

16 MAY 2001 : AN OPEN DISCUSSION MEETING - SYMONS MEMORIAL LECTURE

**Mr K Mylne, Met Office** - The Use of Ensembles in Operational Weather Forecasting - ([Ken.Mylne@metoffice.com](mailto:Ken.Mylne@metoffice.com))

Since the advent of the ECMWF operational ensemble prediction system (EPS), Met Office medium-range forecasters have made increasing use of it to assess different possible outcomes, and their confidence in forecasts. Although still deterministic, guidance products are constructed as the "most probable" solution based on the EPS and various centres' models. Forecasters also have the option to issue alternative solutions, with probabilities attached. Truly probabilistic products are now also becoming more common, and some of the EPS tools used to help in their construction will be illustrated. Probabilities are particularly important in the assessment of severe-weather risks, and a system to aid forecasters in issuing early warnings will be described. New systems to automatically generate calibrated site-specific probability forecasts will also be described. Verification demonstrating the benefits of calibration will be included.

**S Jewson, Risk Management Solutions Ltd** - The use of ensemble forecasts in the financial industry - ([Steve.Jewson@rms.com](mailto:Steve.Jewson@rms.com))

Ensembles are used in the financial industry to estimate distributions of impacts of meteorological phenomena. In their basic form, these ensembles are statistically generated and contain only climatological information. They are only relevant for the prediction of financial outcomes on long timescales. On shorter timescales additional information is potentially available in dynamical NWP forecasts, although extracting and using this information in an optimum way presents a significant challenge. This talk will use two examples based on the climatological ensembles used for the assessment of financial risk due to hurricanes and temperature. Methodologies will be discussed by which both single and ensemble NWP forecasts can be blended with these climatological ensembles to produce a forecast for the distribution of financial outcomes on all time-scales from hours to years.

**J Murphy, Met Office** - The use of ensembles in decadal and climate prediction - ([James.Murphy@metoffice.com](mailto:James.Murphy@metoffice.com))

Ensembles of coupled ocean-atmosphere model simulations are used to estimate the contribution of anthropogenic forcing to changes in climate observed during the 20th century and expected during the 21st century. Ensembles are created by starting the model from random states selected from a control simulation of pre-industrial climate, with the aim of separating the signal due to anthropogenic forcing from the noise due to natural variability. However new developments in climate research now demand new designs for climate model prediction ensembles. Attempts are under way to predict climate variations on the seasonal to decadal time scale using ensembles of simulations started from observed conditions, where the required initial states are obtained by assimilating oceanic and atmospheric analyses into the coupled model. It is also

recognised that specification of the risk associated with future climate change requires estimation of the uncertainty arising from the model physics as well as that arising from imperfect knowledge of the initial conditions. This will be addressed by designing ensembles whose members are characterised by different sets of values for physical parameters in the model which are subject to an uncertainty range.

**Dr T Palmer, ECMWF** - The Symons Memorial Lecture - Economic value of ensemble forecasts: from days to decades - ([Tim.Palmer@ecmwf.int](mailto:Tim.Palmer@ecmwf.int))

Historically, validation of forecast systems by NWP developers, who measure performance in terms of the RMS error of meteorological fields, has been of little interest to commercial customers who are interested in pounds or dollars saved. Ensemble forecasts provide a qualitative tool for risk assessment for user applications; examples on daily, seasonal and decadal timescales will be given.

A simple decision analytic model is described that allows one to assess the potential economic value of ensemble forecasts for customers. It will be shown that conventional NWP skill scores may not correlate at all well with customer value. A generalised measure of forecast skill is proposed, and it is suggested that in the future decisions on possible changes to NWP systems will depend on who the customers are