tabs to the view additional data for each individual beam from the instrument
  - **Chart Font Size:** Sets the font size for the charts, default is 20. This allows for easier viewing of the charts for vessel operators
- **Layers Tab:** On this view, the current magnitude vs depth is shown in the chart on the left, followed by a row for each layer in the calculation, on the right, see Figure 18-33
- **Profiles Tab:** On this view, the current magnitude vs depth profile is shown in the chart on the left and current direction on the right, see Figure 18-35

On the direction chart, the range outward from the center represents the depth of the layer, while the angle on the polar plot indicates the current direction at that depth.

The current profile can also be viewed in the 3D Map, as seen in Figure 18-36.

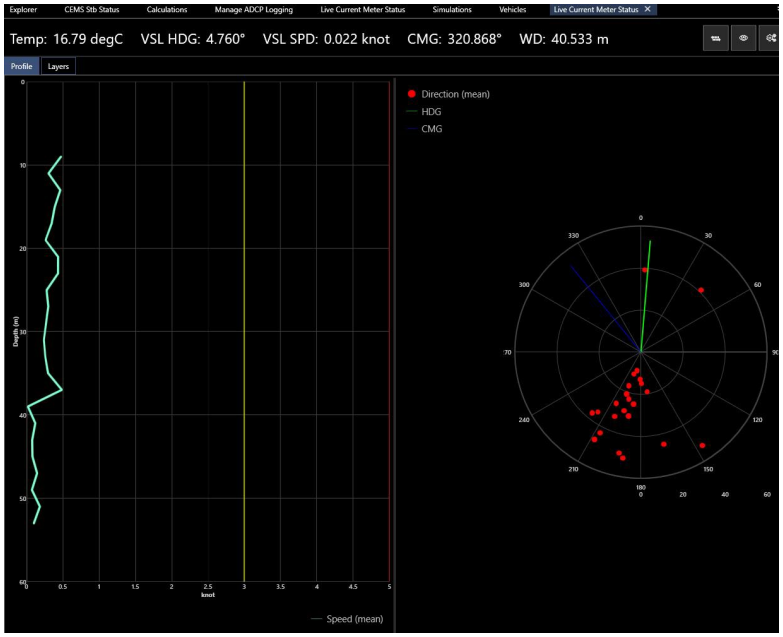

FIGURE 18-35 ADCP PROFILE WINDOW - PROFILES TAB

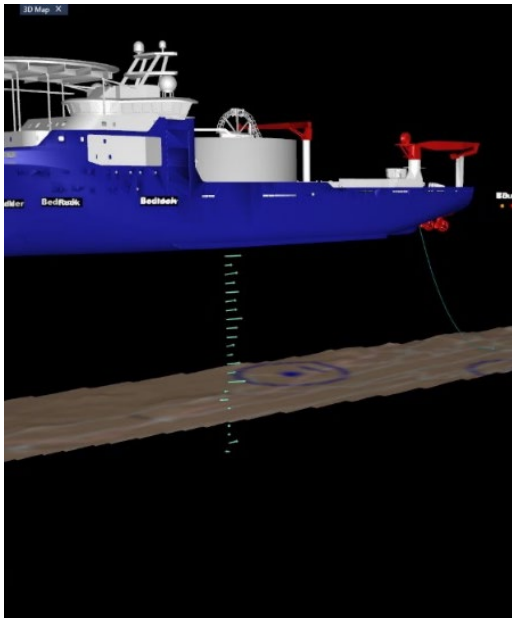

FIGURE 18-36 CURRENT PROFILE IN 3D MAP