

Supplemental Material

# System for Analysis of Wind Collocations (SAWC): A Novel Archive and Collocation Software Application for the Intercomparison of Winds from Multiple Observing Platforms

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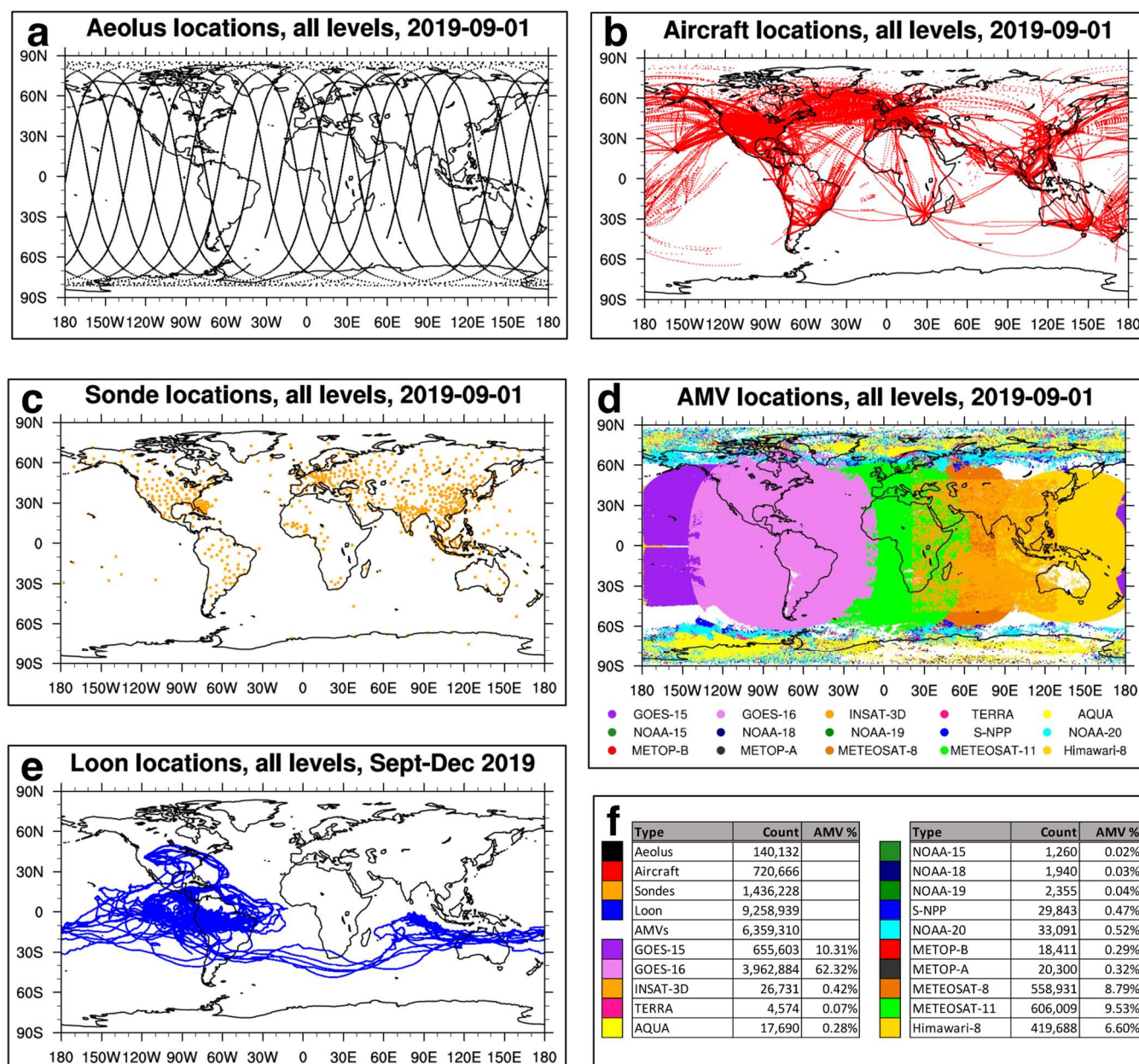
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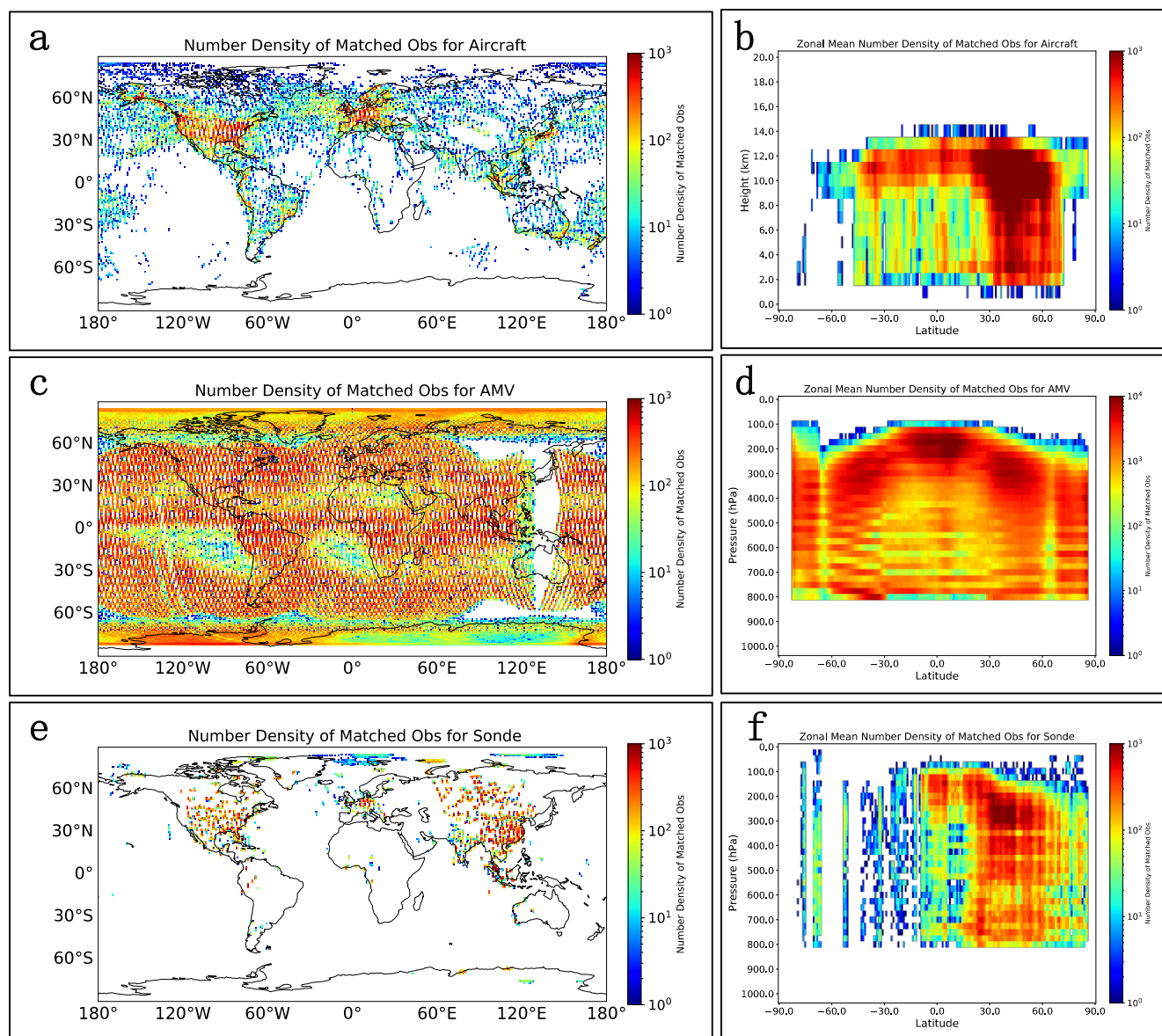
**Note:** This supplemental material includes figures referred to in the article text. Note that figure panels enclosed in boxes are as produced by SAWC plus an identifying letter.

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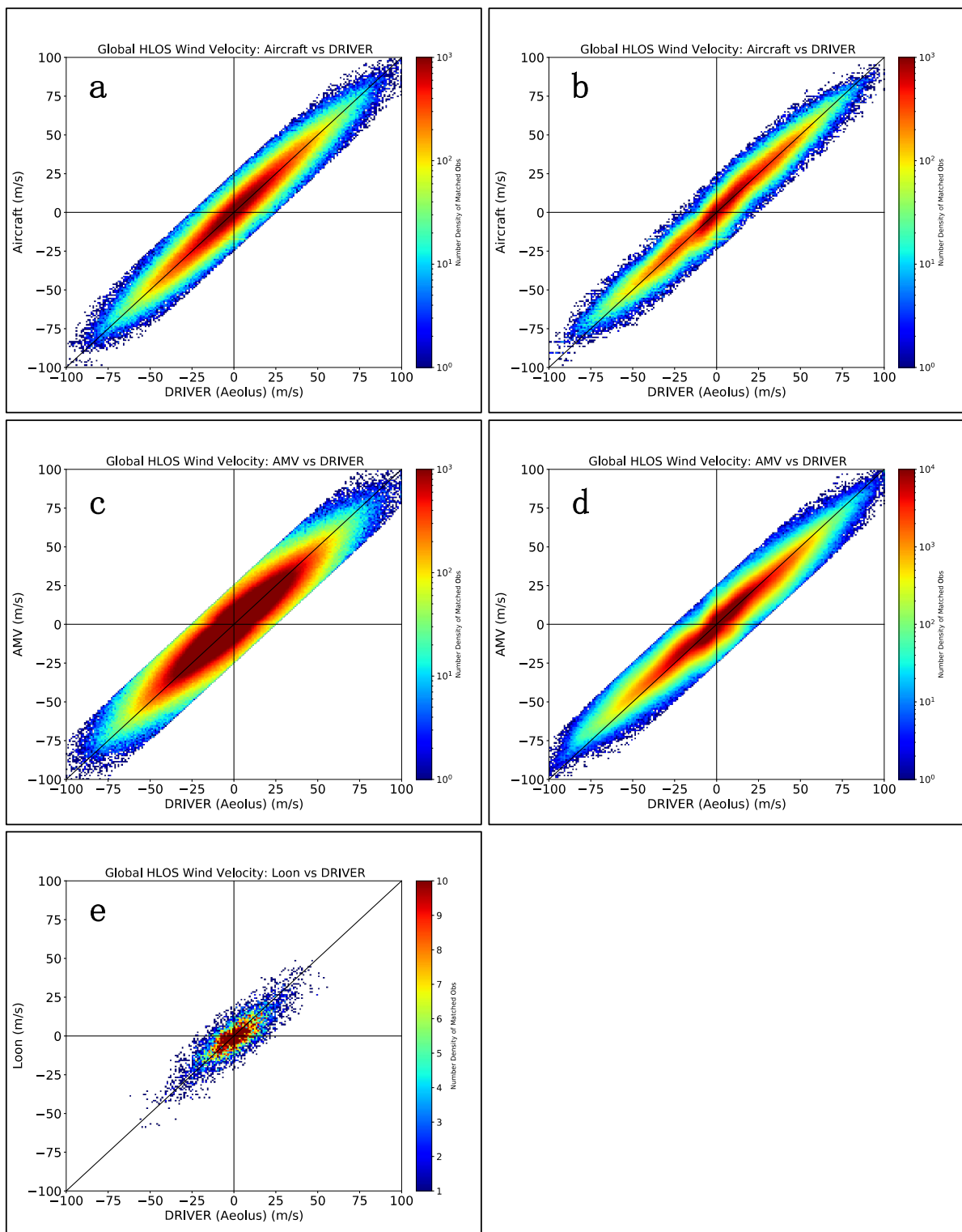
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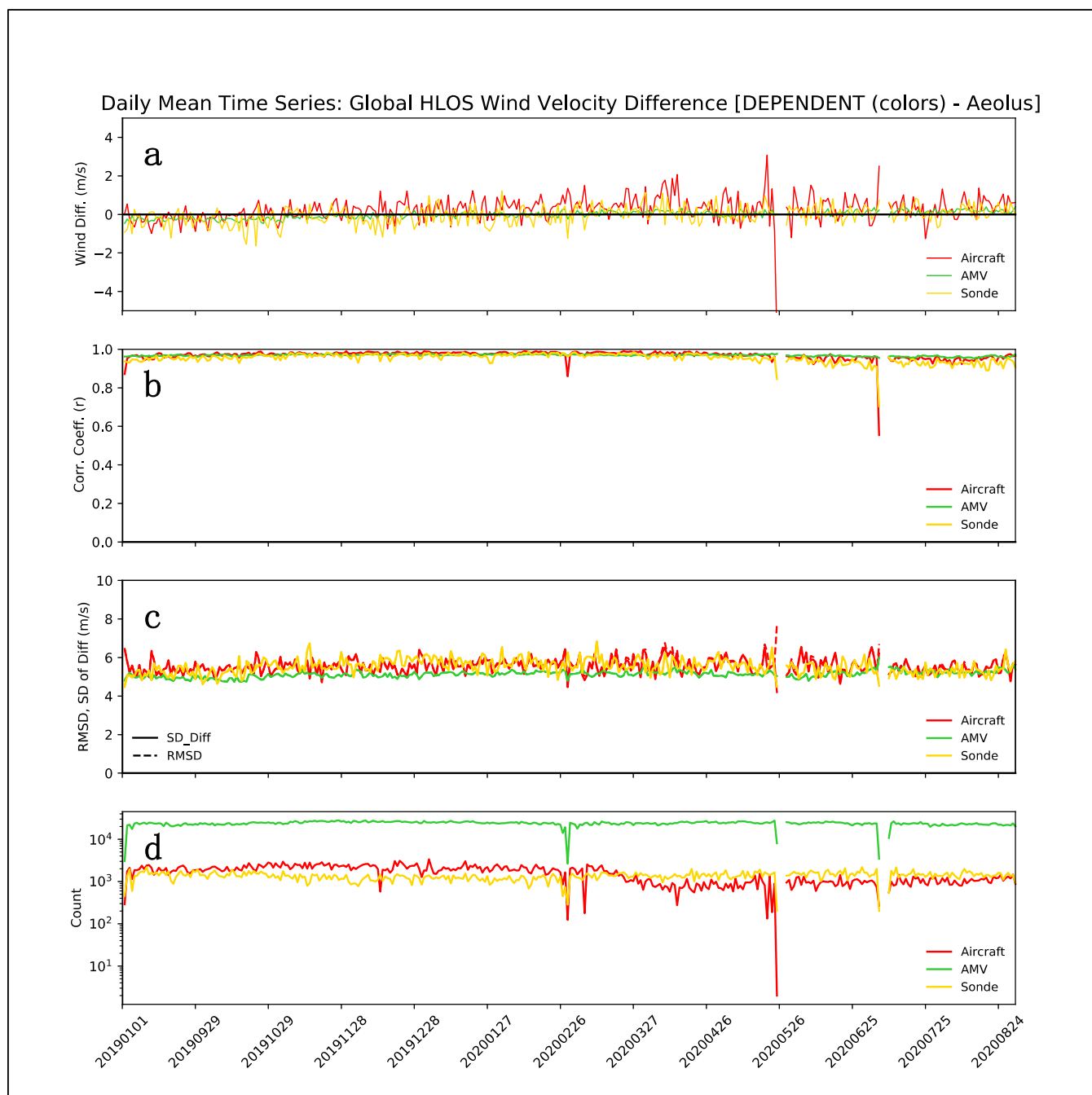
**Figure S1.** Example spatial coverage of each wind dataset currently available in the SAWC archive for a 24-h period for (a) Aeolus, (b) aircraft, (c) sondes, and (d) AMVs, and for a 4-month period for (e) Loon. Colors and counts for each type are given in (f).



**Figure S2.** Observation number densities collapsed onto the latitude-longitude plane (**left column**), and onto the height/pressure-latitude plane (**right column**) for (**a,b**) aircraft winds, (**c,d**) AMVs, and (**e,f**) sonde winds, all collocated with Aeolus Mie-cloudy winds for Sept 2019-Aug 2020. Colors indicate number density per grid cell, with dimensions of  $1^\circ \times 1^\circ$  for panels (**a,c,e**),  $1 \text{ km} \times 1^\circ$  for panel (**b**), and  $25 \text{ hPa} \times 1^\circ$  for panels (**d,f**). Plotting conventions as in Figure 3.

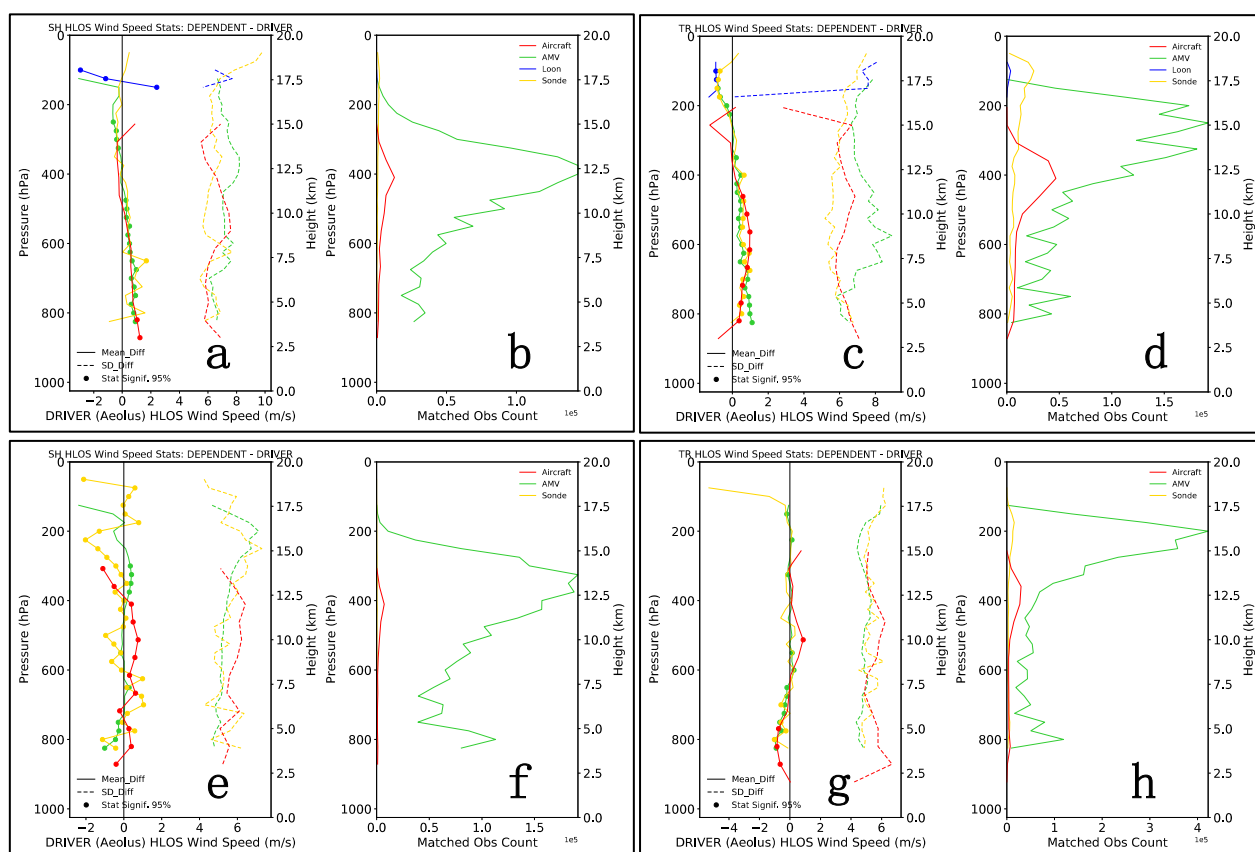


**Figure S3.** Density scatterplots of HLOS wind differences for RayClear (left (a,c,e)) and MieCloud (right, (b,d)) comparisons with aircraft (a,b), AMVs (c,d), and Loon (e) for Sept 2019-Aug 2020. Statistics of the collocation are given in Table 2. Colors indicate number density per  $1 \text{ m/s} \times 1 \text{ m/s}$  cell. Plotting conventions as in Figure 4.

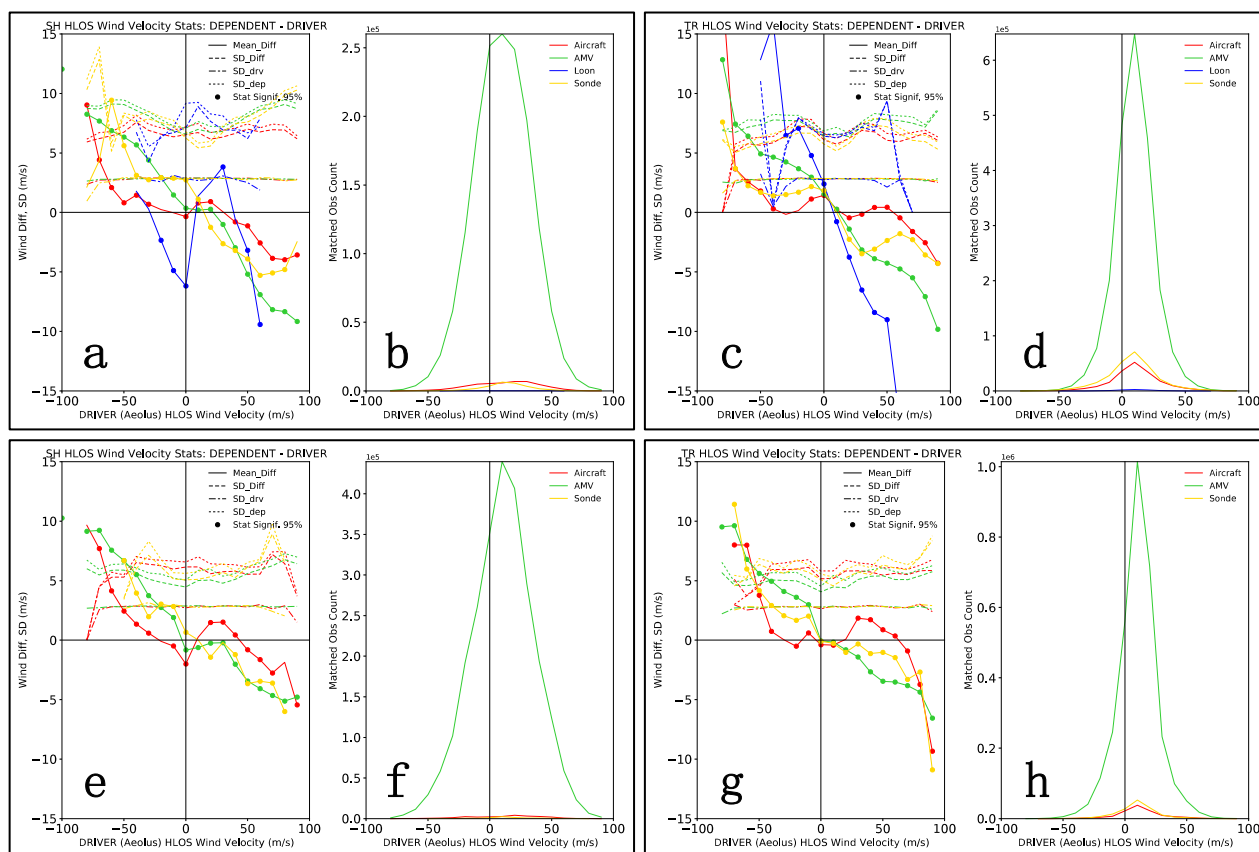


**Figure S4.** Time series of Mean\_Diffs (m/s, (a)), correlation coefficients (r, (b)), RMSD and SD\_Diffs (m/s, (c)), and collocation counts (d) for MieCloud comparisons during September 2019–August 2020. Statistics of the collocation are given in Table 2. Colors denote each Dependent wind dataset. Plotting conventions as in Figure 5.

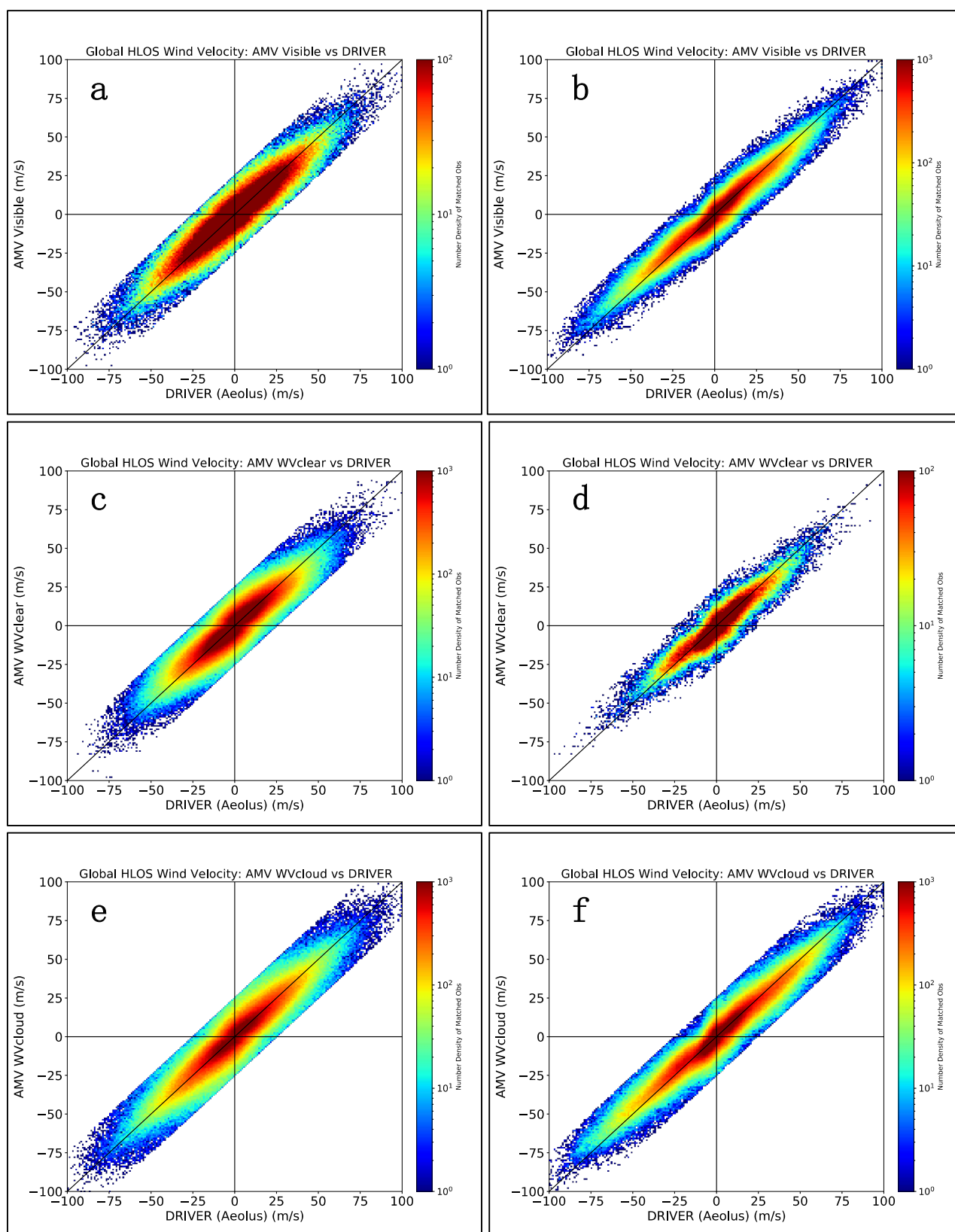




**Figure S5.** Vertical profiles of Mean\_Diffs (solid lines) and SD\_Diffs (dotted lines) per height/pressure level (**a,c,e,g**) and corresponding collocations counts ( $1e5$ , (**b,d,f,h**)) comparing the Dependent datasets (colors) with Aeolus RayClear (top, (**a,b,c,d**)) and MieCloud (bottom, (**e,f,g,h**)) winds for the SH (left, (**a,b,e,f**)) and the Tropics (right, (**c,d,g,h**)) during September 2019–August 2020. Solid dots indicate statistically significant Mean\_Diffs at the 95% level. Plotting conventions as in Figure 6.



**Figure S6.** Mean\_Diffs (solid lines), SD\_Diffs (dotted lines), SDs of the Driver (dash-dot lines), and SDs of the Dependent datasets (dotted lines) (**a,c,e,g**) and corresponding collocations counts ( $1e5$ , (**b,d,f**),  $1e6$  (**h**)) as a function of Driver wind speed (binned by 10 m/s) comparing the Dependent datasets (colors) with Aeolus RayClear (top, (**a,b,c,d**)) and MieCloud (bottom, (**e,f,g,h**)) winds for the SH (left, (**a,b,e,f**)) and the Tropics (right, (**c,d,g,h**)) during September 2019–August 2020. Solid dots indicate statistically significant Mean\_Diffs at the 95% level. Plotting conventions as in Figure 7.



**Figure S7.** Density scatterplots of HLOS wind differences for RayClear (left (a,c,e)) and MieCloud (right, (b,d,f)) comparisons with visible AMVs (a,b), WVClear AMVs (c,d), and WVcloud AMVs (e,f) for September 2019–August 2020. Statistics of the collocation are given in Table 3. Colors indicate number density per  $1 \text{ m/s} \times 1 \text{ m/s}$  cell. Plotting conventions as in Figure 4.