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SARAL/AltiKa is the first satellite radar altimetry mission to fly a Ka-band instrument. Ka-band backscatter measurements suffer larger signal attenuation due to water vapor and atmospheric liquid water than those from Ku-band altimeters. An attenuation algorithm is provided, based on radar propagation theory, which is a function of atmospheric pressure, temperature, water vapor and cloud liquid water content. Due to the nature of the air-sea interactions between wind and surface gravity waves, the shorter wavelength Ka-band backscatter exhibits a different relationship with wind speed than at Ku-band, particularly in the linear model regime at moderate to high wind speeds. Here we present a new one-dimensional wind speed model, as a function of backscatter only, and a two-dimensional model, as a function of backscatter and significant wave height, tuned to AltiKa's backscatter measurements, once corrected for attenuation. The performance of these new Ka-band altimeter wind speed models is assessed through validation with independent ocean buoy wind speeds and theory. The results indicate wind measurement accuracy comparable to that observed at Ku-band, with only a slightly elevated noise level in the wind estimates. The one-dimensional wind speed model has been endorsed by the SARAL/AltiKa project team for the next major product update to "version-D" in early 2014.
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