1046-65-1531   **Yulong Xing*** (`xing@cims.nyu.edu`), 251 mercer street, New York University, new york, NY
10012, and **Andrew J. Majda** and **Wojciech W. Grabowski**. *New Efficient Sparse
Space-Time Algorithms for Superparameterization on Mesoscales.*

Superparameterization (SP) is a multi-scale modeling system with explicit representation of small-scale and mesoscale processes provided by a cloud-resolving model (CRM) embedded in each column of a large-scale model. The approach involves applying a 2D cloud-resolving model in each column of a 3D large-scale model. In the original formulation, small scale models are solved through the whole time and over the whole domain. Here we present new efficient sparse space-time algorithms based on the original idea of SP, which only solve the small scale models in some reduced portion of the spatial domain and time interval, while we keep the same large scale dynamics. The new algorithms have been applied to a two-dimensional free squall line test, and the numerical results are compared with the CRM and original SP test. It shows that the large scale variables, such as velocity and specific humidity, can be captured in a reasonably statistically accurate way, based on the information passed from the reduced small scale models for space-time domains reduced by roughly a factor of 1/3; thus, the new efficient algorithms for SP result in a gain of roughly a factor of 10 in efficiency and a statistical accuracy on the large scale variables. (Received September 15, 2008)