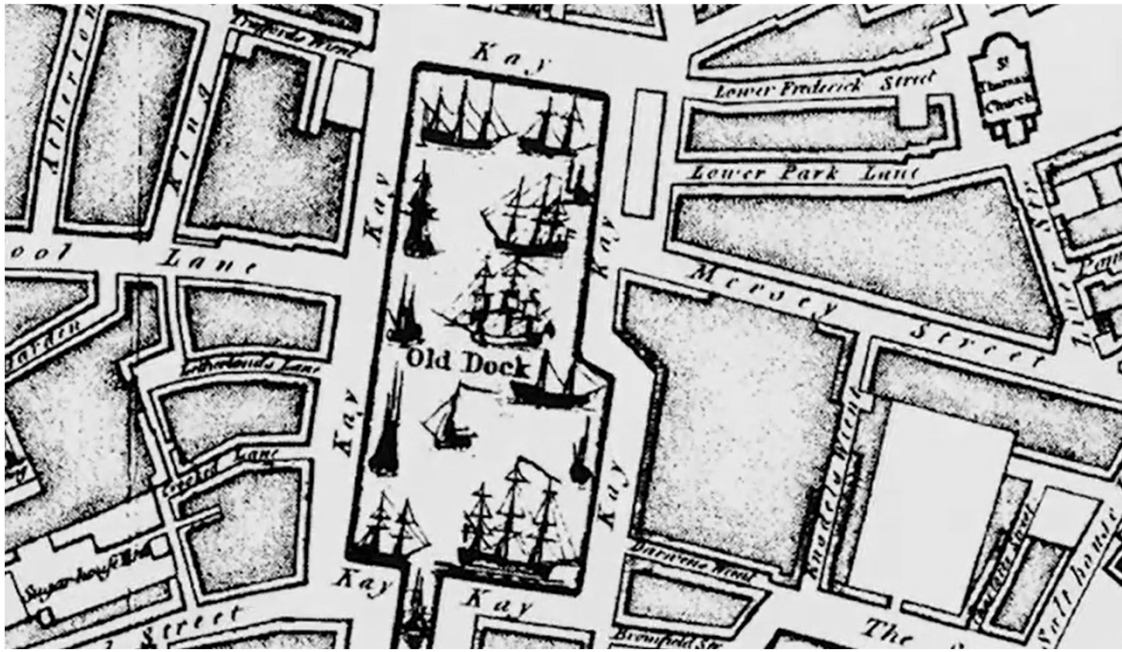
NOC Innovations

HYDRO 2025

ADVANCES IN TIDAL PREDICTION FOR OFFSHORE AND COASTAL SURVEY WORK

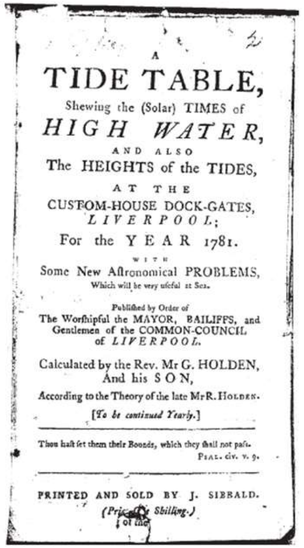
First…a little History



STORY STARTS IN 1715 – LIVERPOOL'S FIRST WET DOCK

NOC Innovations

Captain William Hutchinson first systematic UK record of high waters spanning1768-93



A

TIDE TABLE,

Shewing the (Solar) TIMES of

HIGH WATER,

AND ALSO

The HEIGHTS of the TIDES,

AT THE

CUSTOM-HOUSE DOCK-GATES,

LIVERPOOL;

For the YEAR 1781.

WITH

Some New Astronomical PROBLEMS,

Which will be very useful at Sea.

Published by Order of

The Worshipful the MAYOR, BAILIFFS, and Gentlemen of the COMMON-COUNCIL of LIVERPOOL.

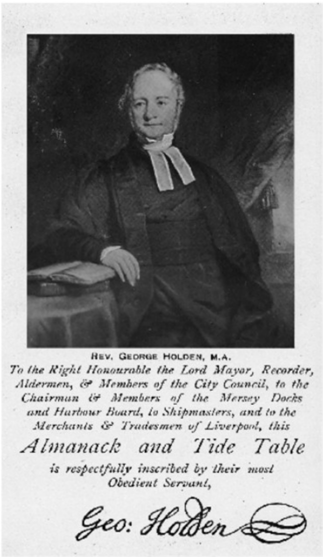
Calculated by the Rev. Mr G. HOLDEN, And his SON,

According to the Theory of the late Mr R. HOLDEN.

[To be continued Yearly.]

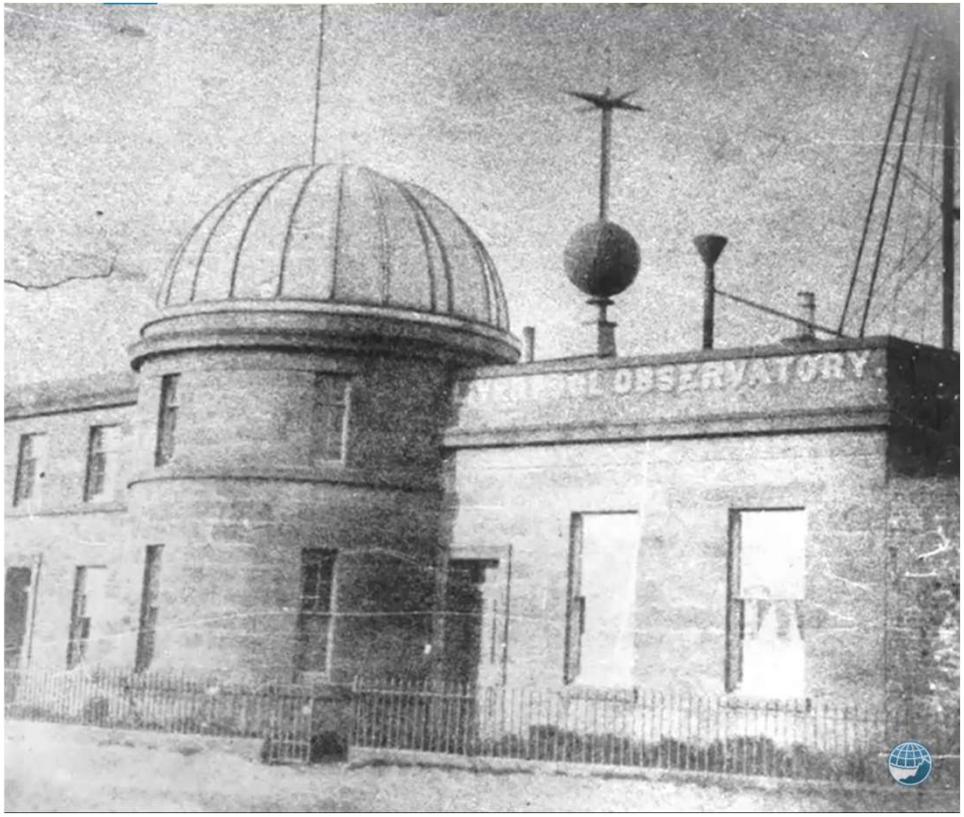
Thou hast set them their Bounds, which they shall not pass. PSAL. civ. v. 9.

PRINTED AND SOLD BY J. SIBBALD.



Hutchinson's data used by Richard and George Holden to produce some of the first publicly-available high water prediction tables in 1770 and published for next 200 years

LIVERPOOL OBSERVATORY (C.1845-1929) – BASED IN WATERLOO DOCK



Liverpool Observatory (1845) – Based in Waterloo Dock

Bidston Observatory (1866)

1920’S TO 1950’S – INTRODUCTION OF NEW ANALOGUE TECHNOLOGY

1919 Professor Joseph Proudman Establishes The University of Liverpool’s Tidal Institute

Arthur T Doodson

Doodson-Légé Machine
(Halved the time of calculations)

1920’S TO 1950’S – WAR AND LATER 2/3 OF THE WORLD’S TIDES CALCULATED FROM BIDSTON OBSERVATORY

NOC Innovations

HYDROGRAPHIC DEPARTMENT
ADMIRALTY
BATH

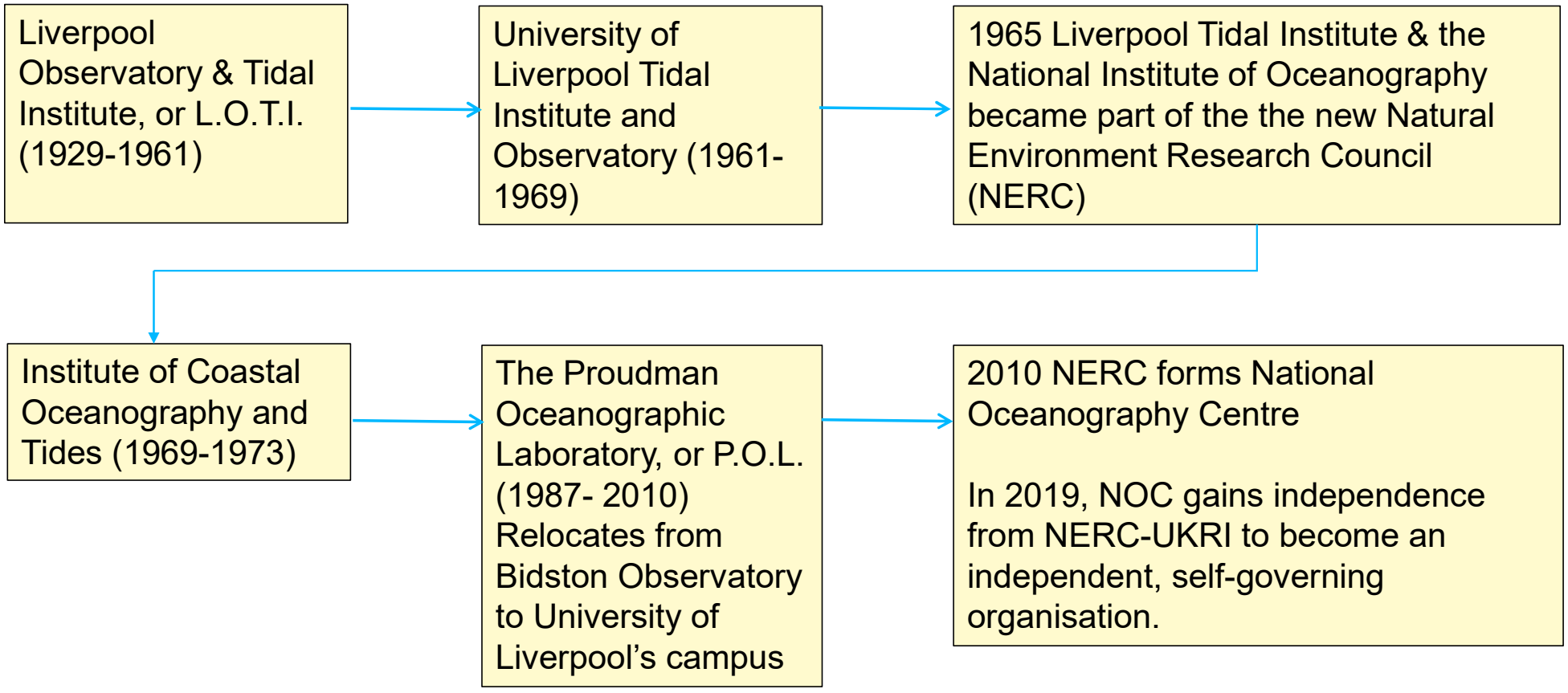
MOST URGENT
HOURLY HEIGHTS FOR POSITION Z
for 4 months commencing 1st April 1944.
Time zone 0 hours
Zo 14.1 feet

M_2	272°	7.9′
S_2	317°	2.6′
~~K_2 112°~~		~~0.8′~~
N_2	250°	1.6′
K_2	317°	0.7′
K_1	112°	0.3′
O_1	000°	0.2′
M_4	064°	0.6′
MS_4	146°	0.3′
M_6	200°	0.4′
$2SM_6$	100°	0.2′
P_1	102°	0.1′

Send first 15 days as soon as possible.

9.10.43.

NOC HAS AN ENDURING GLOBAL REPUTATION AS THE AUTHORITY ON TIDAL PREDICTION



NOC TIDAL PREDICTION TODAY – HARDWARE & DATA

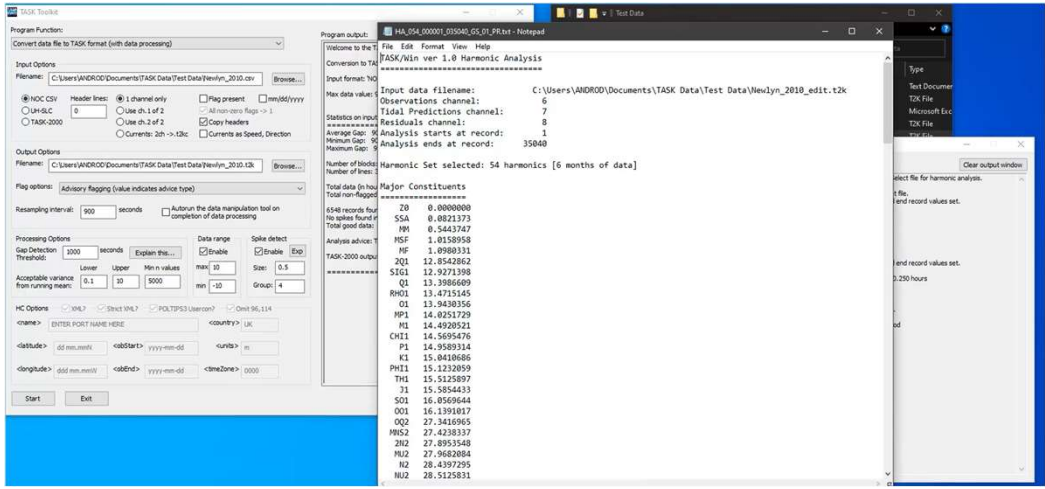
NOC GNSS & Radar Tide Gauges designed and built in NOC Liverpool

NOC Engineering Team service and maintain UK Tide Gauge Network

Raw Tide Gauge Data

NOC – British Oceanographic Data Centre – QC and Extraction of Sea Level Data for Science

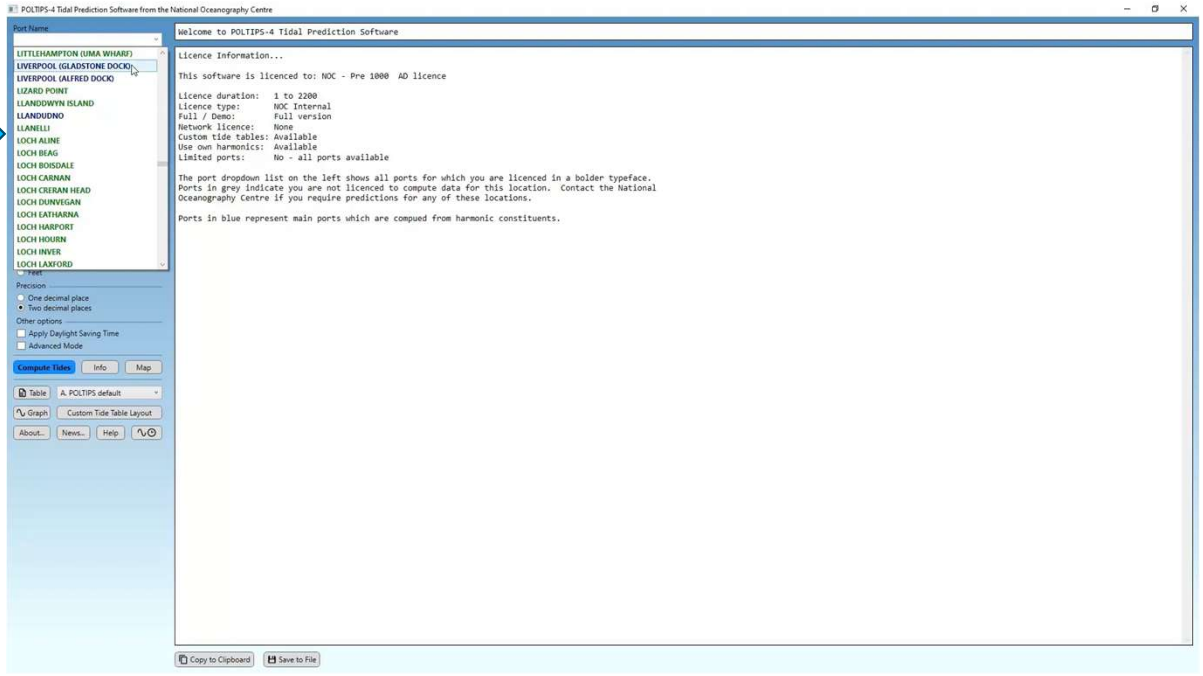
TASK Software

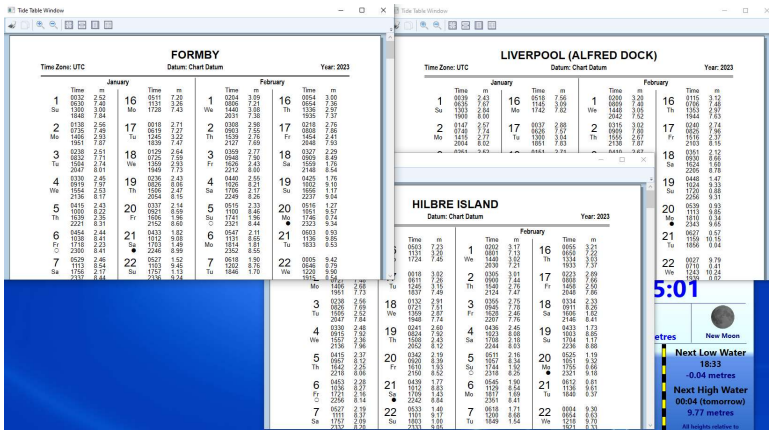


TASK analysis produces tidal harmonic constituents for each location

TODAYS PRODUCTS – COASTAL PREDICTIONS

TASK
Harmonic Constituents

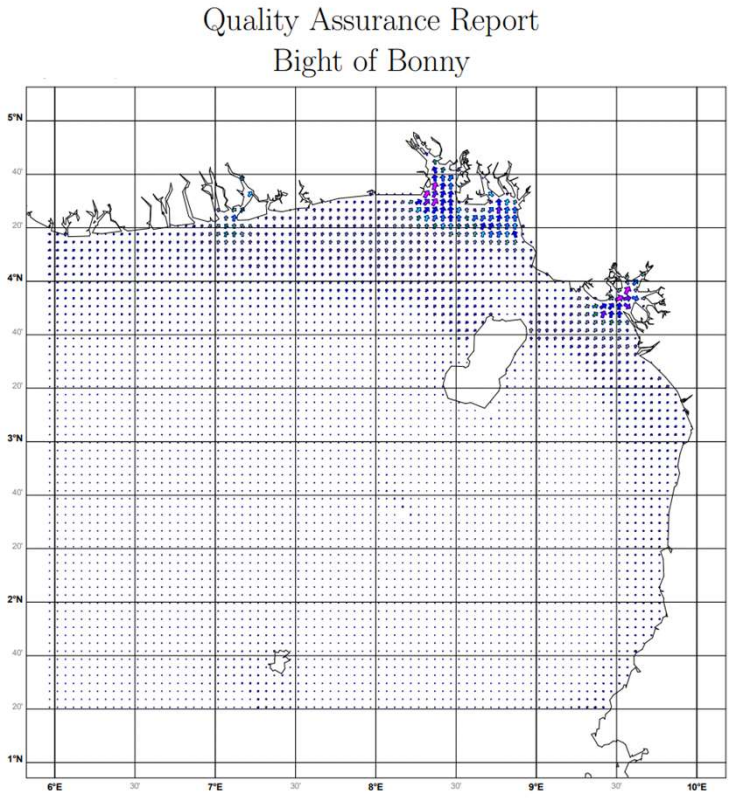




Traditional multiformat tide table data made available through Poltips 4 software

NOC scientists working on integration of Machine Learning to enhance predictions for secondary porta and locations with estuaries and significant river interactions.

OFFSHORE TIDAL MODEL DEVELOPMENT

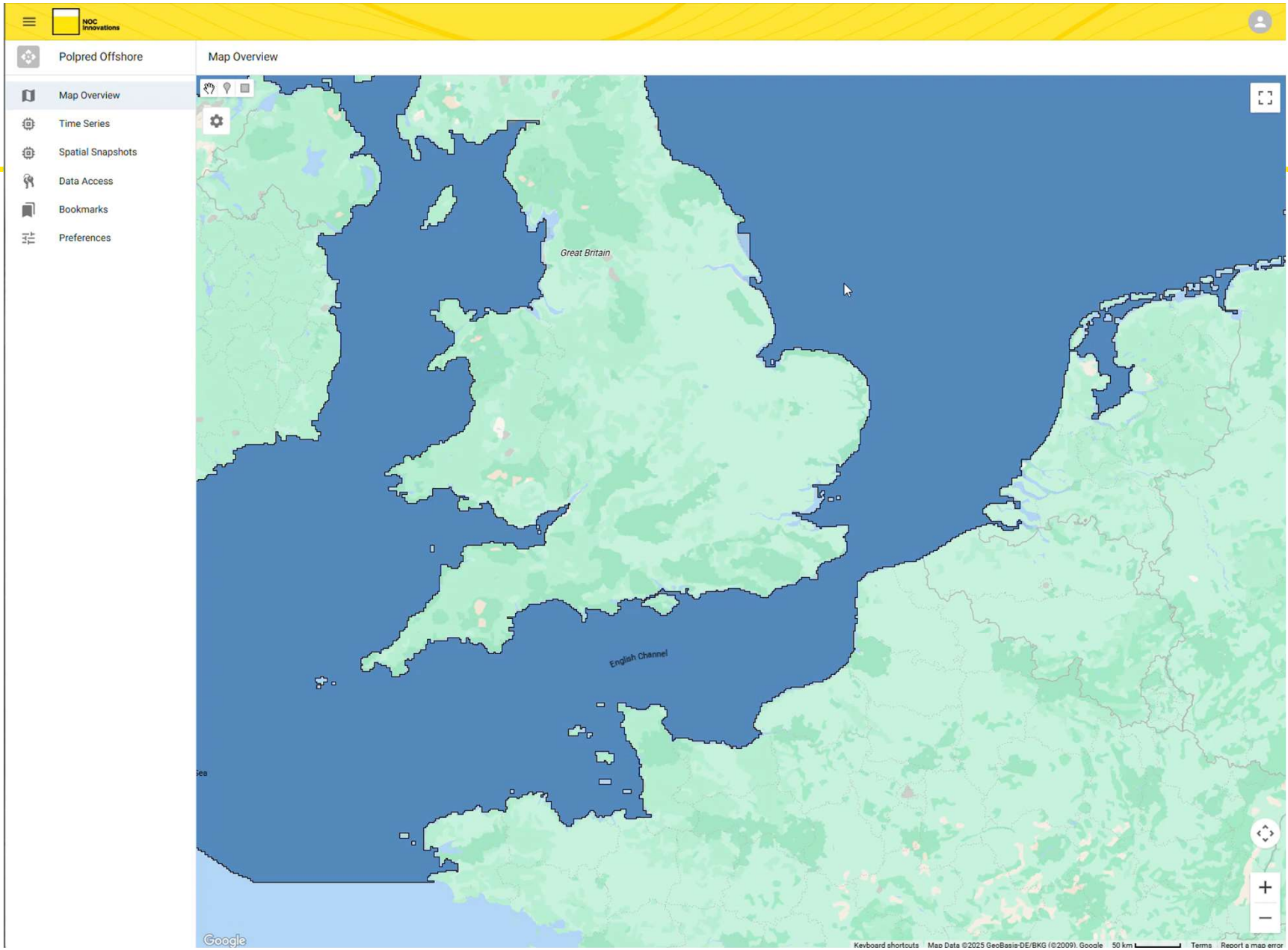


- NOC models a variety of ocean variables including the creation of high-resolution tidal models
- NOC scientists use modelling software that requires detailed bathymetry for the model domain, a definition of the initial sea state – (usually just a still water level), and data to force the model. For a tidal model the forcing data will usually be the known tides around the edge of the model
- The modelling software utilises equations governing fluid flow to compute tidal levels and currents for the area. Results are quality checked against known tidal data sources.

OFFSHORE PREDICTIONS

Polpred

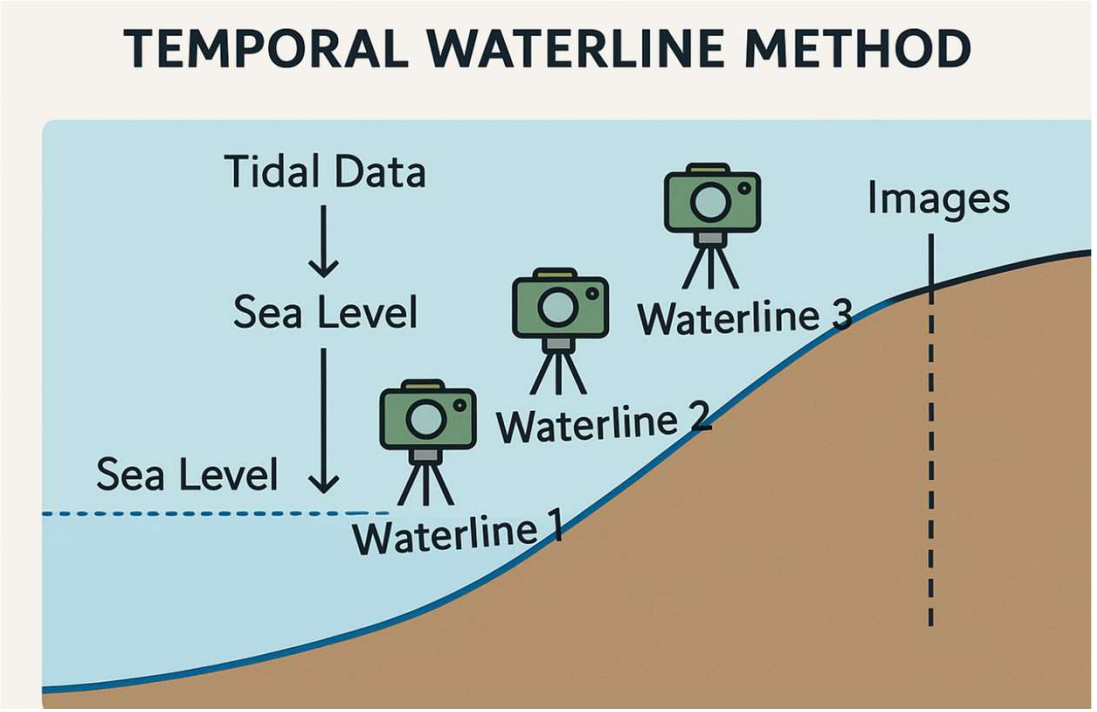
- Predict tidal elevations and currents worldwide
- High resolution and 3D current NOC models for specific areas of interest
- Well established / widely used offshore with proven accurate predictions
- Accessible through browser – no software installation required



OTHER USES OF TIDAL DATA AND MODELS
NEW INTERTIDAL SATELLITE MAPPING (ISM) SERVICE

NOC Innovations

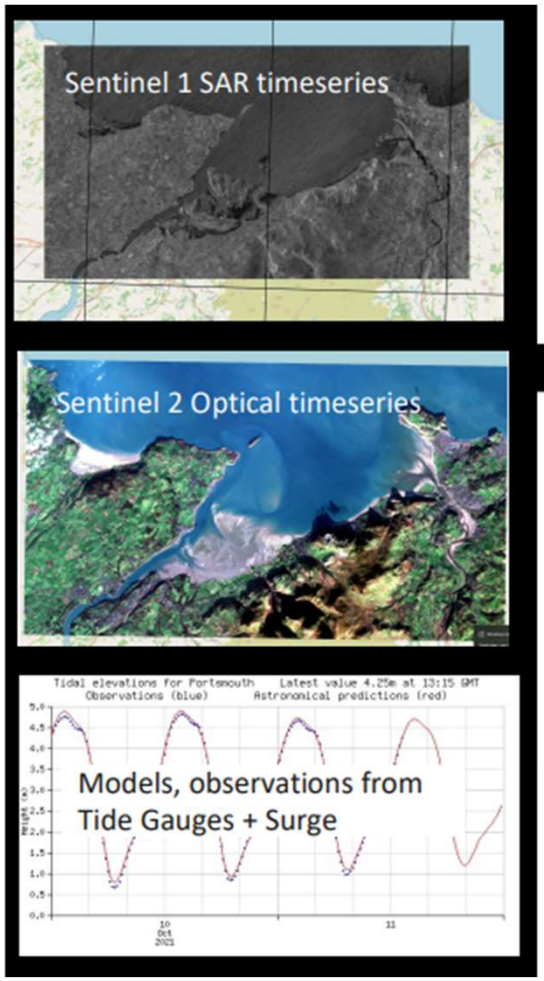
- NOC scientists have developed an Earth Observation driven technique utilising satellite technology and NOC tidal models & other tide elevation data to monitor intertidal zones (the areas that become wet and dry out between tides between land and sea).



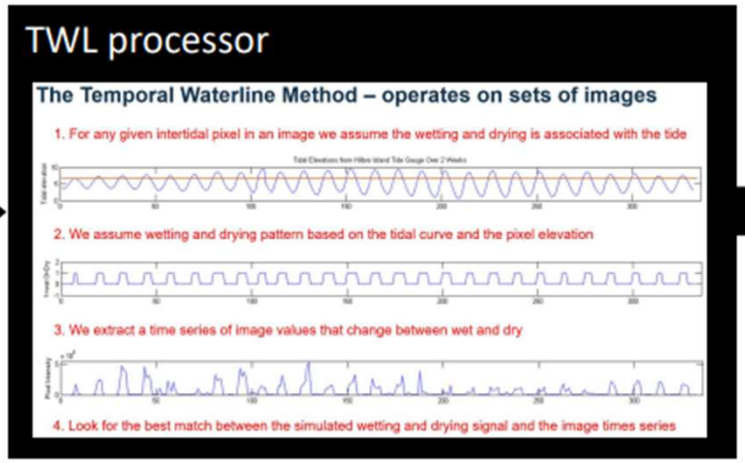
ISM, COMPOSITE ‘SNAPSHOTS’ OF TOPOGRAPHY

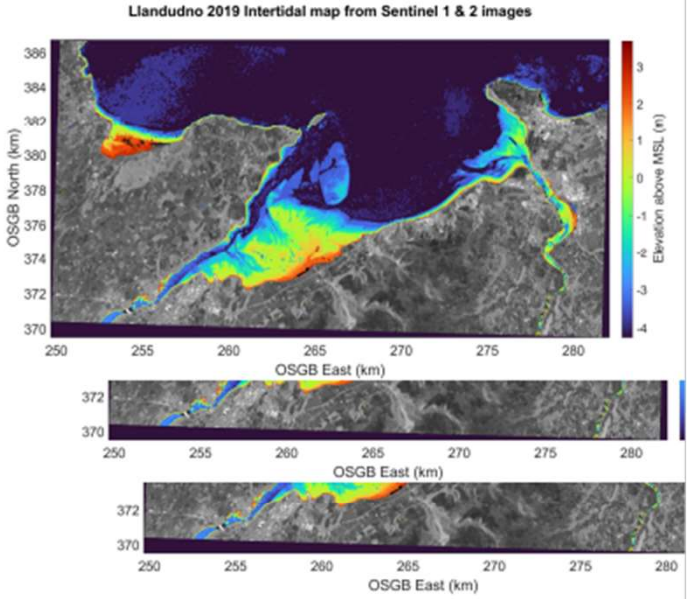
(USES 6-12 MONTHS OF SATELLITE IMAGERY TO GENERATE AN 6-12 MONTH AVERAGE MAPS)

NOC Innovations



The Temporal Waterline Method is a per-pixel adaptive approach operating on wet/dry timing compared with a reference tidal water level

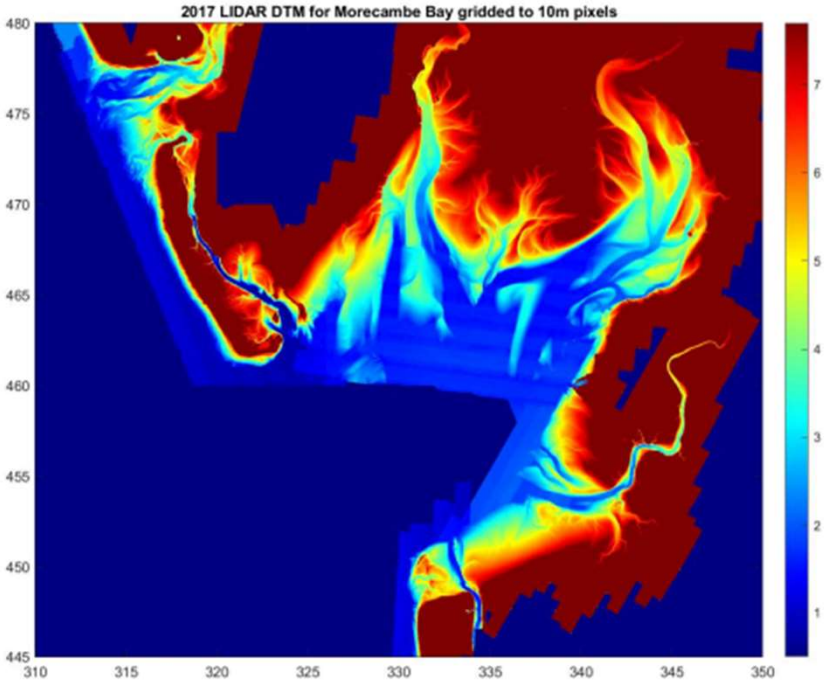


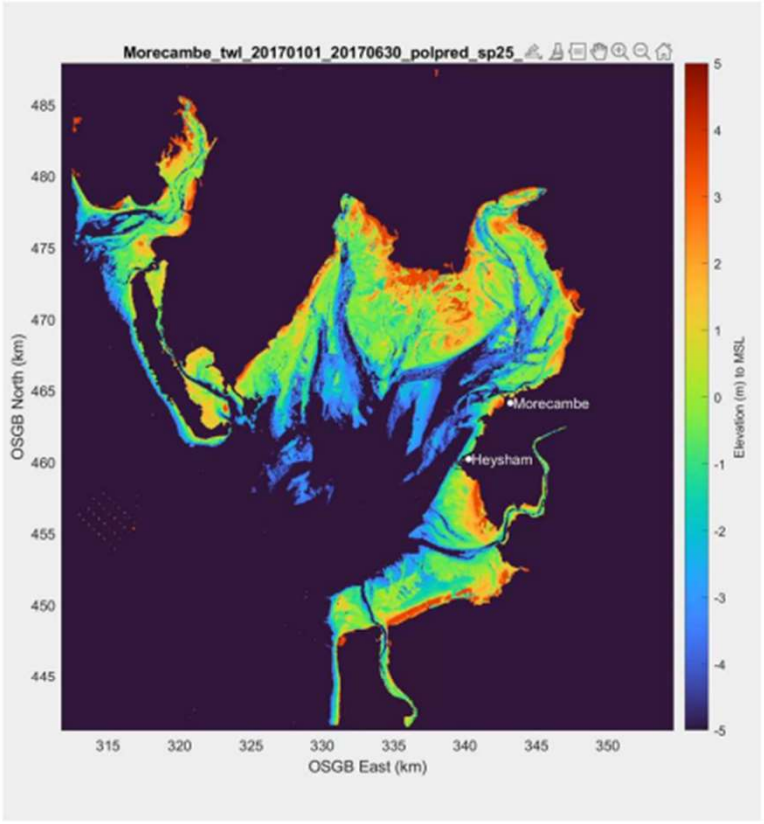


ISM TEMPORAL WATERLINE METHOD AND LIDAR COMPARISON

NOC Innovations

Morecambe Bay: 2017 LiDAR & SAR-Only TWL Comparison





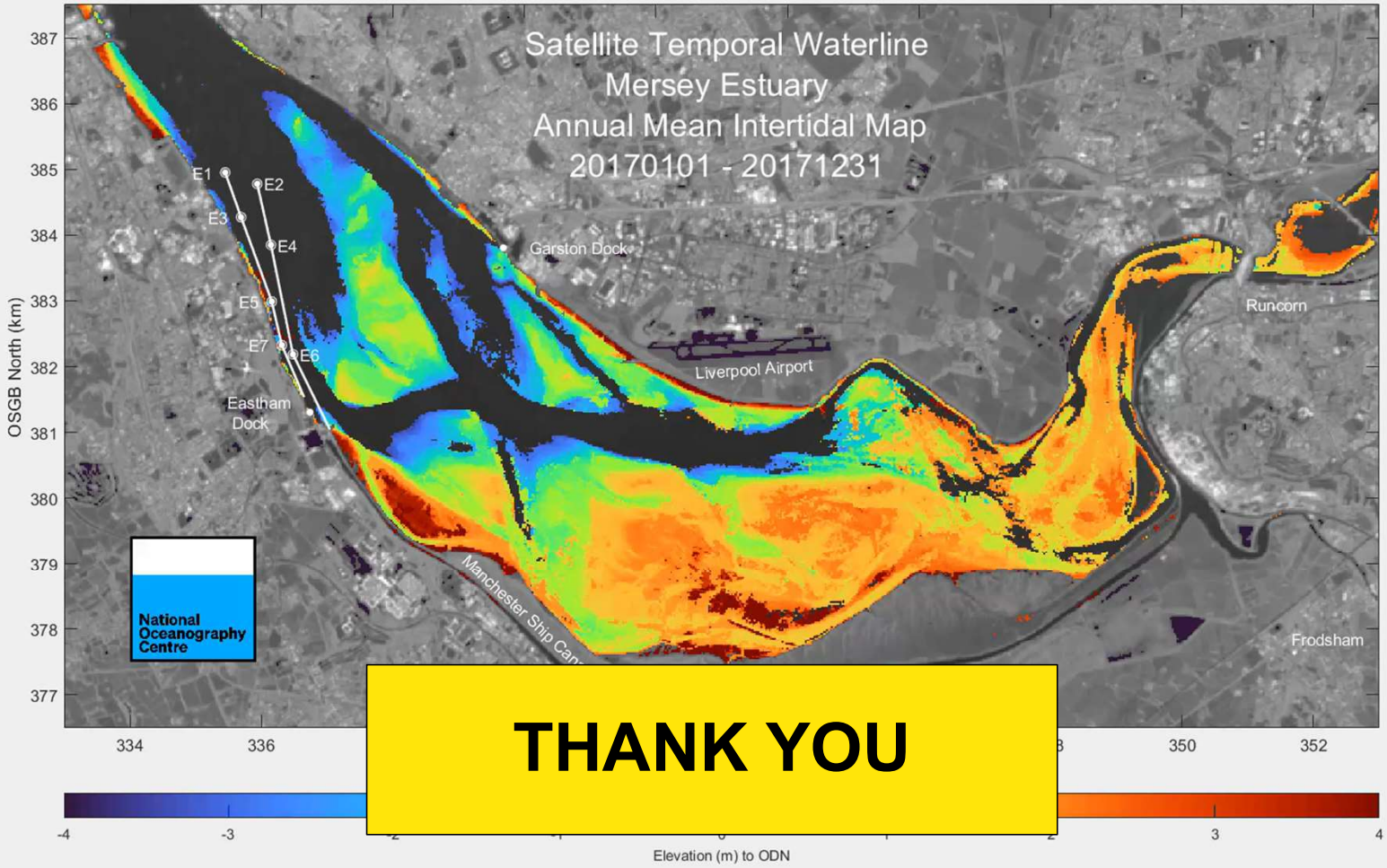
ACCORD Addressing Challenges of Coastal Communities through Ocean Research for Developing Economies

UKRI Natural Environment Research Council

marine resources eo4sd

esa European Space Agency

COMING 2026 – MARVE ISM – INTERTIDAL SATELLITE MAPPING



THANK YOU