



GAMBLE - Operators' Workshop

Investigating multiple altimeter sampling - A short case study of the 15/01/03 Schiehallion event.

David Cotton - Satellite Observing Systems



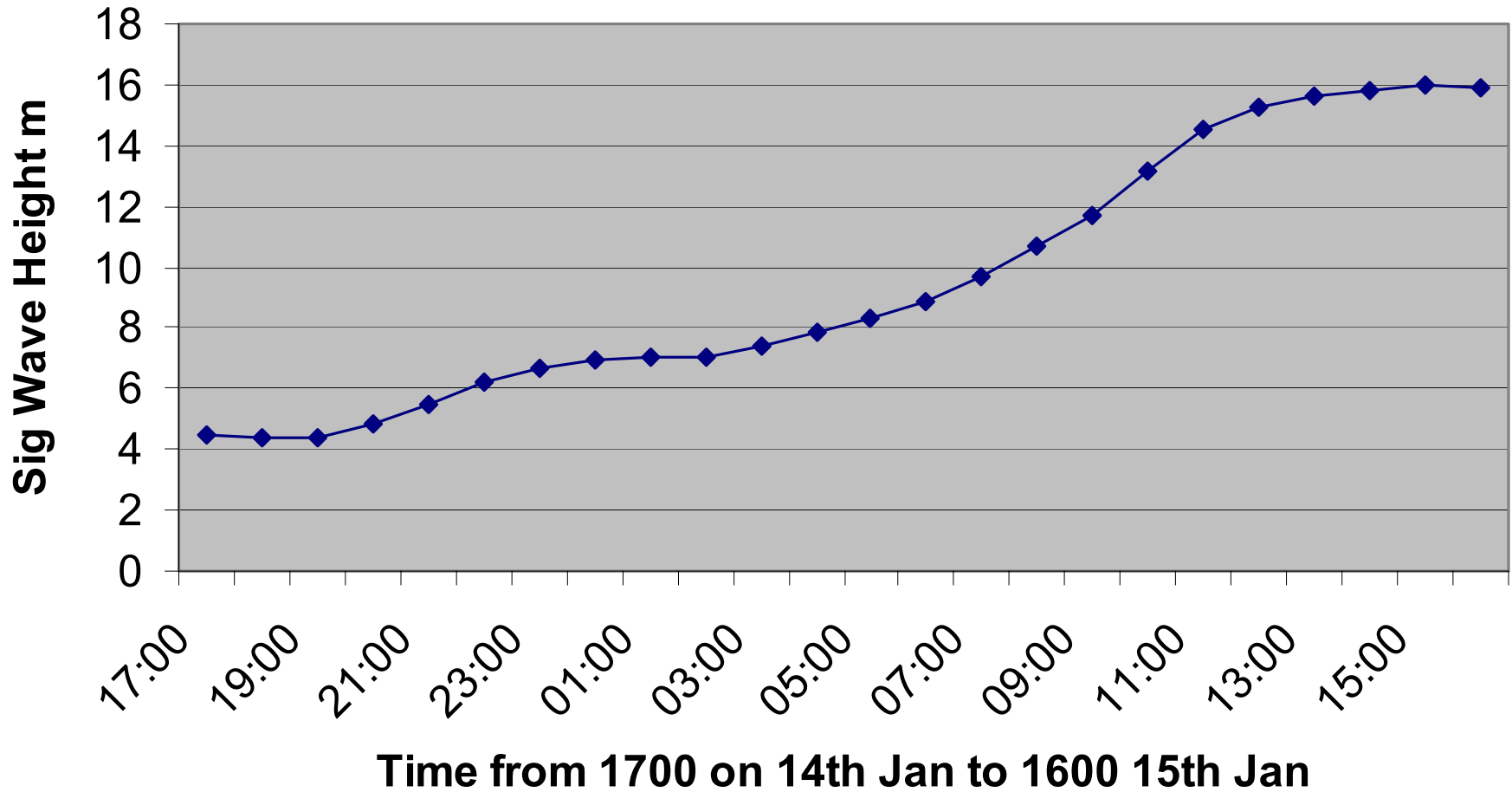
Background and Purpose

- Forecasts predicted very high waves in the region of Schiehallion for the afternoon of 15/01/03
 - Forecast 1 - $H_s = 16\text{m}$
 - Forecast 2 - $H_s = 12.5\text{ m}$ ($H_{\text{max}} = 21\text{m}$)
- Which forecast was to be believed?
 - Different actions required

- Wave (and wind) data from 4 altimeters now available
 - Could (near real time) data have been used?
 - How would they be best applied?
 - To improve modelling
 - To independently validate forecasts?



Forecast 1

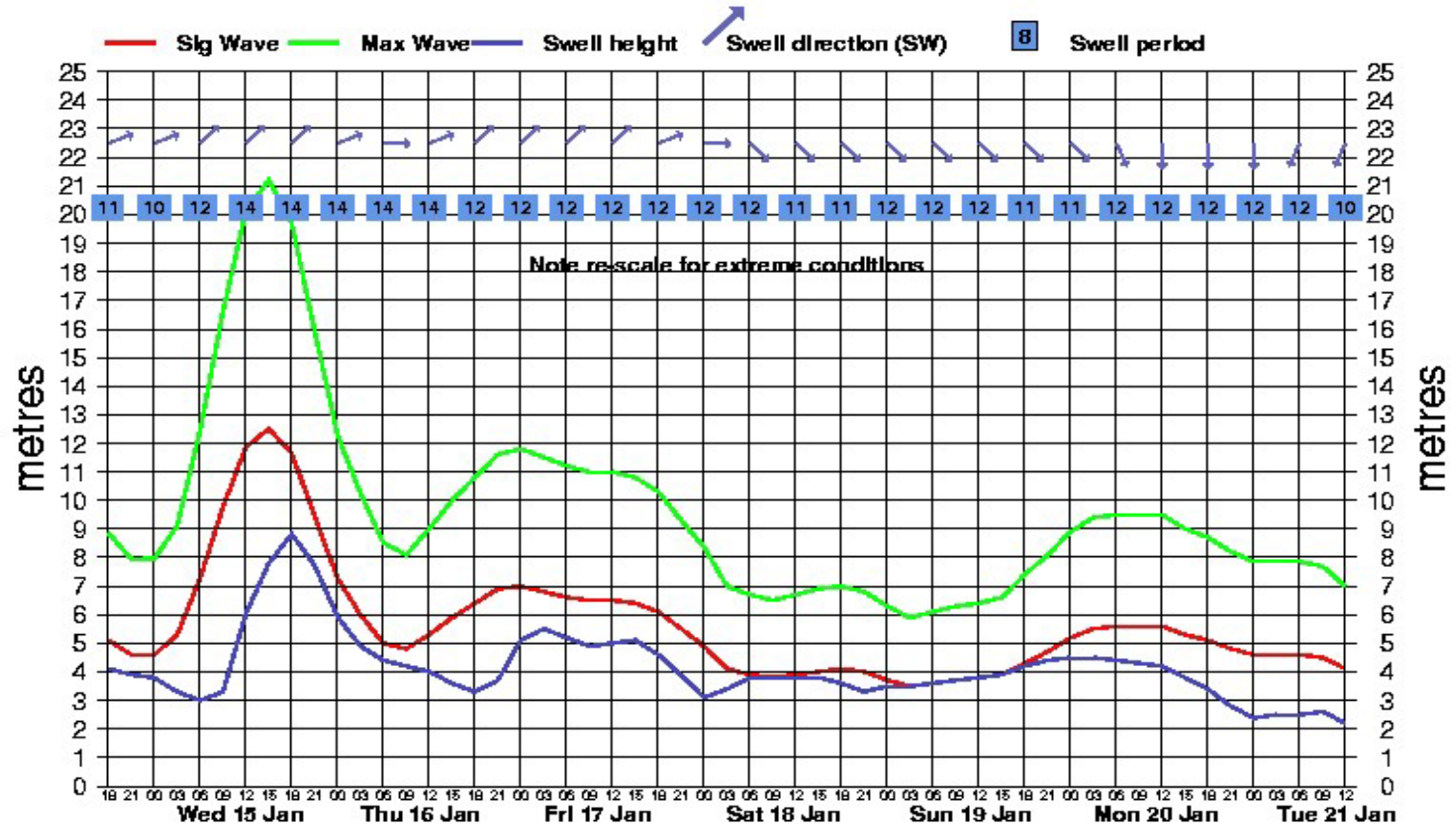




Forecast 2

UK Block 204 (Schiehallion and Foinaven Fields) West of Shetland

Issued: 1800 14/01/03



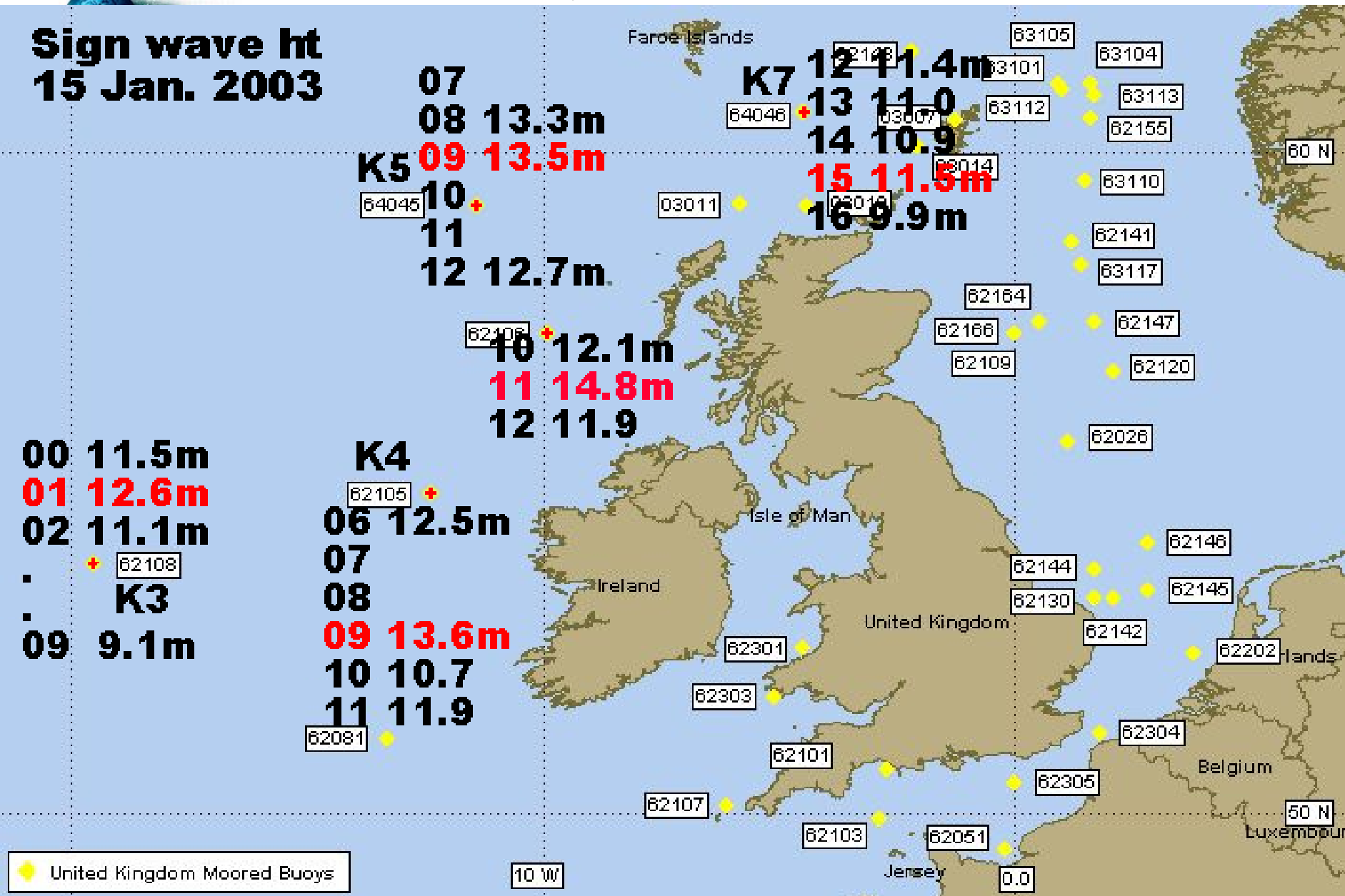


Forecasts (cont.)

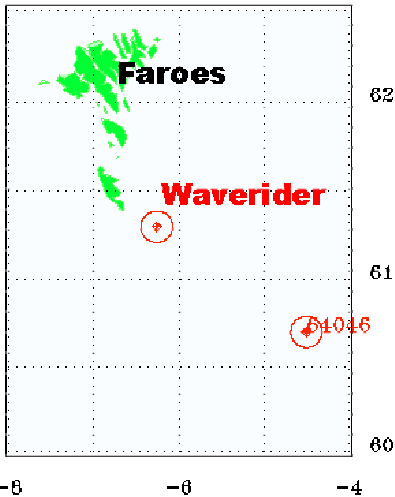
	H sig (1)	H sig (2)	H max (2)	10 m wind (1)	10 m wind (2)
72 hr		6 m	11.5 m		47 kn
48 hr	17 m	9 m	17 m	50 kn	50 kn
24 hr	16 m	12 m	21 m	50 kn	48 kn
12 hr		10 m	18 m		45 kn

Buoy measurements

Sign wave ht
15 Jan. 2003

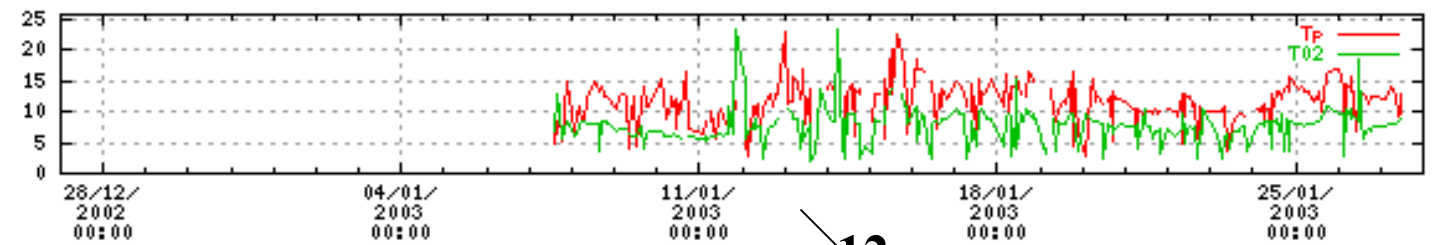
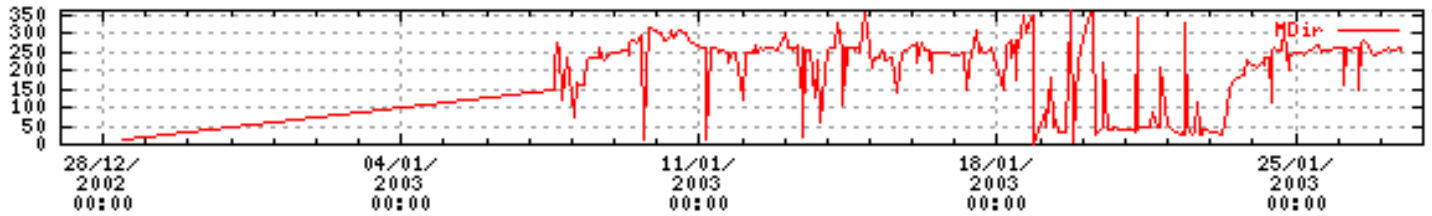
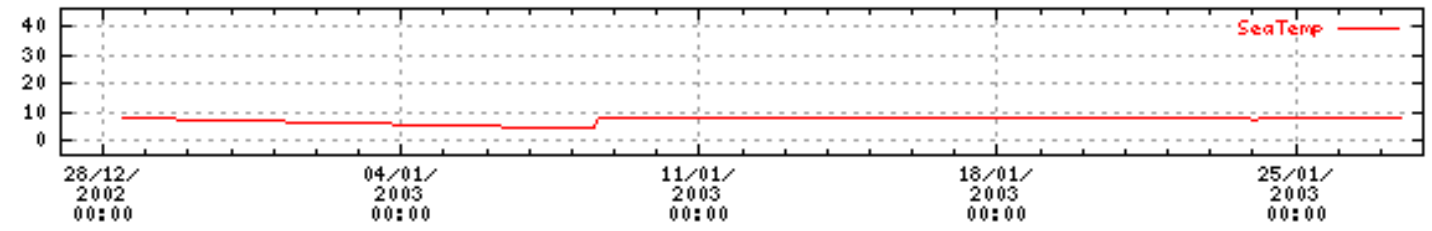


United Kingdom Moored Buoys

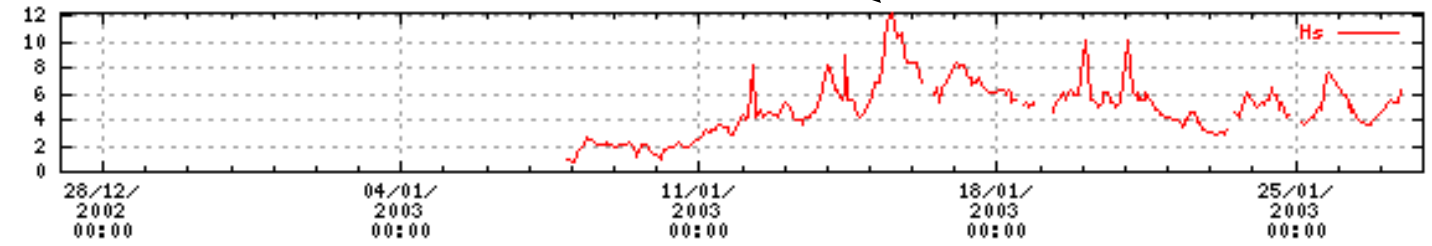


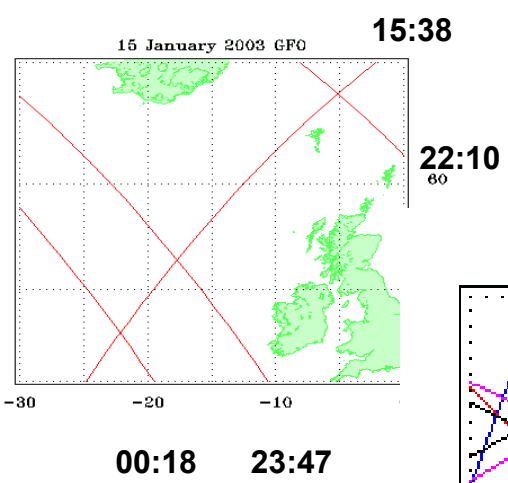
61.3°N, 6.26°W

Directional Waverider South of the Faroe Islands



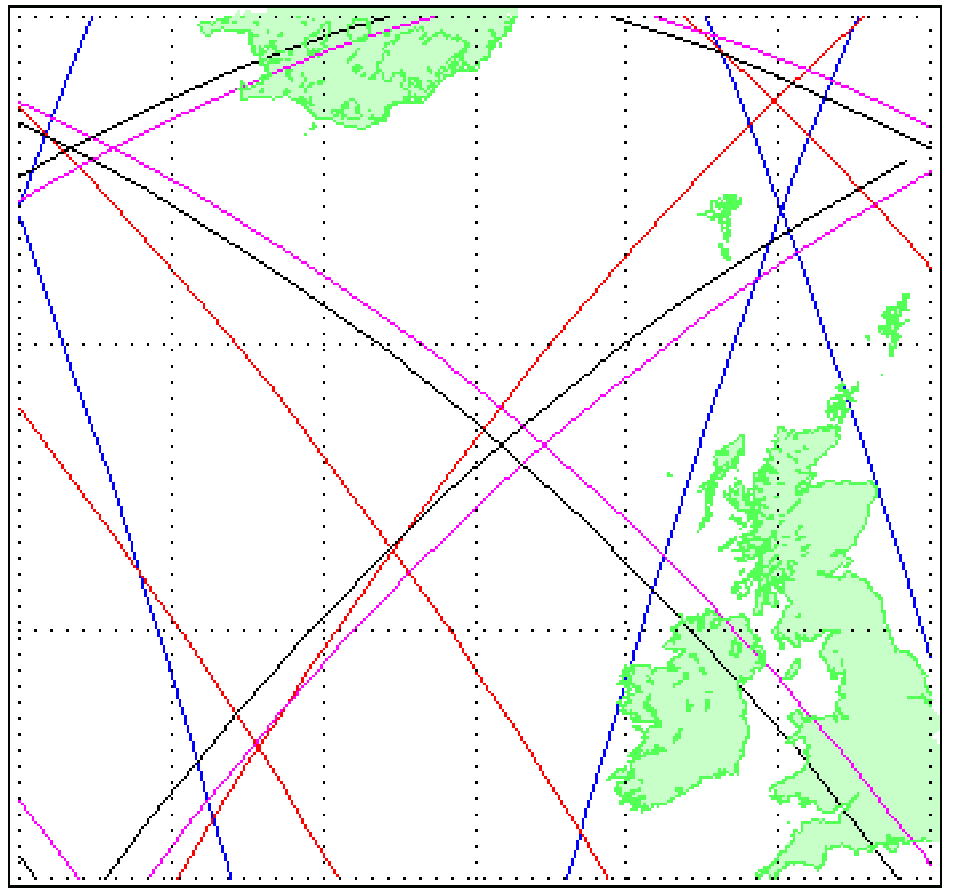
12m



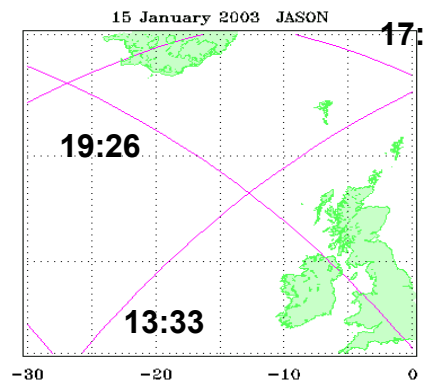
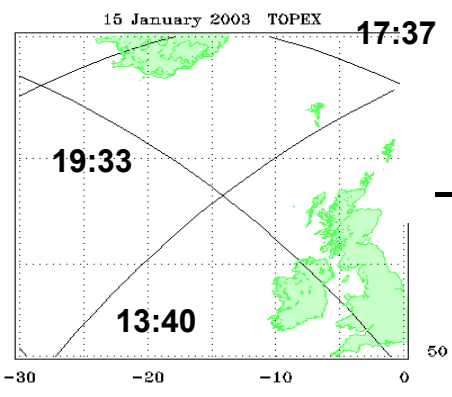


Altimeter tracks

15 January 2003



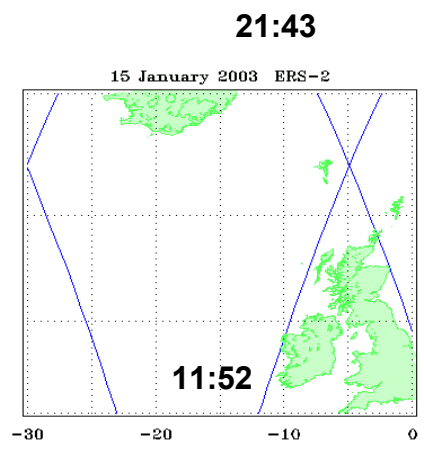
-30 -20 -10 0



80

60

50



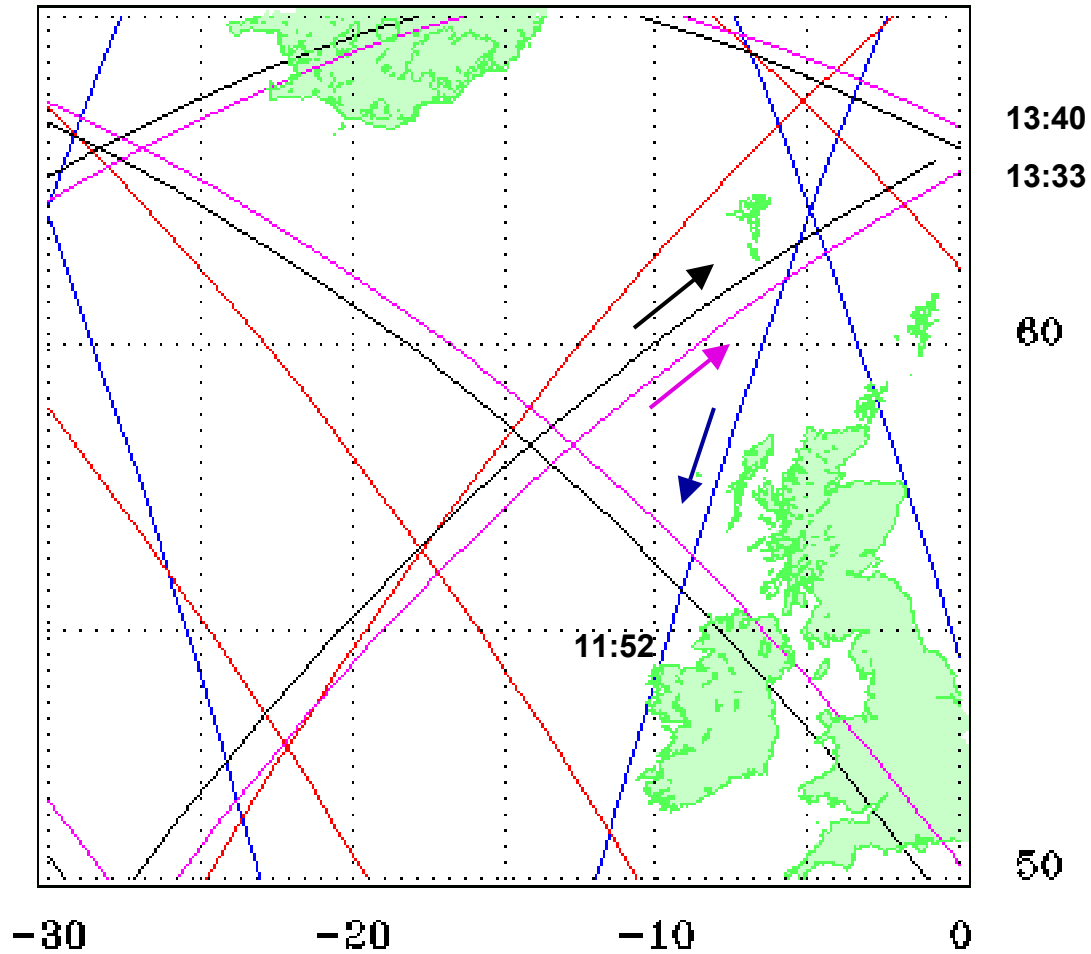
003

Satellite

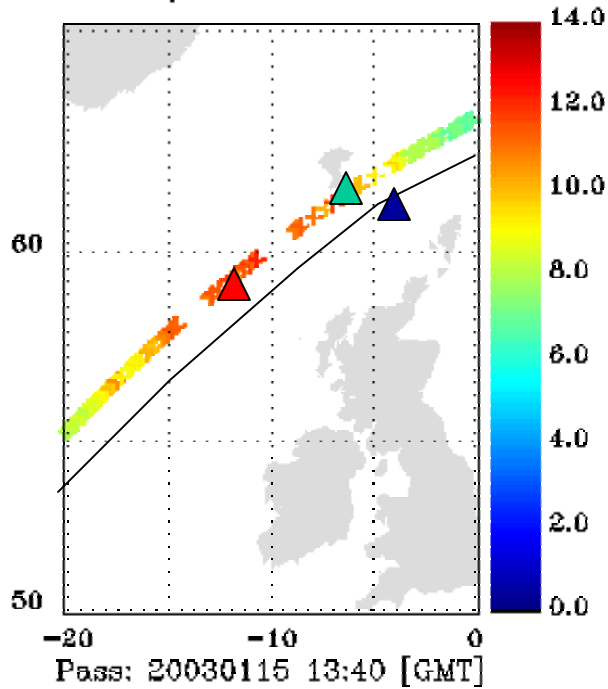


Altimeter tracks

15 January 2003

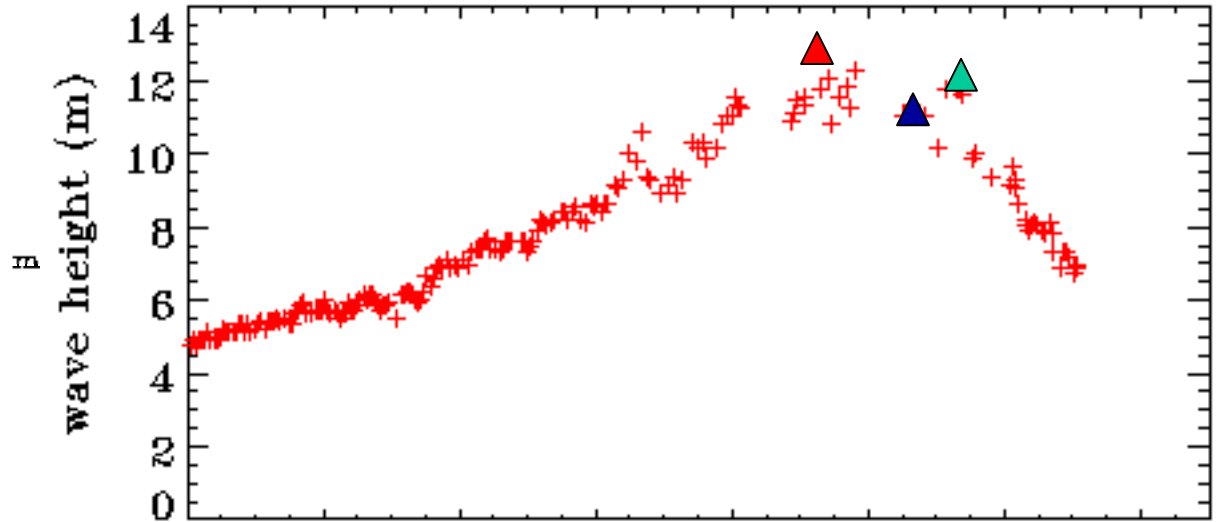


T/P altimeter

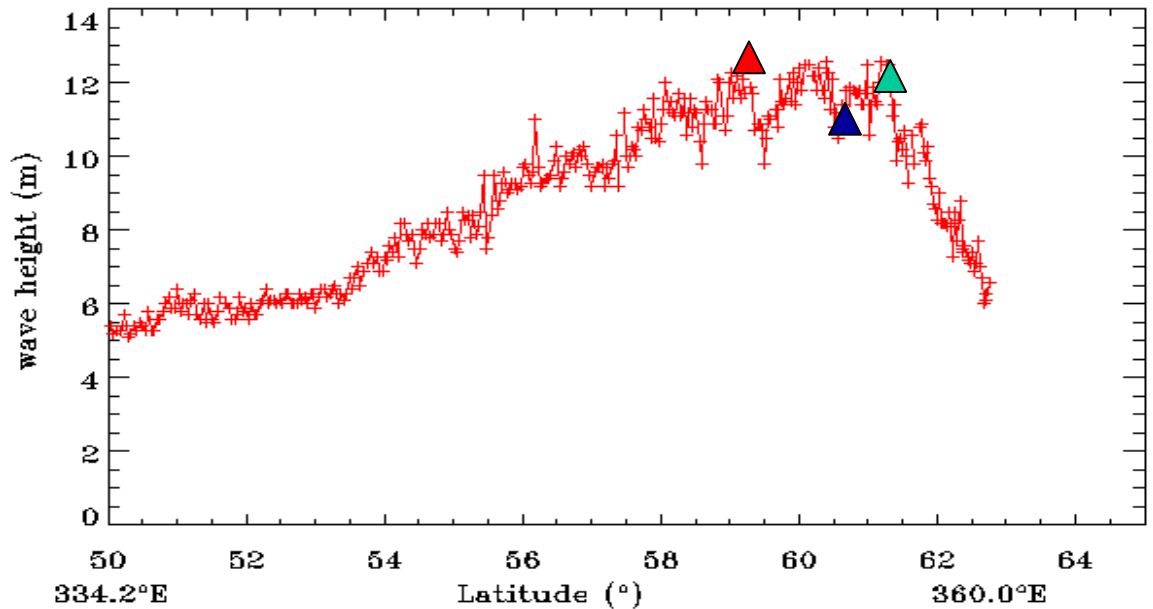


- ▲ Faeroes w/r 61.3°N, 6.26°W
12.0m @ ~1200
- ▲ "K5" - 59.3°N, 11.7°W
12.7m @ ~1200
- ▲ "K7" ~60.7°N, ~4.6°W
11.0m @ ~1300

T/P altimeter



JASON OSDR

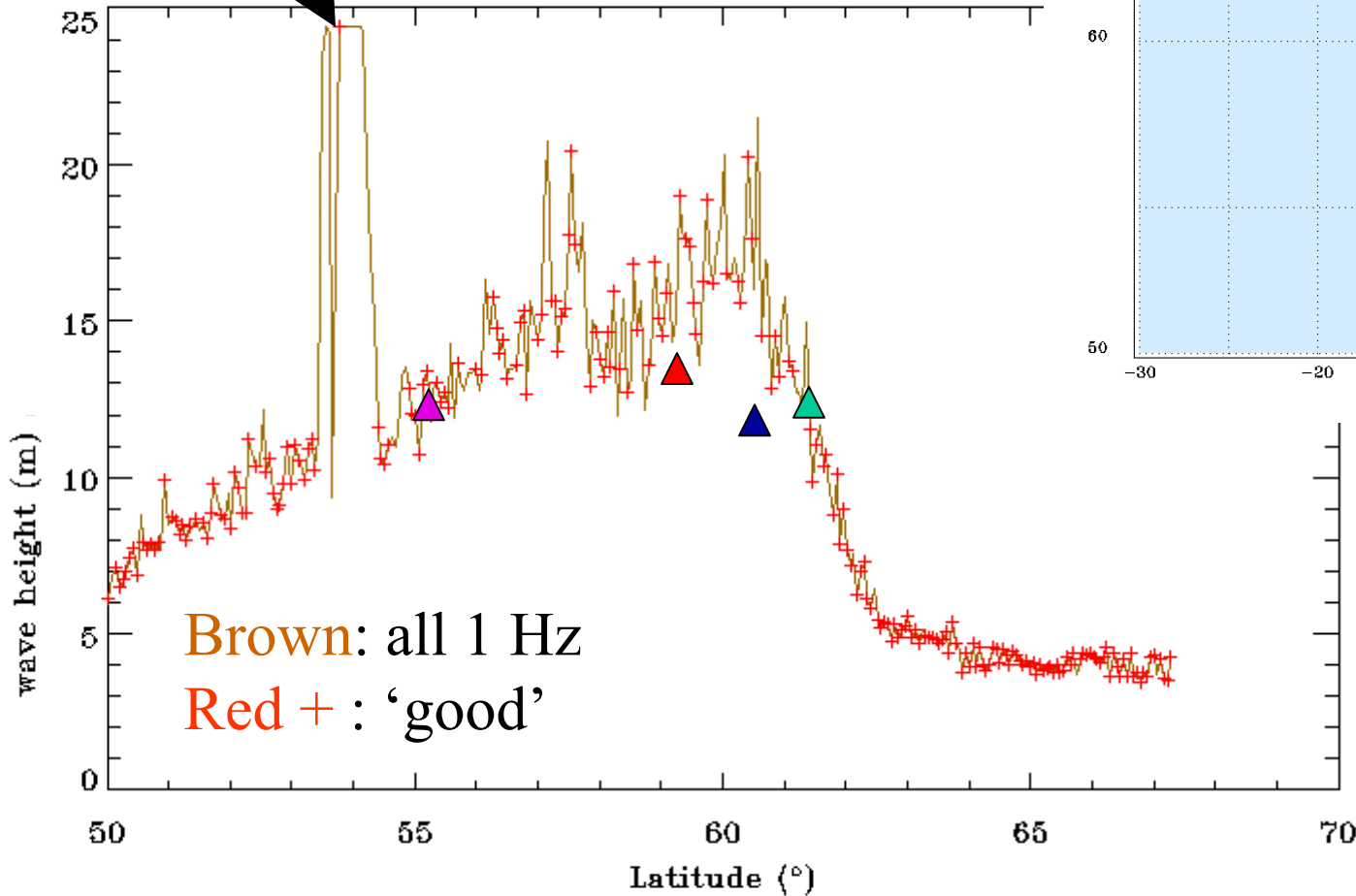


+ Wave ht. 20030115 13:33 [GMT]

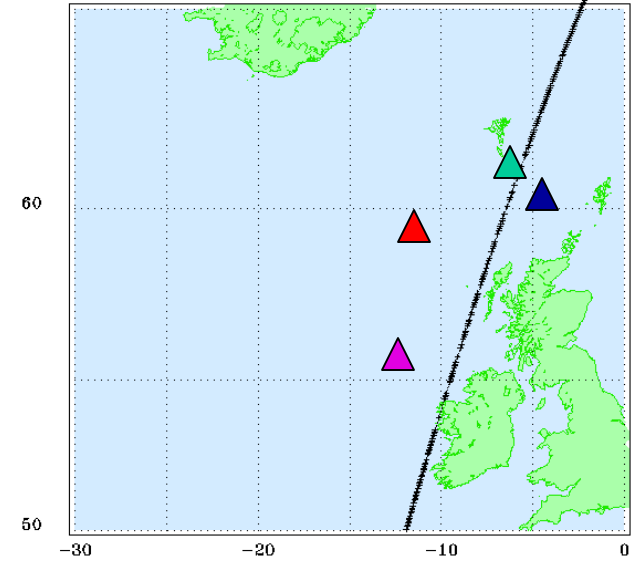


Good??

15-JAN-2003 11:52 ERS-2



15-JAN-2003 11:52 ERS-2



- ▲ Faeroes w/r 12.0m @ ~1200
- ▲ "K5" 12.7m @ ~1200
- ▲ "K7" 11.4m @ ~1200
- ▲ "K4" 11.9m @ ~1100

11.9°W

0.0°E

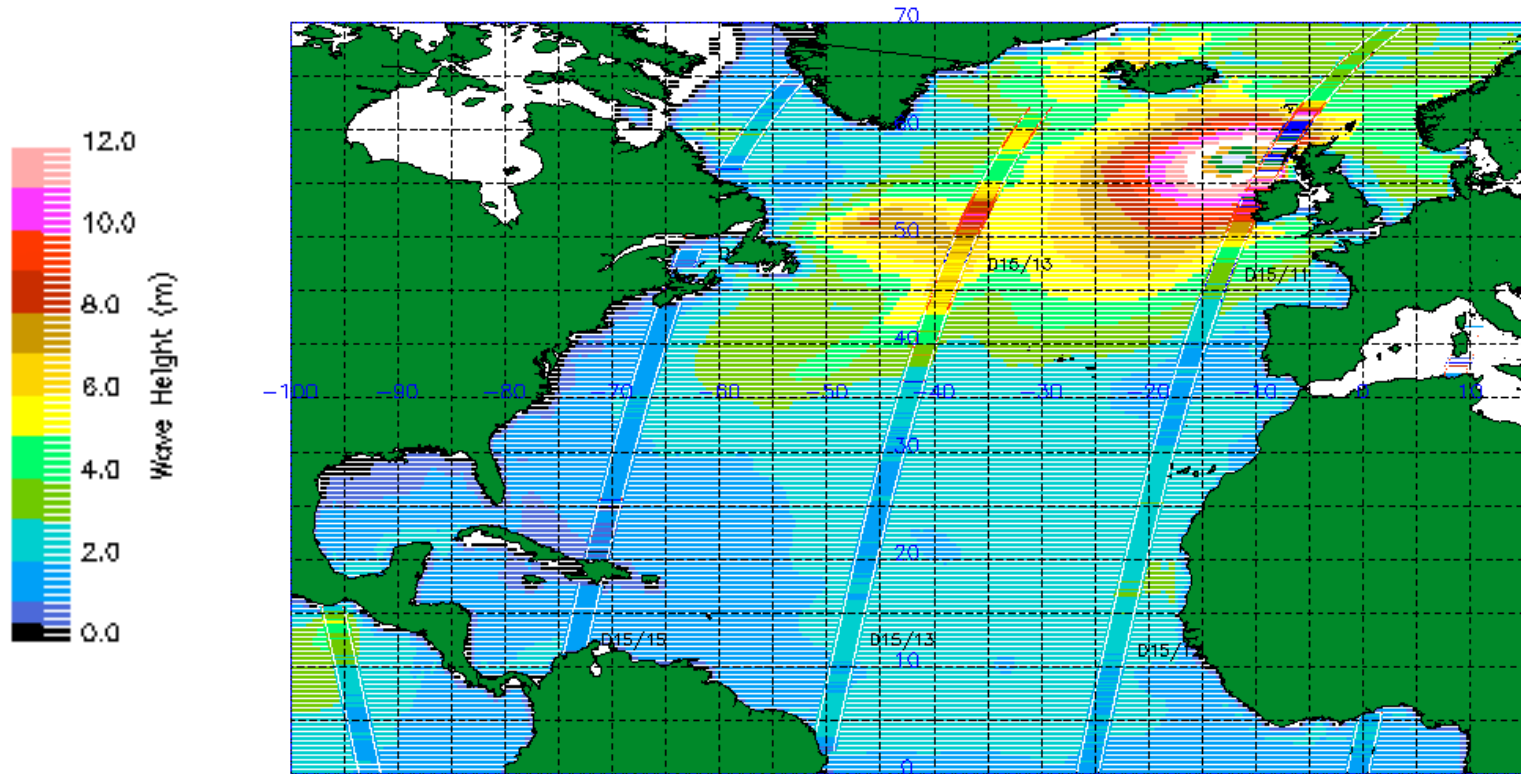
calibration:

$$H_s = 1.168 * H_s(ERS2) - 0.201$$



N. Atlantic T+6: ERS-2 corrected wave heights - 15 Jan 2003

NOAA WW3 forecast background image, valid 2003011506 + 6 hours



Colour key for track border:
White - alt & model Hs agree to 1m
Red - model Hs < alt Hs by 1m
Blue - model Hs > alt Hs by 1m



Discussion -1

- Severe events difficult to model.
 - Very quickly changing in space & time.
- 3 altimeter passes to W of Schiehallion, 1.5-3.0 hr before predicted time of highest waves.
- Could these data have been used?
 - Assimilation or validation?
 - To verify fine structure of storm?
 - Even if we have perfect description 1-200 km to W and 1 hour in advance - how accurately can models predict subsequent development?



Discussion - 2

- How much warning is required?
 - Is 2 hours enough?
 - Need for real time data (<1 hour).
- Altimeter measurements on tracks 1° (~50km) apart show high correlation.
 - Optimum sampling pattern for waves would have wider separation?
 - Could information on spatial scales from satellites inform choice of best model grid size?
- Notes
 - Altimeter & buoy agree well for $H_s = 12+m$
 - Good altimeter calibrations are important!
 - Need gridded model output to investigate individual storms.