



# XOCEAN

Ocean data, **delivered.**

## **Automating Hydrographic Data Collection while still maintaining regulatory compliance using Uncrewed Surface Vessels**

*Duncan Mallace/Benoît Poyelle – XOCEAN - Hydro 2022*







# INTRODUCTION



# Data as a Service

Using Uncrewed Surface Vessels (USVs), XOCEAN offers data collection services to Surveyors, Companies and Agencies.

- Fixed Price, Turnkey Service
- Data Delivery & Quality Guarantees

## SAFETY



No Offshore Personnel

## ENVIRONMENT



Carbon Neutral Data

## ECONOMIC



Significant Savings



# Highly differentiated value proposition

## Traditional Method

- **Safety:** Large crew offshore
- **Emissions:** Significant emissions
- **Business Model:** High day rates

## Hornsea:

World's largest offshore wind farm supplying 2.5M homes



## XOCEAN Solution: USV

- **Safety:** No personnel offshore
- **Emissions:** 1,000x lower
- **Business Model:** Data as a Service







# World class customers, with offices and deployments across 18 markets

XOCEAN

Over **150 projects** across **18 jurisdictions** internationally.

International offices in Ireland, US, Canada, UK, Norway and Australia.



INTRODUCTION

PROPRIETARY & CONFIDENTIAL



# The environment and sustainability at our core

**ENVIRONMENT:** Over the next 5 years, we will displace the emission of one million tons of carbon

**ENVIRONMENT:** Over the next decade, we will support the development of over 100 gigawatts of offshore wind.

**SAFETY:** In the next 5 years, we will avoid over 5 million seafarer exposure hours

**GENDER BALANCE:** Over the next decade we will operate at more than triple the IMO average for seafarers





# Leading an employment revolution XOCEAN in the maritime industry

## ALTERNATE CAREER PATHS:

Route for offshore operatives to come ashore.

## REMOTE FIRST:

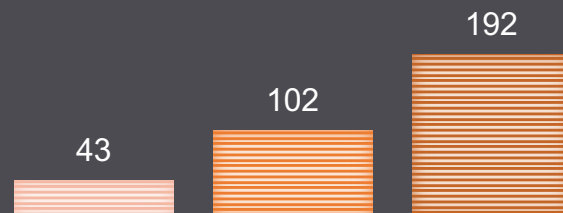
Access to the best talent globally through remote operations.

## GENDER:

Unlocking talent through operating at 31x the industry average.

### HEADCOUNT

■ 2020 ■ 2021 ■ 2022





# We operate the largest fleet of survey class USVs

## World largest fleet of uncrewed survey vessels

- X-25 in production, new build every 4 weeks.
- Over 70,000 hours of system operation. 1.4PB of data collected.



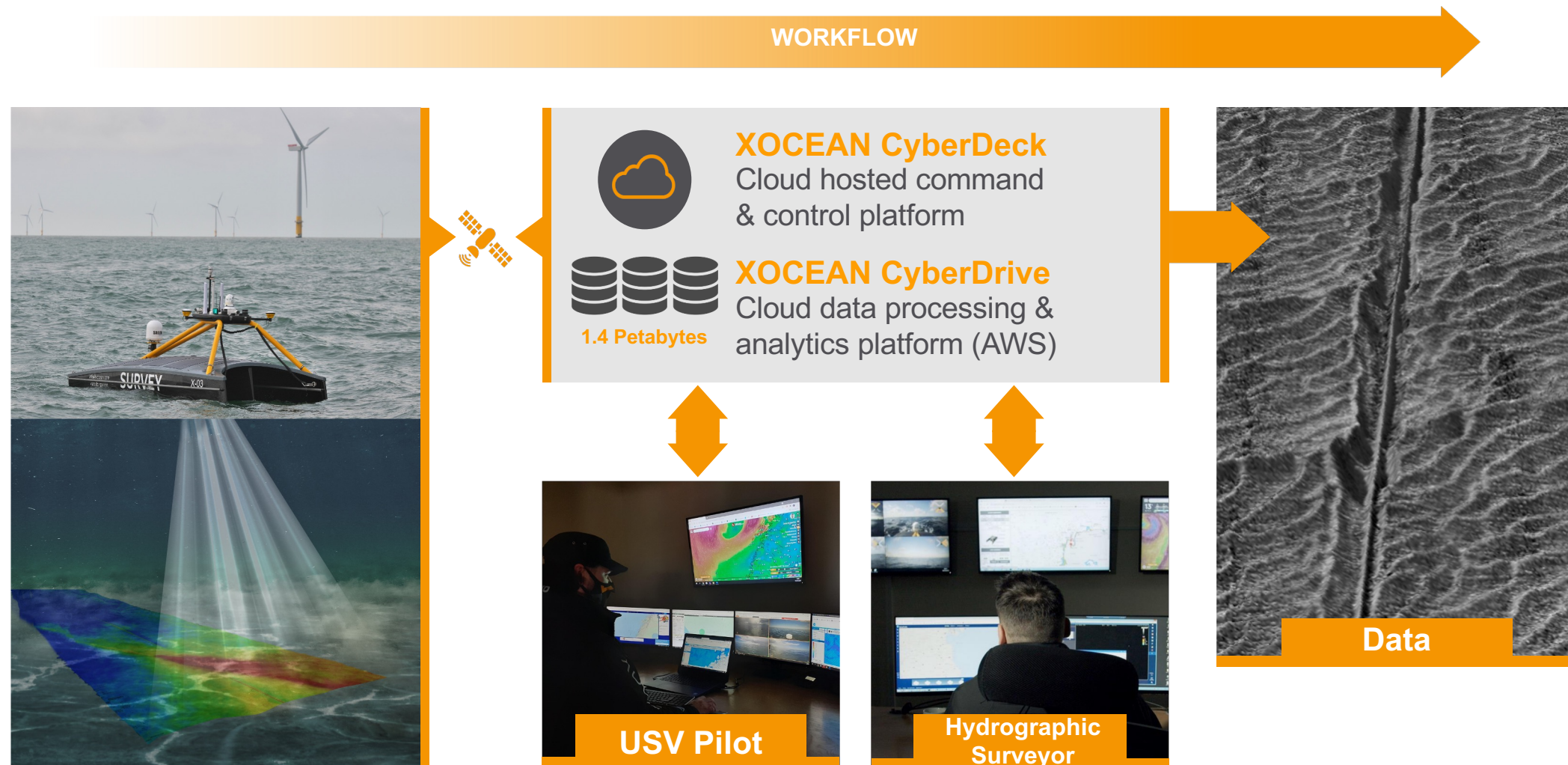




# SURVEY AUTOMATION



# Vertically integrated acquisition and data analytics platform





# Dynamically working to the seabed

## AUTOMATICALLY GENERATED SURVEY LINES:

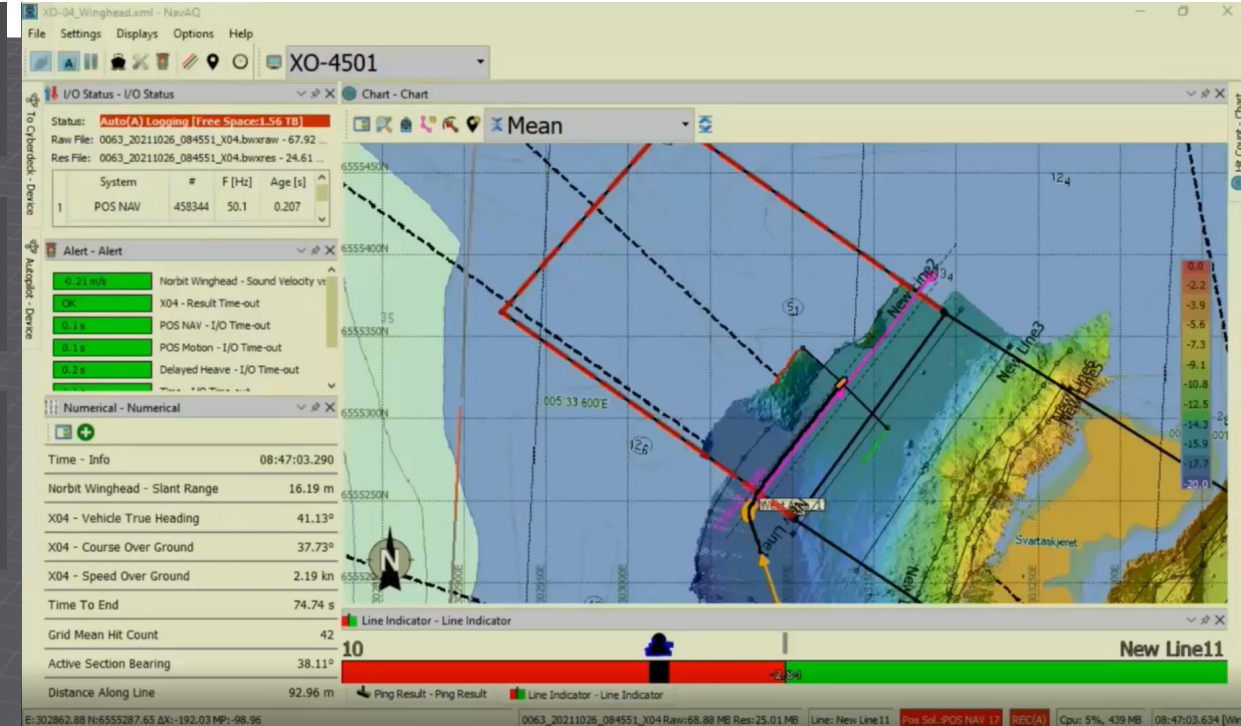
Line generated by monitoring swath width and feeding it to the autopilot.

## AUTOMATIC NEXT LINE & START/STOP LOGGING:

A series of pre-defined lines can be run.

## DEPTH & PROXIMITY ALARMS & ACTIONS:

USV automatically stops when it gets to a certain depth or distance from seabed or feature.





# Adjusting to the data

## SURVEY SPECIFICATION DEFINED:

Every survey has a sounding density & overlap requirement.

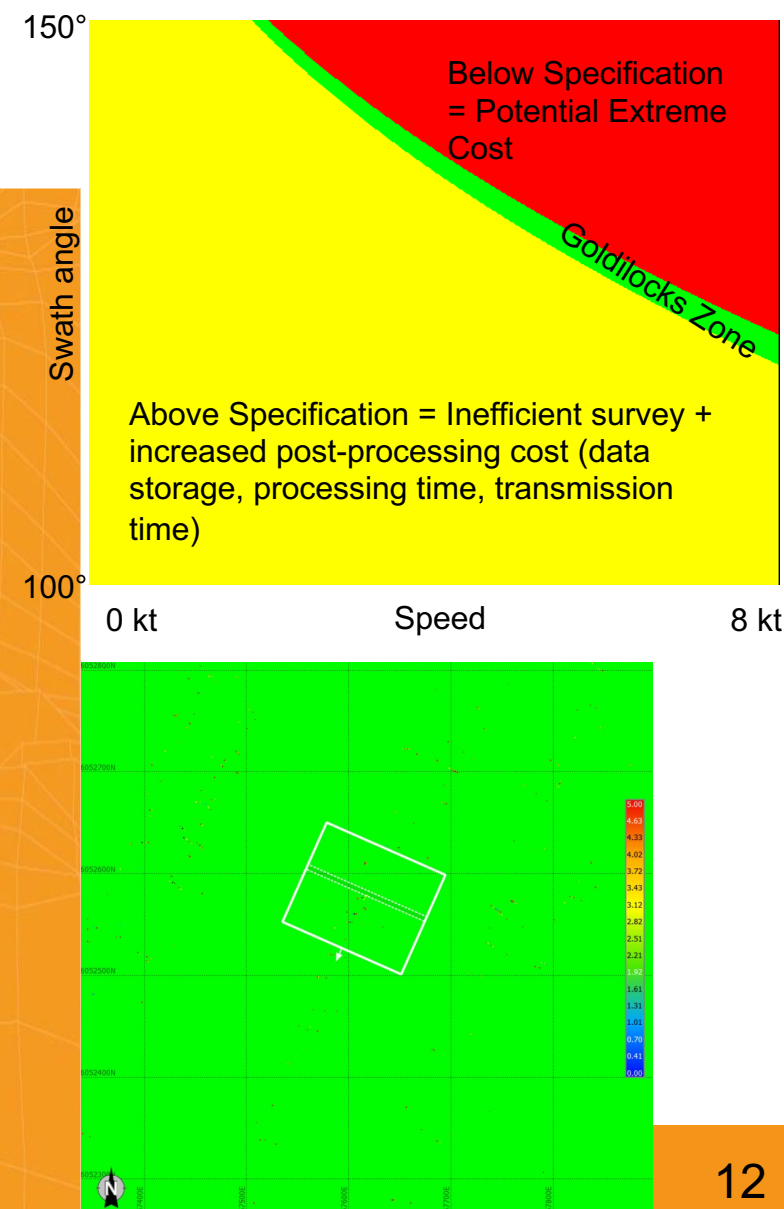
## CONTINUOUSLY MONITOR DATA WITHIN CELLS:

Data being fed from the acquisition software to app which monitors soundings in cells and outputs metrics.

## ADJUST EITHER SONAR OR USV:

Swath or vessel speed can be automatically adjusted to ensure specification is matched at all times. Critical to link with USV Command & Control.

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# Automating the progress

## EACH SURVEY HAS A BUDGET:

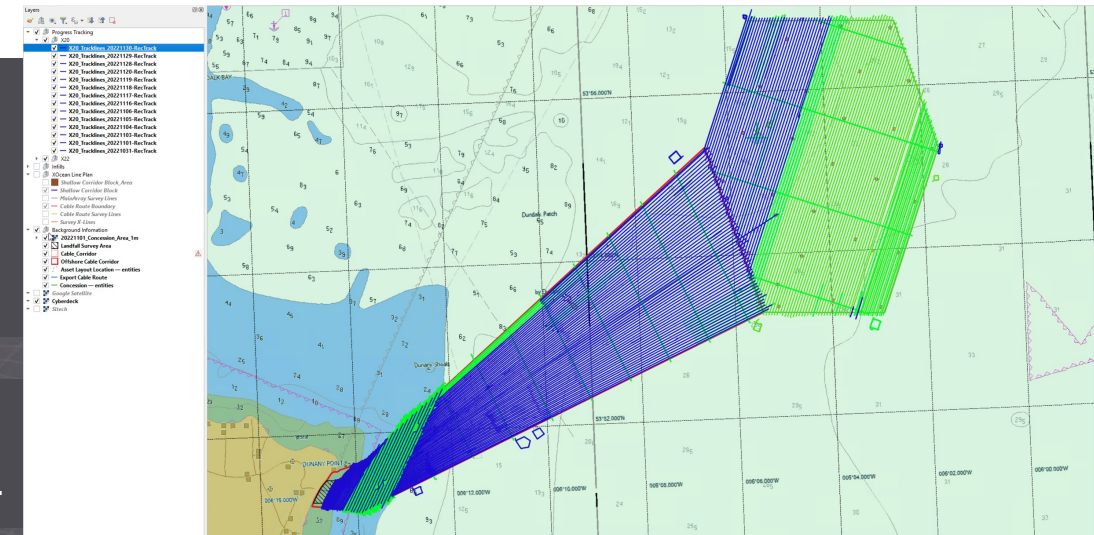
Accurate progress reporting is required for sound business practice. When operating multiple USVs on a single project it is vitally important to know the project progress accurately.

## SURVEY INFORMATION AUTOMATICALLY UPLOADED TO AZURE:

Traditional survey log information such as start/stop logging, USV speed..

## SURVEY METRICS AVAILABLE TO EVERYONE IMMEDIATELY:

Survey data in company wide QGIS projects & on CyberDeck.



Profiles	Task	Export / Import	View	Help	Support	Serial Number	SyncBackPro V10	Help
Profile	Type	Last Run	Result	Left / Source	Right / Destination			
USV	Group	30/11/2022 12:24:08		(none)	(none)			
POSMV USB move to C	Custom	30/11/2022 12:24:08	Success	C:\PROJECT%02_POSMV_USB\	E:\...01_Raw\02_POSMV_USB\			
POSMV USB copy to E	Backup	30/11/2022 12:24:08	Success	C:\PROJECT%02_POSMV_USB\	E:\...01_Raw\02_POSMV_USB\			
POSMV ETH move to E	Custom	30/11/2022 12:24:08	Success	C:\Users\admin\Norbit\WBMS\Applanix Logs\	E:\...01_Raw\02_POSMV_ETH\			
NAVAQ_Storage copy to E	Backup	30/11/2022 12:24:08	Success	C:\PROJECT%01_NAVAQ\StorageFolder\	E:\...MISSION%\PROJECT%01_Raw\01_NAV			
NAVAQ_Project copy to E	Backup	30/11/2022 12:24:08	Success	C:\PROJECT%01_NAVAQ\	E:\...MISSION%\PROJECT%01_Raw\01_NAV			
NAVAQ_xml copy to E	Backup	30/11/2022 12:24:09	Success	C:\PROJECT%03_SVP\	E:\...01_Navaq\YEAR%MONTH%DAY%\			
SVP copy to E	Backup	30/11/2022 12:24:09	Success	C:\PROJECT%03_SVP\	E:\...MISSION%\PROJECT%01_Raw\03_SVP\			
Datadrop copy to D	The profile ...	30/11/2022 12:24:09	Disabled	E:\01_Datadrop\MISSION%	D:\MISSION%			
Norbit GUI Config copy to E	Backup	30/11/2022 12:24:09	Success	C:\...Roaming\Norbit\PredefinedSonaSettings\Bathy\	E:\...PROJECT%03_Settings\04_Norbit\01_Bat			
Norbit GUI Logs move to E	Custom	30/11/2022 12:24:09	Success	C:\Users\admin\AppData\Roaming\Norbit\Logs\	E:\...PROJECT%03_Settings\04_Norbit\02_Log			





# Automating the progress

Activity	Survey Boat	Line Name	File Name	Start of U	End of U	DB File	Calculated	Depth	Water	MBE	SVS	QC Status	Acquisition Comments
38	Survey	P18	P18_039	0020_211_2022010_214438	10/09/2022	2144	0020	2130	20	0.0000	0.002	3.2	0.41 AS
39	Survey	P18	P18_031	0021_211_2022010_215521	10/09/2022	2155	0021	2156	21	0.0000	0.000	2.1	0.79 AS
40	Survey	P18	P18_027	0022_211_2022010_220223	10/09/2022	2202	0022	2204	22	0.0020	0.004	3.1	0.61 AS
41	Survey	P18	P18_013	0023_211_2022010_220923	10/09/2022	2209	0023	2211	23	0.0200	0.002	3.3	0.61 AS
42	Survey	P18	P18_022	0024_211_2022010_221456	10/09/2022	2214	0024	2222	24	0.0000	0.000	3.2	0.31 AS
43	Survey	P18	P18_017	0025_211_2022010_222758	10/09/2022	2227	0025	2231	25	0.0400	0.002	3.1	0.61 AS
44	Survey	P18	P18_020	0026_211_2022010_224121	10/09/2022	2241	0026	2242	26	0.0000	0.000	2.5	0.18 AS
45	Survey	P18	P18_025	0027_211_2022010_224408	10/09/2022	2249	0027	2253	27	0.0600	0.002	2.8	0.1 AS
46	Survey	P18	P18_008	0028_211_2022010_230221	10/09/2022	2300	0028	2310	28	0.1000	0.002	4	-0.27 MS
47	Survey	P18	P18_022	0029_211_2022010_231141	10/09/2022	2311	0029	2333	29	0.1000	0.000	2.8	-0.31 MS
48	Survey	P18	P18_006	0030_211_2022010_231413	10/09/2022	2324	0030	2335	30	0.1100	0.000	2.6	-0.38 MS
49	Survey	P18	P18_023	0031_211_2022010_231913	10/09/2022	2319	0031	2348	31	0.0000	0.000	2.8	-0.34 MS
50	Transit with in Survey area			Transit to Survey line	10/09/2022	2348		2358		0.1000	0.000		Moving close d/h high current.
51	Survey	P18	P18_019	0032_211_2022010_231942	10/09/2022	2338	0032	0300	32	0.0200	0.000	2.7	0.35 MS
52	NEW DAY (14/09/2022)												
53	Survey	P18	P18_029	0032_211_2022010_232825	11/09/2022	0000	0032	0008	32	0.0800	0.000	2.7	0.35 MS
54	Survey	P18	P18_030	0033_211_2022010_233239	11/09/2022	0012	0033	0208	33	0.0000	0.000	2.5	-0.27 MS
55	Marine Traffic Stand by	P18		Marine Traffic: Restart POSMV USB data log	11/09/2022	0030		0039					MS
56	Survey	P18	P18_005	0034_211_2022010_000930	11/09/2022	0039	0034	1304	34	0.0500	0.000	2.5	0.29 MS
57	Transit with in Survey area			Transit to Survey line	11/09/2022	0104		0135		0.1100	0.000		Moving close d/h high current.
58	Survey	P18	P18_005	0035_211_2022010_010135	11/09/2022	0135	0035	1321	35	0.0800	0.000	2.5	0.49 MS
59	Transit with in Survey area			Transit to Survey line	11/09/2022	0135		0136		0.0000	0.000		Moving close d/h high current.
60	Survey	P18	P18_001	0036_211_2022010_010108	11/09/2022	0130	0036	134	36	0.0400	0.000	3	0.1 MS
61	Survey	P18	P18_004	0037_211_2022010_010121	11/09/2022	0139	0037	140	37	0.0100	0.000	3	0.11 MS
62	Survey	P18	P18_004	0038_211_2022010_010134	11/09/2022	0151	0038	151	38	0.0000	0.000	3	0.11 MS
63	Survey	P18	P18_004	0039_211_2022010_010135	11/09/2022	0152	0039	152	39	0.0000	0.000	3	0.11 MS
64	Survey	P18	P18_004	0040_211_2022010_010153	11/09/2022	0203	0040	200	40	0.0700	0.013	3.3	0.4 MS
65	Transit with in Survey area			Transit to Survey line	11/09/2022	0203		0225		0.1000	0.000		Moving close d/h high current.
66	Survey	P18	P18_004	0041_211_2022010_020539	11/09/2022	0225	0041	239	41	0.1400	0.000	3	0.47 MS
67	Survey	P18	P18_028	0042_211_2022010_020615	11/09/2022	0246	0042	249	42	0.0500	0.002	3	0.1 MS
68	Survey	P18	P18_028	0043_211_2022010_020555	11/09/2022	0255	0043	309	43	0.0500	0.000	3	0.1 MS
69	Transit with in Survey area			Transit to Survey line	11/09/2022	0300		0308		0.0000	0.000		Moving close d/h high current.
70	Survey	P18	P18_001	0044_211_2022010_030802	11/09/2022	0308	0044	310	44	0.0200	0.000	3	0.27 MS
71	Transit with in Survey area			Transit to Survey line	11/09/2022	0310		0324		0.1400	0.000		Moving close d/h high current.
72	Survey	P18	P18_020	0045_211_2022010_031022	11/09/2022	0314	0045	339	45	0.0100	0.000	3	0.75 MS
73	Survey	P18	P18_002	0046_211_2022010_031043	11/09/2022	0314	0046	349	46	0.0300	0.002	3	0.85 MS
74	Survey	P18	P18_021	0047_211_2022010_031053	11/09/2022	0315	0047	401	47	0.0600	0.000	3	0.7 MS
75	Survey	P18	P18_021	0048_211_2022010_040139	11/09/2022	0405	0048	412	48	0.0700	0.004	2	0.85 MS



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73	Survey	P18	P18_002	0046_211_2022010_031043	11/09/2022	0314	0046	349	46	0.0300	0.002	3	0.85 MS
74	Survey	P18	P18_021	0047_211_2022010_031053	11/09/2022	0315	0047	401	47	0.0600	0.000	3	0.7 MS
75	Survey	P18	P18_021	0048_211_2022010_040139	11/09/2022	0405	0048	412	48	0.0700	0.004	2	0.85 MS

Soon:  
Web based survey log -> POSTSQL DB  
Data fusion with GIS data

File Home Insert Page Layout Formulas Data Review View Help Antidote Print PDF										0001-BPI-ENG-WIND-PROGRESS TRACKING_V01a_01 - Last Modified: Yesterday at 17:42 - Search [Alt+F2]										Benoit Puyotte										Comments										Share									
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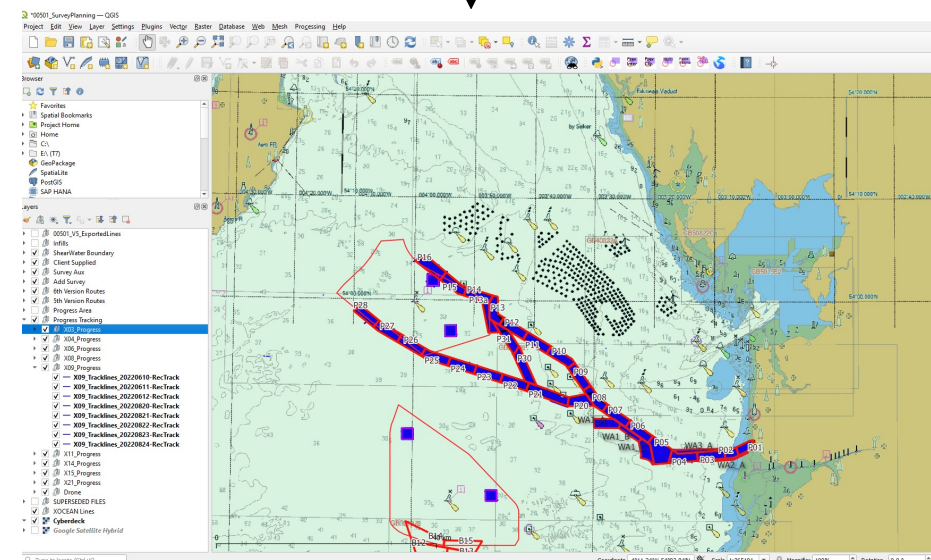
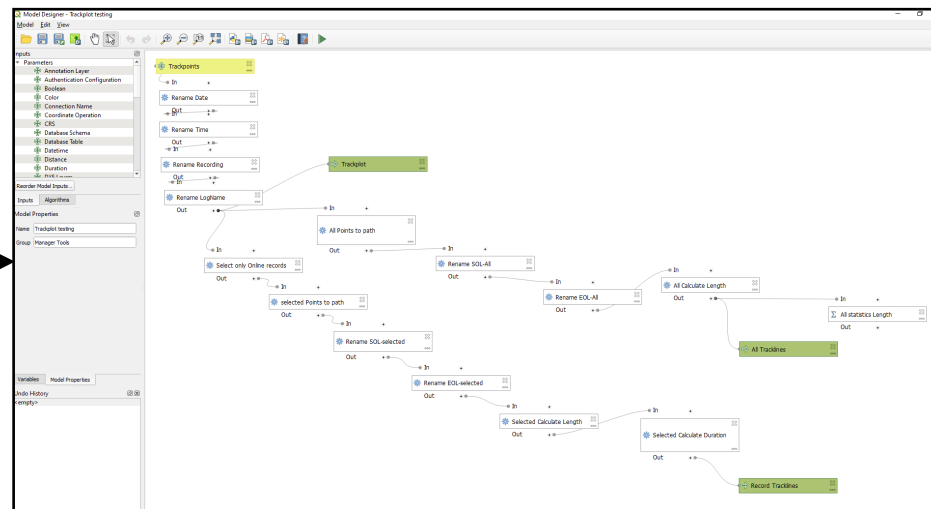
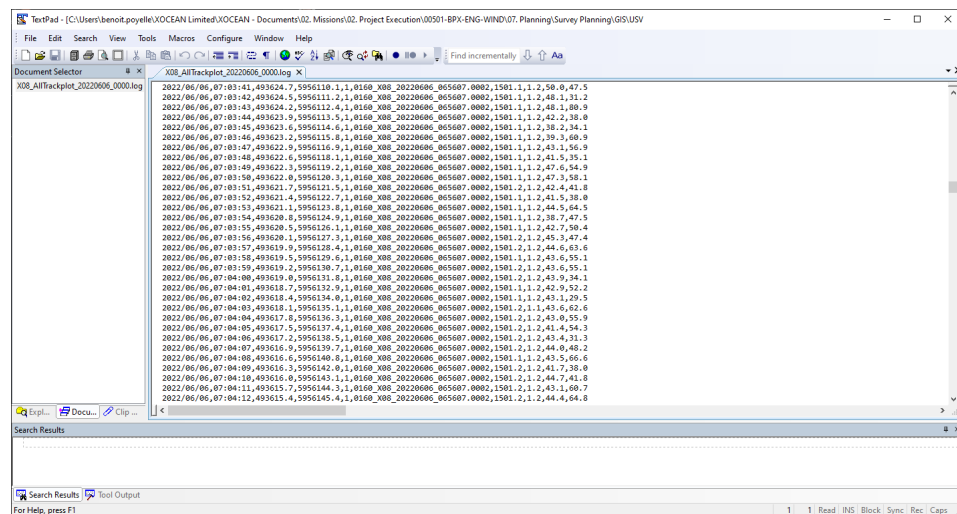


# Automating the progress

# SURVEY AUTOMATION

Soon:  
Ascii Log -> PostGIS DB -> Geoserver -> real  
time tracking/display available to all with  
WMS/WFS

- QGIS
- Cyberdeck
- BeamworX suite
- Global mapper





# Processing the data on the USV

## REALTIME XYZ COMPUTED FOR EACH BEAM:

Using accurate GNSS & refraction corrections.

## FILES AUTOMATICALLY IMPORTED:

When a file is closed, it automatically gets imported to AutoClean.

## DTM UPDATED & METRICS UPDATED:

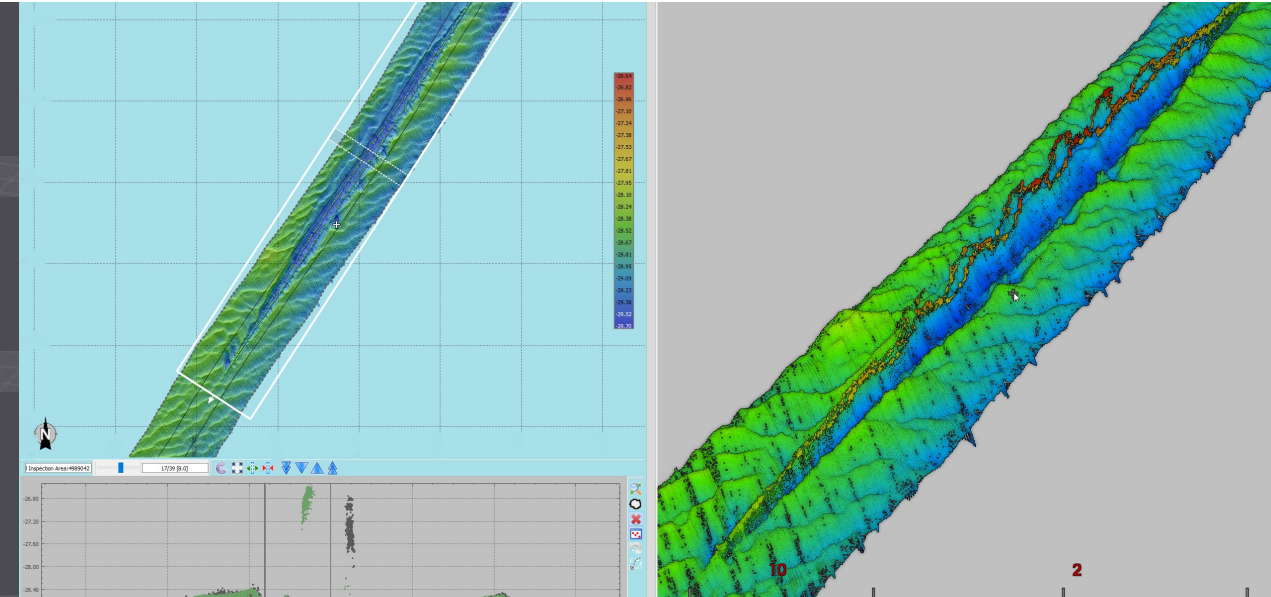
DTM is automatically updated and sounding density/standard deviation computed for each new or updated cell.

## INITIAL FILTERING:

The bathymetric data can be filtered once imported to remove most major outliers.

## BACKSCATTER PROCESSING:

Initial backscatter processing performed on import. Full processing can be achieved at certain intervals manually.





# XOCEAN

Ocean data, delivered.

