

Interactive comment on “Retrieved wind speed from the Orbiting Carbon Observatory-2” by Robert R. Nelson et al.

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The main purpose of the OCO-2 instrument is to retrieve the column integrated CO₂ concentration (XCO₂). Over water surfaces, the measurement are acquired in the glint mode where the instrument is pointed to a direction that is close to the glint geometry. The measurements are then sensitive to the sea surface reflectance which itself is sensitive to the wind speed. The measurement can then be used for an estimate of that parameter. Yet, the algorithm also includes a semi-empirical Lambertian component to the surface reflectance that is designed to represent calibration errors. This feature of the retrieval algorithm can be turned on or off. This paper analyse the precision and accuracy of the wind speed retrieval in comparison to the estimate from another instrument -assumed to be more precise- that flies over the same orbit as part of the A-

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Train. It is shown that the wind speed error is rather large when using the operational algorithm with the Lambertian albedo feature, but that it gets much better when the feature is turned off (ie the surface reflectance is based on the glint reflectance only).

The wind speed retrieval uses the Cox-Munk model for the sea surface slope distribution as a function of wind speed. It is said (correctly) that the model uses a Gram Charlier expansion (page 4, line 11). Yet, the equation line 14 strongly indicates that the author use the simplified version of the Cox and Munk model that is NOT based on a Gram-Charlier expansion and that do not depend on the wind direction. This is a strong assumption that must be discussed. Indeed, the wind speed direction has a very significant impact on the glint reflectance, in particular when the observation geometry is away from the glint. This may explain some of the features that are commented by the authors (but without referring to the wind direction)

In addition, it is stated (page 3, line 12) that the accuracy of the AMSR product is 1-1.5 m/s. Yet, the comparison of the best OCO-2 wind speed product against AMSR leads to a RMSD of 0.75, which is significantly lower than the stated accuracy. This indicates that the errors in the AMSR product and the OCO-2 product are significantly correlated, so that AMSR product cannot be used as an independent validation dataset. At the very least, this should be discussed.

One result of the paper is that the operational OCO-2 retrieval leads to wind speed estimated that are rather poor. This provides strong evidence that the Lambertian reflectance correction has a negative impact on some features of the retrieval. This is, I think, a result of importance that could be included in the abstract.

Minor issue : I suggest that the heat maps of Figure 3 and 5 use the same color table as those of the others, with grey color for values with no count.