Validation and intercomparation discussion Items

Size of assimilation ensembles. Is it to be determined only by numerical stability of algorithms? (O. Talagrand)

Which qualities are most desirable for an assimilation algorithm? Accuracy, optimality, numerical efficiency, anything else? (O. Talagrand)

Discussion Items (M. Buehner)

What approximation is better for temporal covariance evolution: 1) TL/AD evolution of localized (or otherwise modified) P or 2) nonlinear evolution of low-rank P (i.e. in sub-space of O(100) ensemble members)?

How does choice depend on scales or processes of interest (global vs. limited-area)?Is there a way of getting around the current limitation in EnKF algorithms of only being able to apply spatial localization to (PH^T) and (HPH^T) and not to P directly?

How important are the differences in the variational and EnKF solution algorithms with respect to accuracy and computational efficiency (as number of obs increases in the future)? In what situations would one approach be expected to be better that the other (assuming same P, H, background state, etc.)?

Discussion Items Specific to LAM NWP EnKF vs. VAR (F. Zhang)

Multi-scale in nature

- **Balance versus imbalance**
- **Moist error growth dynamics at meso/convective scales**
- **Significance of model error, esp. in moist physics and boundary layer**
- **Strong inhomogeneity in data coverage, lack of good thermodynamic obs**
- **Localization challenge: moving beyond empirical tuning?**
- **Ensemble initiation, startup vs. lead time, DFI windows**

Needs for lateral boundary conditions and nesting

- **Perturbation availability and consistency from global models**
- **Multiple domain updating, one-way versus two-way nesting**
- **Related: Unified model, dual resolution**

Satellite data assimilation for mesoscales

- **Bias correction**
- **Model top**

Validation and inter-comparison with variational methods

- **Lack of common domains and metrics**
- **Lack of compatible 4Dvar**
- **Grid-point RMSE versus feature-based verifications**