1105-76-190 **Artem N. Semakin*** (arte-semaki@yandex.ru) and **Y. Rastigejev**. *A Parallel High-order Optimized Wavelet-based Adaptive Mesh Refinement Method for Global Atmospheric Chemical Transport Simulations.*

Significant difficulties associated with numerical modeling of multi-scale global Atmospheric Chemical Transport (ACT) impose severe limitations on the spatial resolution of non-adaptive grids. The interaction of numerical diffusion caused by these crude resolutions with complex velocity field of atmospheric flows leads to large numerical errors. To address the described difficulties, we have developed an Optimized Wavelet-based Adaptive Mesh Refinement (OWAMR) method for numerical simulation of multi-scale problems. The OWAMR is a 3D adaptive parallel method that minimizes the number of grid points required to resolve the finest scales. The algorithm uses a new two-parameter adaptation criterion that significantly reduces the number of grid points compared with the standard one-parameter grid adaptation. The OWAMR has been tested for several challenging ACT problems. Particularly, it was shown that the method correctly simulates dynamics of a pollution plume traveling on a global scale producing less than 3% error. To achieve such accuracy, conventional non-adaptive techniques would require five orders of magnitude more computational resources. The obtained results demonstrate the OWAMR ability to achieve high accuracy at a low computational cost. NSF grant HRD-1036563 (Received September 22, 2014)