Impact of Cartosat-1 Orography in 330m Unified Model Forecast

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Abstract: The newly introduced high-resolution (330 m) regional model, DM (Delhi Model), at the National Centre for Medium Range Weather Forecasting (NCMRWF) targets winter time fog/visibility forecast over Delhi, India. Current study focuses on the benefits of enhanced orographic features in DM, through a new data set developed using the Indian Space Research Organisation (ISRO) Cartosat-1 orography (Cartosat-run), against those from the NASA Shuttle Radar Topography Mission Digital Elevation Model employed previously (SRTM-run). The early morning visibilities from the Cartosat-runs were lower compared to the SRTM-runs, which could be linked to an enhanced downdraft (negative vertical velocity) in the former, helping form a shallow and stratified boundary layer. The evolution and variability of ventilation index in the model domain is regulated by the local wind circulation changes within the shallow boundary layer which in turn is modulated by the orography representation. The DM forecasted ventilation index has been projected to be a potential indicator of the atmosphere dispersion of airborne pollutants over Delhi.