Crowdsourced bathymetry on the Great Barrier Reef

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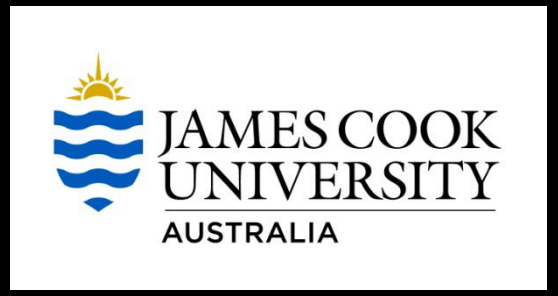


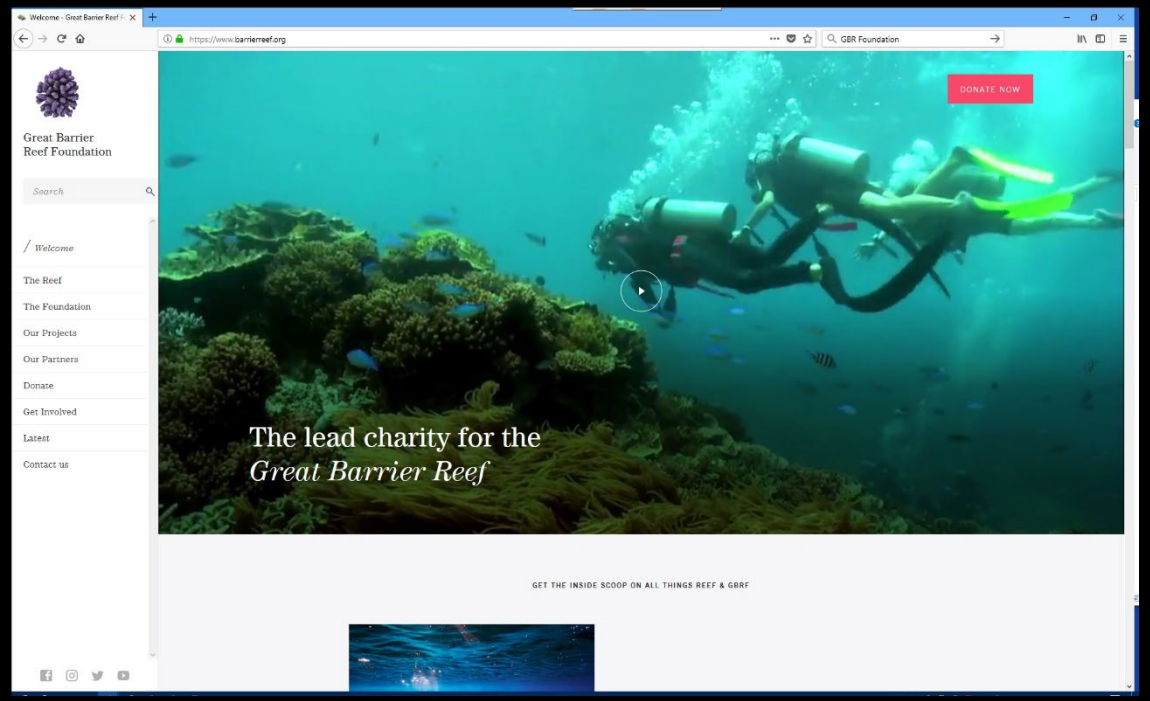
Aims

- Crowdsourced bathymetry (CSB) is collection of depth measurements from vessels, using standard navigation instruments engaged in routine operations.
- International Hydrographic Organisation (IHO) accepts CSB data into the Data Centre for Digital Bathymetry (DCDB) through a network of ‘Trusted Nodes’.
- The ‘Crowdsourced bathymetry on the GBR’ project is a Trusted Node.
- Talk will focus on how CSB data are collected, processed and made public.

IHO Crowdsourced Bathymetry Initiative at: https://www.ngdc.noaa.gov/iho/ CSB on GBR project at: https://www.deepreef.org/projects/246-crowdsourcebathy.html

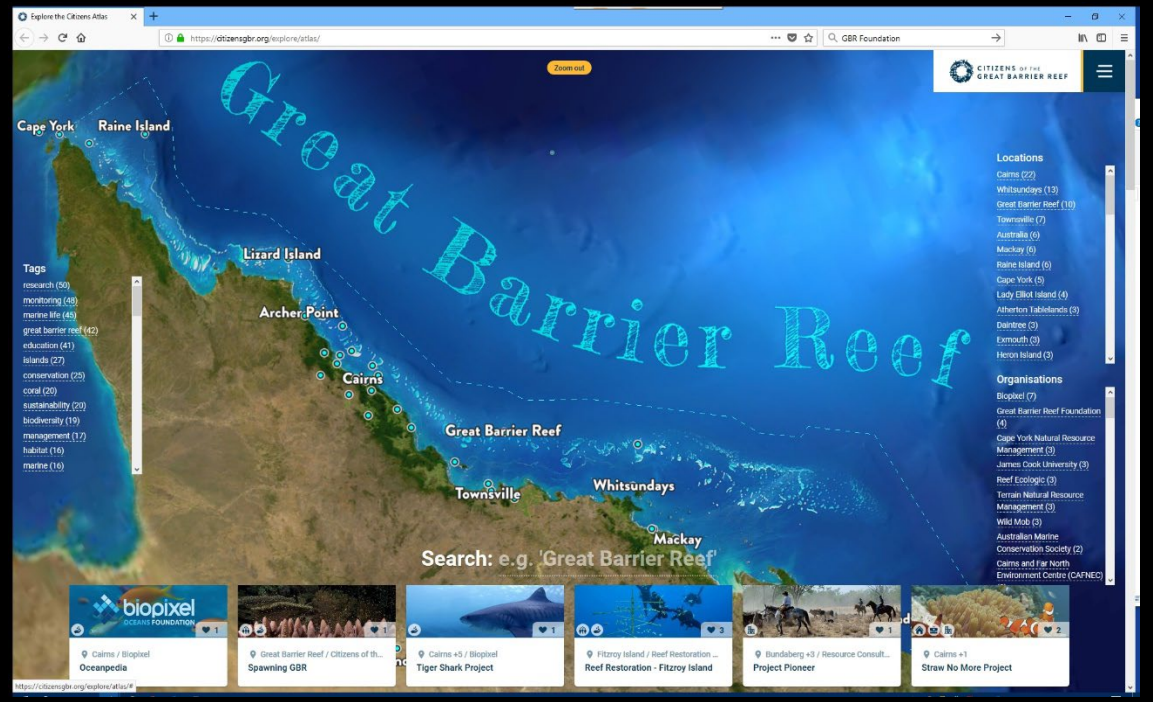
Funding and support

- Great Barrier Reef Foundation



GBR Foundation at: https://www.barrierreef.org/

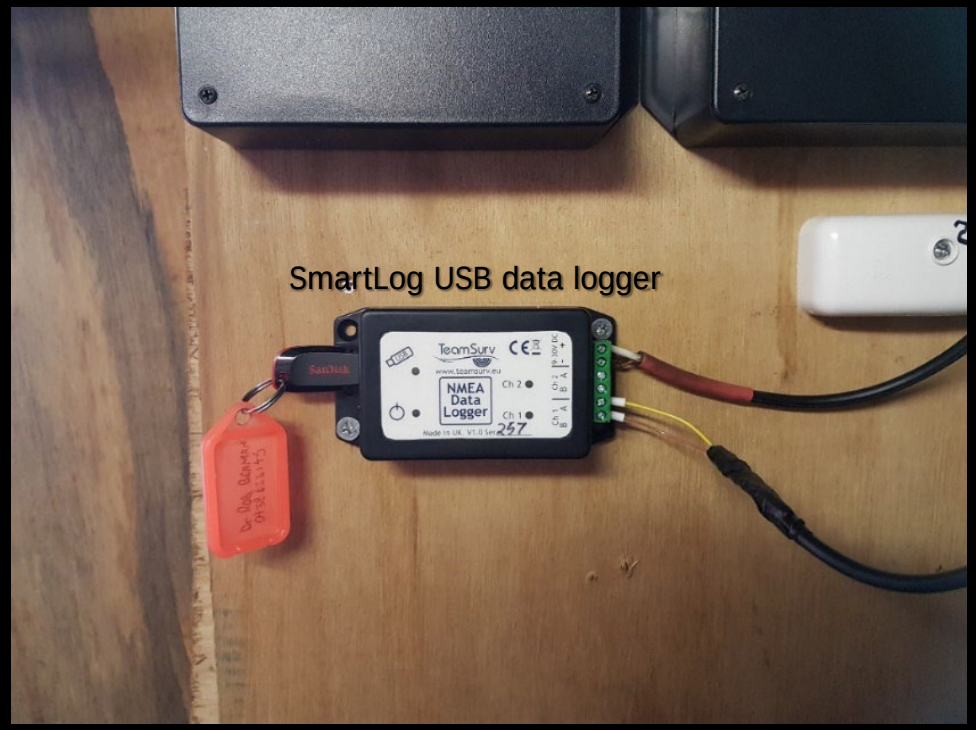
- Citizens of the Great Barrier Reef



Citizens of the GBR at: https://citizensgbr.org/

Technology

- TeamSurv SmartLog USB logger
- 12/24VDC plus NMEA channel 1
- reliable but sensitive to over-voltage



- stores raw NMEA 0183 data to USB

$GPGGA,022018,1617.7499,S,14541.6567,E,1,11,0.84,-62.51,M,59.91,M,,*76
$GPBWC,022020,1617.3701,S,14541.0190,E,301.8,T,295.0,M,0.721,N,End,A*37
$SDDBT,3.74,f,1.14,M,0.62,F*36
.....
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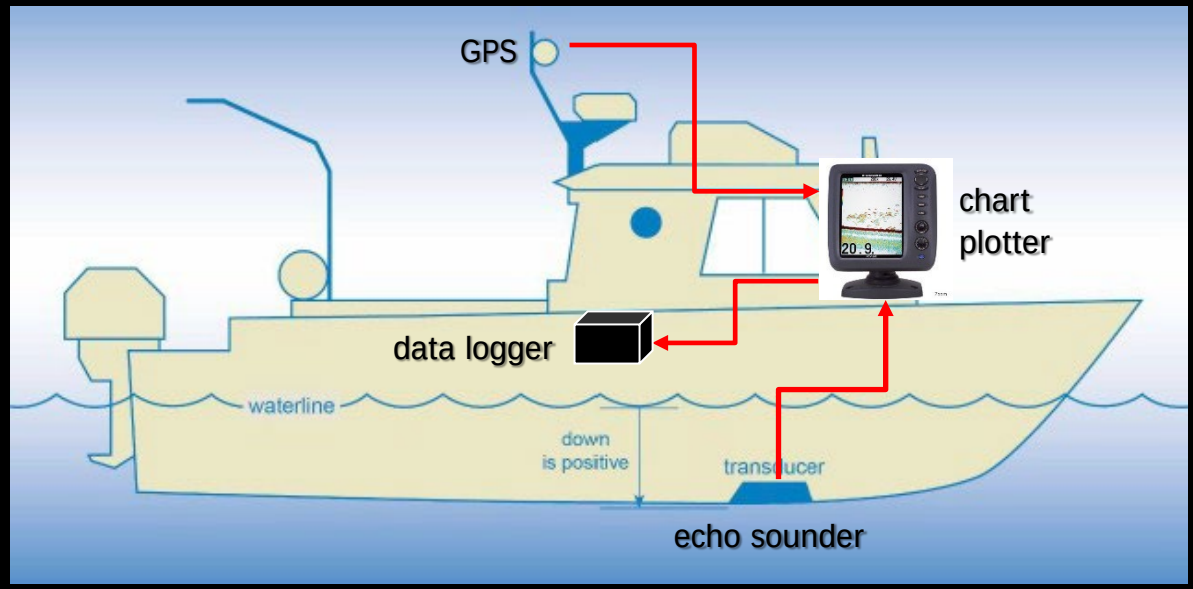


Vessels


ARGO


NQ
HireBoats
nqhireboats.com.au


Gundoo Spirit


Westcoaster 72

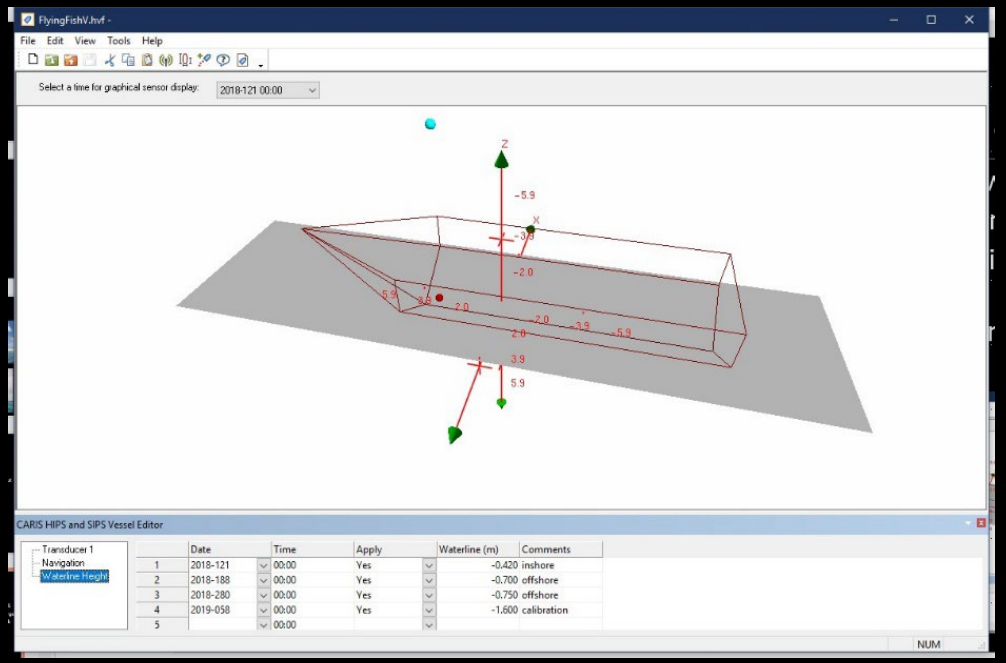

SPOILSPORT

Chart plotters

Installation

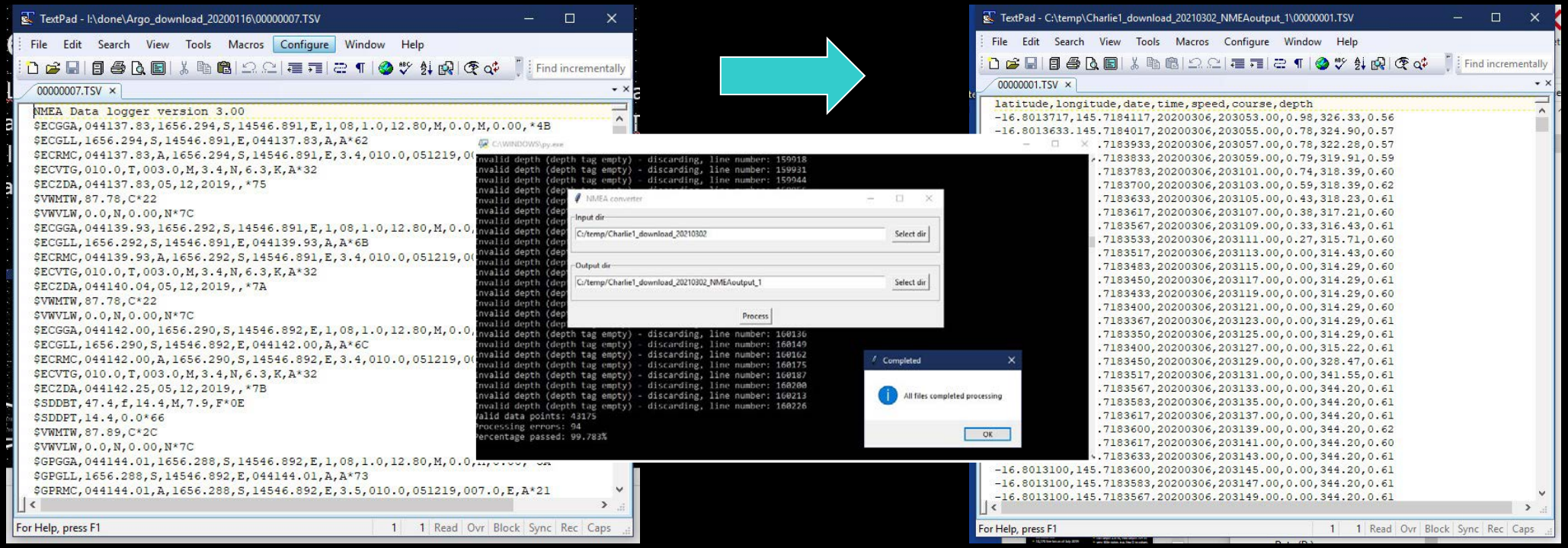
- marine technician to install
- mount in dry sheltered place
- ideally one NMEA channel feed
- switch or fuse helps to kill power

- use 30 m tape to measure offsets
- reference point (RP) is the sounder
- GPS aerial is measured to sounder
- measure depth with leadline for waterline height to RP



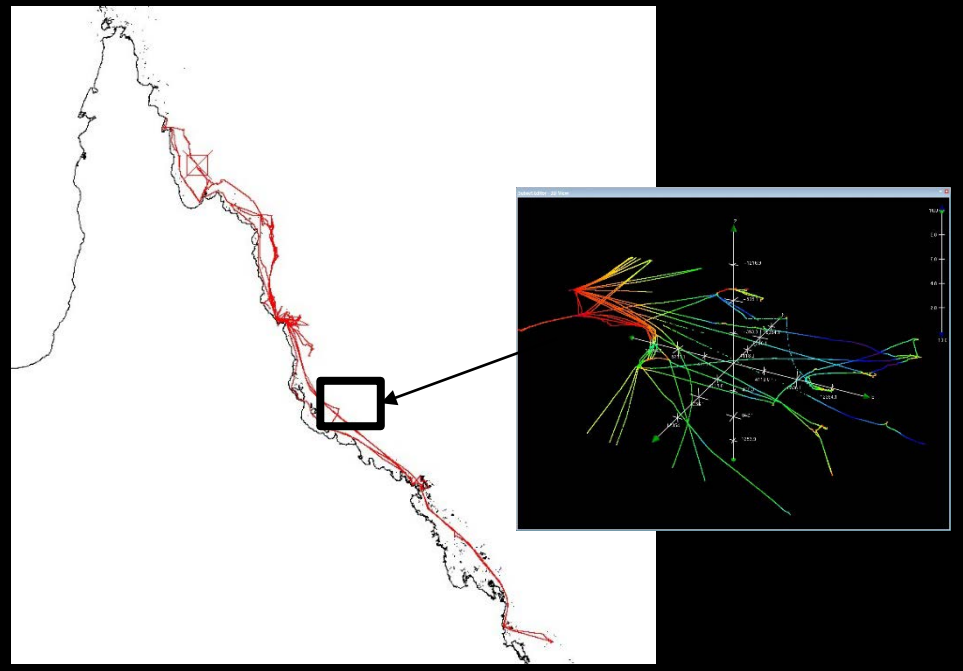
Python processing

- data logger stores .TSV files
- raw data are NMEA 0183 strings
- can have wrong dates, missing value
- i/p GGA, RMC, ZDA, DBT strings
- o/p lat,long,date,time,course,speed,depth
- report of errors, valid data points, % pass

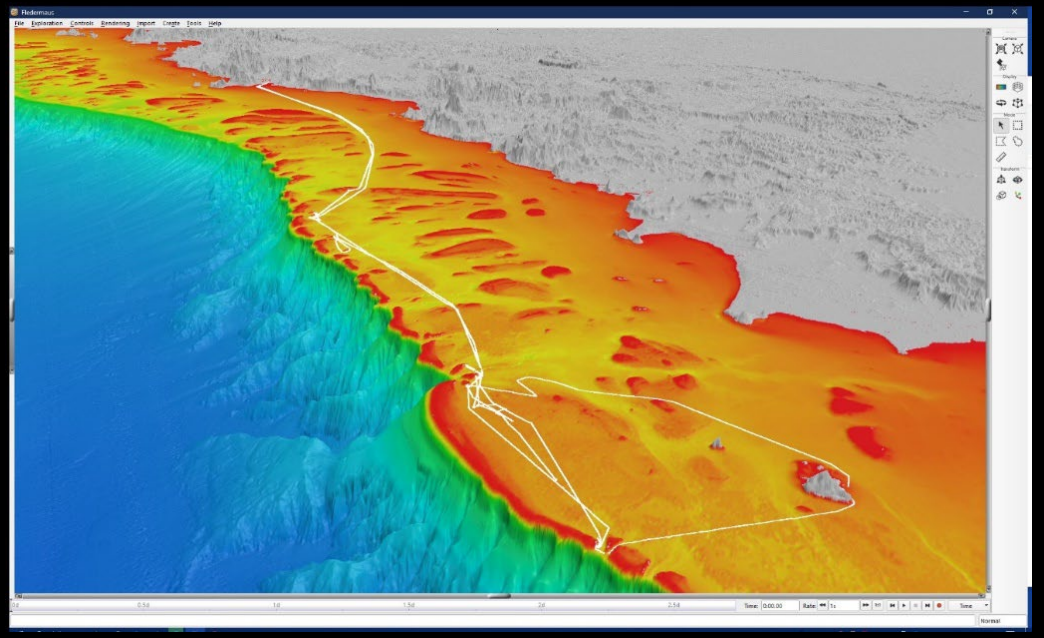


Spatial filter

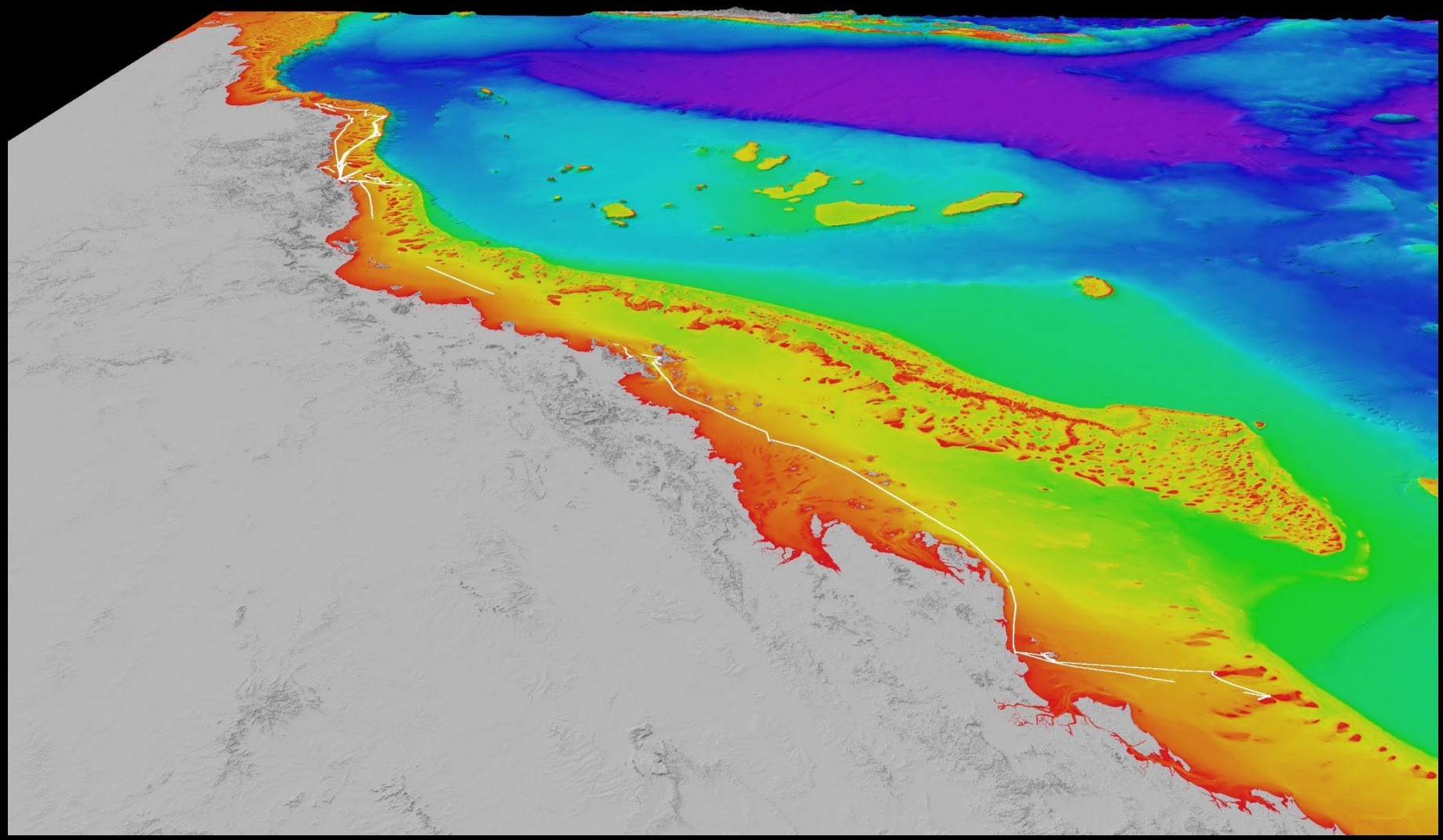
- import data tables into spatial visualisation software
- Fledermaus, HIPS, GIS, Google Earth
- ideally viewed as 3D point cloud



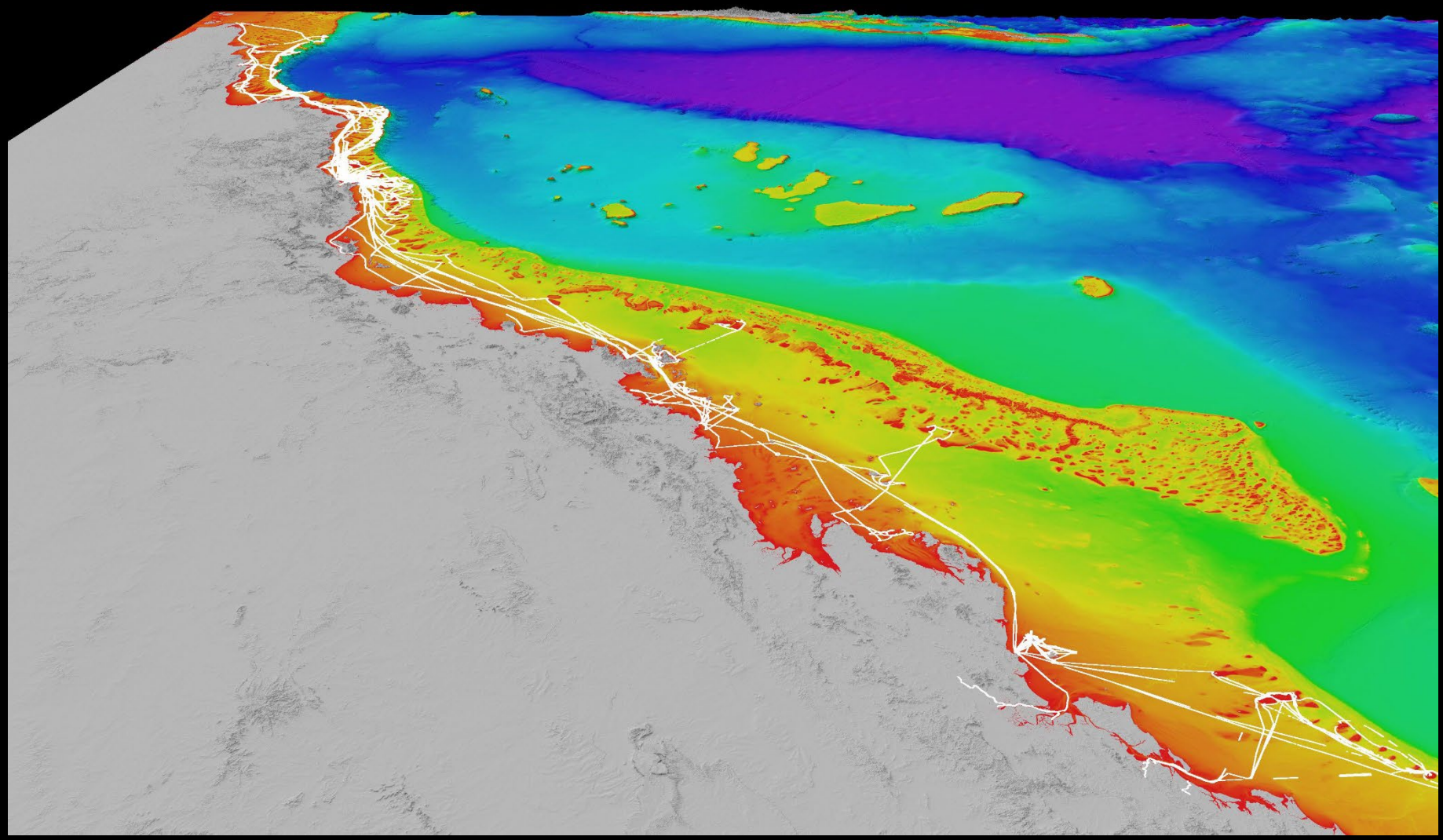
- filter and remove anomalous points
- very little noise, e.g. few 0 m values
- very few nav spikes (using raw GPS)
- sound speed (usually) 1500 m/sec



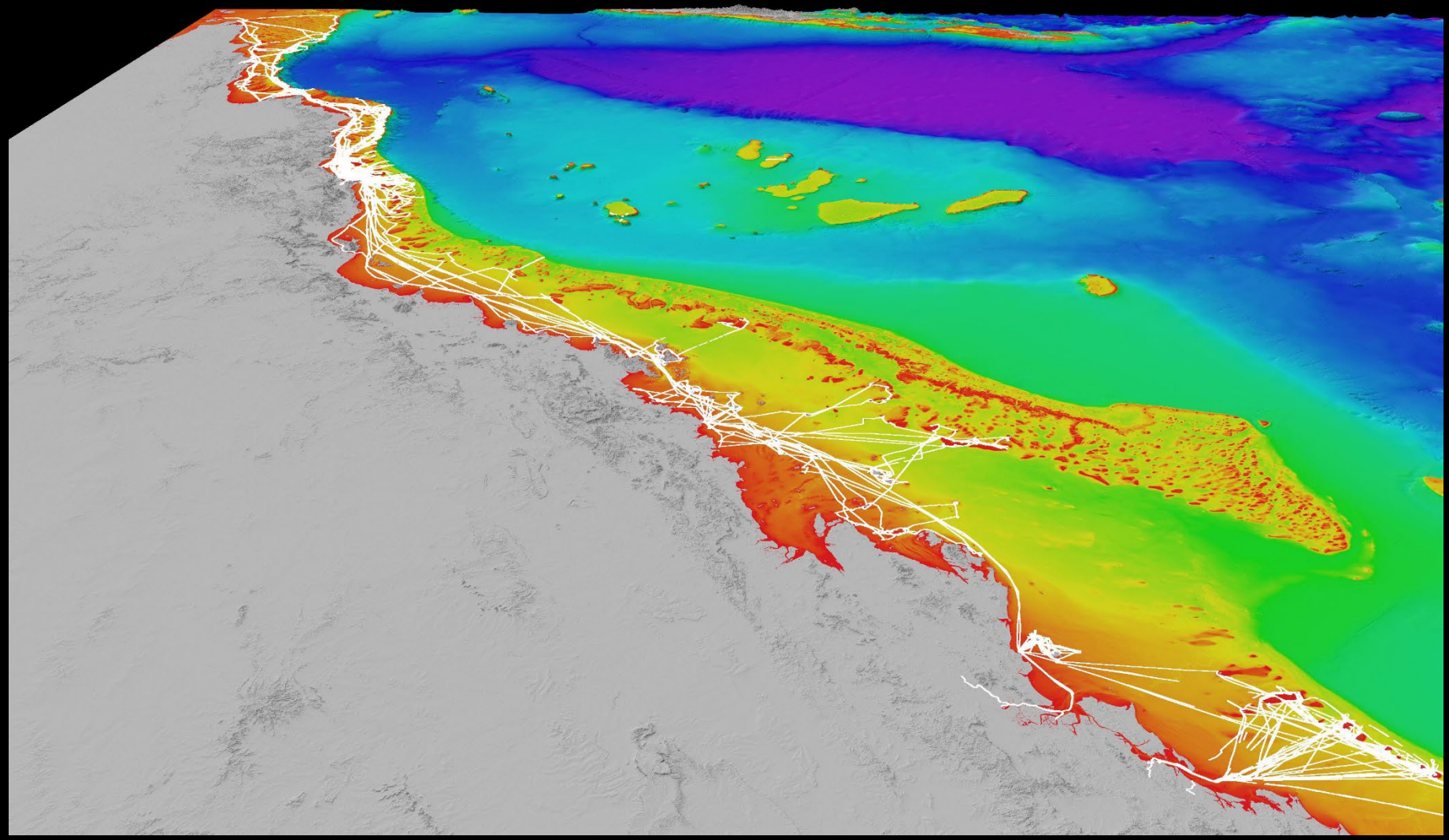
2018



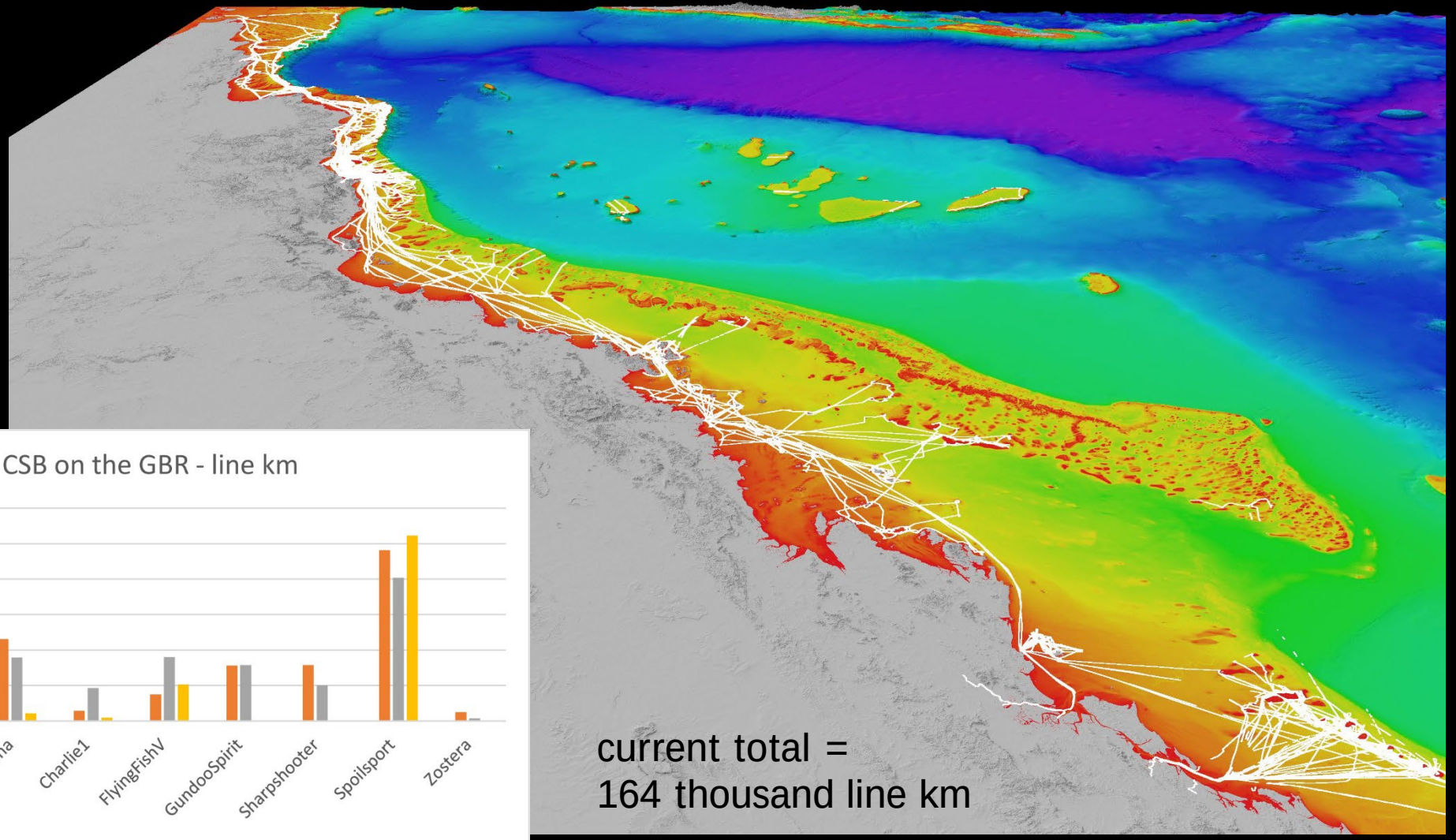
2018-2019

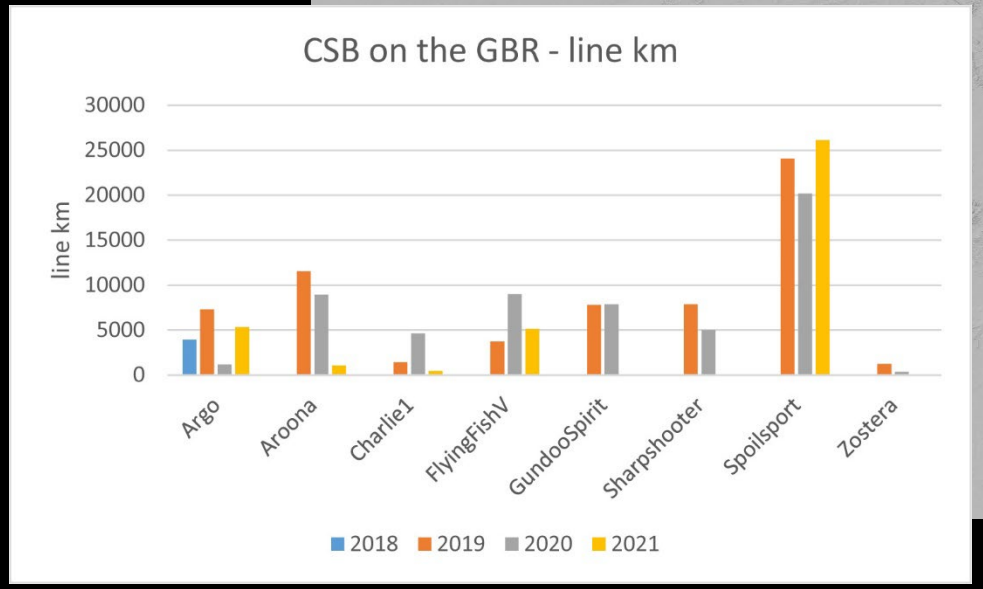


2018-2019-2020



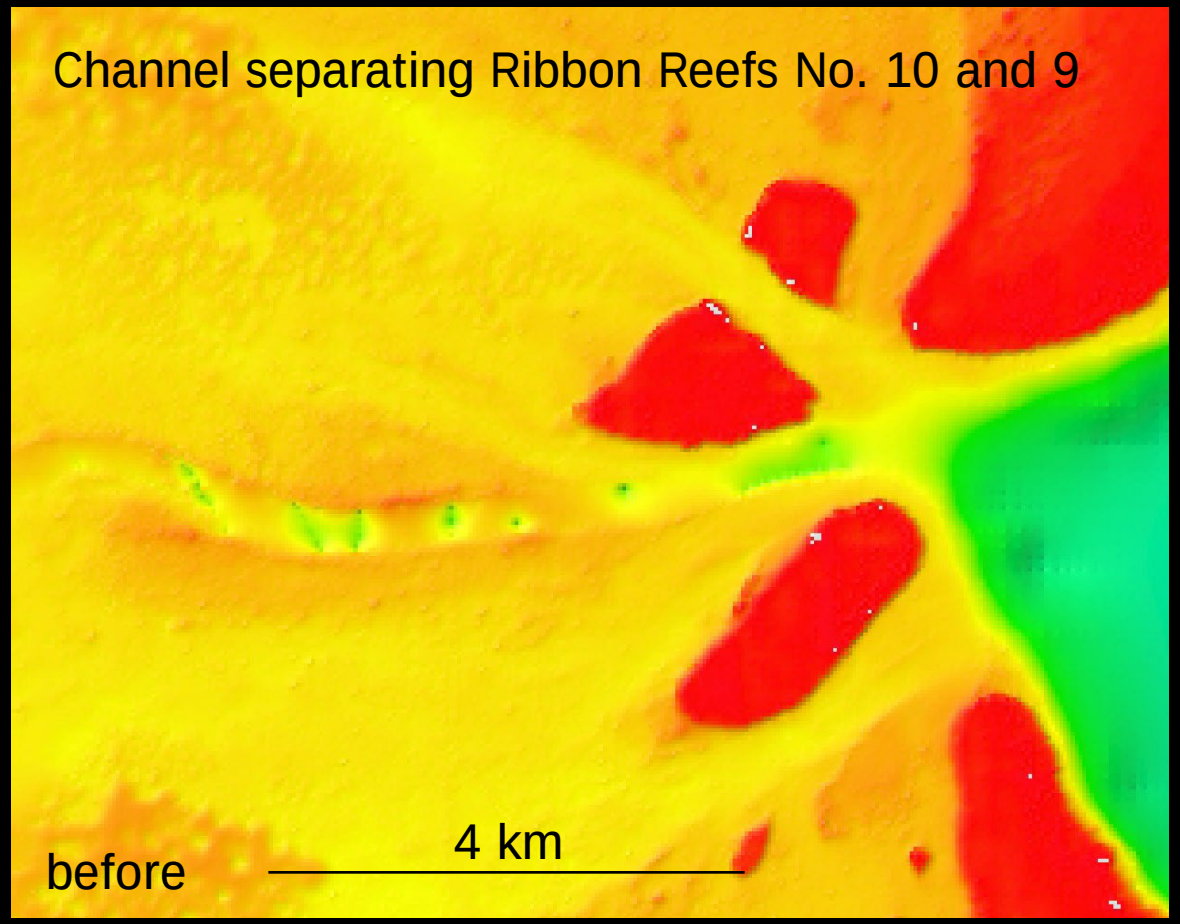
2018-2019-2020-2021

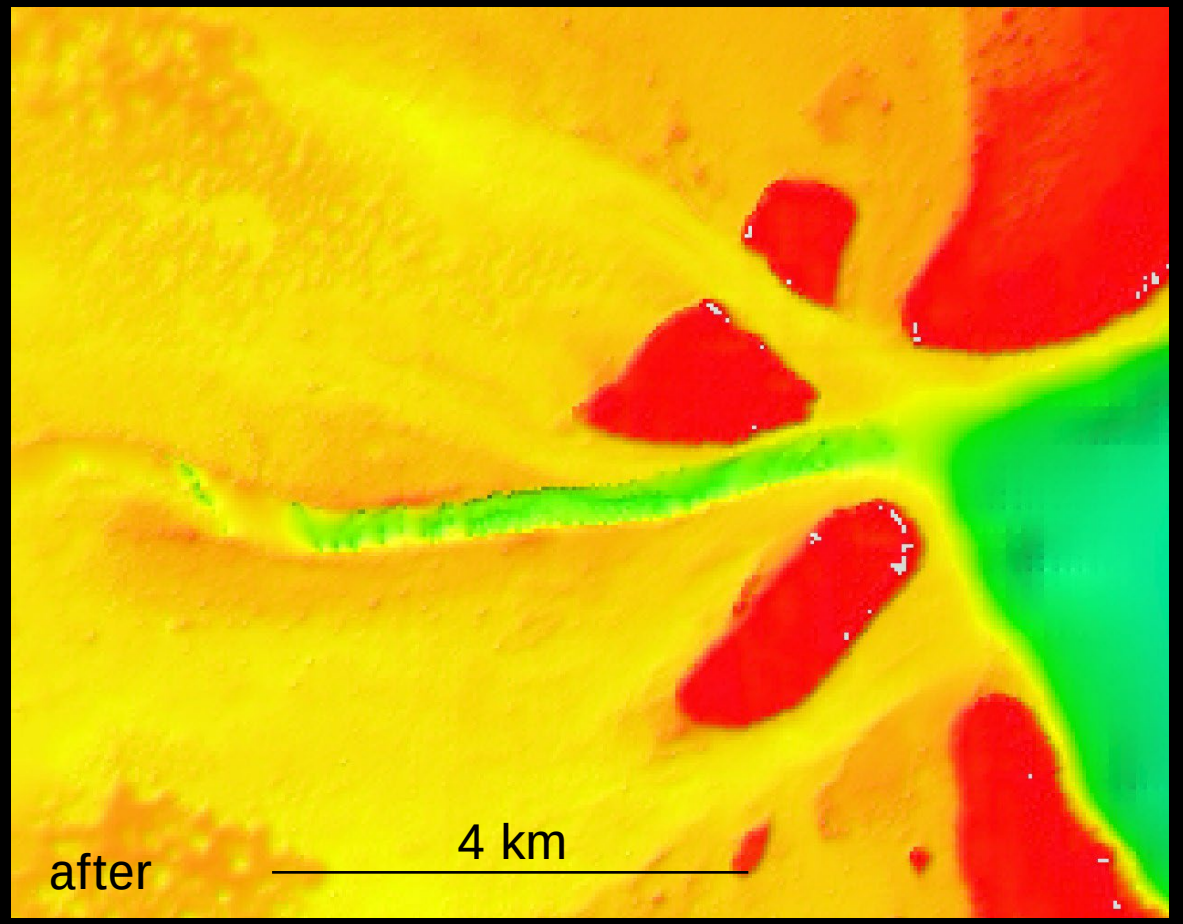




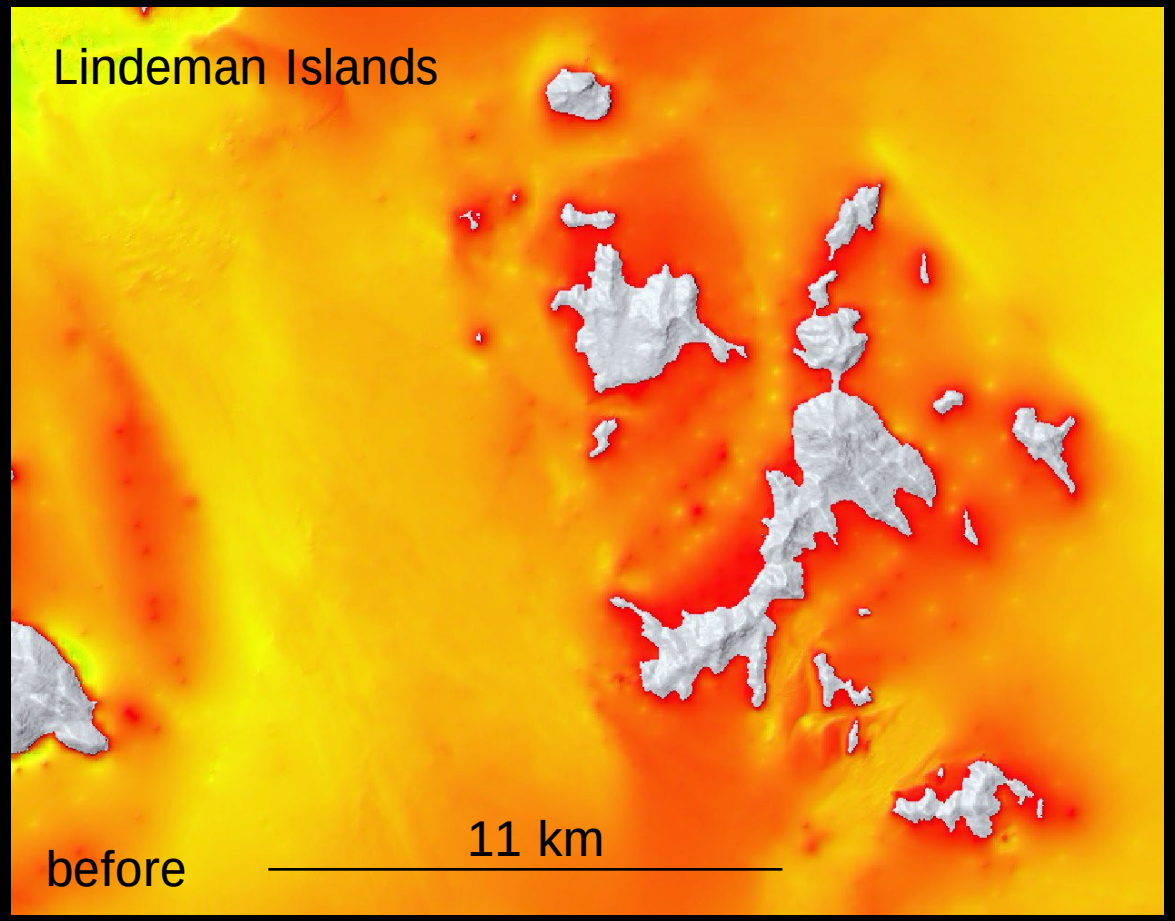
current total =
164 thousand line km

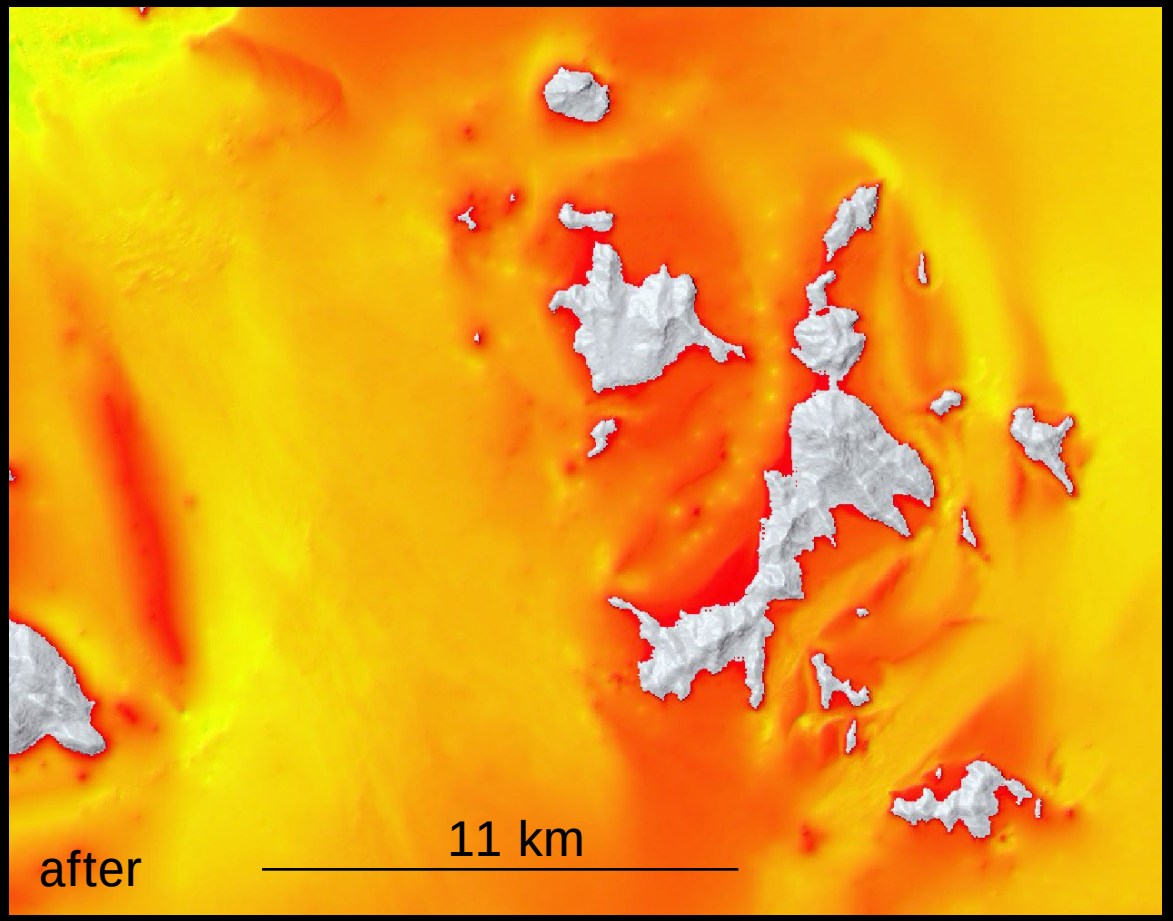
Making a difference



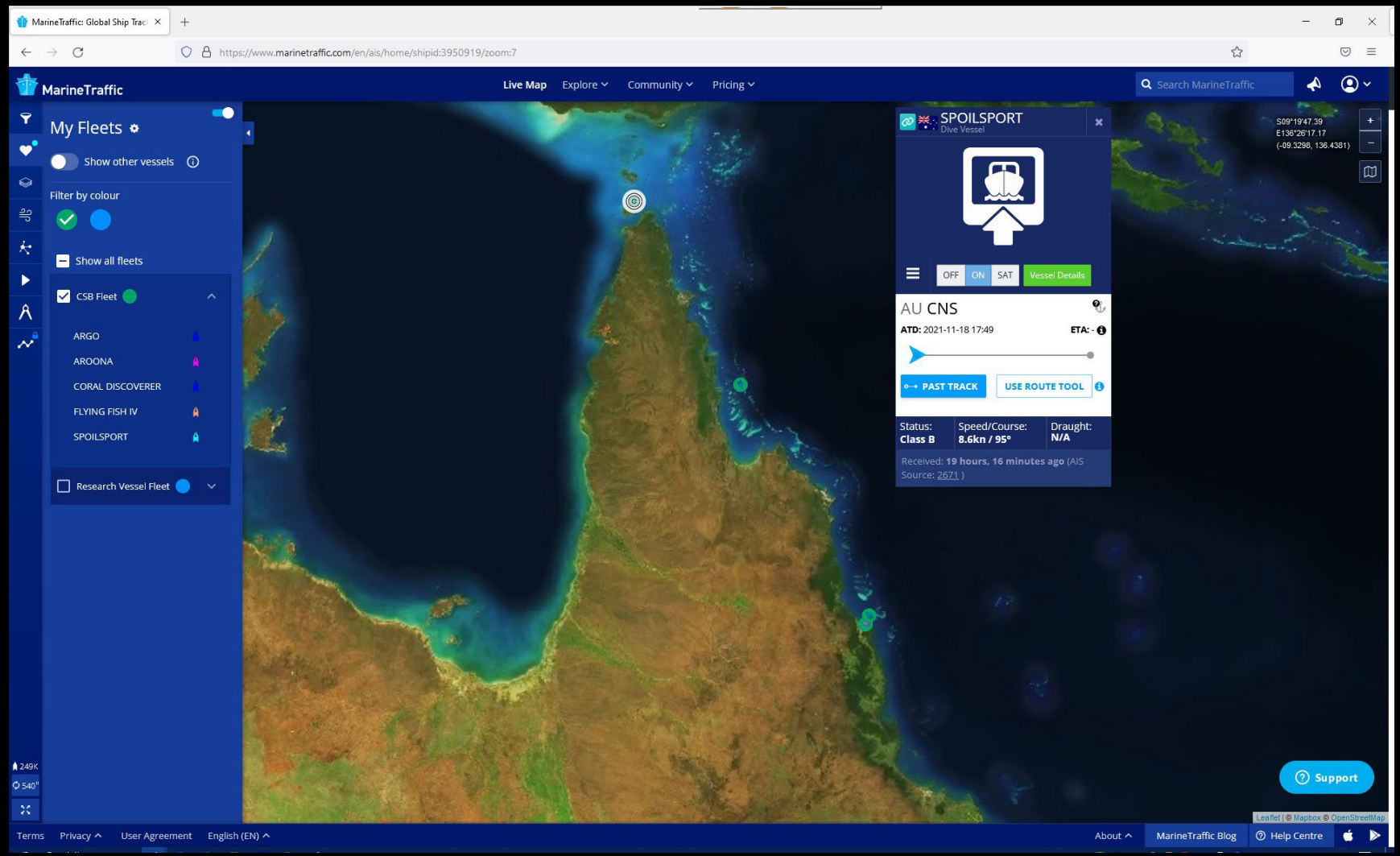


Making a difference

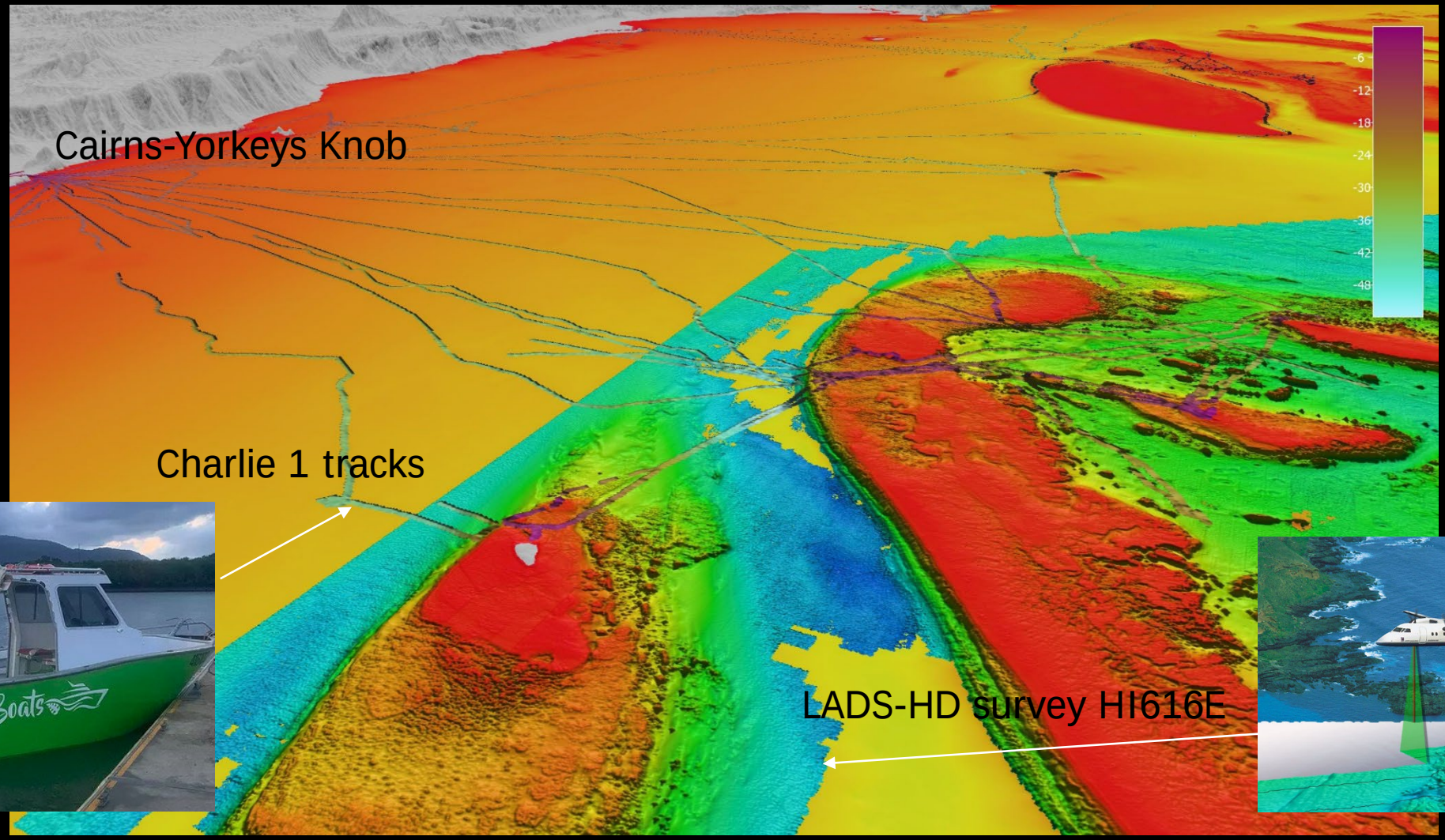


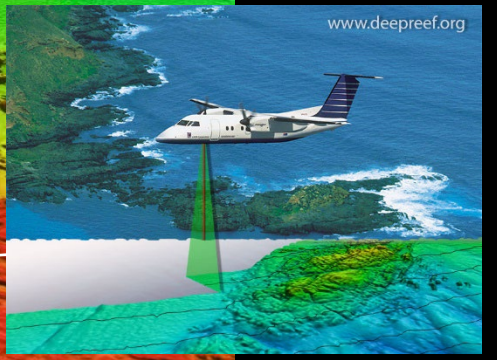


Keeping track

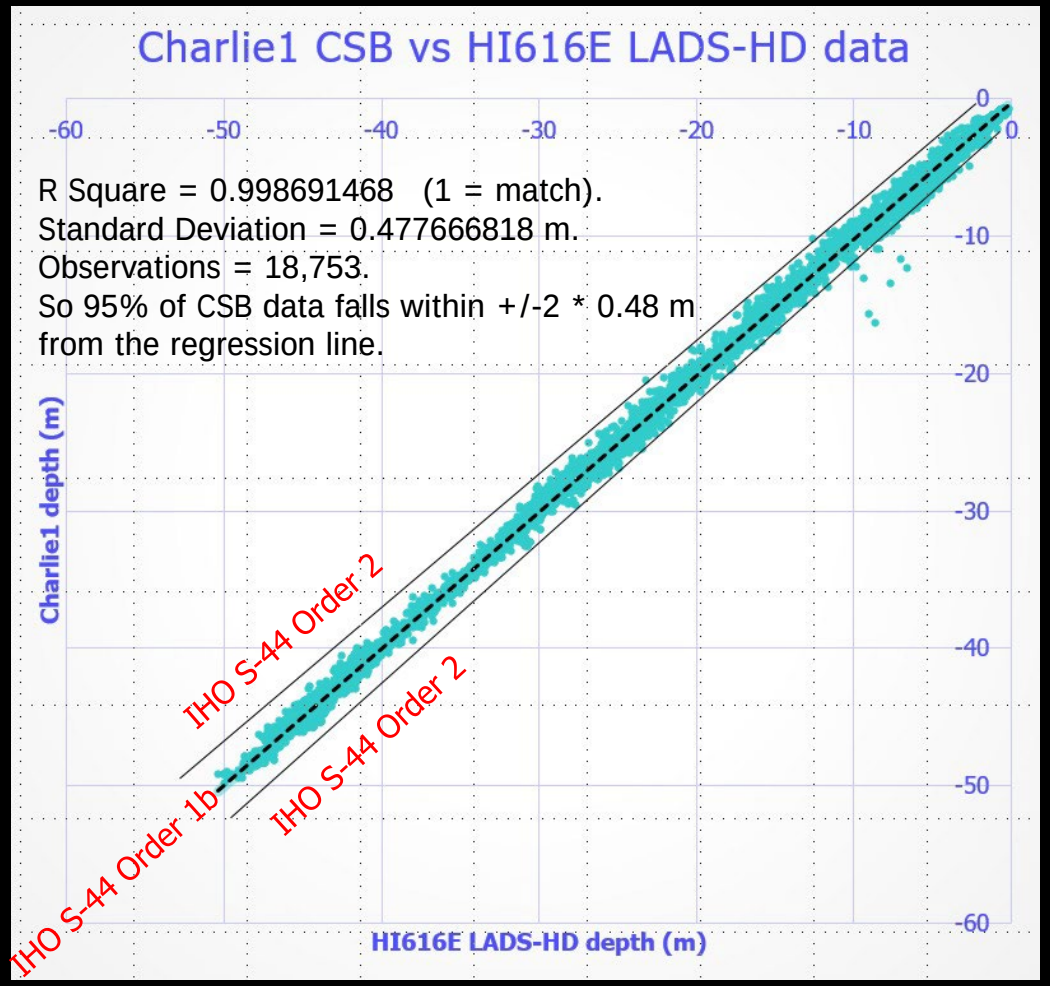


Compare CSB to LADS-HD





TPU conclusions



- CSB data comparison with LiDAR +/- 0.80-0.96 m (95% confid level)
- So is reasonable to say that CSB data TVU +/- ~1 m (95% confid level)
- And CSB data conforms to IHO S-44 Order 1b* or (minor) Order 2
- Improved TVU if offsets to waterline RP, tide applied, cleaned of noise etc.
- Improved THU if able to use SBAS, modern GNSS receiver etc.

* Classified according to the S-44 Matrix as: Ba7 (THU=7.37 m), Bc8 (a=0.5 m), Bd6 (b=0.013)

Data delivery

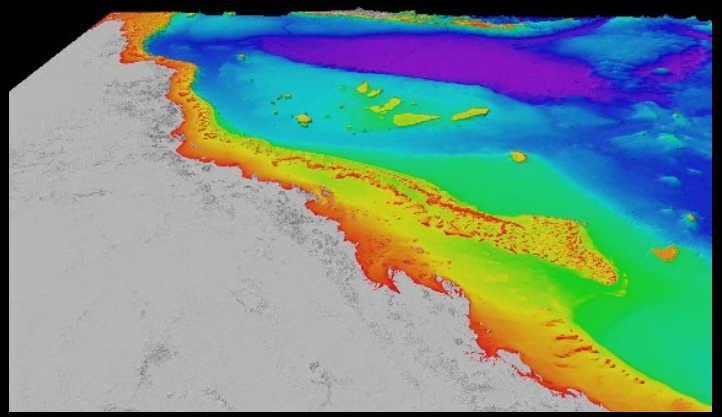
JCU (Trusted Node)

raster grids of integrated data

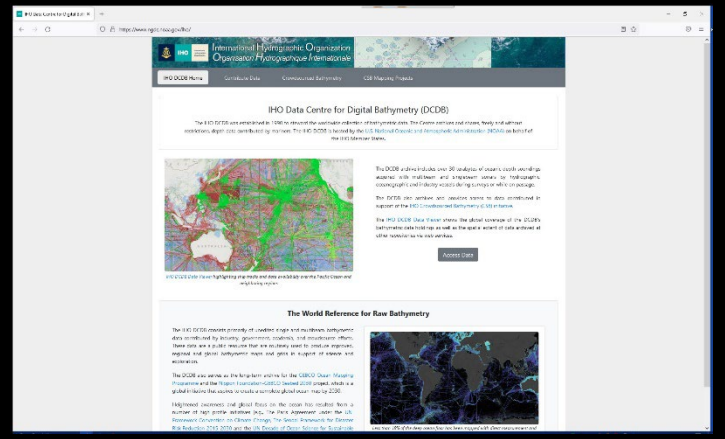
ftp transfer of xyztime points + metadata (currently hidden)

Deepreef Explorer

AusSeabed Marine Data Portal



IHO Data Centre for Digital Bathymetry (DCDB)



Future work

- Add more volunteer vessels to CSB on GBR project
- Put python script online for tsv-csv file conversion
- Upload more CSB on GBR data to the IHO DCDB
- Get approval by AHO to release CSB on GBR via IHO DCDB
- Continue advising Australian efforts for acquiring CSB data