

# Software for Constructing Forecasts from Ensembles: The EMTOOL

**J. Broecker** (1), L. A. Smith (1)

(1) Centre for the Analysis of Time Series, London School of Economics, United Kingdom,  
(cats@lse.ac.uk)

The software EMTOOL, developed at the Centre for the Analysis of Time Series (CATS) is presented and explained. The purpose of the EMTOOL is to provide a matlab toolbox for creating and training ensemble interpretation methods. Here “ensemble interpretation methods” refer to methods that turn ensembles into forecast distributions, for example by kernel dressing or through estimating parameters of distribution functions of various shapes. The user is provided with a set of interpretation methods ranging from well established procedures to CATS’ most advanced techniques. A short introduction to the syntax, the available methods and the numerical recipes and algorithms behind the methods is provided. In some sense, the EMTOOL aims to perform regression in the space of probability density functions (as opposed to usual regression methods, which assume values in the real numbers only). The methods are trained on a forecast-verification archive consisting of ensemble members from various sources (multi-model, initial-condition, singleton, multi-parameter etc) and corresponding verifications. The verifications can be either binary (“rain vs no-rain”) or continuous (“temperature at London Heathrow”).

The EMTOOL philosophy is not only to provide access to algorithms, but also to facilitate for forecasters and other researchers to test, contribute and share their own ensemble interpretation methods within the object oriented structure of the EMTOOL, thereby ensuring coherent syntax and compatibility. The EMTOOL is available under the GPL from [www.lse.ac.uk/collections/cats](http://www.lse.ac.uk/collections/cats) . An EMTOOL discussion group is maintained under <http://cats.lse.ac.uk/forum> , “Tools for Forecasting”.