IMPROVEMENTS TO HiWind CODE

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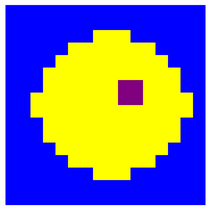
HiWind

- Balloon-borne Fabry-Pérot interferometer
- Only instrument capable of measuring daytime thermospheric winds
- Previously flown in 2011 and 2018, upcoming launch scheduled for 2022

EXISTING CODE

- License for IDL plotting routines not available in remote locations during HiWind flight
- No automatic methods to check for instrument malfunction during operation
- No simulation of payload instruments to rigorously test code

PAYLOAD SIMULATOR

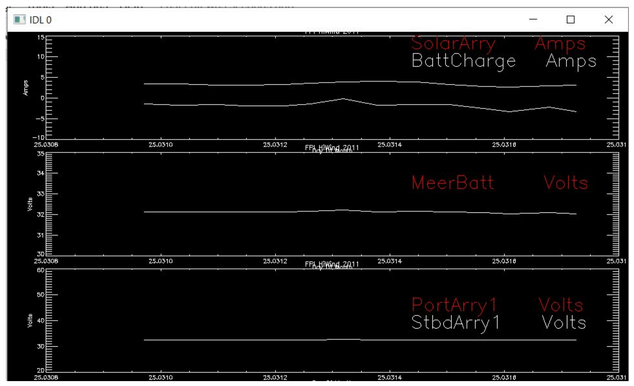


- Simulates communication with payload using TCP-IP packets

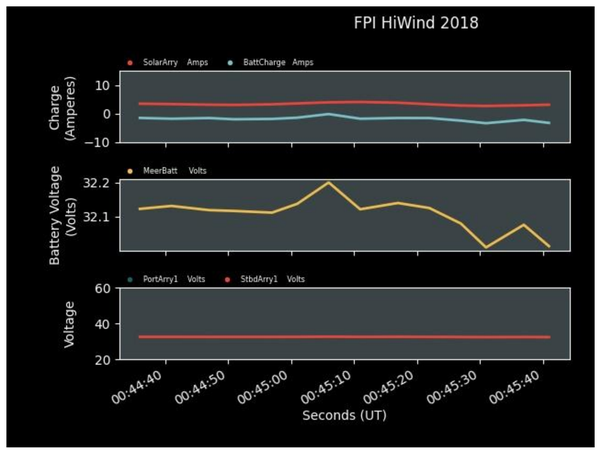
- Necessary to test existing code
- Useful for predicting reactions to instrument malfunctions in flight

VISUALIZATION

IDL

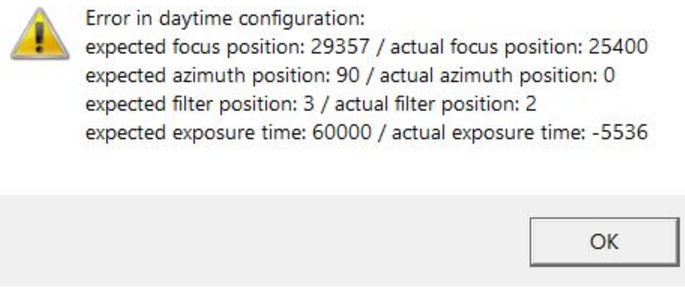


Python



- Open source language avoids license issues
- Improved color scheme and labeling for 29 different plots
- Intelligent scaling and label functions

ERROR CHECKING



- Code produces error messages under the following conditions
  - Instrumentation deviates from expected operational patterns
  - Non-physical values occur in the data
  - Extended time period has elapsed since the last viable signal from the instrument

ACKNOWLEDGMENTS

Wu, Q., Knipp, D., Liu, J., Wang, W., Häggström, I., Jee, G., et al. (2019). What do the new 2018 HIWIND thermospheric wind observations tell us about high-latitude ion-neutral coupling during daytime? *Journal of Geophysical Research: Space Physics*, 124, 6173– 6181. https://doi.org/10.1029/2019JA026776
Moe, K., and Wu, Q. (2014), Impact of HIWIND balloon measurements on thermospheric density models, *J. Geophys. Res. Space Physics*, 119, 2476– 2483, doi:10.1002/2013JA019390.
Wu, Q., Wang, W., Roble, R. G., Häggström, I., and Strømme, A. (2012), First daytime thermospheric wind observation from a balloon-borne Fabry-Perot interferometer over Kiruna (68N), *Geophys. Res. Lett.*, 39, L14104, doi:10.1029/2012GL052533.