

Gradient Features identified in ASCAT data correspond well to observed CYGNSS wind shifts

Comparing ASCAT and CYGNSS winds near tropical convection

Timothy Lang¹, George Priftis², Piyush Garg³, and Steve Nesbitt³
¹NASA Marshall Space Flight Center, ²University of Alabama in Huntsville, ³University of Illinois

INTRODUCTION

- Gradient wind magnitude in ASCAT observations has been recently shown to be a useful proxy for the presence of tropical convection cold pools.
- To help confirm this in the vicinity of precipitation we perform a comparison with the L-band CYGNSS wind dataset.

DATA & METHODS

- Decomposed v2.1 CYGNSS level 2 data to specular point tracks matched with ASCAT & IMERG
- University of Illinois ASCAT Gradient Feature (GF) database
- Matched GFs to coincident CYGNSS tracks within 25 km distance

RESULTS

- CYGNSS and ASCAT wind speeds agree within 1.7 m s⁻¹ outside of rainfall (May 2017-October 2018)
- CYGNSS/ASCAT feature similar wind behavior within GFs
- GF corresponds to notable wind shift at ship during PISTON field campaign

DISCUSSION

- Due to reduced rain sensitivity compared to ASCAT, comparison with CYGNSS provides increased confidence that ASCAT GFs are commonly associated with convective gust fronts & cold pools.

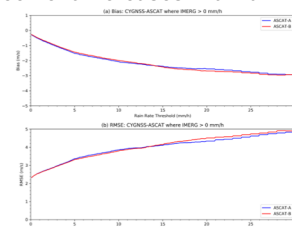
ACKNOWLEDGMENTS

- This research was supported by NASA Weather & OVWST, and ONR PISTON
- GF database is available here: <https://publish.illinois.edu/scat-coldpools/>

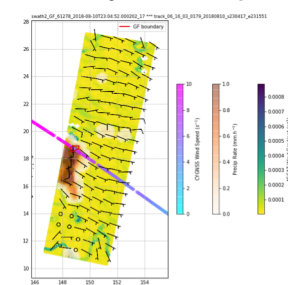
ASCAT and CYGNSS winds agree well outside of rain; disagreement increases with rain rate

ASCAT-A	Bias (m s ⁻¹)	RMSD (m s ⁻¹)	N
No rain	+0.06	1.68	21,092,290
Rain	-0.28	2.29	1,629,188
ASCAT-B	Bias (m s ⁻¹)	RMSD (m s ⁻¹)	N
No rain	+0.06	1.68	21,151,627
Rain	-0.25	2.29	1,631,257

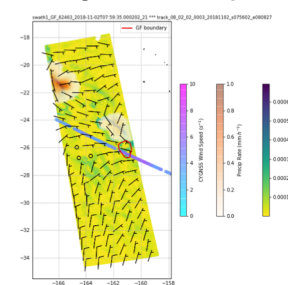
Full CYGNSS/ASCAT/IMERG matchup database (5/17-10/18)



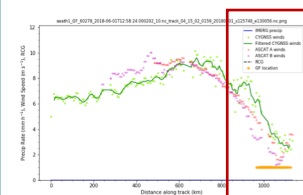
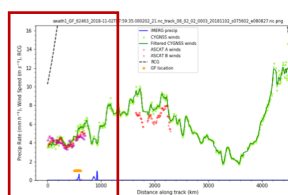
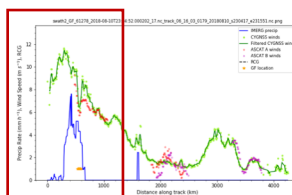
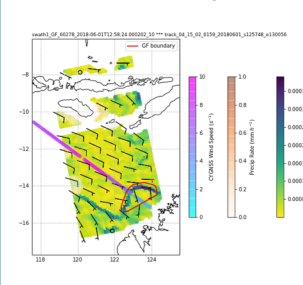
Heavy Rain Example



Light Rain Example



No Rain Example

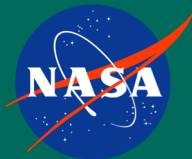
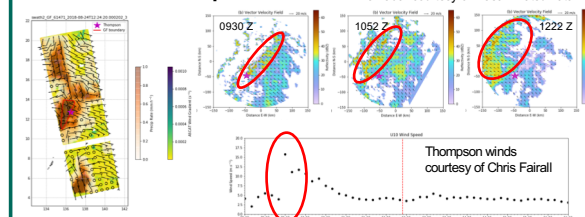


ASCAT-A and CYGNSS winds have similar behavior within GFs

ASCAT-A	Bias (m s ⁻¹)	RMSD (m s ⁻¹)	N
No rain	+0.38	1.66	1486
Rain	-0.10	1.97	621

CYGNSS/ASCAT/IMERG matchups in GFs only (5/17-11/18)

PISTON GF Example



Take a picture to download an electronic copy

