



# The Met.Office

**Some preliminary results from a Met. Office  
Open Ocean Buoy fitted with a TRIAXYS  
wave sensor**

**By**

**Wynn Jones, Simon Keogh**

# The Met. Office marine AWS network



# Open Ocean Buoy



- 3m diameter hull
- 6m overall height
- 4m sensor exposure height
- Closed cell foam floatation + self coloured elastomer skin
- Stainless steel superstructure
- Single point lifting eye
- 1.5m diameter sensor ring
- Duplicate sensors attached with quick release clamps
- ARGOS antenna on hatch cover

# Open Ocean Buoy



## Variables Measured

- Wind speed & direction
- Barometric pressure
- Air temperature
- Relative humidity
- Sea temperature
- Significant wave height and period

# Wave measurements

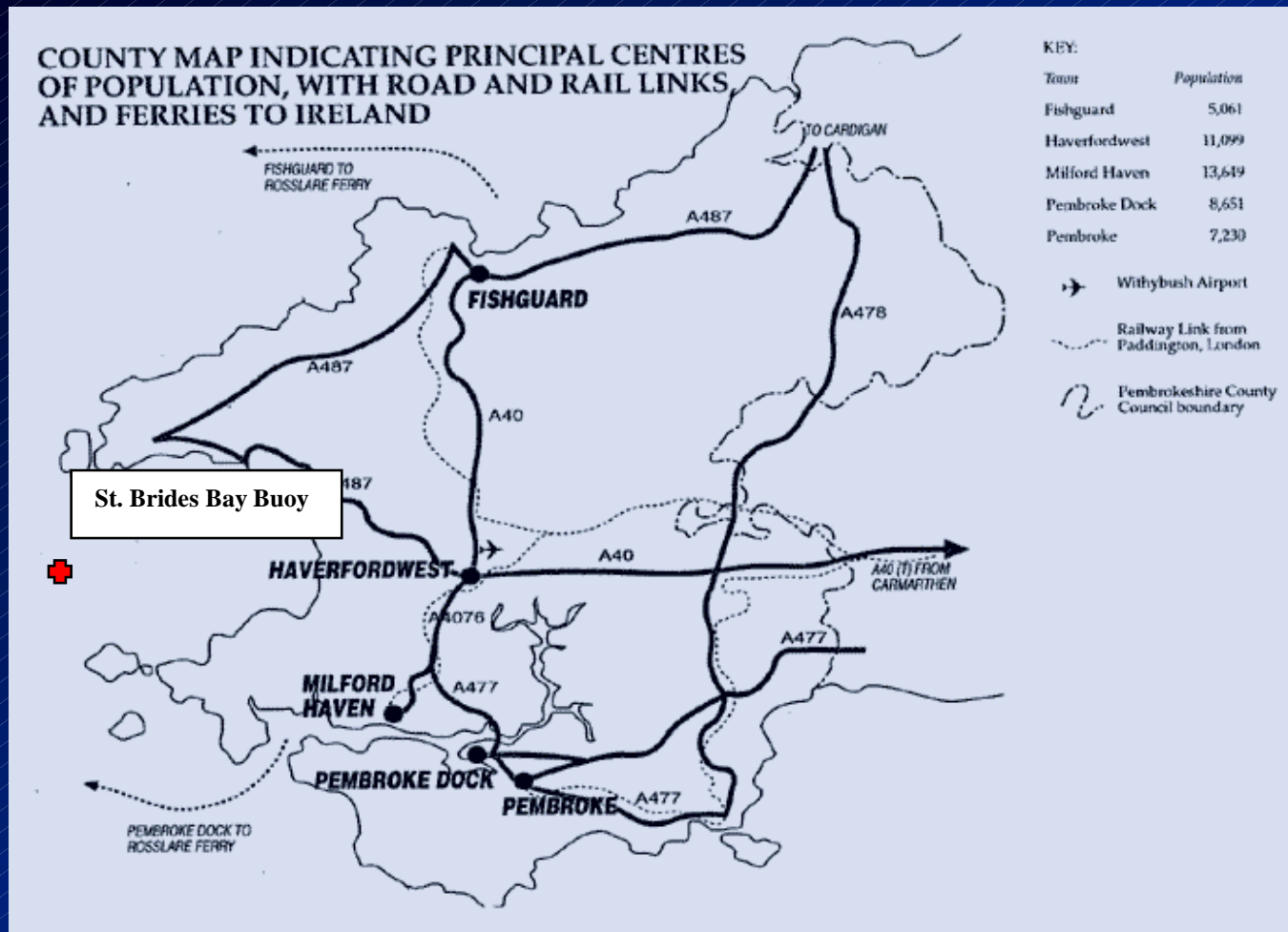
- At present, significant wave height and period derived from a single Datawell heave sensor fitted inside the buoy hull
- To determine the suitability of the buoy for directional spectral wave measurements The Met.Office commissioned an analysis of the buoy's dynamics in a variety of wave and current conditions for the standard mooring configurations



# Wave sensor trials

- TRIAXYS wave package selected as a suitable sensor for directional spectral measurements
- Fitted to an Open Ocean Buoy within the superstructure.
- Buoy deployed in St Bride's Bay, SW Wales (51°47.8'N, 5°19.3'W)
  - Open to the South West
  - co-located with a datawell wave-rider buoy owned by the countryside council for Wales
  - suitable shore site available for radio telemetry of the TRIAXYS wave data
  - relatively accessible

# St. Brides Bay, SW Wales.



# TRIAXYS wave buoy



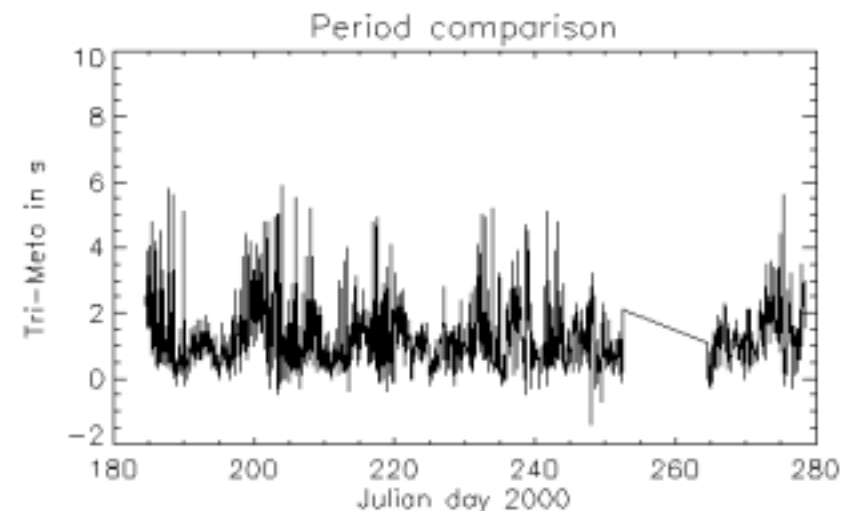
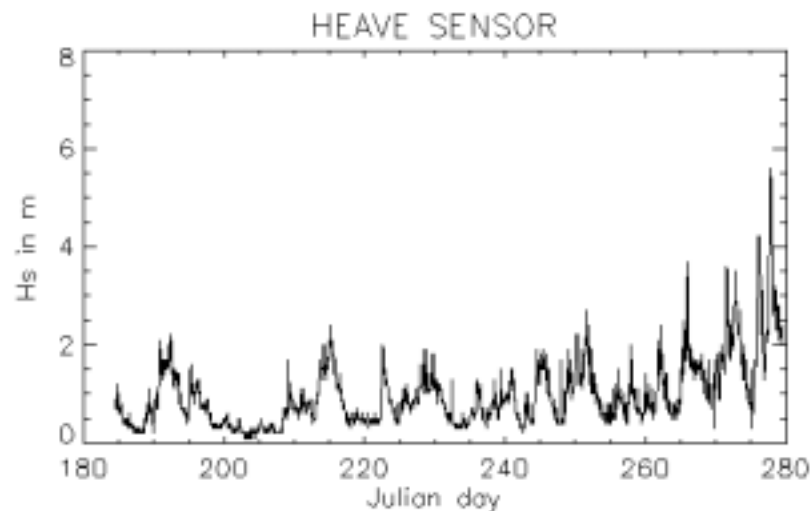
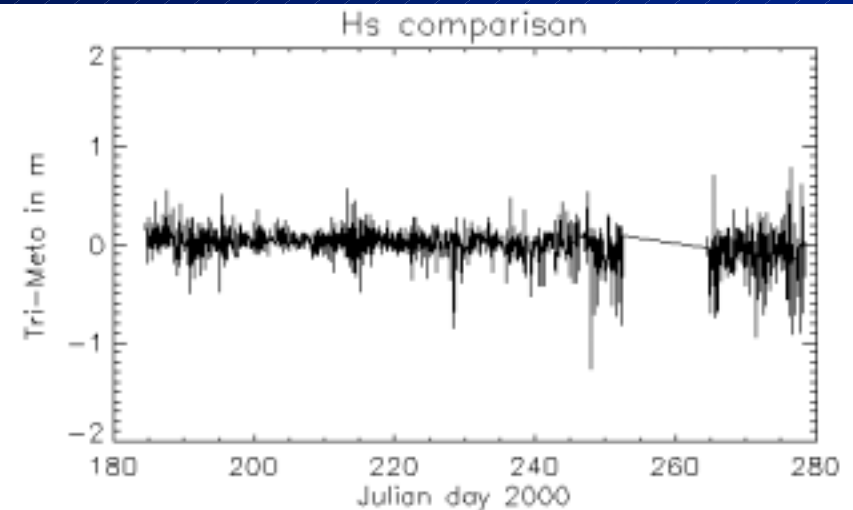
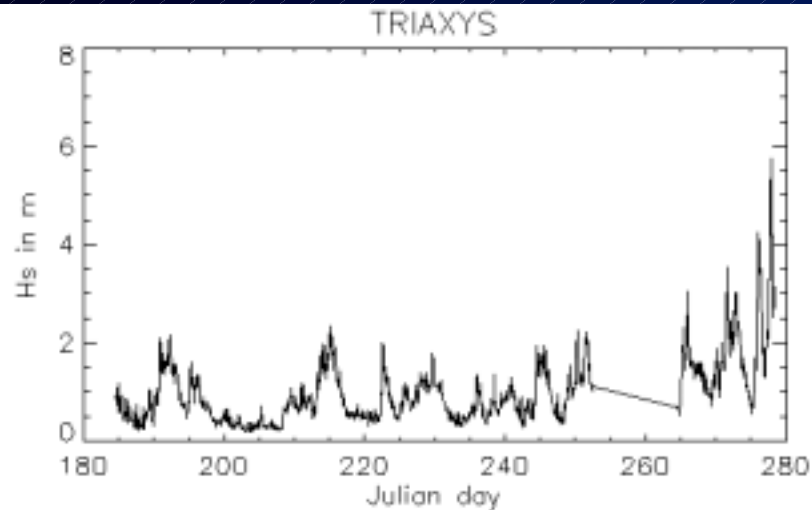


# Data analysis

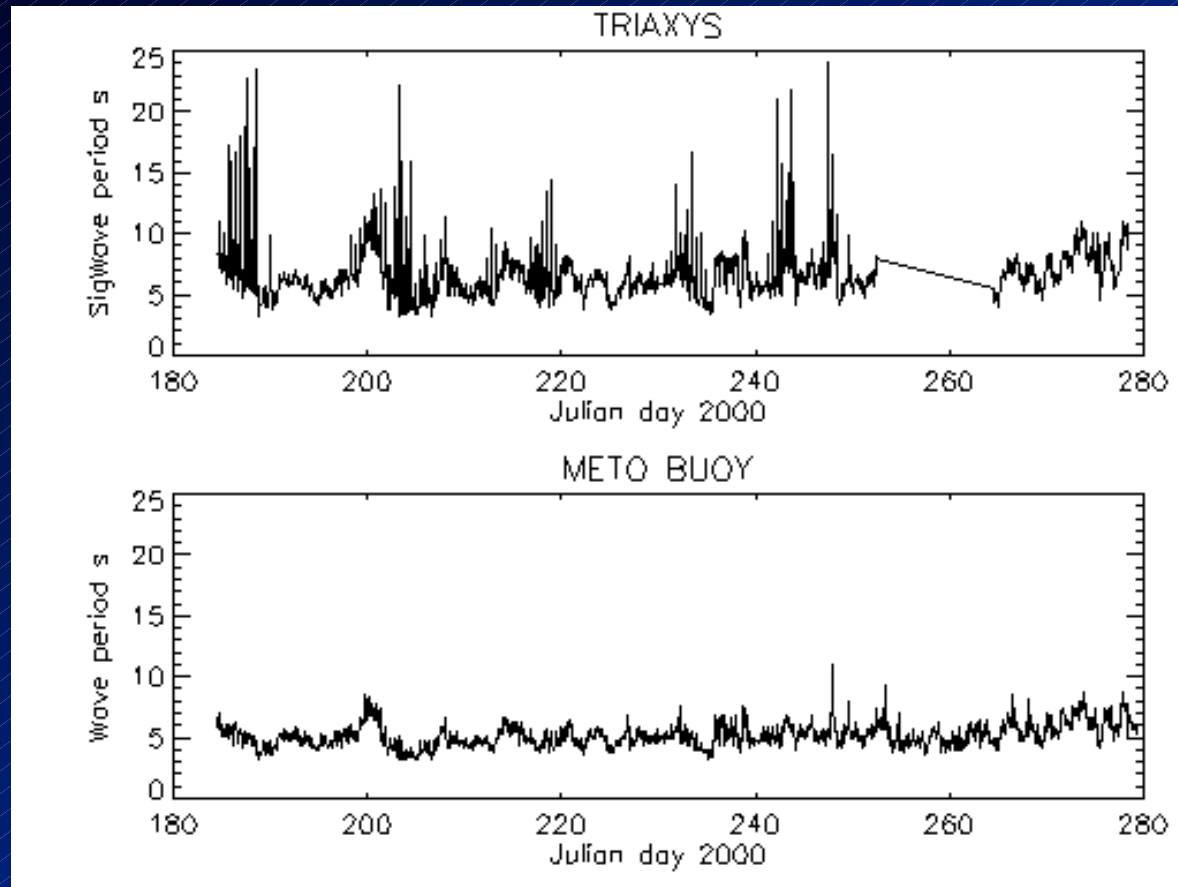
## Results will include:-

- comparison of sig wave height and period from TRIAXYS wave sensor and on board heave sensor
- comparison of sig wave height and period from TRIAXYS wave sensor and nearby waverider
- comparison of wave direction from TRIAXYS wave sensor and waverider
- examples of spectral wave measurements from TRIAXYS sensor

# comparison of significant wave height from OOB/TRIAXYS wave sensor and on board heave sensor

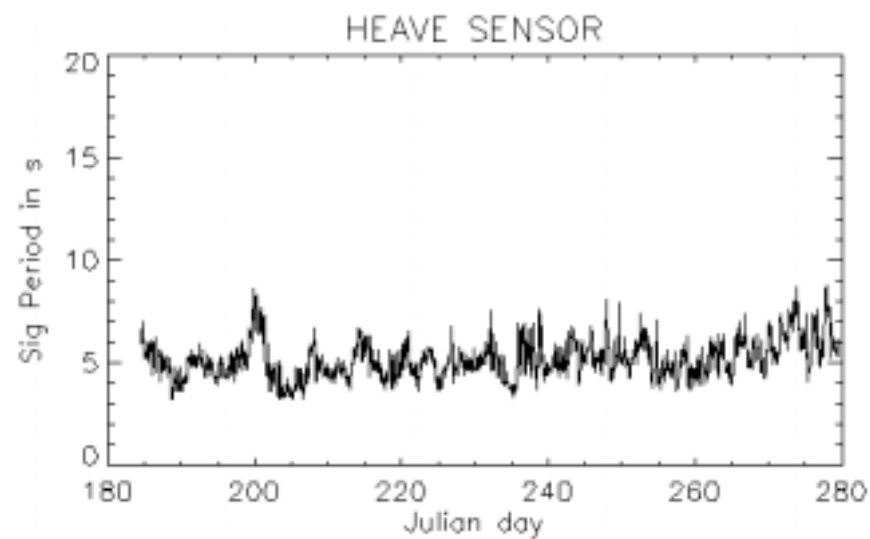
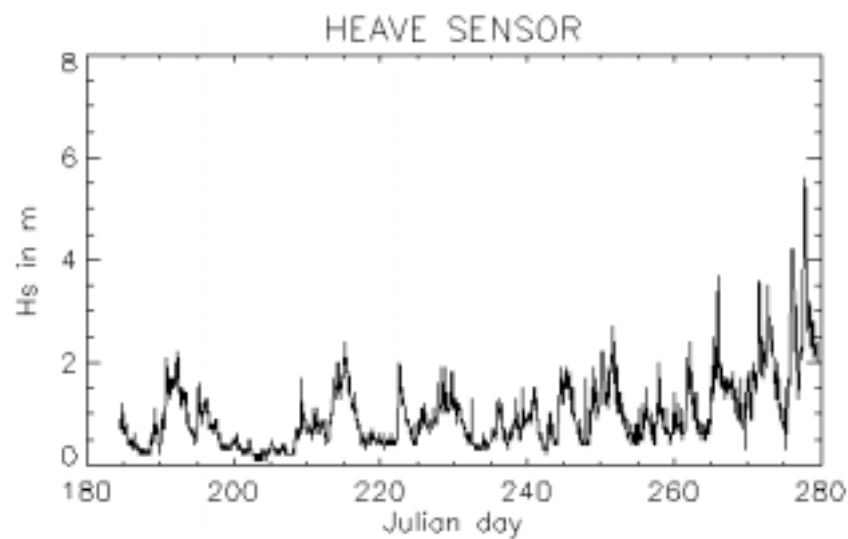
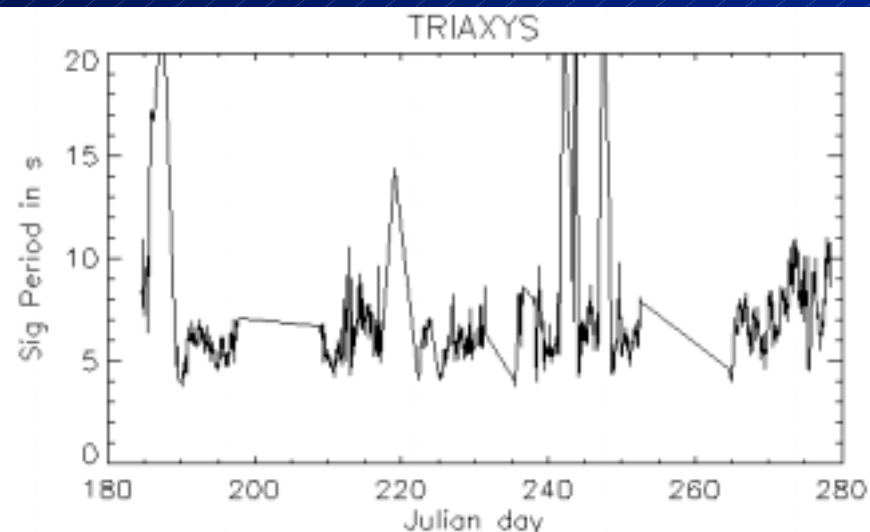
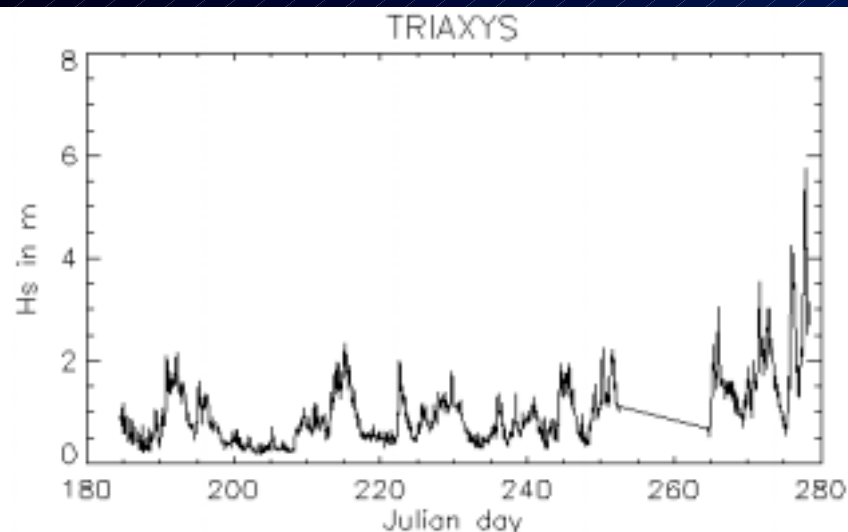


## comparison of period from OOB/TRIAXYS wave sensor and on board heave sensor



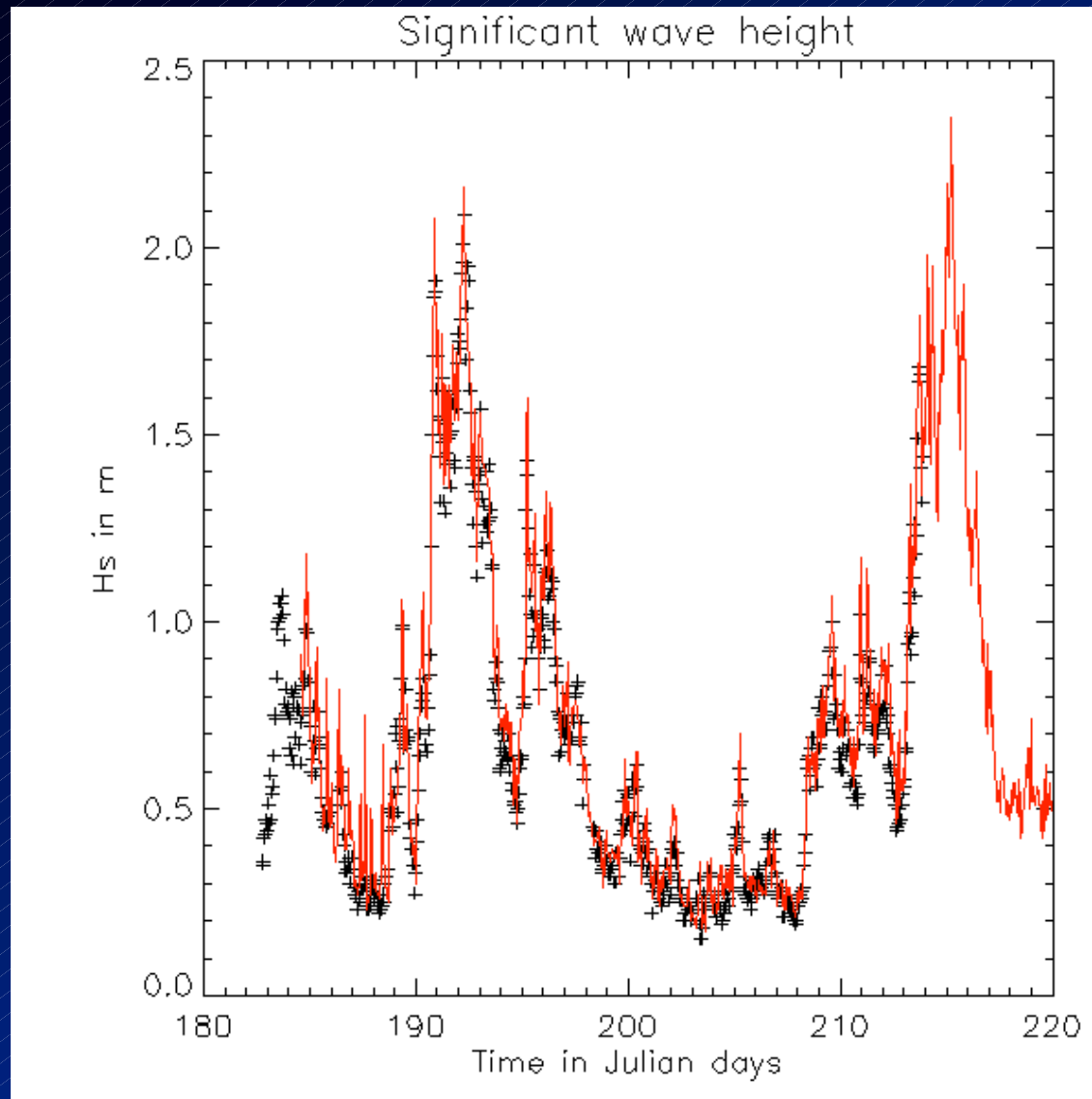
**Note 1: Triaxys data has spurious spikes (period > 10s) which occur at times when the sig wave height is < 1.4 meters. This is due to a known software problem which the manufacturers claim has been solved.**

# comparison of wave period from OOB/TRIAXYS wave sensor and on board heave sensor



\* See note 1.

# comparison of significant wave height from OOB/TRIAXYS wave sensor and nearby waverider

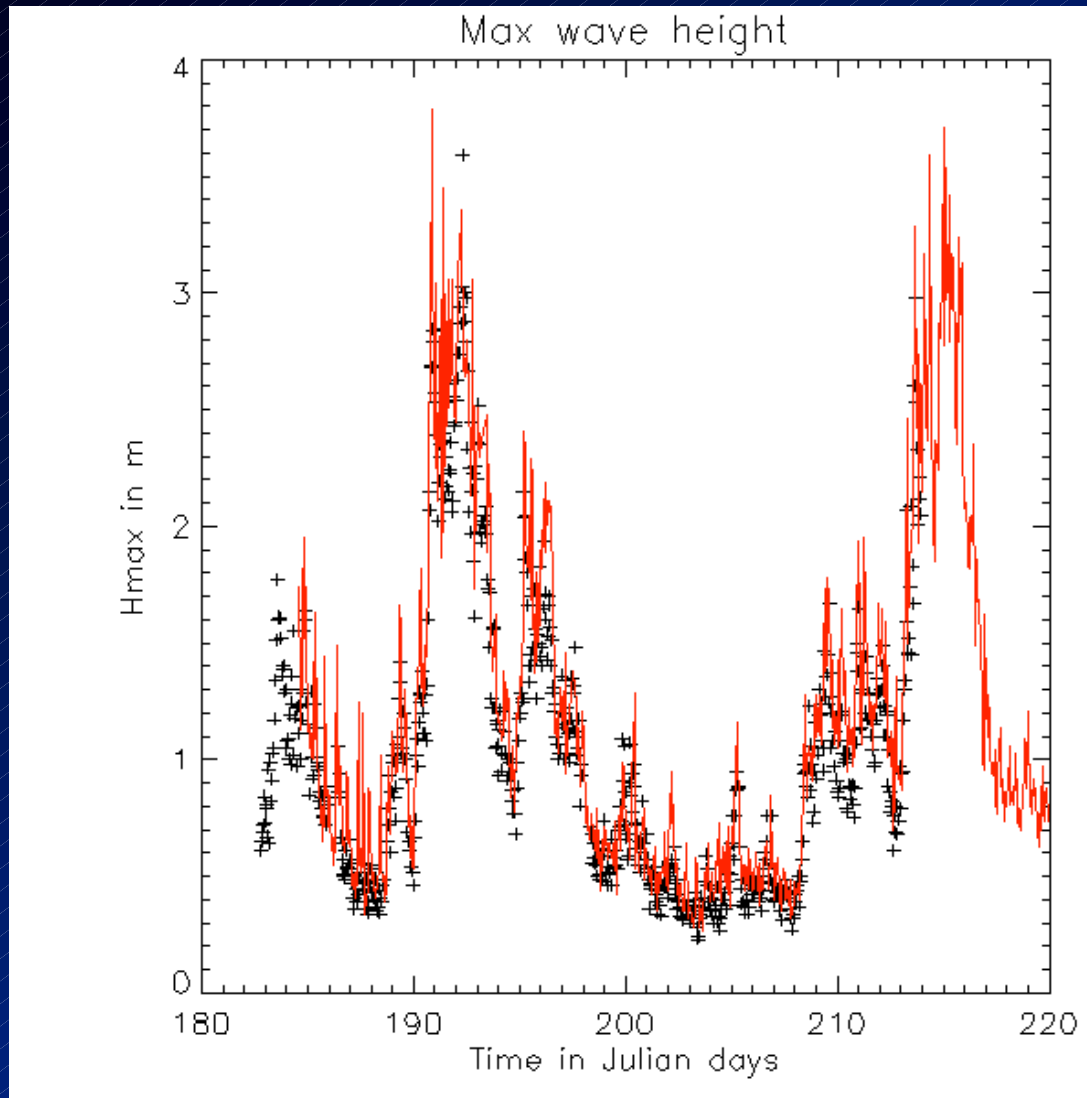


— TRIAXYS

+ Waverider



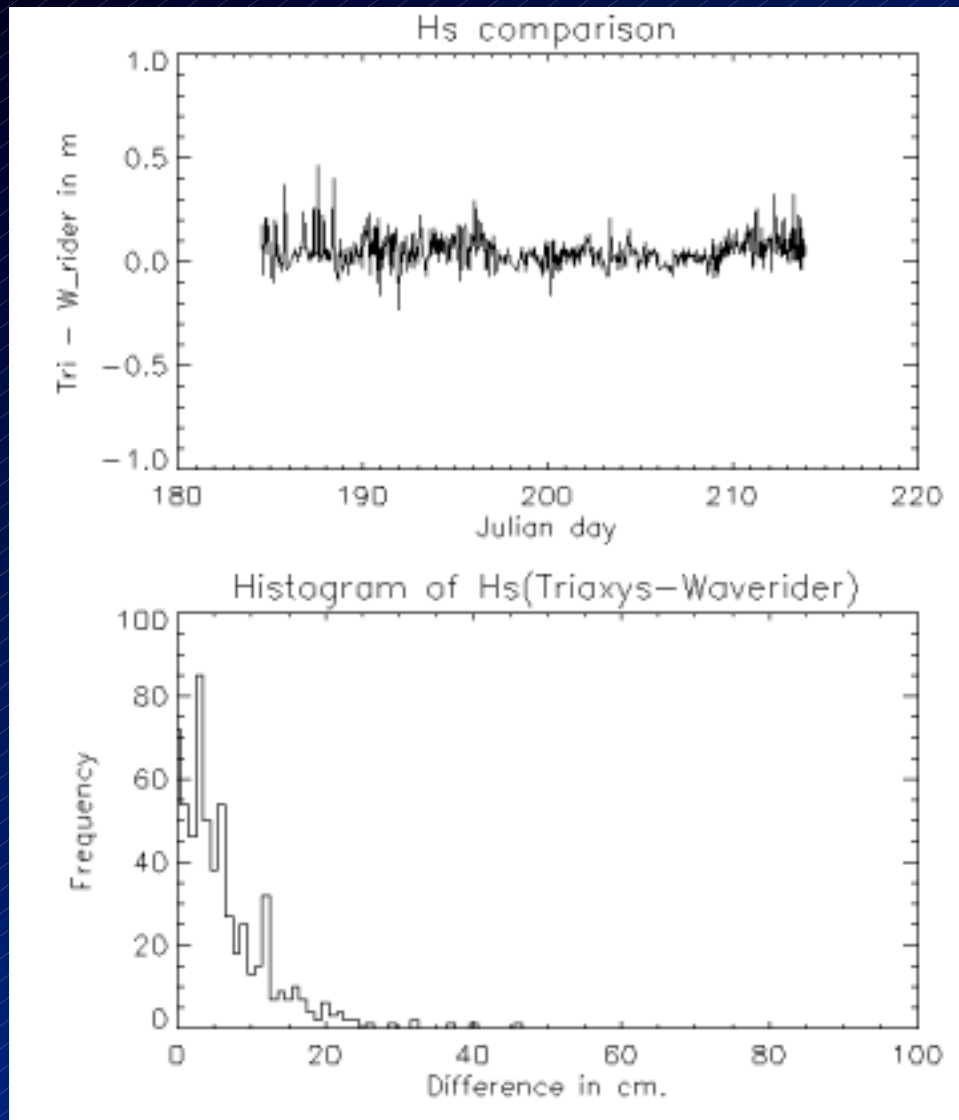
# comparison of Maxwave height from OOB/TRIAXYS wave sensor and nearby waverider



TRIAXYS

+ Waverider

# comparison of significant wave height from OOB/TRIAXYS wave sensor and nearby waverider

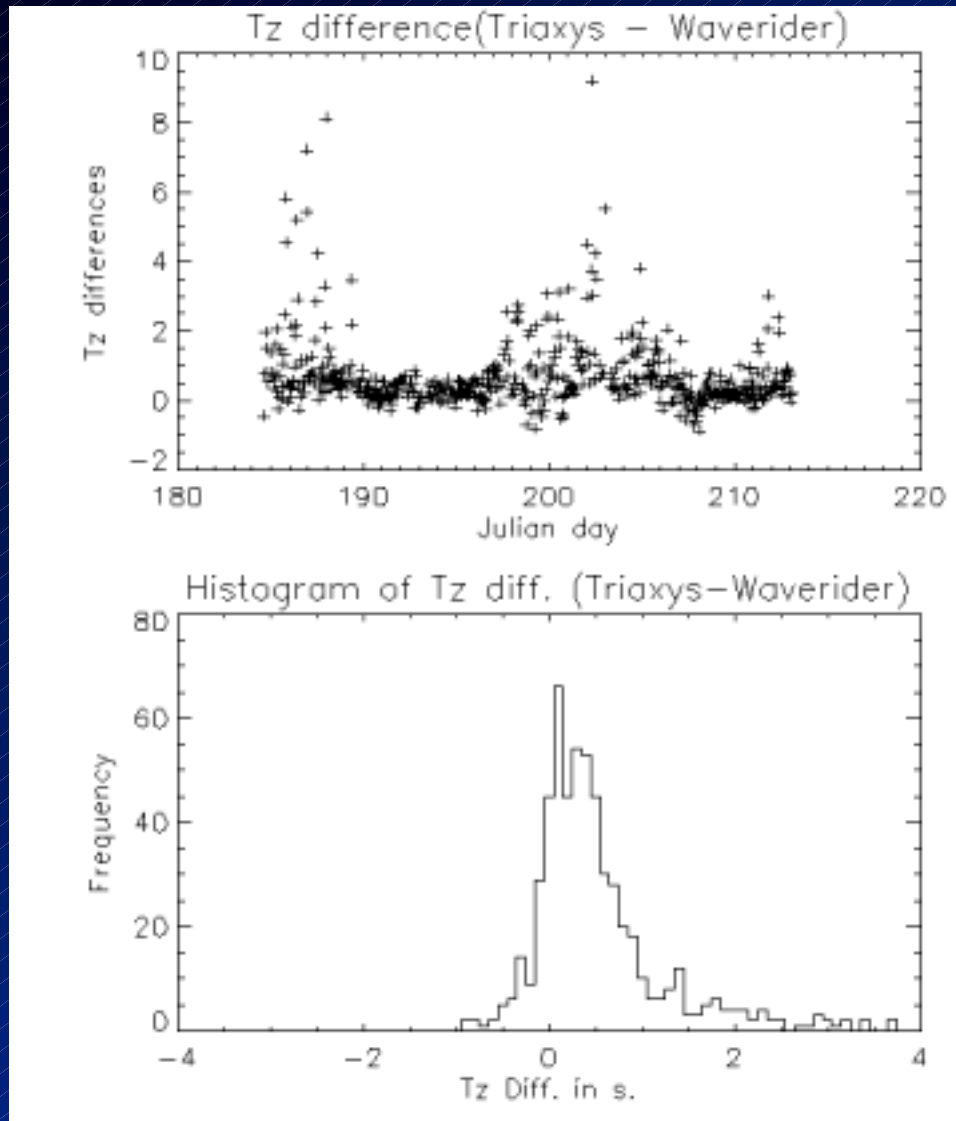


**Av diff = 0.06m**

**Sd of diff = 0.06m**

**median diff= 0.05m**

# comparison of wave period from OOB/TRIAXYS wave sensor and nearby waverider



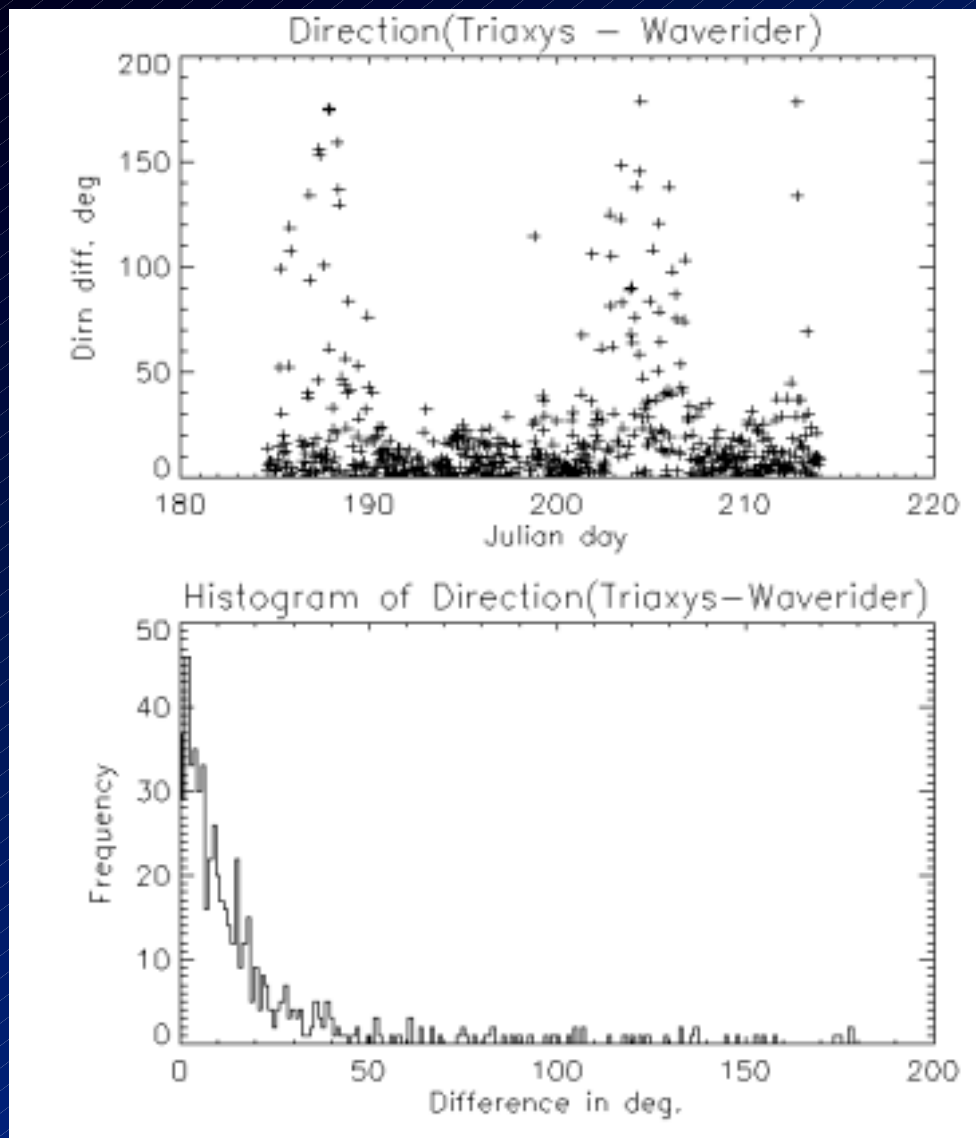
**Mean diff = 0.66sec**

**Sd of diff = 1.02 sec**

**median diff = 0.41sec**

**See note 1.**

# comparison of wave direction from OOB/TRIAXYS wave sensor and nearby waverider



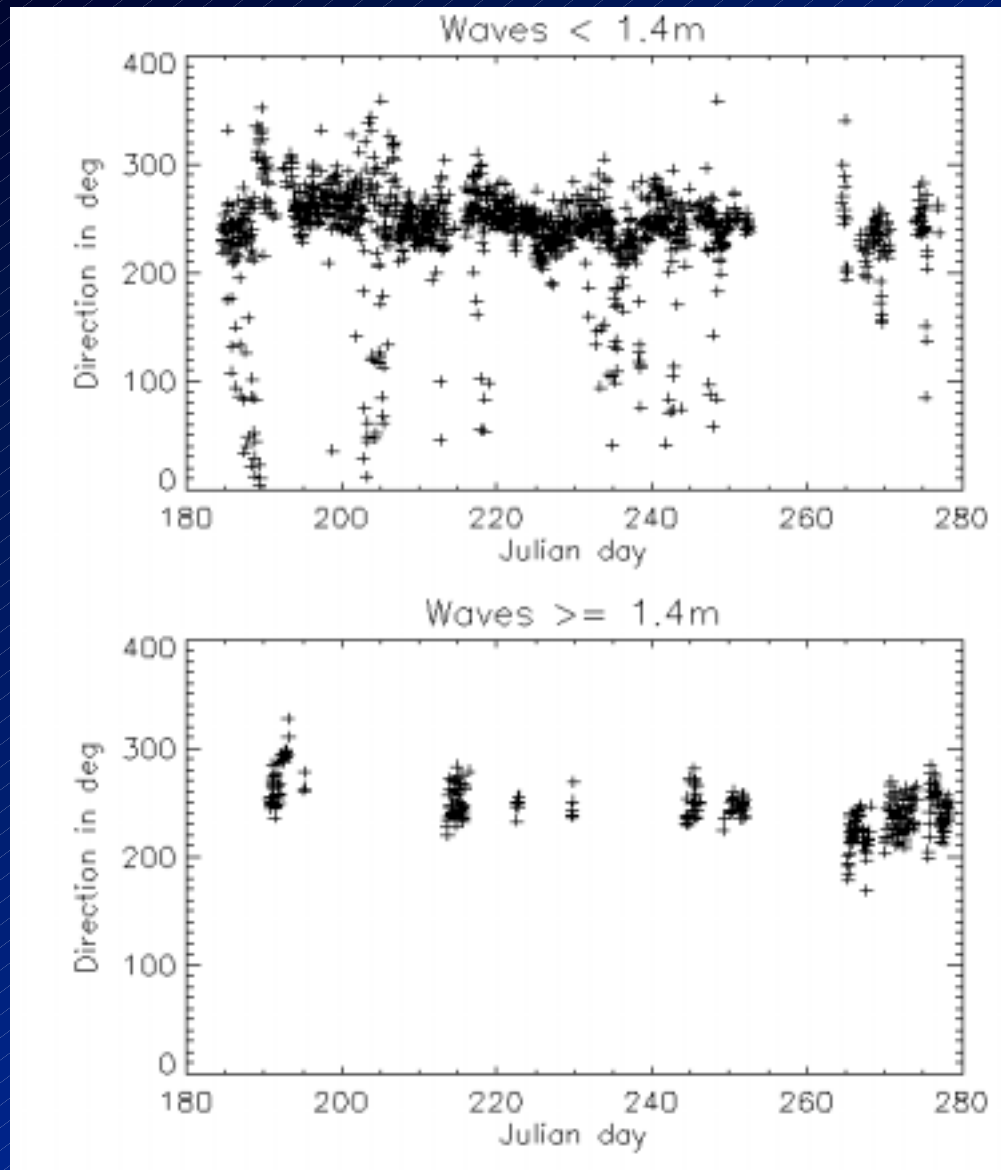
**Mean diff =  $19^{\circ}$**

**SD =  $30^{\circ}$**

**Median diff =  $9.6^{\circ}$**

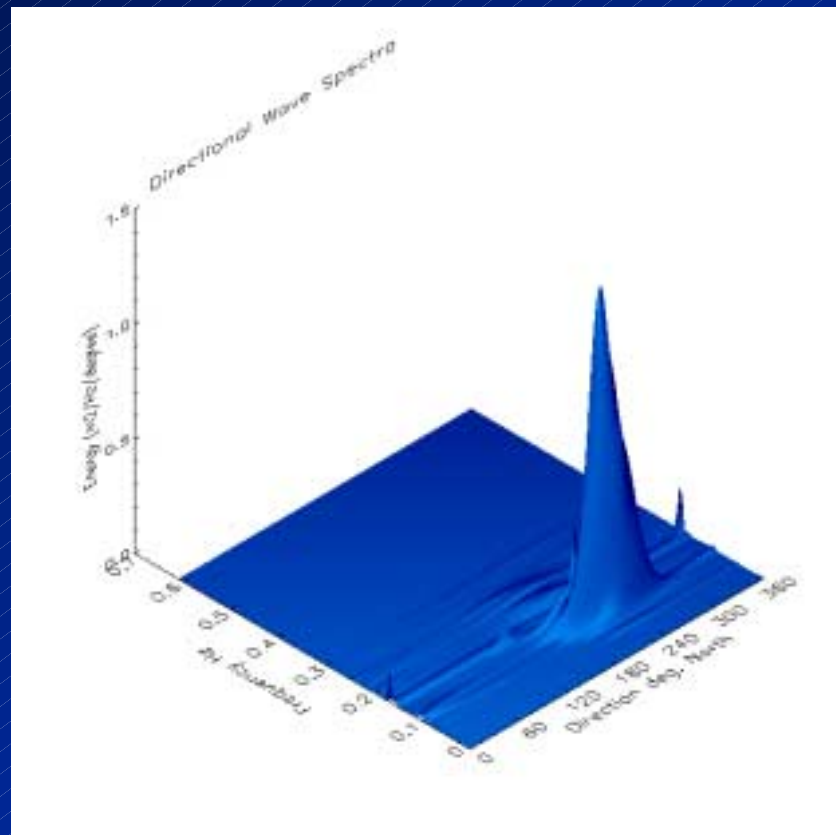
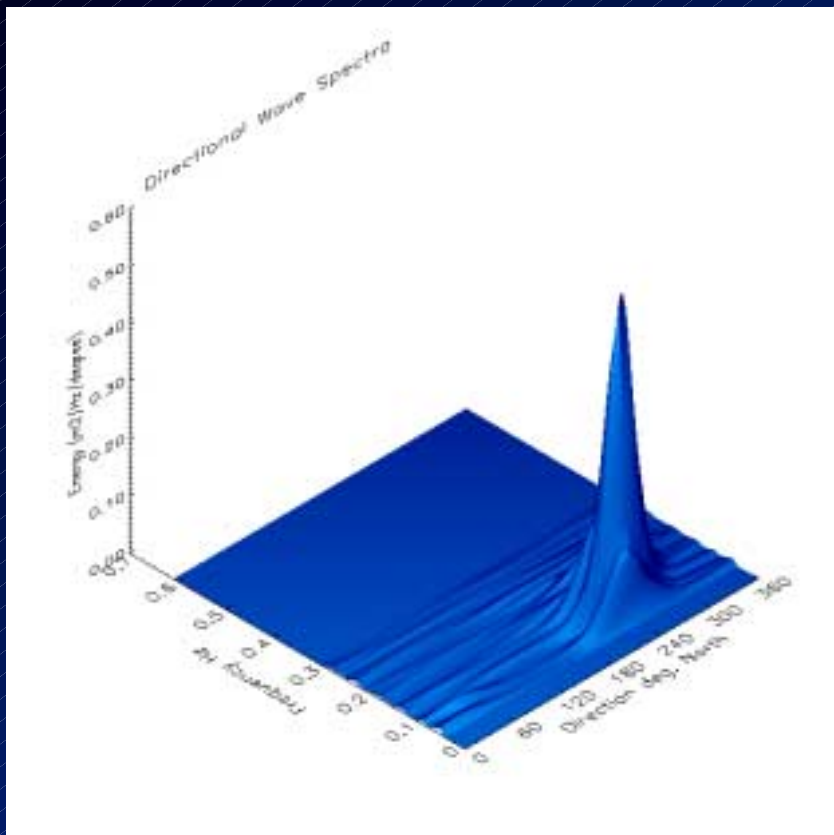
**See note 1.**

# comparison of wave direction from OOB/TRIAXYS wave sensor and nearby waverider



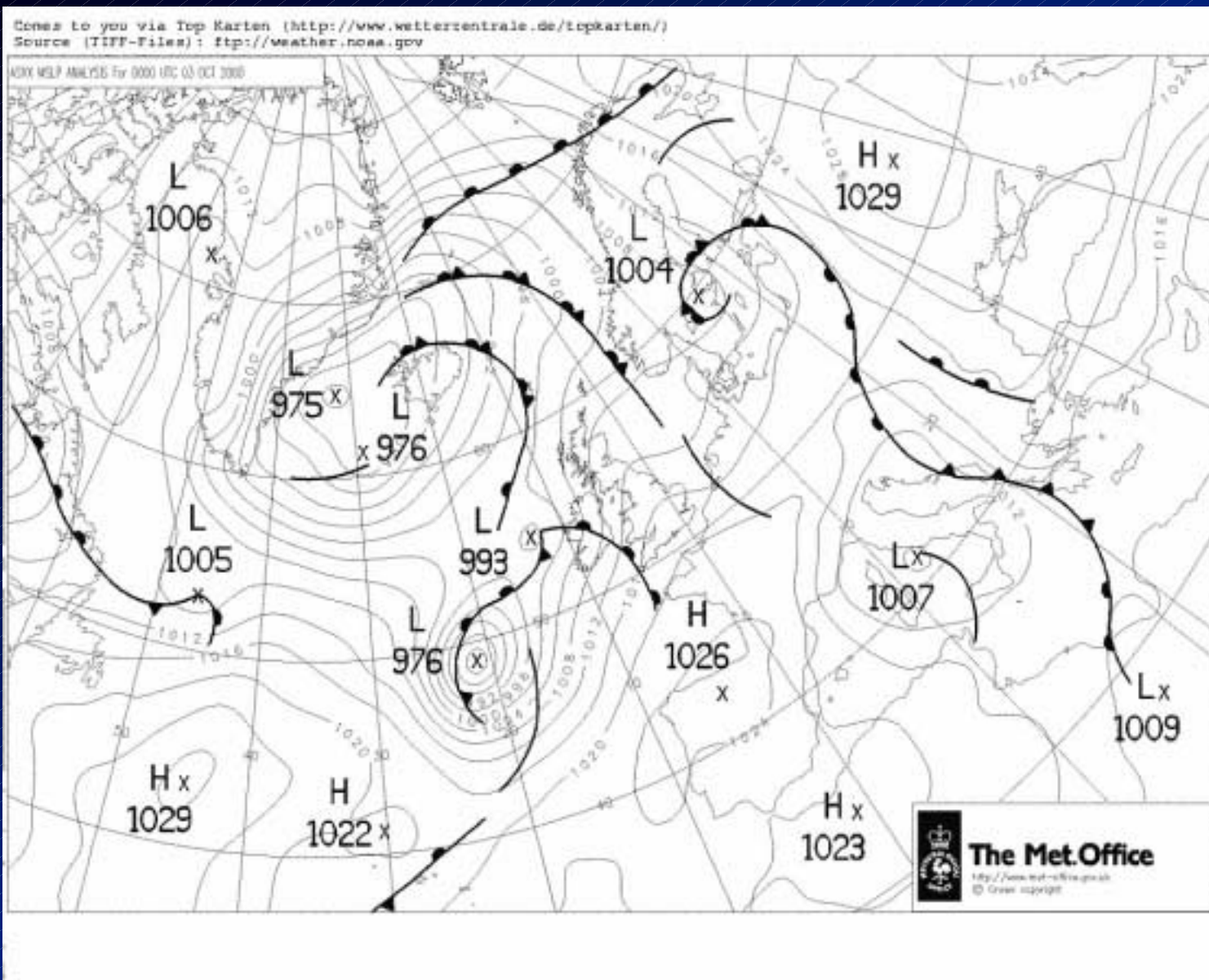


## examples of spectral wave measurements from OOB/TRIAXYS sensor

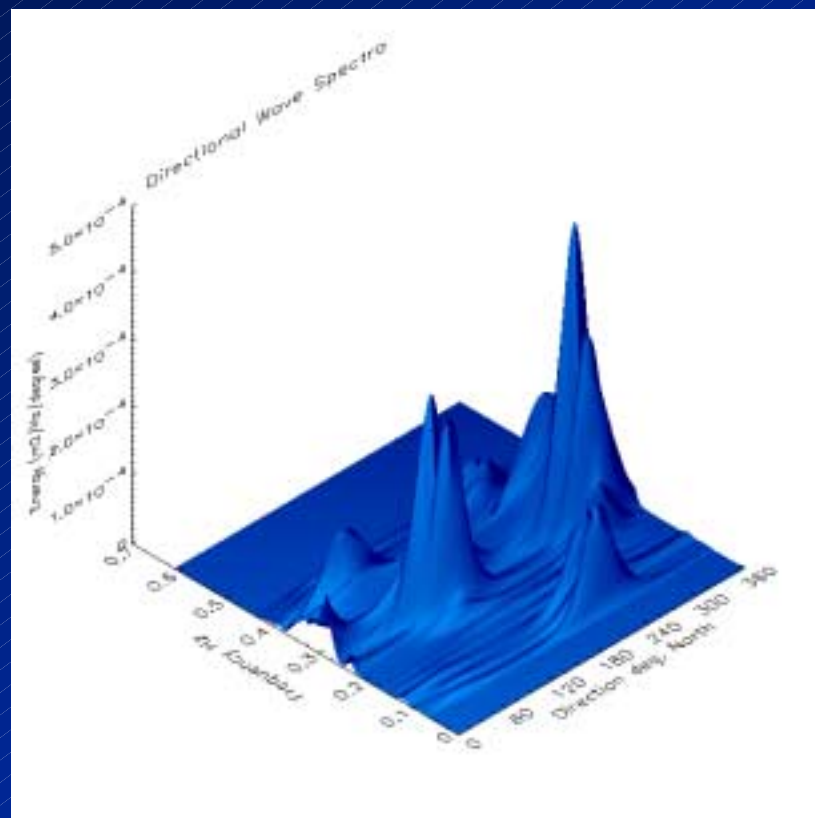
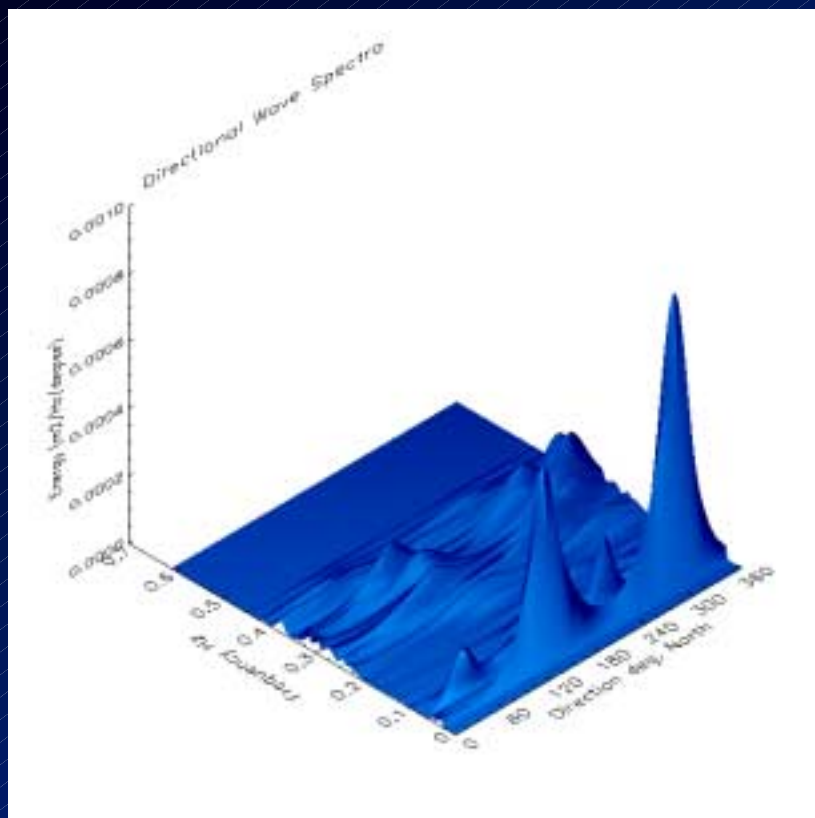


5.30pm and 11.30pm 3rd October 2000, Sig wave heights ~ 4.5 - 5.0 meters.

# Corresponding synoptic chart



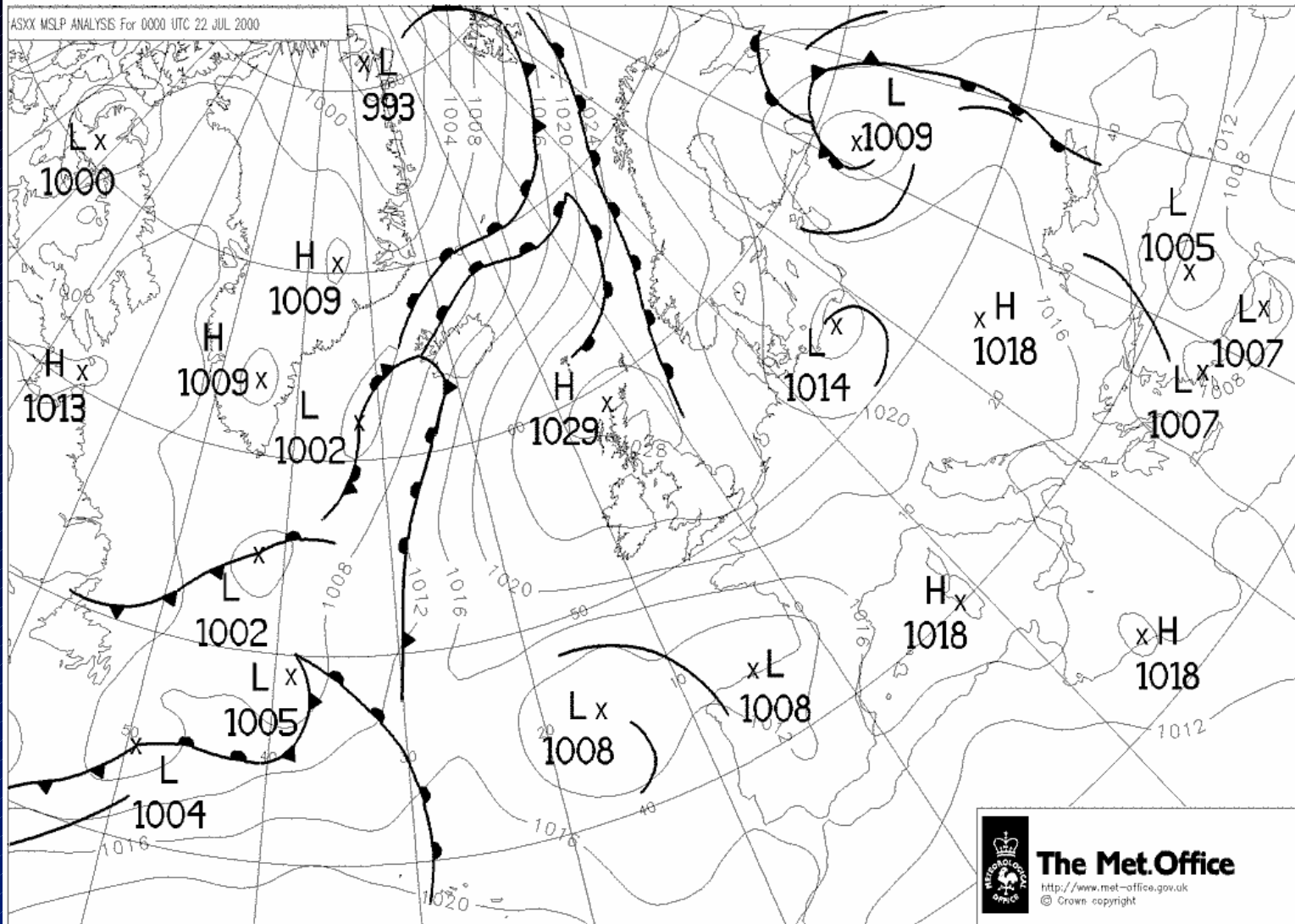
## examples of spectral wave measurements from OOB/TRIAXYS sensor



3.30pm and 6.30pm, 22nd July 2000. Sig wave heights ~ 0.4 meters.  
Spectra contaminated by instrument noise - see note 1.

# Corresponding synoptic chart

Comes to you via Top Karten (<http://www.wetterzentrale.de/topkarten/>)  
Source (TIFF-Files): <ftp://weather.noaa.gov>





# Summary.

- **Results demonstrate that the Met Office buoy hull is capable of being used to produce directional wave spectra.**
- **Comparison of the Triaxys sensor with the on board heave sensor and a nearby waverider sensor show that the dynamics of the buoy hull have not significantly affected the measurement of ocean wave spectra during this trial.**
- **Further work will involve evaluating updated firmware to test whether the firmware eliminates the problem described in note 1 such that the unit performs well under all conditions.**