**Semester:** Spring 2010
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**Dissertation title:** KALMAN FILTER BASED TECHNIQUES FOR ASSIMILATION OF RADAR DATA

**Abstract:**
The assimilation of radar data in storm-scale numerical weather prediction models is essential for improved forecasts of thunderstorm events. The huge computational cost of assimilating the high temporal and spatial resolution radar observations poses a challenge to the data assimilation techniques. The objective of this study is to examine the Kalman filter based technique for assimilating the high density radar observations. The first set of experiments evaluates the impact of assimilating high temporal frequency radar observations over a shorter assimilation period using the Ensemble Square Root Filter (EnSRF) data assimilation technique. The impact of model error and the value of using a range of intercept and density parameters for hydrometeor categories across the ensemble members within the same microphysics scheme are examined in the second set of experiments using the EnSRF technique. While the EnSRF technique shows promise in radar data assimilation, one limitation of EnSRF is the high computational expense when the number of observations is very large. Thus in an effort to explore efficient data assimilation method, the feasibility of the information filter as data assimilation technique for large number of observations assimilation is examined. The extended information filter (EIF) is implemented using the Lorenz 96 model and the performance of EIF in assimilating high density observations are compared with the benchmark extended Kalman filter (EKF) data assimilation technique.