



Report on Met Office buoy activities

DBCPC-28, Fremantle, Oct 2012

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Drifter activities

- Have budget line for drifter activities that includes support for E-SURFMAR plus a separate line to procure and deploy barometer drifters in the South Atlantic/Southern Ocean as a contribution to the global drifter array (supporting GCOS and NWP)
- Has enabled purchase of
 - Iridium drifters (contributing to the DBCP Iridium Drifter Pilot Project)
 - Drifters with lithium batteries (hope for up to 2x the normal SVP lifetime at ~1.3 x the normal SVP cost)
 - In FY11&12 15 HRSST-2 Iridium drifters with high precision SST sensors



South Atlantic/Southern Ocean drifters

- 5 MetOcean SVP-B drifters deployed in Southern Ocean, Dec 2005
- 4 MetOcean SVP-B drifters (with lithium batteries) deployed in South Atlantic, May 2007
- 5 MetOcean SVP-B Iridium drifters deployed in Southern Ocean, Dec 2007/Jan 2008
- 7 MetOcean SVP-B Iridium drifters deployed in South Atlantic, Oct/Nov 2008 (2 with lithium batteries)
- 10 MetOcean SVP-B drifters (9 Iridium, 1 Argos) deployed in South Atlantic, Oct/Nov 2009 (all with lithium batteries)
- 7 MetOcean SVP-P Iridium drifters deployed in Southern Ocean, Dec 2010/Mar 2011 (all with lithium batteries and YSI 46000 temperature probe)

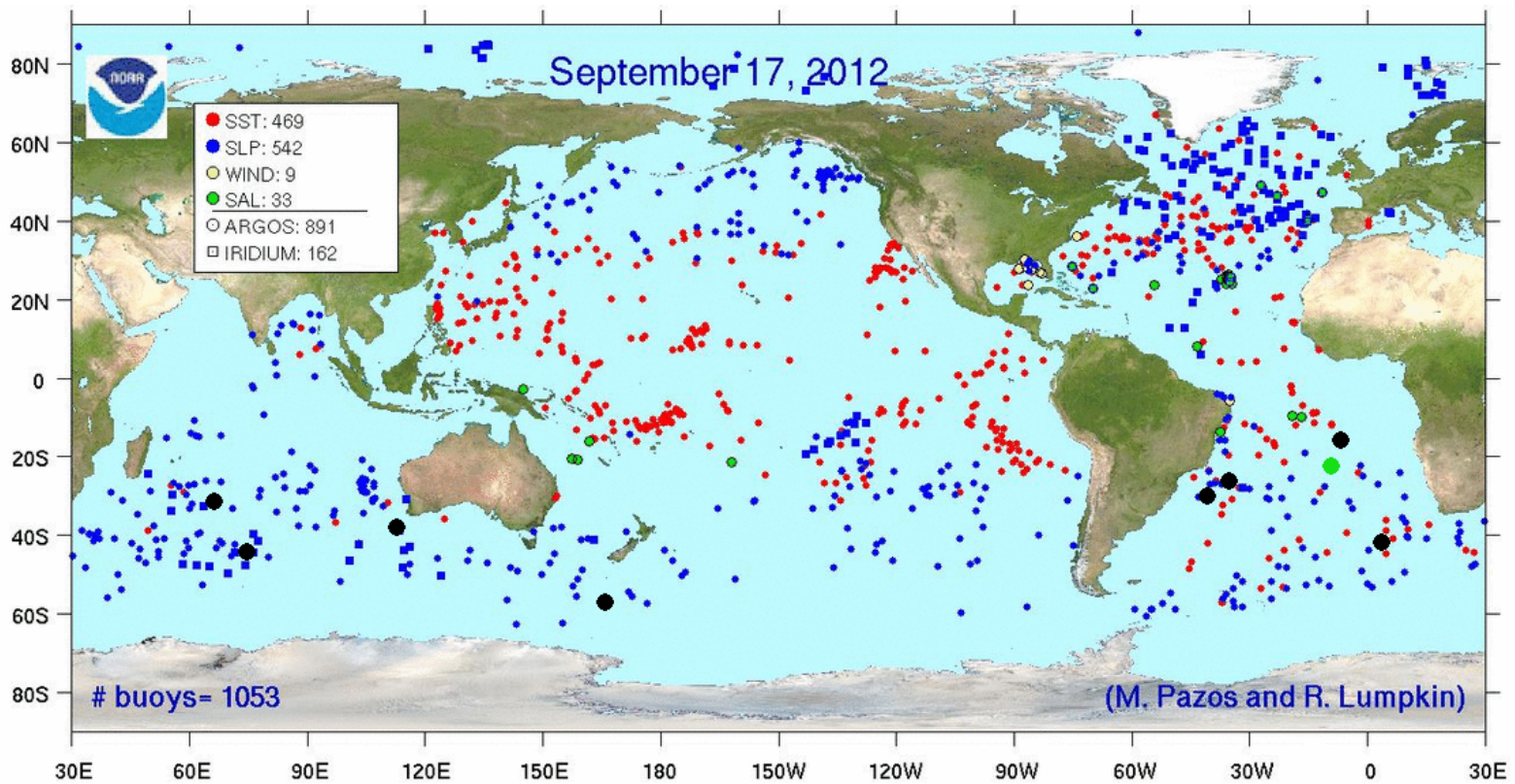


Drifters available for deployment

- 12 MetOcean Iridium SVP-B drifters available for deployment (9 with HRSST-2 upgrades)
- 9 MetOcean Iridium SVP-B drifters expected to be delivered Oct 2012 (6 with HRSST-2 upgrades)
- Planned deployments
 - 4 HRSST-2 drifters during RAPID cruise Oct/Nov (north-east Atlantic ~26N)
 - 3 HRSST-2 drifters from Eddystone (1 near Ascension, 2 west of the Canaries) Oct & Nov

Active drifters (at 17 Sept)

1 Argos drifter ●, 8 Iridium drifters ● – all with Li batteries

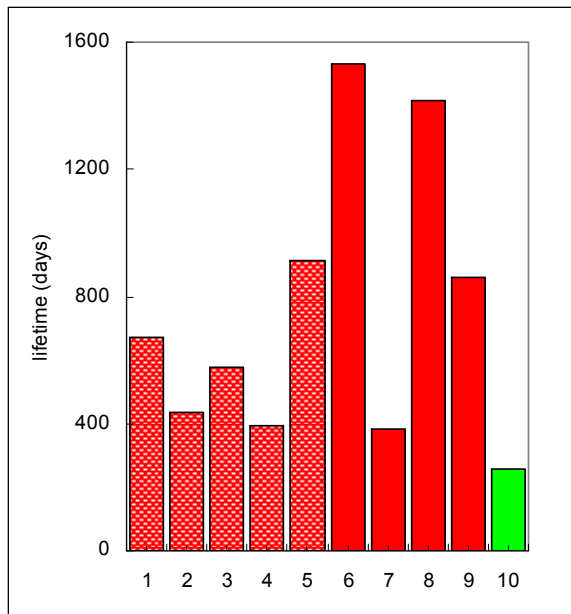




Drifter lifetimes

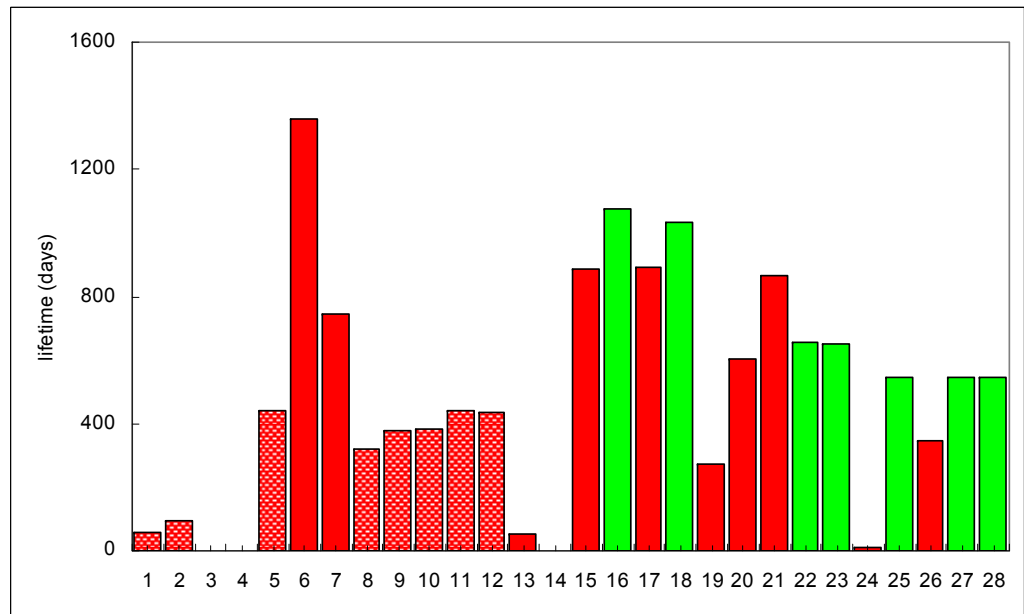
Expired drifters in red, active drifters in green
Hatched for alkalines, solid for lithiums

Argos drifters



Lifetime $\times 1.75$
(based on expired drifters excluding early failures < 100 days)

Iridium drifters

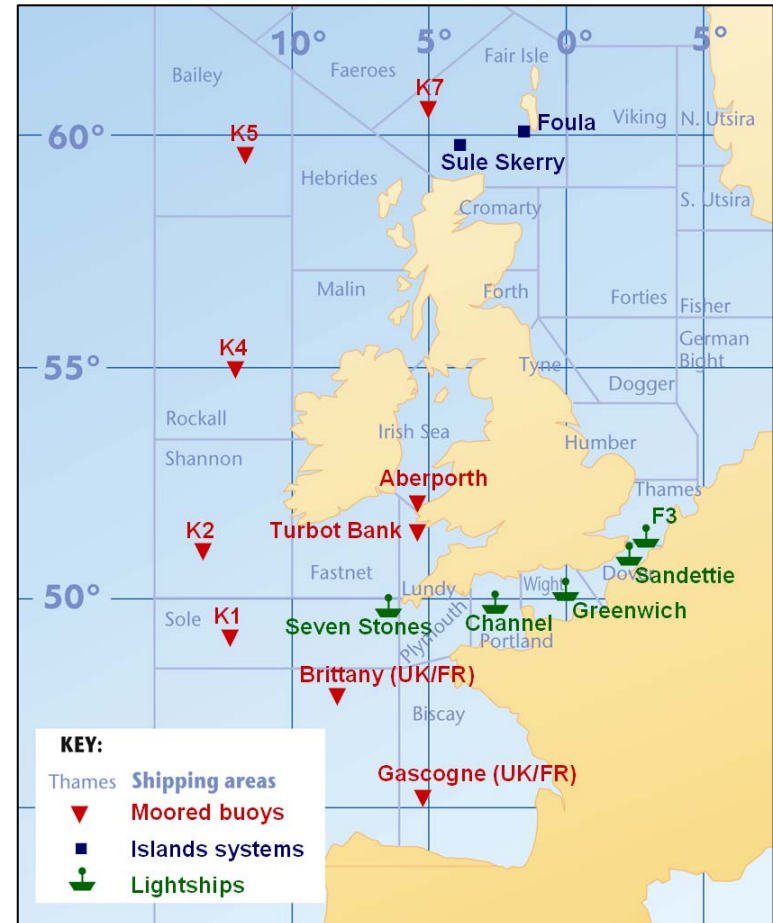


Lifetime $\times 1.86$
(based on expired drifters excluding early failures < 100 days)



Marine Automatic Weather Station (MAWS) network

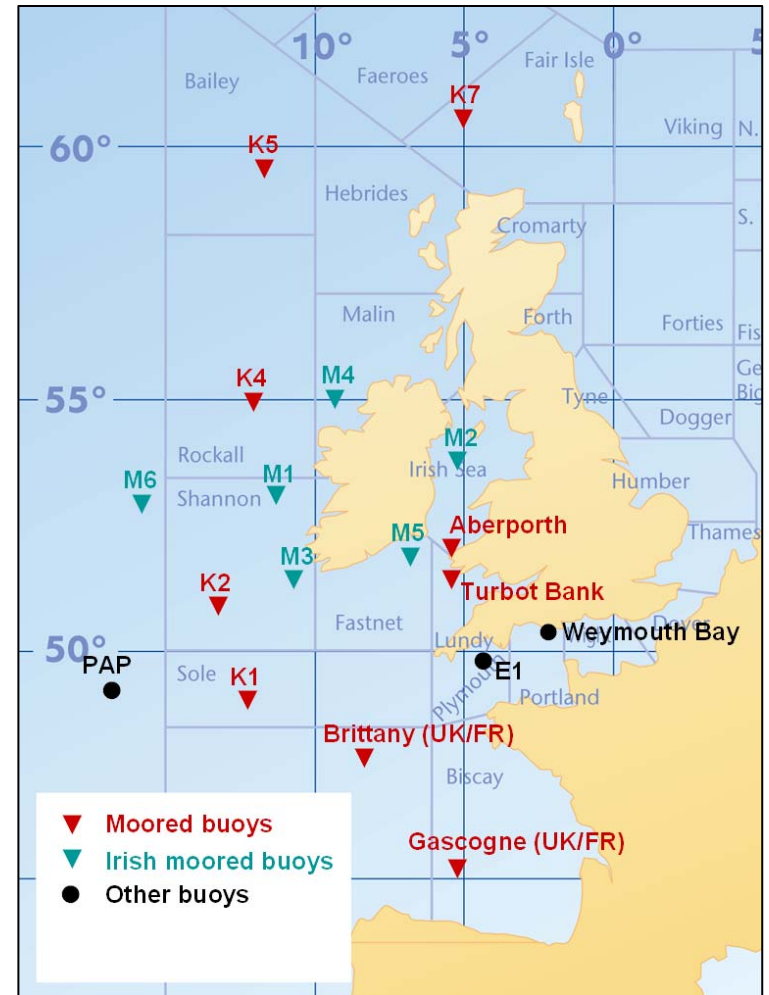
- Operational MAWS network presently comprises
 - 9 moored buoys
 - 5 light vessels
 - 2 remote islands





Moored buoy networks

- Met Office moored buoy network developed following the 'Great Storm' of 1987
- Brittany/Gascogne operated jointly with Météo-France
- K7 presently off-station
- Weymouth Bay operated for LOCOG (2012 Olympics)
- Met + oceanographic buoy operated at PAP with the National Oceanography Centre
- Met + oceanographic buoy being designed with Plymouth Marine Laboratory for operation at the E1 site in the Western Channel
- Provide support to Irish Marine Institute and Met Eireann on the Irish buoy network



The 'old buoys'

Basic design has been in operation since the early 90s

- 2.6 m diameter hull
- 6 m overall height
- 4,500 tonne weight
- 1.5 m diameter sensor ring with duplicate sensors attached with quick release clamps
- Cross-linked dual control electronics (CR10x/PC42) and communications systems for maximum resilience
- Wind sensors exposed at 3½ m above sea level

Mid-life upgrades

- Iridium (+ Meteosat DCP) comms
- Gill Windsonic anemometers





Met Office moored buoys

- Parameters measured include: wind speed and direction, max gust, air pressure, air temperature, relative humidity, sea temperature, significant wave height, average wave period
- All stations transmit observations hourly – 24 hours a day, 365 days a year
- 6-hourly spectral wave data from autonomous Triaxys system on K5, 3-hourly from Brittany (system on Gascogne has stopped) – limited by energy budget/solar charging in winter
- Weymouth Bay system providing 15-minute met data and 30-minute wave data (with directional information)



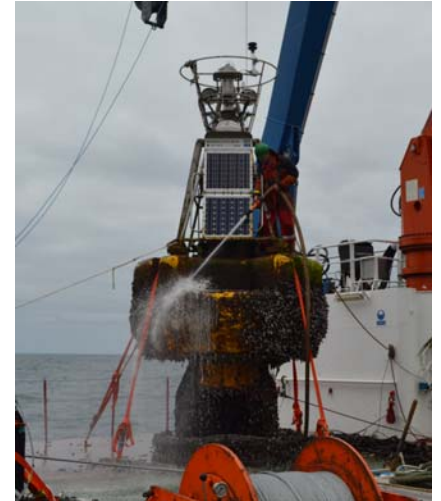
Spectral wave on K5

- Triaxys system originally deployed on K5 in August 2008, replaced in June 2011 with an autonomous spectral wave/Iridium system
- Current Triaxys systems return the 'first-5' spectral parameters over 32 frequency bands (as opposed to 123 bands on original system)
- Sampling periods for heave sensor and Triaxys now aligned and K5 data are being analysed – agreement looks to be closer than before (when sampling periods were not properly aligned)
- Triaxys data received via emails in NMEA (text) format, these are reformatted into a BUFR message for internal storage and dissemination on GTS (uses a short self-describing message for spectral wave data only as the met data are already in FM-13)



PAP buoy system

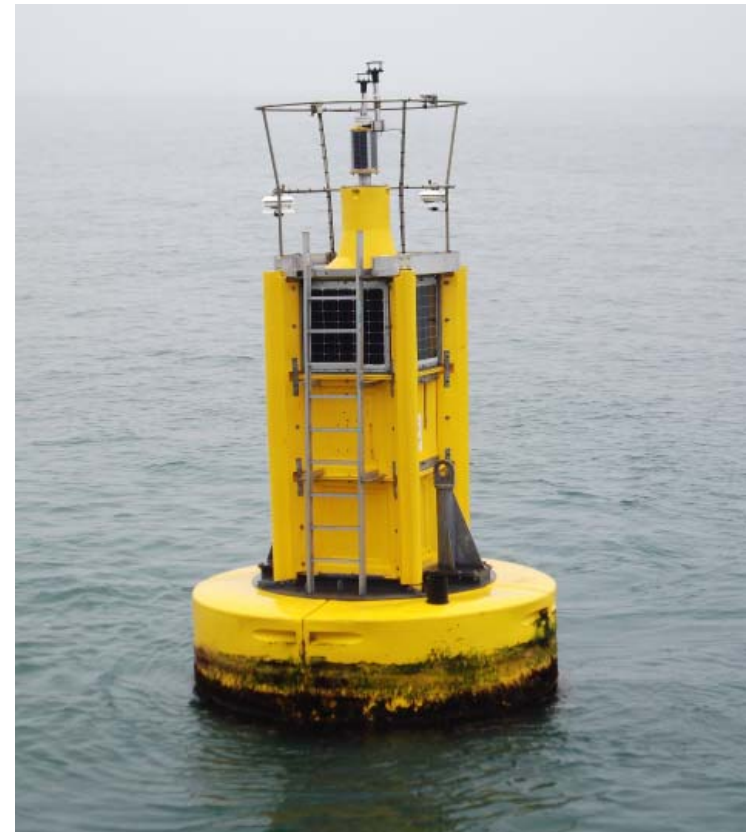
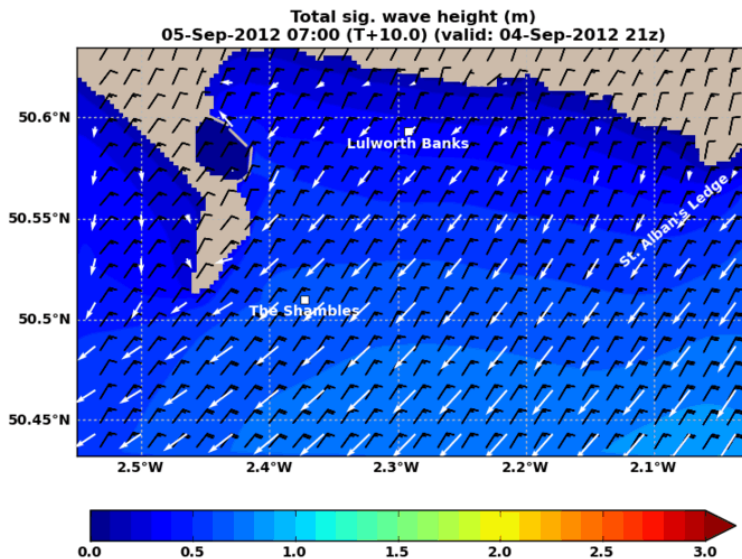
- Initially deployed June 2010: modified K-series buoy with a single met system as one side is used for NOCS systems to receive and transmit sub-surface data from a sensor frame at 30m below the buoy
- Replaced in May 2012 with a more resilient system having dual sensors, Axys Watchman DAS, autonomous Triaxys with more batteries/solar panels





Weymouth Bay 'Olympics' buoy

- Deployed in July 2011 to support the forecasting for the Olympic sailing events
- Sends met data every 15 minutes (directional wave data every 30 minutes)



Dual sensors, Axys Watchman DAS and Iridium TX systems and a Triaxys spectral wave sensor, on a DB-300 3m hull



New design Hydrosphere DB-8000 systems

- Built on 3m diameter Mobilis hulls
- #1 system deployed late March 2012 at Turbot Bank for testing
- Almost twice the battery capacity (>1300 ampere hours) of the K-series hulls (allowing sub-hourly obs)
- Space (a moon pool) for hosting a variety of oceanographic sensors
- #2 system (with dual Axys Watchmans, Triaxys and Iridium/Sutron DCPs) being built for deployment at K7
- #3 system with met + oceanographic capability to be built for E1 and operated in collaboration with PML





Other network developments

- Turbot Bank buoy operated for Milford Haven Port Authority, plan to replace existing K-series buoy with a DB-300 system with single Axyx Watchman, Iridium (and heave sensor for waves)
- If initial deployments of Hydrosphere DB-800 systems are successful then plan is to replace the K-series buoys with these new designs over the next 2-3 years (funding agreed)
 - Aim to use new Sutron DCPs as the primary transmission system with Iridium as a back-up
- Comparison of wave spectra from the larger buoys with Triaxys against a Datawell waverider remains an outstanding requirement
 - Datawell Mk-3 Waverider buoy purchased spring 2012 and now available for use



New design Hydrosphere DB-2000 system

- Smaller (1.9m) diameter Mobilis hull
- Single sensor system, Axys Watchman DAS and Iridium TX system to deliver 30-minute met (& SST) data for the NERC Ocean Surface Boundary Layer (OSBL) project
- Deployed from RRS Discovery in place of one of the four 2m marker buoys at the project site adjacent to the PAP mooring site
- Ceased transmitting ~5 hours after deployment, has 'vanished' – not known if it has been hit by a ship or sunk





Other sources of moored buoy data around the UK

- [Irish buoy network]
- Jersey Met Dept
- CEFAS SmartBuoys
- WaveNet
- Channel Coast Observatory



Jersey buoy

- Jersey buoy (62027), operated by Jersey Met Department
- Redeployed in autumn 2009, 20 minute met data, hourly wave data
- Data now going routinely to GTS

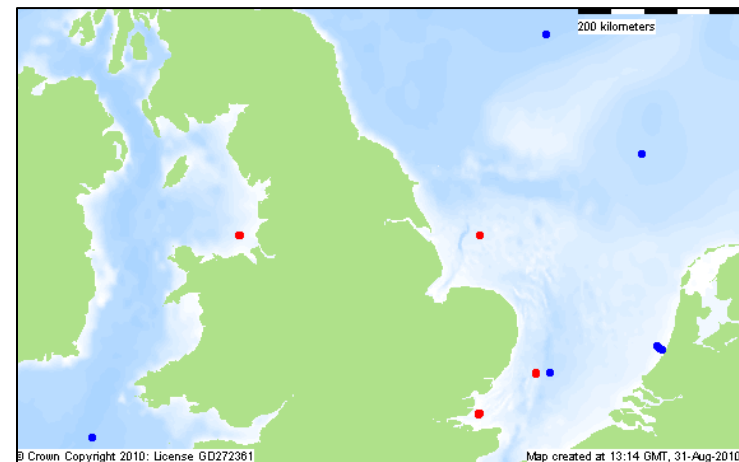




Met Office

CEFAS SmartBuoys

- Measurements include: temperature, salinity, chlorophyll fluorescence, suspended particle load, downwelling PAR, nutrients
- Data applications
 - Improved understanding of environmental variability
 - New insights into ecosystem function
 - Monitoring change in marine biodiversity
 - Ecosystem model validation and testing
 - Ecosystem early warning and forecasting
- Plan to work with Cefas to add a met package to the buoys

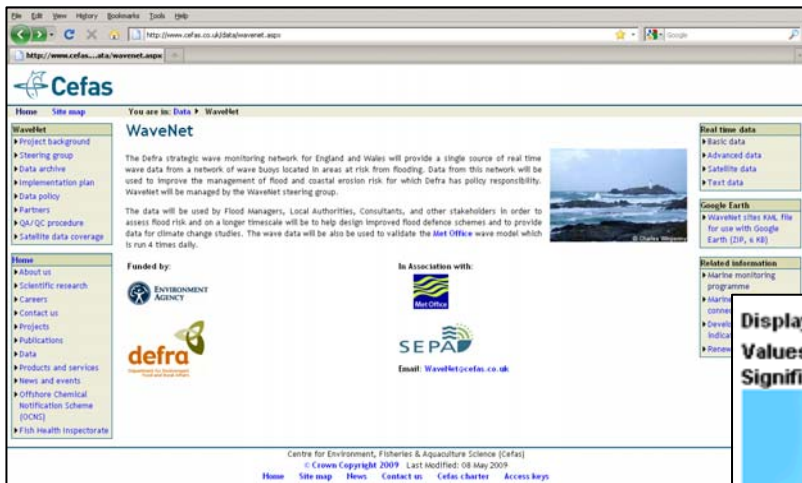




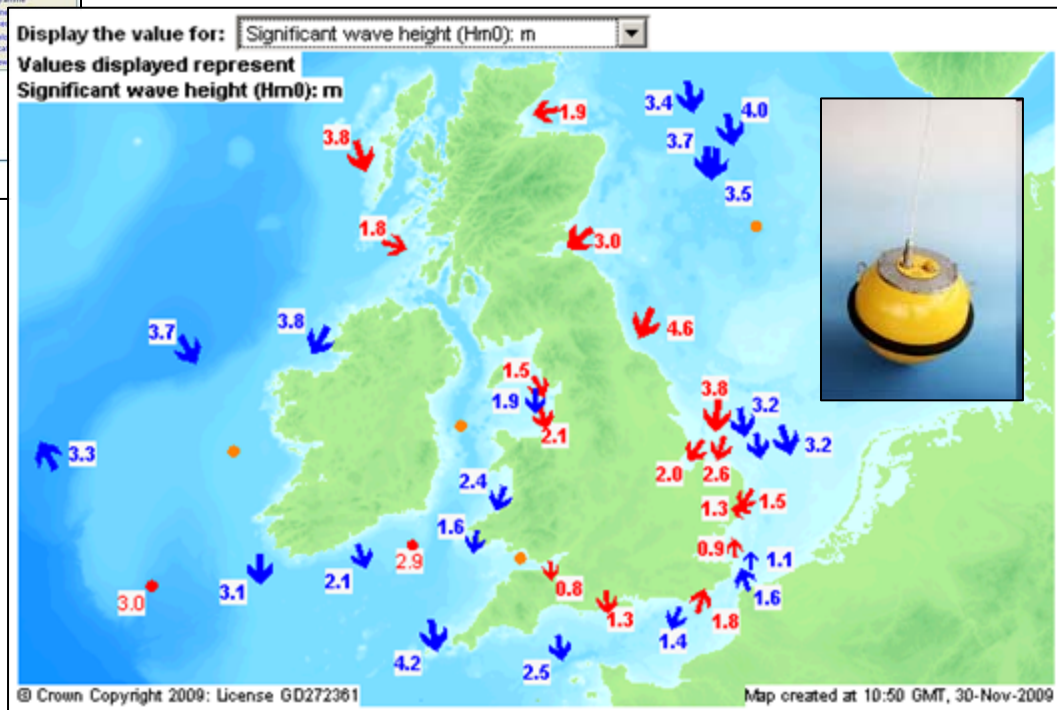
WaveNet

The Defra strategic wave monitoring network for England and Wales (now extended into Scotland)

www.cefas.co.uk/wavenet



Includes data from Met Office buoys and lightships, CEFAS wave buoys, Shell metnet platforms, Irish buoys, Environment Agency wave buoys etc.

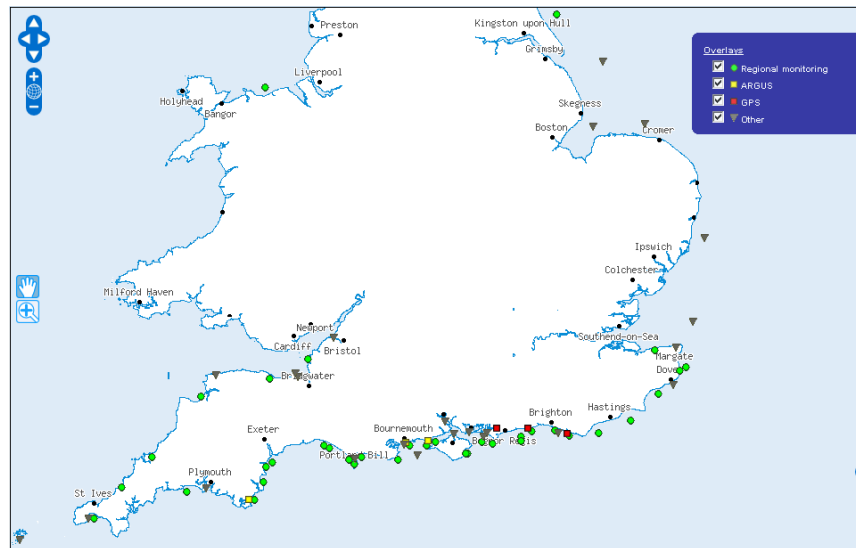




Channel Coast Observatory



- Collects observations made by various local authorities
- Real-time observations (waves, sea temperature, tide gauges) available via www.channelcoast.org





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