Route based applications of gridded long term averages using GIS techniques

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Long-term averages (LTAs) are a well established tool for describing the state of the climate. The Met Office has developed a set of UK monthly, seasonal and annual LTAs for the 1961-1990 and 1971-2000 averaging periods for 17 climate variables on a 1km rectangular grid (Perry and Hollis, 2005).Using GIS (Geographic Information System) techniques, these gridded datasets are being exploited for the benefit of users in a number of different industries, primarily for assessing risk and for planning purposes.

The relative vulnerability of road, rail and electricity infrastructure to adverse weather can be assessed by analysing the variation of gridded LTAs, either individually or in combination, across each network. For the national rail network, risk maps of ice at overhead line height and frost and snow at railhead height have been generated. For specific routes this information has been combined with detailed digital terrain model data to highlight route sections most susceptible to snow drifting.

Combinations of gridded climate variables can be analysed in order to divide networks into a set of climatologically homogeneous areas by using a combination of principal components analysis and cluster analysis. This method has been used to optimise road temperature sensor networks used for road surface temperature prediction at both county and regional levels. Each resulting cluster represents a distinct climate zone, and the sensor network can then be refined such that each area contains a road sensor site.

This paper will also discuss the potential for further developments.

Reference: Perry MC & Hollis DM, The development of a new set of long-term climate averages for the UK, International Journal of Climatology, 25, pp1023-1039, 2005.