Report on Met Office buoy activities

DBCP-29, Paris, September 2013

Jon Turton, UK Met Office

Drifter activities

- Have budget for drifter activities that includes support for E-SURFMAR plus funding to procure and deploy barometer drifters mainly 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 (anticipate up to 2x the normal SVP lifetime at ~1.3 x the normal SVP cost)
  - Drifters with high precision SST sensors (contribution to the DBCP/GHRSST pilot project)

Drifter deployments

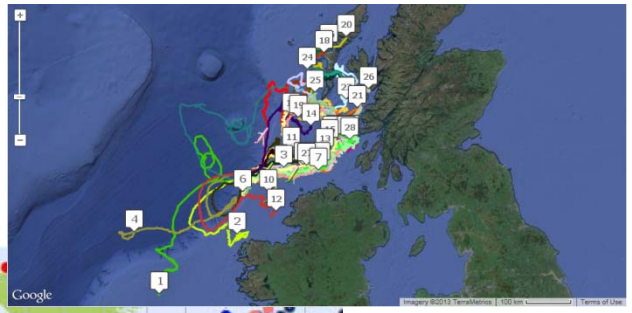
- 38 SVP-B drifters deployed (2005 to 2011) – 28 with Iridium
- 18 drifters deployed since last DBCP
  - 12 SVP-B HRSST-2 drifters deployed in North Atlantic
  - 1 SVP-B HRSST-2 drifter deployed in South Atlantic
  - 5 SVP-B drifters deployed in South Atlantic
- 17 drifters presently operating

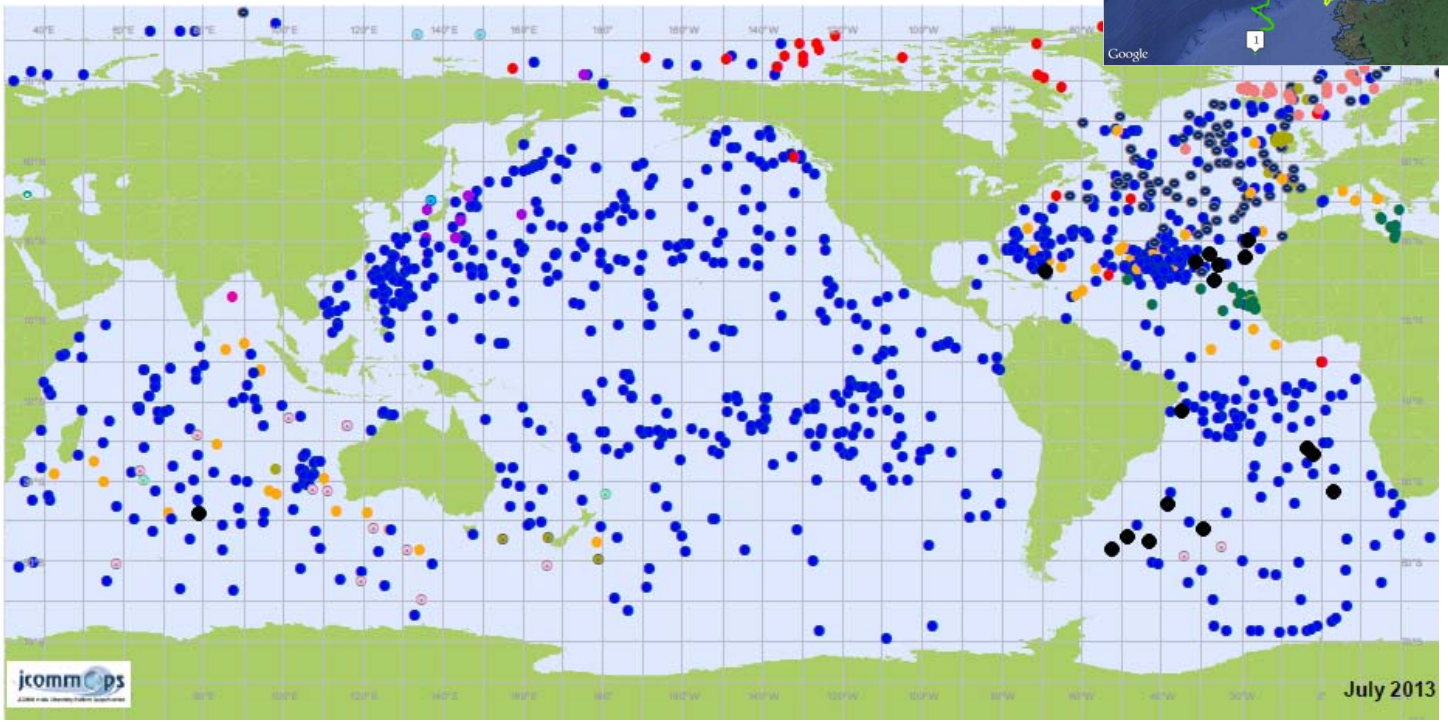
NERC FASTNEt (Fluxes Across Sloping Topography of the North East Atlantic) drifters

- 30 drifters (SST only) deployed in July
- 26 presently operating

Active drifters (at 29 May)

UKMO drifters ●, NERC drifters ●





Drifters available for deployment

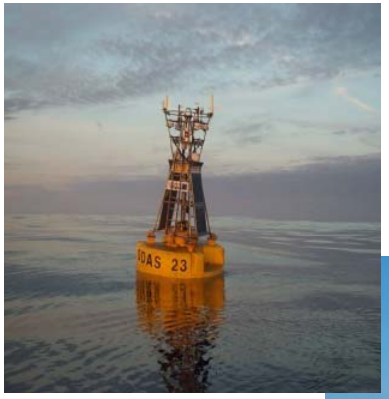
- 3 MetOcean Iridium SVP-B drifters
- 6 MetOcean Iridium SVP-B drifters with HRSST-2 upgrades

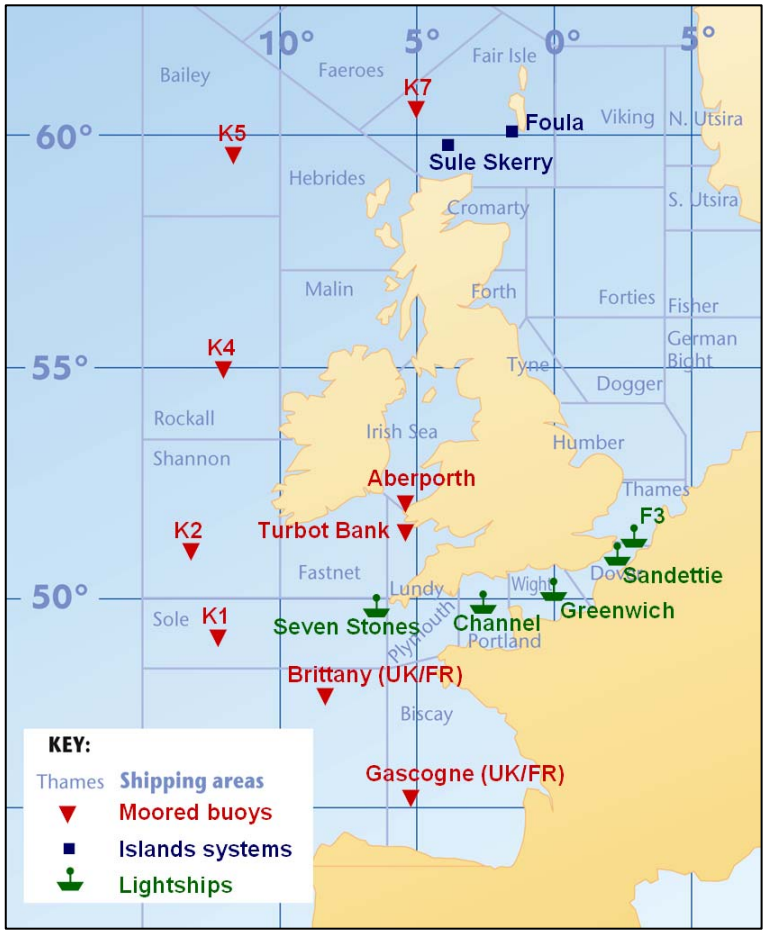
Drifter lifetimes

- Typically get ~ x2 lifetime for Iridium drifters when lithium batteries are fitted

Marine Automatic Weather Station (MAWS) network

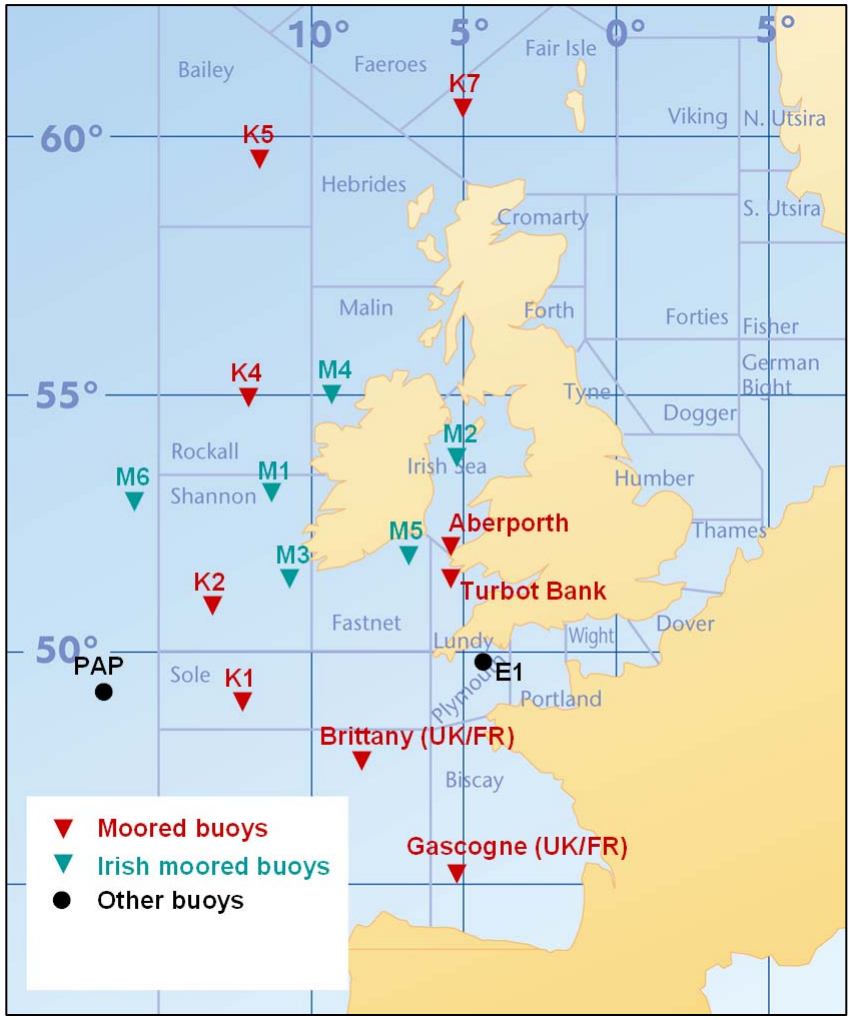
- Operational MAWS network presently comprises
  - 9 moored buoys
  - 5 light vessels
  - 2 remote islands





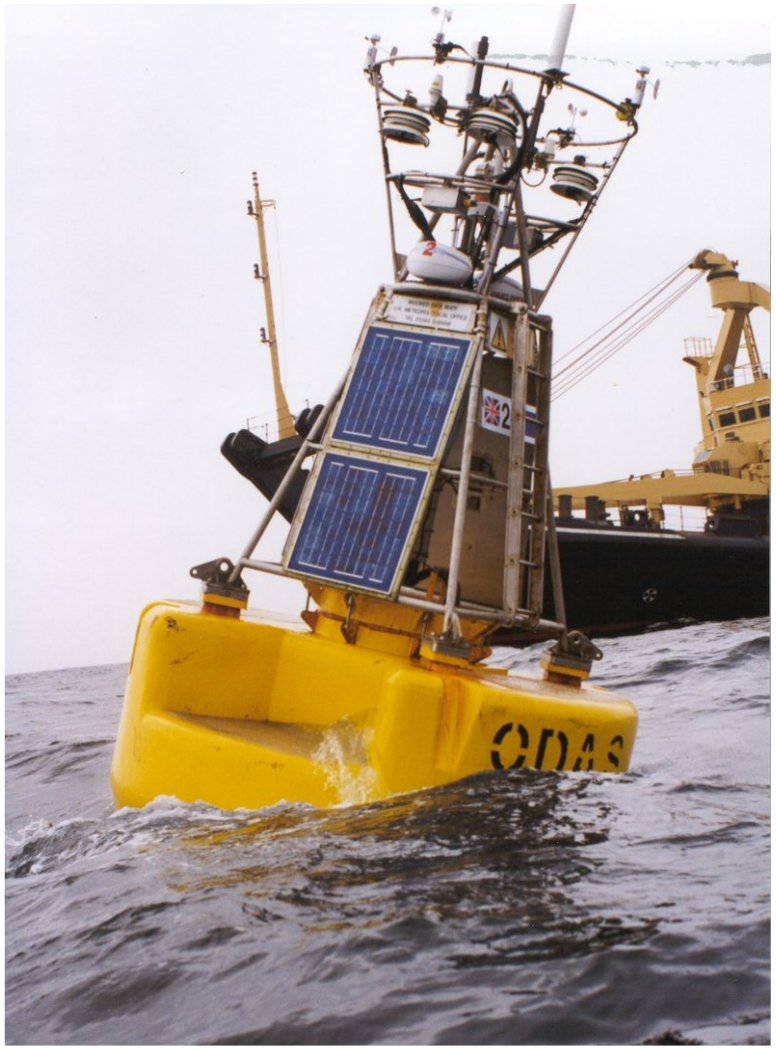
Moored buoy networks

- Met Office moored buoy network developed following the ‘Great Storm’ of 1987
- Brittany/Gascogne operated jointly with Méteo-France
- Jointly operated systems at
  - PAP with the National Oceanography Centre
  - E1 with Plymouth Marine Laboratory
- Collaborate with Irish Marine Institute and Met Eireann on the Irish buoy network



The ‘old buoys’

- Basic design has been in operation since the early 90s
- Dual sensors (other than for waves), cross-linked to dual electronics and satellite communications
- Mid-life upgrades in the late 2000s
  - Iridium SBD (+ Meteosat DCP) comms
  - Gill Windsonic anemometers
- Now being replaced by new buoy designs

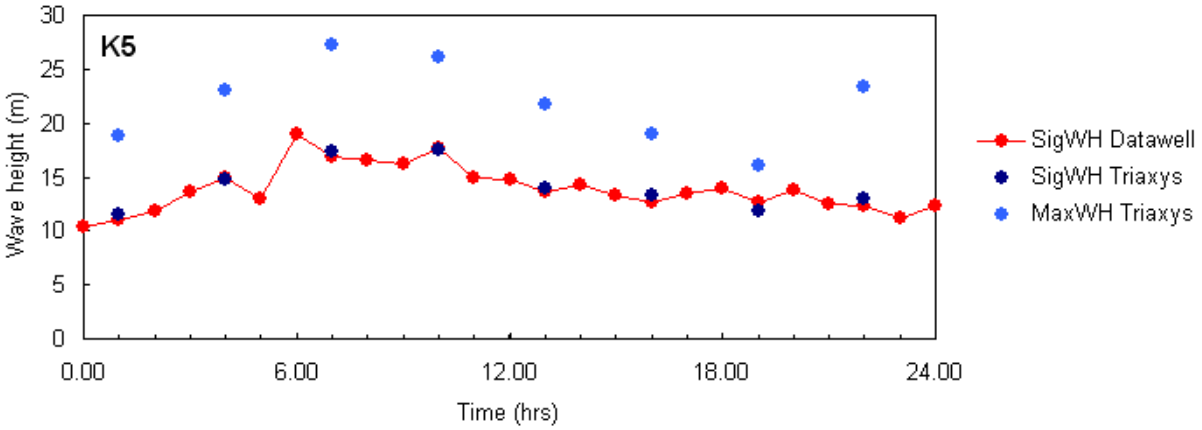


Met Office moored buoys

- Parameters measured include: wind speed and direction, max gust, air pressure, air temperature, relative humidity, significant wave height, average wave period
- All stations transmit their observations hourly – 24 hours a day, 365 days a year
- Designed to operate through extreme conditions

Severe waves in the north-east Atlantic, February 2013

Highest SWH at K5 of 19m with max WH of 27m

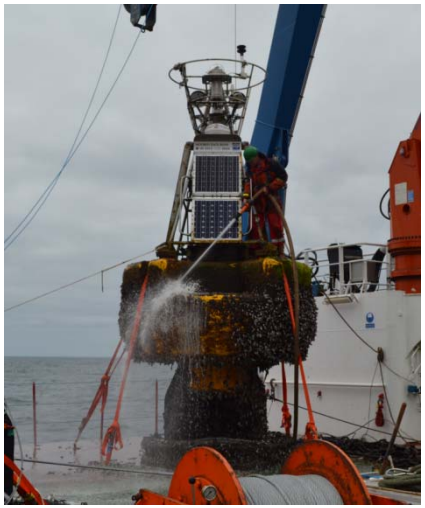


Spectral wave data

- Stand-alone Triaxys spectral wave sensors now returning hourly data from Brittany, Gascogne, K5, K7, Turbot Bank and E1
  - Returns ‘first-five’ parameters (energy, mean direction, principal direction, first and second-moment directional spread) over 32 frequency bands
  - Triaxys data disseminated on GTS in a short self-describing BUFR message
- Integrated spectral wave system on PAP sending hourly data (standard Triaxys hex output over 0.05 KHz bands) alongside the Watchman metocean message

PAP buoy system

- Initially deployed June 2010 at NOCS PAP OceanSITES mooring site
- Modified K-series buoy with a single met system as one side is used by NOCS to receive and transmit sub-surface data from a sensor frame 30m below the buoy
- Replaced in May 2012 with a more resilient system having dual sensors, Axys Watchman DAS and Triaxys with more batteries/solar panels
- Came adrift 29th Dec 2012 in high waves (some collision damage) and recovered. Repaired system redeployed in April and presently operating

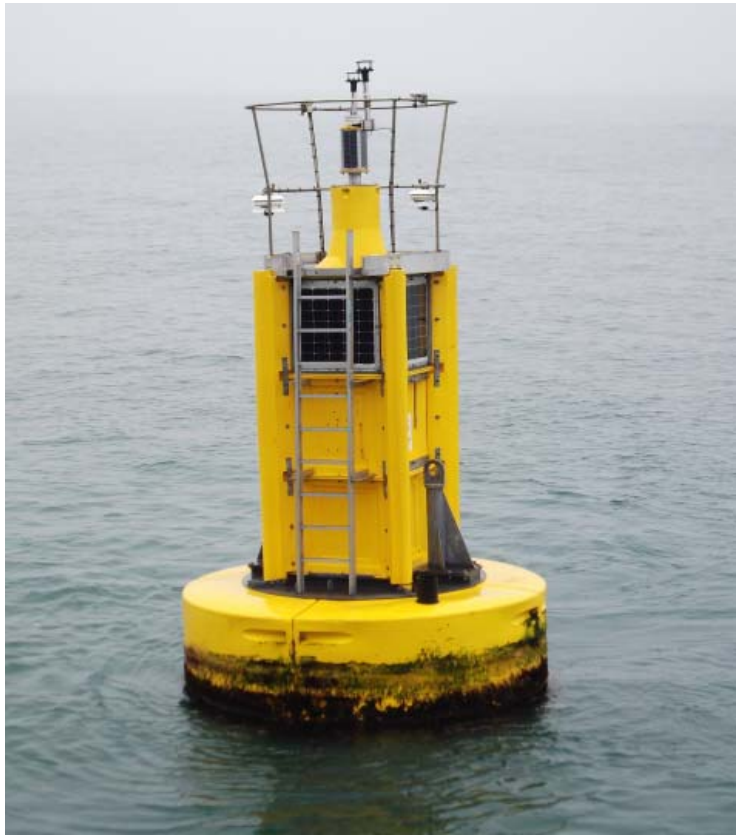


New design Hydrosphere DB-8000 systems

- First operational system deployed at K7 end Nov 2012
  - 3m Mobilis hull, dual met systems, dual Axys Watchman data collection systems, dual Iridium comms and an autonomous Triaxys system
  - Almost twice the battery capacity (>1300 ampere hours) of the old buoys
- Second system deployed at E1 in June in collaboration with Plymouth Marine Laboratory
  - one side used for met, the other for oceanography (temperature, salinity, dissolved oxygen, chlorophyll fluorescence, turbidity, CDOM, nitrates, PAR)
  - modified design to allow a sub-surface sensor cage to be winched into/out of the water for cleaning the sensors
  - autonomous Triaxys/Iridium system for directional spectral wave measurements

Turbot Bank buoy

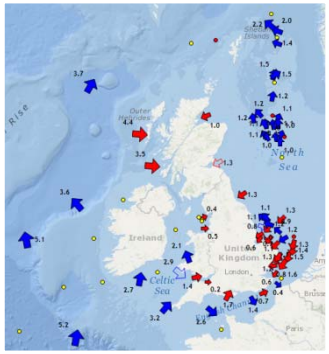
- Operated for the Milford Have Port Authority
- Single Axys Watchman with Iridium system and an autonomous Triaxys spectral wave sensor, on a DB-300 3m hull
- Deployed March 2013

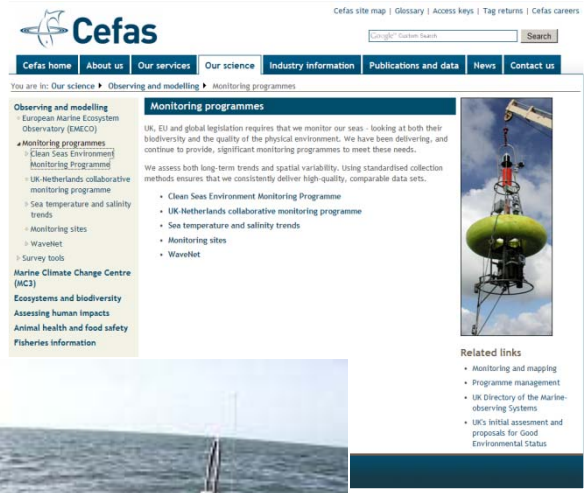


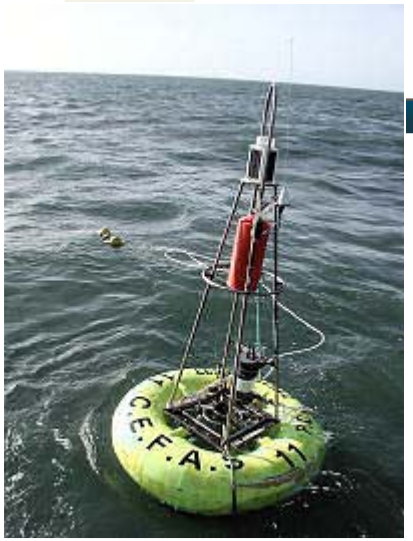
Other network developments

- Deploy standard K-type buoy with Triaxys in the Celtic Sea in November in support of the CANDYFLOSS project (1 year deployment)
- If the Hydrosphere DB-8000 systems prove to be sufficiently robust then plan is to replace the offshore K-type buoys with these over the next 2-3 years (funding agreed)
  - K7 system has operated through waves with 15m SWH and 25m MWH
  - Need to inspect the buoy before the winter
- 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
  - Plan to deploy initially at Aberporth to compare against a K-type buoy

Cefas WaveNet and SmartBuoys







Plan to investigate potential to fit Met Office AMOS to the SmartBuoys