

Introduction to Data Assimilation.

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The basic purpose of data assimilation is to combine different sources of information to estimate at best the state of a system. These sources generally are observations (data), a numerical model and error statistics. Why not simply use observations? First, because observations are sparse or partial in geophysics. Some information is necessary to interpolate the information from observations to unobserved regions or quantities. A numerical model naturally does that. Second, because observations can be noised. Combining several noised data is an efficient way to filter out noise and provide a more accurate estimate. The data assimilation problem may be tackled with different mathematical approaches: signal processing, control theory, estimation theory for example. Stochastic methods, such as the well known Kalman filter, are based on estimation theory. On the other hand, variational methods (3D-Var, 4D-Var...) come from control theory. I will briefly present these two types of methods, and some implementation issues.