Value of Marine Meteorological Observations for Forecasters

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Requirements prior to making a forecast

- Conditions at commencement of prediction
- In meteorology this is known as an ANALYSIS
- Analysis *should* define the atmosphere at a specific time
- In order to define the atmosphere it is necessary to observe the atmosphere

Successful forecasts require an accurate analysis

- Atmosphere is very complex
  - A fluid in motion
  - A fluid with heat exchange from above and below
- Need to define the atmosphere as precisely as possible

How to define the atmosphere

- Observations are required
- Atmospheric flow less complex as one ascends
- Atmosphere very complex near the surface due to orography, land/sea, and the result of radiation and absorption at the earth's surface – either water or land

Input to the analysis

- Observations from land, sea and air
- Land observations – surface and upper-air
- Density of land observations agreed so that a reasonable definition of the atmosphere can be obtained
- Observations from marine environment (VOS, drifting and tethered buoys)

Result of errors in the analysis

- Errors grow rapidly and can swamp the forecast – in some instances within 24 hours
- Example of a typical error in the South-west Approaches and the effect on the forecast for the British Isles and adjacent coastal waters

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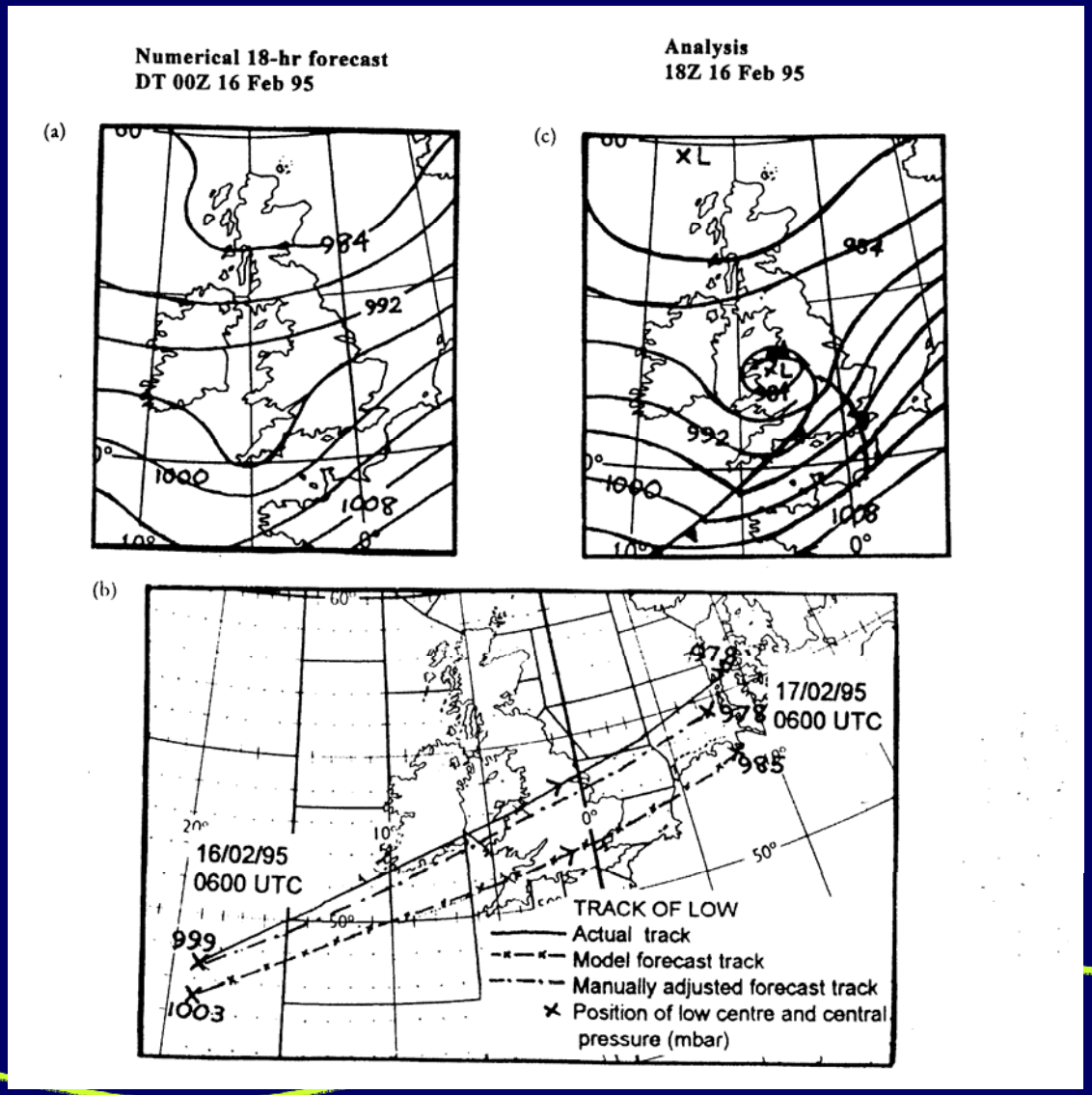
An example


Numerical 18-hr forecast
DT 00Z 16 Feb 95
Analysis
18Z 16 Feb 95
(a)
(c)
(b)
984
992
1000
1008
XL
16/02/95
0600 UTC
17/02/95
0600 UTC
999
1003
985
TRACK OF LOW
Actual track
Model forecast track
Manually adjusted forecast track
Position of low centre and central pressure (mbar)

Requirements for marine observations at the surface

- Guidelines provided by the WMO for surface land observations
- In the marine environment forecasters are totally dependent on observations from ships, floating and fixed buoys
- Observations required every six hours

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Use made of observations (1)

- Data arrives at the Met Office via the Communications channels
  - Inmarsat or other ship to shore links
  - GTS
- Observations all entered into the computer and compared with a six-hour forecast from the previous data time

Use made of observations (2)

- Computer highlights observation if considered to be outside certain limits
- Forecaster then over-rides the computer if the observation is considered to be correct
- The 6-hour forecast adjusted to take account of the new observation

Use made of observations (3)

- Forecaster assesses the observations in conjunction with those made by the satellites
- The adjusted 6-hour forecast finally accepted as the starting point (analysis) for the new forecast computation
- The numerical computation then produces forecasts out to six or more days.

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In summary

- Safety of life at sea depends to a considerable extent on ***accurate*** and ***reliable*** forecasts
- The ***accuracy*** of the computed forecast is ***dependent*** on the ***initial data***
- Marine data is especially important to reduce analysis errors since the oceans cover a large area of the earth's surface

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Thank you

for listening