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Devlopment of Barotropic Limited area numerical weather pridction model over Ethiopia

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This numerical weather prediction model is developed over Ethiopia for case studies of September 10-11/2008, July 01/2008 and December 01/2008 at 500mb, 600mb and 700mb which predict absolute and relative vorticity, streamfunction and wind field using initial and lateral boundary conditions from NCEP reanalysis data. The model includes the effect of orography of a country using it as grid points. FORTRAN 90 programming language and Golden surfer-8 are used to develop a model and to plot spatial variation system over a country respectively.

Baraotropic model assumes incompressible atmosphere, no vertical advection such as buoyancy and convectively activities. Physically, 500mb is a level of non-divergence in mid latitude and most part of tropics and 700mb over West Africa. The model output and the NCEP reanalysis data have best agreement at 500mb than 600mb and 700mb for absolute vorticity prediction over Ethiopia even though its discrepancies increase with period of prediction. The other importance of this model is it can model the westward propagation of waves at 500mb, 600mb and 700mb. The model fails to predict wind field as it only model the non divergence and neglect the irrotational wind field. It conserves the fundamental invariants of barotropic model like domain total mean kinetic energy, enstropy and wave number. The level of non divergence is shifted seasonally which is clearly seen from experimental simulation of July, September and December 2008.

LAM is affected by different factors. The spatial resolution and the topography of domain of an area are some of the major factors that alter the flow of the weather system. Those are clearly noticed from results obtained by changing grid resolution and including the topography of study area. Particularly, the impact is quite apparent in the magnitude and intensity of flow of weather system over an area.