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Eric Kostelich. *Graph Partitioning Algorithms for Load Balancing on Massively Parallel Computers.*

Data assimilation is the process by which a complex model, such as a global weather forecast model, is updated from a large set of observations. Forecasting operations require that numerical methods for this purpose be able to process millions of observations within a few minutes. The Local Ensemble Transform Kalman Filter is a data assimilation scheme that is designed for efficient operation on massively parallel computers. However, its primary performance bottleneck is poor partitioning of workload, because the geographic distribution of observations in combination with the existing load balancing algorithm creates poorly balanced partitions. This talk describes the use of graph partitioning algorithms, such as METIS, to improve performance by creating good partitions of computational workload which are evenly balanced across potentially hundreds of processors. Conversion of the existing observation data structures into graphs is required to use METIS, but performance benefits in terms of well-balanced workloads make the additional cost of data structure conversions worth the small computation time. (Received September 18, 2013)