A new Ku-band low incidence backscatter model (KuLMOD) was proposed to retrieve wind speeds from Ku-band Tropical Rainfall Mapping Mission (TRMM) precipitation radar (PR) data. The model was designed as a simple linear second-order polynomial function of the incidence angle and wind speed bins. The retrievals for the 2–5° incidence angle bins were better than those for the other bins (Figure 14a), yielding an average RMS error of about 1.37 m/s. The retrievals for the 4–9 m/s wind speeds had better accuracies than those for the other wind speeds (Figure 14b), with an averaged RMS error of about 1.39 m/s.

Using the KuLMOD, the wind speeds were retrieved from the TRMM PR data by the least squares method and compared with the buoy-measured wind speeds. The retrieved wind speeds were compared with the buoy-measured wind speeds. Figure 4 shows good correlation with a CORR of 0.83, essentially no bias (0.03 m/s), and an RMS error of 1.45 m/s. Therefore, the retrieved wind speeds agreed well with the buoy-measured wind speeds. However, there were minor inconsistencies between the wind speeds. The retrievals had higher accuracies with higher wind speeds above 12 m/s.

Figure 5 shows the RMS errors of the wind speed retrievals as a function of the incidence angle and wind speed bins. The retrievals for the 2–5° incidence angle bins were better than those for the other bins (Figure 14a), yielding an average RMS error of about 1.37 m/s. The retrievals for the 4–9 m/s wind speeds had better accuracies than those for the other wind speeds (Figure 14b), with an averaged RMS error of about 1.39 m/s.

CONCLUSIONS

A new model was proposed to retrieve wind speeds from Ku-band TRMM PR data obtained at low incidence angles. The data set consisted of TRMM PR observations and NDBC buoy-measured wind and wave data. TRMM PR data were analyzed as a function of the wind speed. The model assumed a simple linear second-order polynomial function, with the coefficients derived by fitting the collocated data set.

With the KuLMOD, the wind speeds were retrieved from the TRMM PR data by the least squares method and validated with the collocated buoy wind speeds, showing an RMS error of 1.45 m/s. The retrieval accuracy was further analyzed as a function of the incidence angle and wind speed, with better accuracies obtained for the 2–5° incidence angles and 4–9 m/s wind speeds.

REFERENCES