Quantitative Assessment of the Environment

Date: 30 October 2002
Venue: Department of Meteorology
Organiser: David B. Stephenson
Minutes: Christopher Ferro

David Stephenson opened the informal research workshop, the first of its kind at the University of Reading, and welcomed all participants. The stated purpose of the afternoon was to help establish contact between researchers with common interests and to identify training and computer software requirements. David also described some of the fundamental, technical issues facing environmental scientists.

Howard Grubb gave the first talk and began by describing the activities of the School of Applied Statistics. These included the Statistical Advisory Service (www.rdg.ac.uk/AcaDepts/sn/), which is freely available to all researchers in the University. Howard also recommended the Environmental Statistics Study Group of the Royal Statistical Society and the ENVSTAT mailing list (www.jiscmail.ac.uk/files/envstat). The second part of Howard's talk was an *Exploration of trends in atmospheric temperatures*, in which he presented a statistical analysis of the Central England Temperature series, looking at seasonality and extremes. He concluded that because of the complex structure in environmental data sets (e.g. seasonality), there was scope for the careful application of simple models in novel ways rather than more sophisticated modelling strategies.

The second talk was given by Ivan Astin, who catalogued the different projects being undertaken at the ESSC. These included kriging mud flats, mapping volcanic flow hazards, flood modelling, weather tracking, and problems in remote sensing. Many of the activities at ESSC involve a complex spatial element and various methods have been developed at ESSC for coping with each of these particular problems.

William Lahoz described DARC's interest in atmosphere, ocean and earth-system modelling, before handing over to Ross Bannister who explained their work on variational data assimilation (VAR). The interest here is in combining satellite measurements with other sources of data and physical knowledge of the systems being modelled. One particular problem is the estimation of spatial covariances in background fields. The use of physically motivated transformations to precondition the variables before assimilation appeared to be a promising direction.

At this point the meeting adjourned for fifty minutes for refreshments kindly prepared by Della Fitzgerald. This time was well used for further discussion of issues raised in the first half of the afternoon. Many of the scientists had not met each other before and therefore had the opportunity to get to know each other.

The second half began with a review presentation by Abdel Hannachi of the quantitative methods used for analysing gridded data sets in CGAM. Among those illustrated were plotting tools, multivariate techniques for dimension reduction and identification of large-scale climate modes, spectral and filtering methods, and singular systems analysis. Pierre-Philippe Mathieu then gave an inventory of the software used in CGAM, and closed with a vision of how current technology could help to solve problems relating to data

storage, computational efficiency, and software standardisation.

Sergio Pezzulli presented current work in the Department of Meteorology on *Bayesian methods for combining climate forecasts*. Beginning with a review of Bayes Theorem, Sergio showed how this could be applied to ensemble seasonal forecasts. This approach gave a more accurate assessment of prediction uncertainty than current methods, which suffer from a mis-understanding of the information contained in ensemble forecasts.

The final presentation was given by Ruth Kerry (Department of Soil Science) entitled *A comparison of kriged predictions using average variograms of soil properties and standardized average variograms of ancillary data*. The problem was to estimate maps of soil properties for use in precision farming. When data were limited, it was found that information from alternative sources could be harnessed effectively. The *average variogram* approach was described.

The meeting was well attended by around 50 people from different Schools, Departments, and institutes around the university. Several other people expressed regret that they could not come due to other commitments but said that they would really have liked to participate. The organiser would like to thank all those people who spent their time preparing the talks and hopes that this meeting will stimulate more collaboration in quantitative environmental science in this university. Electronic versions of the talks can be found on the Climate Analysis Group web site www.met.rdg.ac.uk/cag/stats/qae.

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