

The authors would like to thank François-Marie Bréon for their comments on our manuscript entitled, “Retrieved wind speed from the Orbiting Carbon Observatory-2.” Below, we have addressed their comments and made the necessary changes in the manuscript.

“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)”

We have clarified the text in Section 3.1:

“They also found that the mean square slope parameter, which describes the surface roughness in their photographs, could be related to wind speed to a first order approximation using a simplified isotropic (independent of wind direction) function...”

We also examined the difference between the sensor azimuth angle and the wind direction (Fig. 1, below) and found no obvious correlation with the spatial errors (Fig. 2, below).

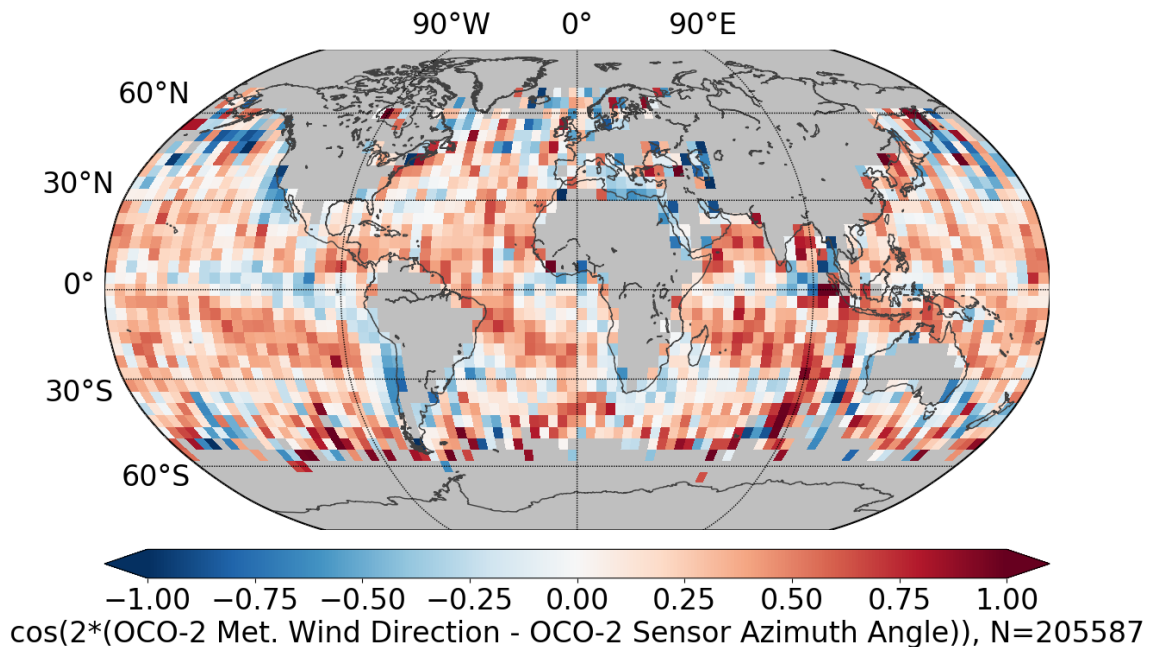


Figure 1. Values of 1 indicate the sensor and wind direction are parallel, while values of -1 indicate that they are perpendicular.

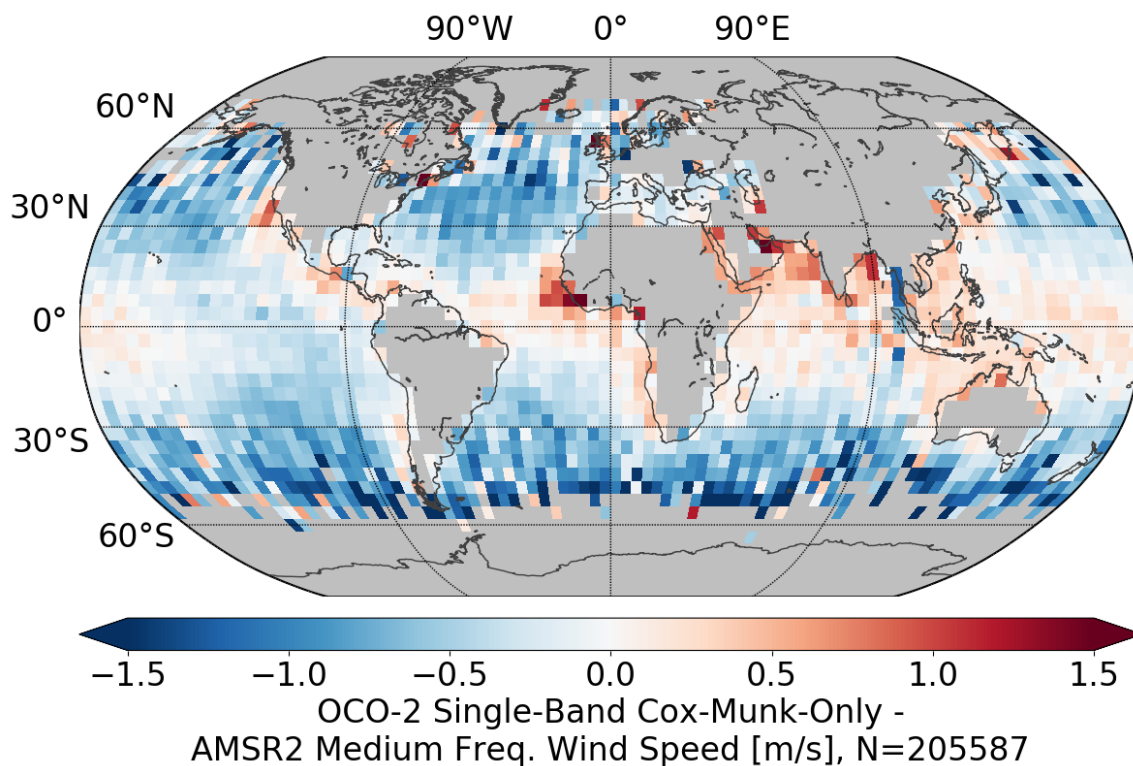


Figure 2. Difference between OCO-2 wind speed and AMSR2 wind speed.

We have added the following statement to Section 5:

“Finally, the isotropic simplification of Cox-Munk used in our retrieval means that wind direction is not taken into account and thus the estimated wind speed could vary slightly depending on if the sensor is viewing up/downwind or crosswind. However, we analyzed the spatial patterns of the difference between the sensor azimuth angle and the meteorological wind direction (not used in the retrieval) and found no obvious correlation with the wind speed differences.”

“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.”

Agreed, and we have added the following statement to Discussion and Conclusions:

“These errors are less than the estimated errors of AMSR2 itself (1-1.5 m/s), which may be partly because both sensors use similar assumptions about sea surface slope distributions and the relationship between these distributions, surface wind speed, and wind stress. Additionally, AMSR2 errors have typically been estimated by comparing to buoys, which has its own set of challenges including spatial-temporal matching errors, buoy height adjustment assumptions, and buoy measurement errors.”

“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 as a negative impact on some features of the retrieval. This is, I think, a result of importance that could be included in the abstract.”

The Lambertian component of the retrieval has a clear positive impact on the XCO₂, which is the primary product from OCO-2. There are a number of retrieval setups that could potentially result in both accurate XCO₂ and wind speed, such as solving for wind speed in all three bands, but implementing and evaluating them was beyond the scope of this paper.

“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.”

Figures 3 and 5 have been updated.