(1) Introduction

- The Environmental Systems Science Centre (ESSC) has developed extensive experience in analysing the ability of forecast models to predict storms.
- The TRACK software of Hodges (1995) has been used to identify and track storms in forecasts data and error statistics have been produced to determine the ability of forecast models to predict storm position, intensity, growth and propagation speed (e.g. Froude 2009, 2010).
- The potential values of this storm prediction information has been recognised by a number of industry sectors, including the marine, insurance and oil and gas. However the question of how these industry sectors interpret and utilise this information presents a major barrier.
- This knowledge exchange project will overcome this barrier by working with BMT ARGOSS (http://www.bmtargoss.com/) to develop tools to visualise and interpret storm prediction information useful to a range of operational activities at sea.

(2) Background

- Accurate forecast information about storms is vital for decision making at sea. Activities ranging from ship routing to resource exploration require such information to optimise operations and to prevent economic and human losses.
- The weather conditions that effect operations at sea will in general be related to storms (both tropical and extratropical). To illustrate this figure 1a shows the global shipping lanes and 1b and 1c show spatial maps of the average number of storms per unit area (climatologies) in the northern hemisphere for extratropical and tropical storms respectively. It is clear that many of the major shipping lanes are exposed to risk from storms.
- BMT ARGOSS are a technical consulting company, specialist provider and leading innovator in the supply of marine environmental information. This project will extend the forecast information BMT ARGOSS can offer its clients by developing tools to extract storm prediction information from forecast data.

(3) Forecast Tools

- Forecasts started 1200 UTC 7 Jul 2005
- First point in analysis track 0600 UTC 6 Jul 2005

(4) eScience Methodologies

- The development of the forecast tools will make use of eScience methodologies (collaborative science performed using distributed computing and data resources). ESSC has extensive experience in the field of eScience, hosting the Reading eScience Centre (ReSC, http://www.resc.ncl.ac.uk/).
- In previous work a web application was developed, which allowed TRACK to be run from a web browser using remote datasets and distributed computing (Froude 2008). Figure 3 shows a schematic of how the web application worked. The data was accessed remotely over the Internet using the DPN/NDAP protocol (Open-source Project for a Network Data Access Protocol, http://openndp.org), previously known as DODD) and the distributed processing of the data was performed using Condor (http://www.cs.wisc.edu/condor/).
- The forecast tools of this project will be developed using OPENNDAP to access the NCEP EPS data, thereby reducing the amount of data that needs to be downloaded and stored locally, which is important in marine information systems.
- The processing will be performed using distributed computing on BMT ARGOSS computer cluster to reduce computation time.

(5) Forecast Verification

- The research into the predictions of storms by EPS, performed at ESSC, provides new and detailed information about storms (e.g. Froude 2009, 2010), which it is not possible to obtain from the standard diagnostics produced at operational centres.
- For example figure 4 shows the ensemble mean error in northern hemisphere extratropical cyclone position and propagation speed for 9 different EPS archived as part of the THORPEX Interactive Grand Global Ensemble (TIGGE) program (http://igge.ucar.edu/TIGGE). There are large differences in skill between the different EPS.

References


Available for download from www.nere-essc.ac.uk/~lsf/papers.html