

Airborne Doppler wind lidar data fusion with a diagnostic wind model

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Abstract

An initialization method using airborne Doppler wind lidar data was developed and evaluated for a mass-consistent diagnostic wind model over complex terrain. The wind profiles were retrieved from the airborne lidar using a conical scanning scheme and a signal processing algorithm specifically designed for the airborne lidar system. An objective data analysis method in complex terrain was then applied to those wind profiles to produce a three dimensional wind field for model initialization. The model results using the lidar data initialization were compared with independent surface weather observational data and profiles from a microwave radar wind profiler. For the complex terrain in the Salinas valley, the model evaluation with a limited number of observations indicated that the diagnostic wind model with airborne Doppler lidar data produced a reasonably good wind field in moderate to strong wind conditions. However, caution must be stressed for weak wind conditions in which the flow is thermally driven as the mass-consistent diagnostic wind model is not equipped to handle such cases.