ECMWF Seminar on Data assimilation for atmosphere and ocean

6 - 9 September 2011

Contents

Contents

ECMWF Seminar on Data assimilation for atmosphere and ocean

6 - 9 September 2011

Introduction

The 2011 ECMWF Seminar was on Data Assimilation for Atmosphere and Ocean. It has been eight years since the previous seminar on the same topic, although this field has seen major advances during that period.

Data assimilation is indeed at the core of ECMWF numerical weather prediction activities. Increasing the accuracy of the forecast relies on the provision of increasingly accurate initial states for the prediction system. Variational data assimilation has been successfully developed and used operationally at ECMWF, today the variational system is a pre-requisite for the assimilation of satellite data and effective use of conventional observations in the atmosphere. Ocean data assimilation is also an integral part of the monthly and seasonal forecast systems. An extension of variational techniques including longer assimilation windows and weak constraint methods to allow for inclusion of model error estimates are current research areas. Ensemble based assimilation systems are currently under development and combined with the variational technique to allow for a flow dependent estimation of background error variances and covariances. The Ensemble Kalman Filter method has been applied to operational NWP and Extended Kalman Filter methods have been developed for surface parameter assimilation. The development of ensemble based assimilation techniques implies that initial state perturbation methods and the representation of model error are essential elements of data assimilation systems thus providing close links with ensemble prediction methods.

The seminar gathered almost a hundred participants, and 21 lectures were given by world leading experts (including 7 ECMWF speakers) in this area. They gave a pedagogical review of the principles behind data assimilation techniques and provided detailed descriptions of the currently used assimilation techniques. A wide variety of more specific topics was covered and led to very active exchanges between the speakers and the audience. These topics included overviews of the observation data sources and their intrinsic properties, outlooks on future developments in data assimilation such as ensemble based methods and weak constraint variational method, and also challenges related to the design of efficient data assimilation schemes on future computer architectures.

ECMWF thanks all the lecturers for their stimulating talks and their written contributions to these proceedings.