

# Celebrating 100 years of tidal science on Merseyside

*Philip L. Woodworth*

To mark the 100th anniversary of the Liverpool Tidal Institute (LTI), a celebratory meeting on 'The ocean tide and the Port of Liverpool' was held at the Merseyside Maritime Museum in May 2019. The LTI's buildings at Bidston Observatory in Birkenhead are a well known local landmark, so the meeting attracted great interest from the general public as well as from academia, and there were almost 200 people in the audience.

The LTI was founded at Liverpool University in March 1919 with funds from Sir Alfred Booth and his brother, Charles Booth, to 'prosecute continuously scientific research into all aspects of knowledge of the tides'. Professor Joseph Proudman became its Honorary Director and Dr Arthur Doodson its Secretary. This same year also marked the start of Oceanography as an area of research and teaching at Liverpool University, which established the first university Oceanography department in the UK.

The LTI was initially located in the Holt Physics Building and moved to Bidston Observatory on the Wirral in stages over the following decade. It became the world centre for knowledge of the tides, with Proudman taking the lead in dynamical theories, and Doodson in the analysis of tidal information from around the world, and in tidal prediction. Work on tidal prediction included the construction of analogue computers called Tidal Prediction Machines. Proudman and Doodson were both Fellows of the Royal Society, a distinction that was later also awarded to Dr David Cartwright, Assistant Director at Bidston from 1974

*The first Director of the Liverpool Tidal Institute, Joseph Proudman (left) and his successor, Arthur Doodson (right)*



to 1986, for his work on the global ocean tides. The LTI was renamed the Liverpool University Tidal Institute in 1961 and went through other name changes, including the Proudman Oceanographic Laboratory. It became a component of the present National Oceanography Centre in 2010.

One should not forget that research at the LTI took in many topics other than ocean tides. These included the numerical modelling of storm surges (or 'meteorological influences on the tides') for purposes of coastal protection, especially following the 1953 floods in the North Sea; long-term changes in sea level (notably through the Permanent Service for Mean Sea Level); tides of the solid Earth; ocean modelling for studies of water quality, ecosystems and climate change; geodetic measurements; and renewable energy. In addition, the LTI

once hosted a large community computer centre; NOC in Liverpool continues to be the main location for the British Oceanographic Data Centre.

The celebration was organised by NOC and the University of Liverpool, in association with the Centre for Port and Maritime History (University of Liverpool, Liverpool John Moores University and Merseyside Maritime Museum) and the Liverpool Institute for Sustainable Coasts and Oceans (NOC, University of Liverpool and Liverpool John Moores University). All the speakers came from NOC, the University of Liverpool and Liverpool John Moores University.

Philip Woodworth began the meeting with an introduction including a brief history of the Liverpool Tidal Institute. That was followed by a talk on the science behind the ocean tide by David Pugh, and then a discussion of opportunities in the UK for extracting tidal energy, by Judith Wolf.

After a coffee break (and a short pause for a fire alarm) there was a presentation on the tides and the oceanography of our neighbouring seas by Jonathan Sharples. The difficulties of the Port of Liverpool in working with the large Mersey tides, even today, were explained by Simon Holgate. Chris Hughes then talked about tides and the Earth's climate, focussing on the work of three scientists with a local connection: Jeremiah Horrocks, Edmond Halley and Reginald Street. Finally, Andy Plater and Jason Kirby gave an overview of how sea levels are measured using geological techniques, taking measurements in Mersey salt marshes as examples, and of how rising sea levels might impact the area in the future.



*A young Arthur Doodson in the LTI's first office in the Holt Building on the Liverpool University campus*

All the talks mentioned above can be obtained as a pdf or video via the meeting webpage: <https://noc-events.co.uk/ocean-tide-and-port-liverpool>. I think everyone who attended the meeting enjoyed it, and we were helped by the nice weather. One reason for holding the event was to test whether there is an appetite locally for science talks on a Saturday morning. It seems that there is, so we are now thinking how other topics can be discussed at the Maritime Museum on future Saturdays.

On the same day as the Museum event, there was also an open day at the NOC building itself in Brownlow Street. This was also well attended, including by some people who took in both events. Amongst the interesting things to see at NOC are the two historical Tide Prediction Machines on permanent display. These two machines were used by Arthur Doodson, who succeeded Proudman as Director of the LTI. One of the machines was used to make tidal computations for the D-Day landings in World War II. Both machines can be inspected by signing up at <http://www.tide-and-time.uk/>

*The so-called 'Bidston Kelvin Machine', one of the Tide-Prediction Machines used at Bidston Observatory*



*Bidston Observatory in 2018 (Photo: Geoff Shannon)*



**Further reading**

Carlsson-Hyslop, A. (2011) *An anatomy of storm surge science at Liverpool Tidal Institute 1919–1959: forecasting, practices of calculation and patronage*. Thesis, University of Manchester. <https://www.escholar.manchester.ac.uk/uk-ac-man-scw:119810>

Cartwright, D.E. (1998) *Tides: A Scientific History*, Cambridge University Press.

Jones, J.E. (1999) From astronomy to oceanography: a brief history of Bidston Observatory, *Ocean Challenge* 9(1), 29–35

Woodworth, P. (1999) William Hutchinson: local hero, *Ocean Challenge* 8 (3), 47–51.

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**Structures in the Marine Environment (SIME 2020)**

Technology and Innovation Centre in Glasgow, 27 May

This interdisciplinary conference will again be jointly hosted by MASTS and INSITE

The programme and presentations from the 2019 event can be viewed at

<https://www.insitenorthsea.org/sime-2019/>

