DRAFT – April 23 2003

WORKSHOP RECOMMENDATIONS ON ENSEMBLE-BASED DATA ASSIMILATION

1. STATISTICAL CONSIDERATIONS
   a) Pursue basic research on how well information is extracted from observations; Develop measures of related information content
   b) Explore relationship and optimal resource allocation between model resolution, ensemble size, and extent of localization in background error covariance estimation
   c) Study hybrid methods that combine ensemble-based assimilation methods with traditional approaches in defining background error covariance information

2. ISSUES RELATED TO THE USE OF IMPERFECT MODELS
   a) Enhance NWP models so they can represent model related uncertainty in ensemble forecasting applications
   b) Advance knowledge related to, and develop new methods for
      i. Reducing bias in background ensemble forecasts
      ii. Estimating the covariance in model related forecast errors by, e. g., studying the relative value of additive vs. multiplicative noise in variance inflation

3. HIGH SPATIAL RESOLUTION APPLICATIONS
   a) Study the relative merits of using limited area vs. variable spatial resolution models in high resolution data assimilation applications
   b) Ensure that in limited area model applications uncertainties present on the larger scales are properly accounted for through the specification of the boundary conditions
   c) Study the effect of, and develop methods to cope with the highly non-linear and spatially and temporally intermittent processes that are present on the small scales

4. OPERATIONAL CONSIDERATIONS
   a) Demonstrate that ensemble-based schemes, like 4D-VAR, can successfully assimilate observations spread arbitrarily over, say, a 6-12 hour time period
   b) Carry out high resolution experiments with realistically high data density for testing prior to considering operational applications
   c) Provide the community with a common set of models and data sets with the level of sophistication ranging from simple to the most complex operational setting so that advances made by different groups can be easily and meaningfully compared