Working Group 1: use and interpretation of medium and extended range forecast guidance

Severe and high-impact weather events

Working Group – use and interpretation
Severe or high-impact weather events

- **What products will help users in providing early warnings of severe events?**
- **What should we expect from the forecasting system at 3 days, 1 week, 1 month, 1 season?**
- **How important is post-processing/calibration of model data?**
- **How can we verify early warnings of severe weather?**
  - **Extreme/rare events**
  - **Sample size**
  - **Observations - how do we know what happened?**
  - **Extrapolate from moderate events**
  - **What scores to use**
- **How should case studies be used (consider false alarms and missed events)?**

Products for severe events

- **Tropical cyclone tracks and strike probabilities are very useful**
  - **Extending to include genesis during forecast would be valuable**
- **Extra-tropical cyclone identification and tracking**
  - **potentially large benefit**
  - **Positive response from forecasters to trials at Met Office, but otherwise limited practical experience so far**
  - **different levels of sophistication in identification/tracking algorithms**
  - **need to distinguish potential severe storms from general "everyday" cyclones**
  - **more practical experience required to evaluate benefits**
  - **Worth pursuing given potential usefulness**

Products for severe events

- **Extreme forecast index (EFI)**
  - **Seems to be widely used as alert to forecasters (then need to investigate forecast more carefully)**
  - **Additional parameters would extend the range of situations where these alerts can help**
    - **Max, min 2m temperature; snowfall; CAPE suggested**
  - **Noted that new EFI climatology will be introduced with unified EPS/monthly forecast in 2008; parameters and forecast steps can be reviewed**
- **Interest in information to complement EFI, eg probabilities of quantiles, return period (more intuitive to users)**
- **Severe events typically rare/extreme – tails of climate pdf**
  - **Parametrisation of tails (extreme value theory) may be worthwhile - climate and/or ensemble distribution**
  - **Some encouraging initial results with return period**

Products for severe events

- **Temporal and spatial precision**
  - **More important to know if something will happen rather than exactly when or where**
  - **Probabilities for event to occur somewhere within time window over region, not restricted to point probabilities**
  - **Depends on forecast range**
  - **Selection of spatial area dependent on user – difficult to do centrally (eg better done by Member States and not ECMWF)**
- **Precipitation – for flash floods, max precip in short period is more important that totals over fixed period (12h, day); e.g. max rainfall in any 3h period during day; would require additional model output parameter**

Post-processing/calibration

- **Post-processing and calibration of model data**
  - **Bias correction is standard practice for monthly and seasonal forecasts (using reforecast data)**
    - **MOS not commonly used, but can give benefit**
  - **MOS, KF generally applied to medium-range forecasts in Member States (various methods, using locally available observations)**
    - **Typical MOS may not be suitable for severe events**
    - **Calibration using reforecasts not generally done at medium-range; VarEPS/monthly reforecasts will be available for calibration (research shows potential benefit)**
- **Combining deterministic and EPS output**
  - **NAEFS plans to make weighted combination for ensemble mean**
  - **Potential should be explored further**
  - **Is reforecast needed for T799?**

Verification

- **Different objective for verification**
  - **Diagnostic to understand model performance and guide developments**
    - **Wide range of measures available**
    - **Still very active discussion and research on methods and tools**
    - **More work needed on availability and use of observations**
  - **Administrative to inform users/managers of benefits of forecasts**
    - **Impossible to summarise in single simple overall measure, especially for severe events where samples are inevitably small**
    - **Proposals under development for WMO, focus on long-range, but more general applicability should be considered**
- **Case studies needed (false alarms should be expected; include missed events); complement objective scores**