

RELEASE NOTES

NAVISUITE KUDA CORE 4.6.2

Last update: 11/10/2022



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1 Release notes NaviSuite Kuda Core 4.6.2

The NaviSuite Kuda Core software version 4.6.2 is a minor release of the NaviSuite Kuda software which mainly consists of the acquisition part of EIVA's high-end solution for hydrographic survey acquisition and processing.

NaviSuite Kuda Core 4.6.2 includes some new features for utilising the **NaviSuite Kuda Autopilot** - this is highlighted in section 6

1.1 Formatting convention

Items formatted in bold are properties, buttons or other elements in the **NaviSuite Kuda Core** software.

2 Configuration

The setup of the instrumentation is done in the application named **NaviSuite Kuda Core Config**.

The setup is limited to a single object operation with all sensors mounted on a vessel where the position comes from the final positioning system, and there is no support for relative positioning systems. The setup is thus suited for single manned vessel and USV operations.

The setup is furthermore limited to navigational input and MBE/Laser data as well as control of standard autopilots.



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Figure 1 NaviSuite Kuda Core Config

The configuration program is based on the same framework as NaviPac 4 and consists of 5 views:

- The vehicle view
 Show the content (instrument listing) of the setup in a grouped map listing Use single click to select an item or right click to act on it
- The tree views Show the content (instrument listing) of the setup in a hierarchy tree listing – Use single click to select an item or right click to act on it
- The properties view Shows a series of parameters to define/edit for selected item
- The 3D visualization view
 Shows a 3D drawing of the vessel with markings for each instrument Drawings can be used via 3DS file format
- The operation control Start/stop survey operation



2.1 Instruments & drivers

To add new instrument to the listing please press the Plus button in the Vehicle view:

New Instrument	_		×
Name			
 SurfaceNavigation 		27 lt	tem(s)
🕑 Gyro		49 lt	tem(s)
 MotionSensor 		47 lt	tem(s)
 DopplerLog 		14 li	tem(s)
 DataOutput 		<mark>8 l</mark> t	tem(s)
Other		14 li	tem(s)
🕑 Bathy		56 lt	tem(s)
 Auxiliary 		<mark>9 l</mark> t	tem(s)
🕑 Rawdata		1 lt	tem(s)
 Echosounder 		72 lt	tem(s)
♥ Sidescan		58 lt	tem(s)
 Pipetracker 		<mark>8 I</mark> t	tem(s)
✓ LaserScanner		4 lt	tem(s)
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Figure 2 Add new instrument

Surface navigation

Base position of the vehicle by e.g., GNSS, GPS, SPRINT-NAV, Phins and similar solutions giving final position as XY or latitude/longitude

- Gyro & motion sensor Vehicle orientation and heave
 - Bathy Height of vehicle from e.g., GPS or similar
- Echosounder Multi-beam echosounder like Teledyne Reason, R2Sonic, Kongsberg, Norbit and many others
- Laser scanner
 Above water LiDAR from eg Velodyne, Ouster, Quanergy-M8 and Dynascan



- Sidescan
 MBE backscatter
- Data output
 Output to autopilot, IxBlue USV status, nadir depth information and similar

The other samples in above image are not supported in NaviSuite Kuda Core.

Details for the various instruments are defined in the properties window, where you among others define IO Settings, offsets, calibration and mounting information.

2.2 Geodesy

NaviSuite Kuda Core is working in grid coordinates (Easting/Northing), so it is important to define the geodesy and datum. This is done from the Tree view, where you can click the **Geodesy** globe icon and then edit settings in the property list:

	Properties		₹ ņ
	Geodesy		
	Ellipsoid	WGS 84	
	Projection	UTM zone 32N	
	Datum Shift	None	
▲ Project	ITRF	Disabled	
🔀 Geodesy	Height Reduction	None	

Figure 3 Geodetic settings

Projection and ellipsoid (the datum) can be defined either using EPSG look-up or entering definitions manually:



_							
F	Reference System Selector						×
	Ellipsoid and Projection						
	Reference System		Sear	rch			
	ID: 2009 Name: NAD27(CGO77) / SCoPO zo	ne 3	ID	Name	Datum		Ellip
	Area: Canada - Quebec - east of 60	°W	2000	0 Anguilla 1957 / British West Indies G	id Anguilla 1957		(701
	Ellipsoid		2001	1 Antigua 1943 / British West Indies Gr	id Antigua 1943		(701
	EPSG: 7008 (Clarke 1866)		2002	2 Dominica 1945 / British West Indies (Grid Dominica 1945		(701
	Semi Major Axis	6 378 206 40 m	2003	3 Grenada 1953 / British West Indies G	rid Grenada 1953		(701
	Inverse Flattening	204 078608214	2004	4 Montserrat 1958 / British West Indies	Grid Montserrat 1958		(701
	Semi Minor	6.356.583.80 m	2005	5 St. Kitts 1955 / British West Indies Gri	d St. Kitts 1955		(701
			2006	6 St. Lucia 1955 / British West Indies Gr	id St. Lucia 1955		(701
	Projection		2007	7 St. Vincent 45 / British West Indies Gr	id St. Vincent 1945		(701
	EPSG: 17703 (MTM zone 3)		2009	9 NAD27(CGQ77) / SCoPQ zone 3	North American Datum 1927 (CGQ77)		(700
	Scale factor at natural origin	0.9999	2010	0 NAD27(CGQ77) / SCoPQ zone 4	North American Datum 1927 (CGQ77)		(70(
	Longitude of natural origin	-58° 30' 00"	2011	1 NAD27(CGQ77) / SCoPQ zone 5	North American Datum 1927 (CGQ77)		(70(
	Latitude of natural origin	00° 00' 00"	2012	2 NAD27(CGQ77) / SCoPQ zone 6	North American Datum 1927 (CGQ77)		(700
	False easting	304 800.00 m	2013	3 NAD27(CGQ77) / SCoPQ zone 7	North American Datum 1927 (CGQ77)		(70(
	False northing	0.00 m	2014	4 NAD27(CGQ77) / SCoPQ zone 8	North American Datum 1927 (CGQ77)		(700
			2015	5 NAD27(CGQ77) / SCoPQ zone 9	North American Datum 1927 (CGQ77)		(70(
					• <u> </u>		×
		OK Cancel			Items:	3307	/ 3307

Figure 4 Geodesy setup using EPSG database

For further information please refer to the EIVA help page: <u>Geodesy : EIVA Support</u> (freshdesk.com)

2.3 Project settings

Besides the detailed instrument settings, there are some project related settings you need to address. This is done via the **Project Settings** item in the Tree view.

The **Project Settings** are grouped into some different tabs, please note especially the **Logging** part and the **System Parameters.**



Project Settings					×
Remote	Logging				
Instrument xtra	⊿ SBD				
Advanced	Logging directory	C:\DATA			
Logging	Append Julianday Fold				
System Parameters	Filename prefix	YYMMDDhhmmss			•
	User defined prefix				
	File shift method	Automatic on time length			•
	File length	30 minutes			
	File size				
	Filename prefix				
	Prefix filename with this				
			ОК	Cance	I

Figure 5 General project settings

2.4 Configuration file

The configuration is saved in a single file called <name>.NSP. The file is ASCII XML and you can save them wherever you want. A copy of an NSP will include the entire setup.

2.5 Starting the survey

You can start the survey operation either by using the **Start** button in the configuration program or by starting the Kuda Core application.





Figure 6 Starting/stopping a survey

3 The Kuda Core application

NaviSuite Kuda version 4.6 is built upon the same framework as NaviModel and NaviPac Helmsman's Display, so you will recognise the general behaviour from those modules.



Figure 7 Sample NaviSuite Kuda display

The NaviSuite Kuda application receives data from the interfacing and recording module (NaviScan service) and enables you to monitor data as well as controlling the data recording and some sonar settings.



3.1 Views & data

The NaviSuite Kuda application includes a series of data views. Some are opened by default when starting the program for the first time and others will need to be opened from the **View** menu.

Data will be received from the recording application as sensor data (position, gyro, roll, pitch, heave, height) and multi-beam data (XYZ data points and Laser XYZ data points).

Multi-beam data and laser data can be display as point cloud data (just showing the raw data points) and this can be shown on one or more map views. Point clouds are typically colour coded by depth information or data intensity (for laser only) and for practical usage only a few million points are shown live.

Data from multi-beam can furthermore be saved as a terrain model (DTM) as known from ie NaviModel. DTMs can be as big as you require, you simply specify cell size and what you want to include in the model (average depth, min/max, density, standard deviation etc); typically the most important quality indicators.



The primary data views for sonar and laser data are the map views.

You can use multiple maps as illustrated above where we have one showing point clouds and depth DTM (left), another one giving data density (upper right) and finally an overview with background information from Bing and a DTM together (lower right).

You can use a 2D or 3D drawing of your vehicle showing real scale information as you go. For example, 3DS, STEP, OBJ files can be used:

Figure 8 Map views





Figure 9 Map views - point cloud and DTM

The software also includes a profile view, where the most recent raw sonar/laser data scan will be shown, this is named NaviScan Profile. Aside from showing the raw scan it is also possible to display historical data from DTM in case you are passing over an already surveyed area. This provides a very good overview and quality control of your data. Enabling/disabling data in the view is done by right clicking your mouse.

Nav	viScan Profile					* -	1 ×
						SCALE 2021_1126_13050	1:1 4 <mark>-</mark>
			с	RP		CR Live_20211126-13053	₽ <mark>×</mark> 8 ■
0			-	× .			
		5.00 m					
5						* **	
	-30	-20	-10	0	10	20	30

Figure 10 NaviScan profile

The main purpose of the Kuda Core setup is to provide data recording. This can be done in two ways: either manually using the toolbar Start/Stop and file-change buttons:



Figure 11 Kuda logging control



... Or, it can be done using runlines and waypoints – see also <u>Runlines & waypoints</u>. For this use the main window is the Vehicle Control where you assign runlines or waypoints to the vehicle.

Vehicle C	ontrol					
	<u> </u>	= 🕂 🛏	= - -		7 🖷	
Name	Status	Mode	Select	Navigation Object	Auto. Start/Stop Surveying	٠
USV-12	-	Automatic		Runline 1		

Figure 12 Vehicle control

Another useful view is the alarm window – where system and sensor quality alarms and messages will be displayed.



Figure 13 Alarms and messages

Finally, there are two data views available – displaying incoming sensor and navigational data as ASCII values as well as data graphs.



Figure 14 ASCII data view





Figure 15 Graphical time series view

3.2 Real time data cleaning

Besides generation of a DTM based on the raw MBE data, it is also possible to perform real-time data cleaning using the EC-3D tool.

As in NaviModel, it is possible to define one or more cleaning sets from the EC-3D tool-box. In Kuda Core it acts as a sequential cleaning operation as illustrated in the below illustration, where three different tools are used in combination.



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opi Online DTM Filters: R2Sonic 2000 series					×	
ine Scan based filters						
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EC-3D filters						
Number of points in sphere	Move Up	Misc				
Distance to average value Distance to multiple points (median 2)		Max. distance Neighbours	0,08 m 5			
	Remove					
		Neighbours Specify the number of neighbour				
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Figure 16 Defining a set of EC-3D cleaning rules

The result will be saved in the terrain model shown on the Kuda Core map view. It is important to remember the flexibly in the EIVA DTM handling, as it allows you to see the DTM in different ways (colour modes). This means that you can see both cleaned and uncleaned surfaces simultaneously.



Figure 17 Cleaned (left) and raw (right) data view



Please note that the terrain model generated in NaviSuite Kuda can be directly used in NaviModel and the cleaning result can be re-used during processing in NaviEdit/NaviModel.

The data cleaning will also help improve the automatic runline planning (Coverage Assist) discussed in the next section.

3.3 Coverage Assist, runlines & waypoints

The first option to manage survey control is by using waypoints or runlines. They can either be imported from ASCII files or defined by using the **Create** toolbar:



Figure 18 Runline and waypoint creator

Waypoints are simply defined by clicking on the map where points need to be created – one by one. Runlines are defined by drawing lines and curves on the map. Input you can control by inputting an arc radius defined by how fast you expect the vessel to be able to turn.





You can also define cross lines, parallel lines etc. Please refer to software FAQ <u>Support :</u> <u>EIVA Support (freshdesk.com)</u> or <u>eLearning</u> for details.

Having created or loaded the line, next step is to use it. A line can be active in two levels:



Navigating

The runline is selected and NaviSuite Kuda calculates distance to the line (DCC) and can send the information across to an autopilot – but no data recording takes place

• Surveying The runline is now active and data will be recorded

To start navigating you select the line or waypoint in the **Vehicle control** either by using the small selector button (...) or by using the map view.

Canada Ditara						
search niter>						
Гуре	Name	File	Star	End		
No Runline/Waypoint						
NaviModel.Runline.NMRunline						
		Save as CSV.		ок	Cancel	
				OK	cuncer	

Figure 20 Runline selector list

The selector list can be rather big if you have several lines, cross and parallel variants, in which case it is preferable to use the map view where you can single click on the runline on the map. The name will now automatically be copied to the selector button in the Vehicle control. Then simply press the name.

The runline will now change status to navigating.

Next step is to start the survey. It can either be set up automatically when entering the line (vessel reaching start of line) or manually by simply using the **Start line** button:





Figure 21 Starting a line

Kuda Core also supports the use of high-level lawn mower pattern planning tools. To use this, create a survey boundary using digitized line or similar, right click on the line and choose **Lawn Mower**.



💽 Create Lawn Mower Pa	ttern in Area57	×					
Name	Lawn Mower Pattern						
Distance between lines	•	4 m					
Angle	•	0					
Tum radius	— •—	50 m					
Turn Inside Boundary							
Speed	1 m/s						
Output	Digitized Ru	nline					
Split							
✓ Runline							
Start KP	0 KP						
End KP	1.3 KP						
 Exclusion Zones 							
Offset for Exclusion Zones	•	0 m					
✓ Result	✓ Result						
Total Distance	1301.45301322095 m						
Total Straights	45						
Total Time	0:21:41.453						
OK Re	set Cancel						

Figure 22 Defining Lawn Mower pattern

For the pattern you must define line spacing, line direction and turn radius (how fast can the vessel turn) – and the result can be delivered as runline or a simple digitised line.

Lines can be defined using inner or outer turns and the result can be given as 1 continuous line or split into lines operated one by one.





Figure 23 Continuous line with inner and outer turns



Figure 24 Segmented line (split) with outer turns

You may also create exclusion zones in the lawn mower pattern by defining inner areas as exclusion zones (right click and define attributes).





Figure 25 Pattern with exclusion zone

This is the traditional survey by planning method, but we will in many cases recommend the use of the automatic route planning (Coverage Assist). With Coverage Assist, NaviSuite Kuda Core uses the collected data to automatically define the optimal next line as well as run-in routes.

This is all controlled via the Coverage Assist toolbar.



Figure 26 Coverage Assist toolbar

The Coverage Assist tool has a number of parameters to help generate runlines according to different situations.

The sampling detail describes how closely related to the DTM edge it must be, low detail means it is much smoother than the actual edge, and high is very closely related.

The edge can then be smoothed further by smoothing the line. The number defined in the **Smooth line** category is the number of times the line is smoothed.

The suggested line, shown as a green line, is where Coverage Assist is preparing to place the new runline, and it is determined by the opening angle of the sonar, the overlap wanted, and how many times the line should be smoothed.



Coverage Assist can avoid exclusion zones, but to not cut corners, it is wise to give the coverage assist an offset from the exclusion zone.

The **Creating runline** section gives Coverage Assist some details on how to create the lines, using the **Vessel turn radius** and how much the new lines should **Extend runline outside boundary**. By extending, you give Coverage Assist some time to create the new runlines and it is recommended to improve the results.

Properties	
∃ General	
Visible	✓ True
Name	CoverageAssist
∃ Information	-
GUID	1b845256-9efe-4cec-84c3-019de29f64bf
☐ Coverage Assist	
Vessel	simualtedNaviScan Vessel
Boundary	Line 1
End Point	<none></none>
Update interval	20 sec
Creating runline	
Connect Runlines with Arcs	✓ True
Extend runline outside boundary	0.00 m
Vessel turn radius	10.00 m
∃ Edgeline	
Sampling detail	Low
Smooth line	
Smooth	20
Suggested line	
Sonar Z offset	0.00 m
Opening angle	90 deg
Overlap	0.00 m
Smooth	10
Exclusion Zone Strategy	Edges
Offset From Exclusion Zones	10.00 m

Figure 27 Defining Coverage Assist

NaviSuite Kuda will then use the MBE data (DTM) to calculate a smooth boundary of the current survey (yellow line below) and based on overlap requirements, it will generate the next line (green line). This will give the optimal survey pattern and decrease risk of not achieving the desired coverage..





Figure 28 NaviSuite Kuda Core Coverage Assist

When using lines and waypoints actively (manually or automatically with Coverage Assist), the operator may use two new windows, a left/right indicator giving a graphical view on how to steer the vehicle (showing same information as we send to the autopilot) and some status information on the line being tracked (time to end of line, distance to end etc).





Figure 29 Map view with topped left/right indicator

💽 Runline: USV-12 → RF		□ ×
Header		USV-12
KP		KP 0.15
DOL		-9.59 m
DEOS		36.04 m
ETA EOS	30/11/2021	15:43:26
DEOL		36.04 m
ETT EOL		00:09:11

Figure 30 Runline follow status information

The left/right information (DCC or DOL) is the same information which will be sent to the autopilot.

3.4 Sensor, display and logging control

Beside the toolbar logging control buttons, NaviSuite Kuda Core includes a dedicated survey control panel. This is enabled via the NaviScan toolbar component:



A special control dialogue is now opened. You may open and close or leave open, whatever suites you the best. <u>Please note that the content of the dialogue depends on the sensor</u> <u>spread in use.</u>



	NaviScan_OKR-XPS15			×
1	 Logging 			
	Log sbd file	\bullet		
	Shift s	bd file		
	File	Not logging		
	Logging directory	c:\eiva\naviscan	\\data	
	Append Julianday Folder	\bullet		
	Prefix filename	Julian day		•
	Shift method	Manual		•
	 Alarm Limits Sonar Select Sonar Reduce System Params 			

Figure 31 NaviScan control panel

The first part of the panel defines the data recording part, as it enables the operator to control file naming, location and file switching.

3.4.1 Alarm limits

The second part of the control panel allows the operator to define time-out alarm level for critical sensors such as MBE, laser, position etc.



NaviScan_OKR-XPS15 🗖 🗙		
 Logging 		
Log sbd file		
Shift s	bd file	
File	Not logging	
Logging directory	c:\eiva\naviscan\data	
Append Julianday Folder		
Prefix filename	Julian day 🛛 👻	
Shift method	Manual 👻	
✓ Alarm Limits		
Alarm interval	3 000 ms	
Waiting alarm limit	2 000 ms	
Latency alarm limit	2 000 ms	
Gyr1 ApxPosmvGyro	0.1 Hz	
Rph1 ApxPosmvRPH	0.1 Hz	
Bat1 NaviPacHeaveCor	0.1 Hz	
Nav1 ApxPosmvPos	0.1 Hz	
Mbe1 Norbit RawRange	0.1 Hz	
 > Sonar Select > Sonar Reduce > System Params 		

Figure 32 Sensor and system time-out alarm

3.4.2 Data down sampling

When using a remote NaviSuite Kuda Core display on low bandwidth connection it can be a challenge to send all data across to get a decent data display. To improve this, NaviSuite Kuda Core offers two different down sampling tools

 Along Simple down sampling by skipping scans, eg just sending one out of 10



Across

Sending fewer points across a scan, either by simply using every n'th point or intelligent by looking at significant points



Figure 33 Display all data



💽 NaviScan_OKR-XPS15 🛛 🗖			×
 Logging 			
Log sbd file	\bullet		
Shift s	bd file		
File	Not logging		
Logging directory	c:\eiva\naviscan	\data	
Append Julianday Folder	\bullet		
Prefix filename	Julian day		•
Shift method	Manual		•
 Alarm Limits Sonar Select 			
Mbe1 Norbit RawRange			
 Sonar Reduce 			
mbe reduce method	along+acros	s2	•
mbe along downsample	5		
mbe across downsample	12		
> System Params			

Figure 34 Along and across down sampling

Please note that to ensure the best data coverage, down sampling only affects data display and not recording.





Figure 35 Full data coverage





Figure 36 Across down sampling

3.4.3 Sonar and filtering control

Depending on the sonar system you can furthermore perform various sonar control settings like power, gain, range etc.

This is handled together with various data windows settings.



NaviScan_OKR-XPS15 🗖 🗙		
 Logging 		
Log sbd file		
Shift s	bd file	
File	Not logging	
Logging directory	c:\eiva\naviscan\data	
Append Julianday Folder		
Prefix filename	Julian day 🛛 👻	
Shift method	Manual 👻	
 > Alarm Limits > Sonar Select > Sonar Reduce > System Params 		
SV Profile	Not used	
CTD Profile	Not used	
Tide Table	Not used	
Waterline height offset	0 m	
Use Bathy		
Use Heave		
Window depth upper	-20000 m	
Window depth lower	20000 m	
Window side port	-20000 m	
Window side stbd	20000 m	

Figure 37 Sonar and system control parameters

3.5 MBE/Laser patch test

NaviSuite Kuda Core includes the patch test module. It is activated from the Tools menu. Please refer to patch test guides for NaviModel <u>Patch Test Calibration with NaviModel :</u> <u>EIVA Support (freshdesk.com)</u>



A sample of laser patch test can be found here: <u>Laser Scanner Patch Test Calibration with</u> Carlson Merlin LiDAR : EIVA Support (freshdesk.com)

4 Data recording

NaviSuite Kuda Core uses same logging format as in NaviScan, that is all data is recorded in EIVA SBD format, which then can be loaded into NaviEdit/NaviModel. The SBD format is compatible with NaviScan version 9.

5 Remote operations

NaviSuite Kuda Core is especially made to support both manned and unmanned operations, and in both cases it allows the operator to have a single remote workstation that controls both the planning/configuration part as well as the real-time survey and line planning operations.

This is done by having the entire NaviSuite Kuda Core software installed on the remote computer and ensuring a (fairly) stable IP connection between the vessel and the remote workstation. From this remote workstation you can both supervise and execute the operations.

The remote operations monitoring, supervision and control uses the same features as known from NaviPac 4.

5.1 Remote NaviSuite Kuda

Remote supervision will allow the operator to:

- Start/stop recording
- Initiate and control Coverage Assist
- Define and upload runlines and waypoints
- Sonar and software control via sonar control panel
- Update background information like display lines, CAD drawings etc not relevant for USV operations

When starting the NaviSuite Kuda Core on a remote computer, it will start up in the status **Remote**:





Figure 38 Remote Kuda display

This is seen in the status icon next to the connection, where M is for **Master** on the main computer and R is for **Remote** on any connected computer,



In this initial **Remote** mode, the remote computer is purely for monitoring the operation – for example as a second display on a manned vessel. However, in **Supervisor** mode, it can be used to let the operator take control of the survey.

Changing the mode is done in the same toolbar as above. Click on the R symbol and choose **Supervisor** mode. The program will then take control of the survey and at the same time send a message to the master which will be 'downgraded' to **Supervised** mode.





Figure 39 Becoming Supervisor

The operator can now control the recording, generate runlines, waypoints and perform **Coverage Assist** operations.

Waypoints and runlines will initially be generated locally on the remote client. To bring them into use, you must first upload them to the vessel.

All operations are performed via the cloud icon in the toolbar:



Figure 40 Supervisor command tool



Select Items to Upload To M	laster				×
L				6/6	6
Name					
 Digitized Lines Maps Runlines Runlines / LineA.rlxp Waypoints Waypoints / Waypoints 1 					
Select all Select none		Save as CSV	ОК	Cano	el

Figure 41 Uploading files

When in **Supervisor** mode, besides this upload process, all other tools act as they do normally.

Please note that the autopilot handling is performed by the onboard NaviSuite Kuda application, so it must be kept running during the entire operation.

5.2 Remote NaviSuite Kuda Config

Remote configuration allows you for example to:

- Download configuration file
- Change sensor and sonar settings
- Change geodesy
- Run local test
- Upload configuration file
- Restart onboard operation

To be able to make a remote configuration, you must first enable remote control from the master system (onboard NaviSuite Kuda Core Config). This is done by going to the menu and clicking **Options** then **Remoting**:



Remote Settings				×
Remoting				
Master IP	tcp://127.0.0.1:6547			
Mode	Master			•
Remoting Port	6547			
Stand-Alone (default): On shi	o, only user. Cannot be supervised.			
Master: On ship, can be super Supervisor: Control another ir	vised by another remote instance. Istance.			
		ОК	Cance	4

Figure 42 Remote NaviSuite Kuda Core Config

The default is **Stand-Alone** which means that the system is blocked from outside control. Change settings to **Master** and accept.

For the supervisor application do the same but select the mode **Supervisor** and enter the IP address of the onboard computer.

The NaviSuite Kuda Core Config will now download the configuration from the main system and load it for editing like a standard setup except that the controls are defined as remote operations.



Kuda Core Config (Conn	artad to: tcp://10.200.11.4:65477 - TESTNILIC) - EIVA-USV		
File Options Help	0		
Controls	▼ Vehicles	Properties	
	A	Instrument	
(') (Main Vessel		
	SurfaceNavigation 🖌 Gvro 💋	Name	NMEA GGA-GLL
Simulate Start		System Name	
Tree	▼ ¹	Instrument ID	
▲ Project		I/O Mode	ON
Geodesy		Info	
🛱 Project Settings	•	Setup Id	
▲ Vehicles		Port setup	
🖌 🛥 Main Vessel		Latency	0 ms
▲ SurfaceNavigation		Mount offset	0;0;0
NMEA GGA-GLL		Use time in packet	
👂 🛿 Gyro		GPS green status	No alarms 🗸 👻
	3D Visualisation 👻 🖡		
	5.2		
	x- X- S.		
U U U			

Figure 43 Remote configuration

At the same time, the local configuration changes title so it's clear that it is under supervision:

Kuda Core Config (Remote control enabled)(Controlled by: 10.200.11.5) - EIVA-USV					
File Options Help					
1 🖆 📋 👌 <u>-</u>					
Controls -	Vehicles				
Ce Co Restart Start	SurfaceNavigation	8 ()			
Tree 🝷 🏹	NMEA GGA-GLL ENaVUIC Gyro				
✓ Project					
Geodesy Geodesy					
🛱 Project Settings	♥	(+)			
▲ Vehicles					
🖌 🛶 Main Vessel					

Figure 44 Supervised config

The control part of the will now enable you to edit the setup, test it locally and upload to the master computer including start/stopping onboard system.





Figure 45 Kuda Core Config control

6 NaviSuite Kuda Autopilot

Autopilot Control now has a NaviSuite Kuda Autopilot.



Figure 46 Autopilot Control with NaviSuite Kuda Autopilot option

With new buttons in the Vehicle control to control the Autopilot



Vehicle Control				
<u> </u>	: ि 🔳 🛲 🍸	? 🖷 🕐 🐓	• 🕸 👼	
Name	Auto. Start/Stop Surveying	Select Mode	Status Navigation Object DCC True	Heading KP SMG
Main Vessel With very Long name		Sequential		

Figure 47 Vehicle Control with new NaviSuite Kuda Autopilot controls



Figure 48 NaviSuite Kuda Autopilot controls

From Left to Right, there is Set Speed, Start thrusters, Emergency stop, Settings to edit Auto Emergency Stop which stops a vehicle in no remotes have been seen after a specific amount of time, and lastly manual control

Manual Control docks in the vehicle control, and changes the Autopilot mode to manual with a set heading. On closing the Manual Control view, the mode is set back to auto, and the thrusters are disabled.

Vehicle Cor	trol		
≣ -	= ∔ ☴ 눈 ∎ == ╤ ▦ ?? \$	• 🕕 🌣 💑	
Name	Auto. Start/Stop Surveying Select Mode	Status Navigation Object DCC True Heading KP SMG	
Main Vesse	With very Long name Sequentia	- Manual Control	
Manual US	/ Control		▲ ἀ ×
Speed			10 %
Handing			77.2*
riedung			

Figure 49 Manual Control docked inside vehicle control, with speed and heading control

7 Backwards compatibility

The data recorded in **NaviSuite Kuda Core** is fully backwards compatible, and can be used in NaviEdit 8.6/NaviModel 4.5 for processing

Runlines, waypoints and DTMs created in NaviPac and NaviModel version 4.5 can be used directly in NaviSuite Kuda Core 4.6