

Comparisons of MISR Cloud Motion Vectors with Reanalysis Winds

Dong L. Wu

NASA Goddard Space Flight Center, Greenbelt, Maryland, USA

Abstract –

The recently-released MISR cloud motion vector (CMV) product has improved its coverage, precision and horizontal resolution (17.6 km). The reprocessed data are available for the entire mission period beginning in March 2000. MISR CMV measurements have demonstrated a promising capability to resolve boundary-layer dynamics with vertical resolution of 500 m. In this study, the new MISR CMV data are compared to ERA-Interim and MERRA reanalysis in terms of zonal and meridional winds, with emphasis on boundary-layer (0-3 km) mean biases in monthly zonal and meridional components. The reanalysis winds are collocated and interpolated to the location and local time of MISR data on a daily basis to minimize sampling biases. We find generally good agreement over ocean but slightly larger differences over land. In particular, the zonal winds over the northern Africa, eastern China, Rockies, and Antarctica exhibit large biases. Meridional winds differ more in the tropics where MISR shows stronger inter-tropical convergence over Africa. Different from the GEO and MODIS CMVs, MISR resolves cloud motion and height simultaneously with stereoscopic pattern matching of its nine high-resolution (275 m) images in <7 minutes. MISR CMV height determination is insensitive to atmospheric temperatures, and therefore not limited by atmospheric thermal structures or complex surface types as in the IR CMV technique. Tracking cloud motions in 7 minutes also helps to reduce CMV uncertainties from the cloud shape distortion in rapidly developing systems such as convective and frontal clouds.