

ADM Cal/Val 2015: DAWN and Dropsonde contributions

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Lidar Working Group Meeting

Miami, 2015

Polar Winds & ADM Cal/Val Team

- Emmitt, Greco and Godwin, SWA
- Michael Kavaya, NASA/LaRC
 - Grady Koch
- Bruce Gentry and H. Chen, NASA/GSFC
- John Cassano, CU
- Keith Hines, OSU
- Dave Winker, NASA/LaRC

Science (PolarWinds)

- Tip Jet
 - Two visits; one ideal; the other was confounded by clouds and weaker than model predicted.
- Marginal Ice
 - Four visits; one failure due to clouds; other two were ideal
- Katabatic flows
 - Two visits; two ideal
- Iceland flow splitting
 - One experiment; successful

Satellite underflights

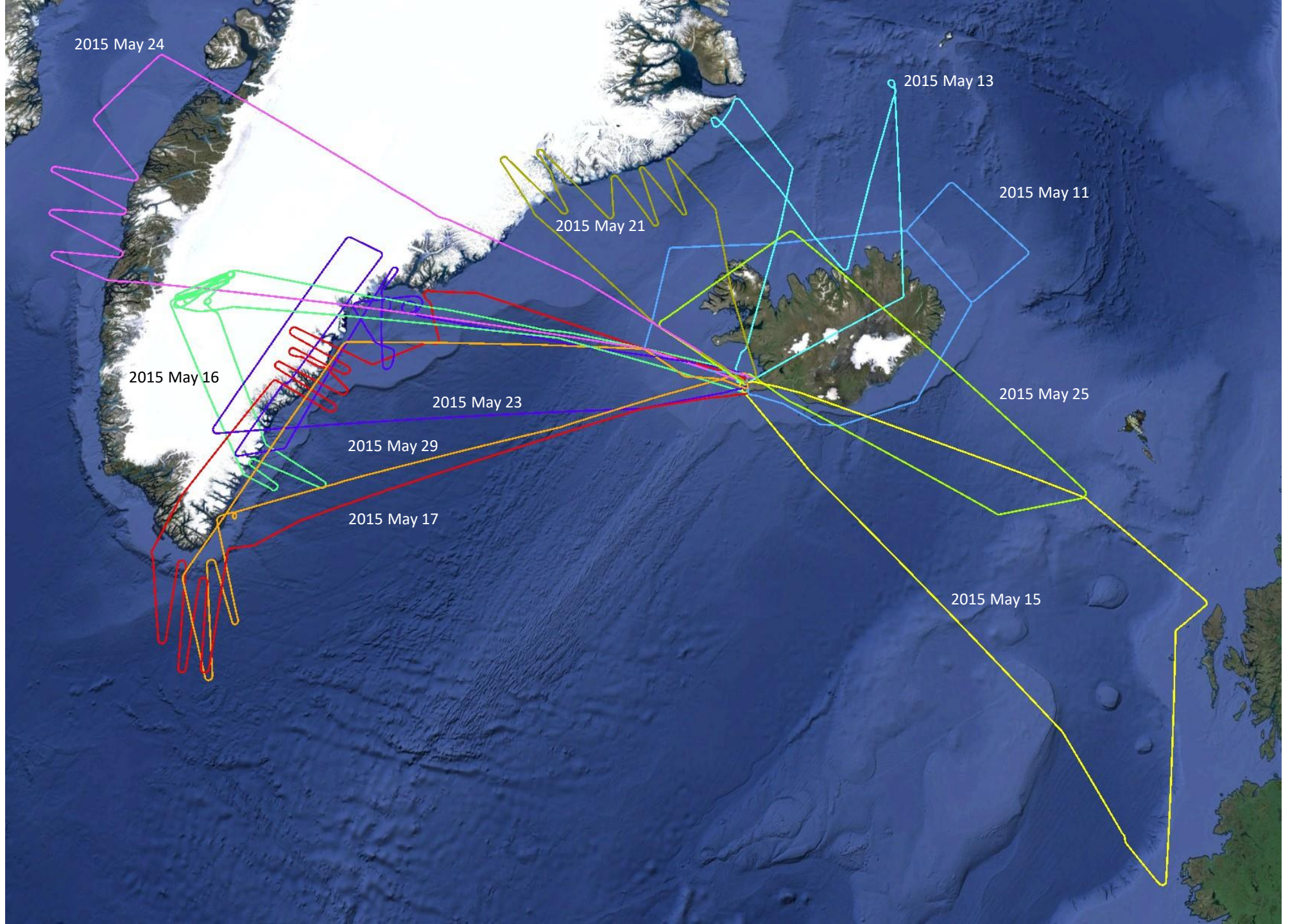
- CALIPSO
 - One successful underflight
- MODIS
 - Six underflights
- ASCAT
 - Eight underflights (no clouds)
- TDS-1
 - One underflight with Falcon

ADM Cal/Val

- Shear aloft
 - High level jet between Iceland and Scotland
 - High level jet along southern east coast of Greenland
- Ice surface calibration
 - Three segments over the Greenland ice cap
- TDS underflight
 - 1st formation flight with Falcon
- ADM stares by DAWN
 - Two > 100km legs



Polar Winds Iceland
Ten Science Flights

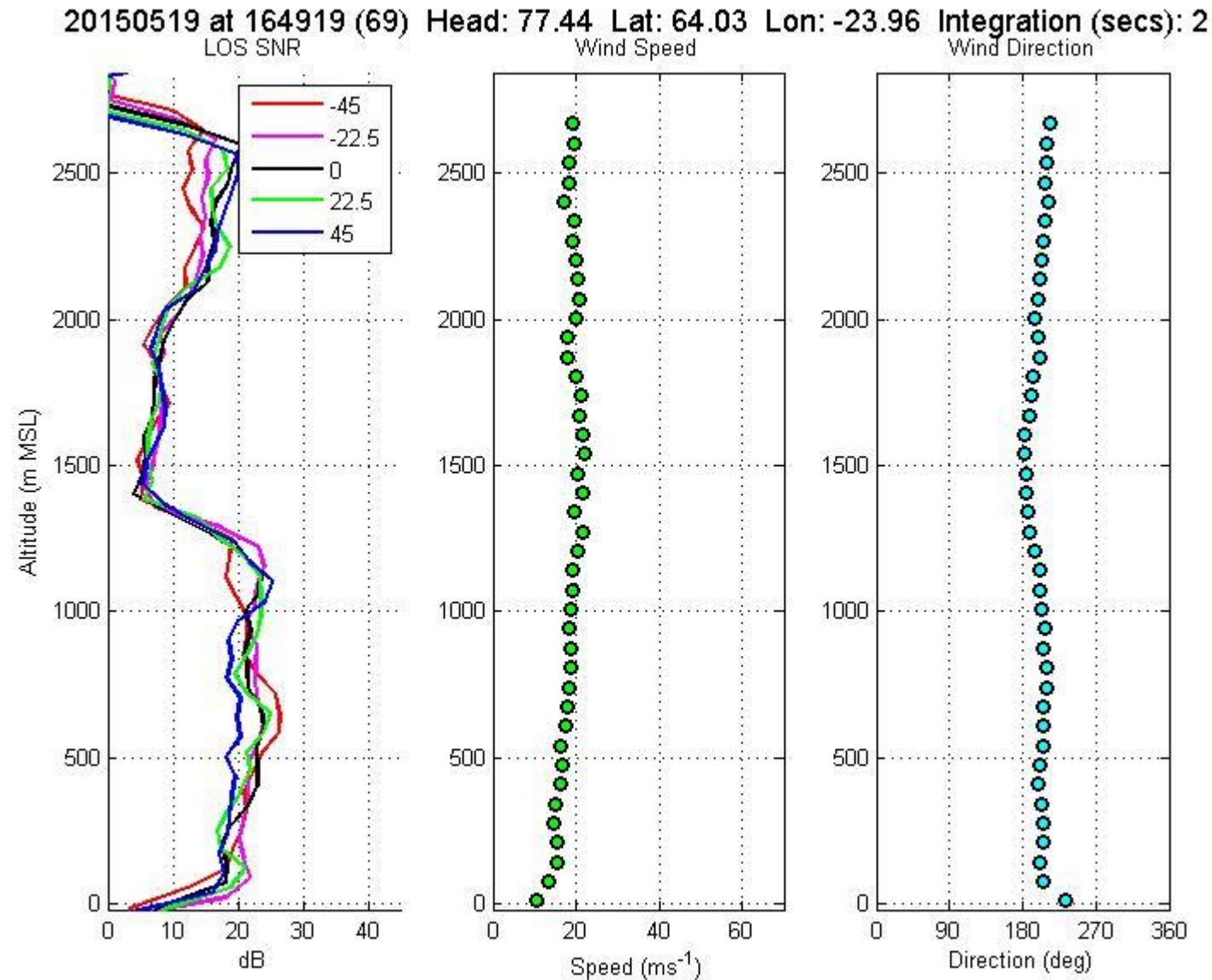


Mission Summary

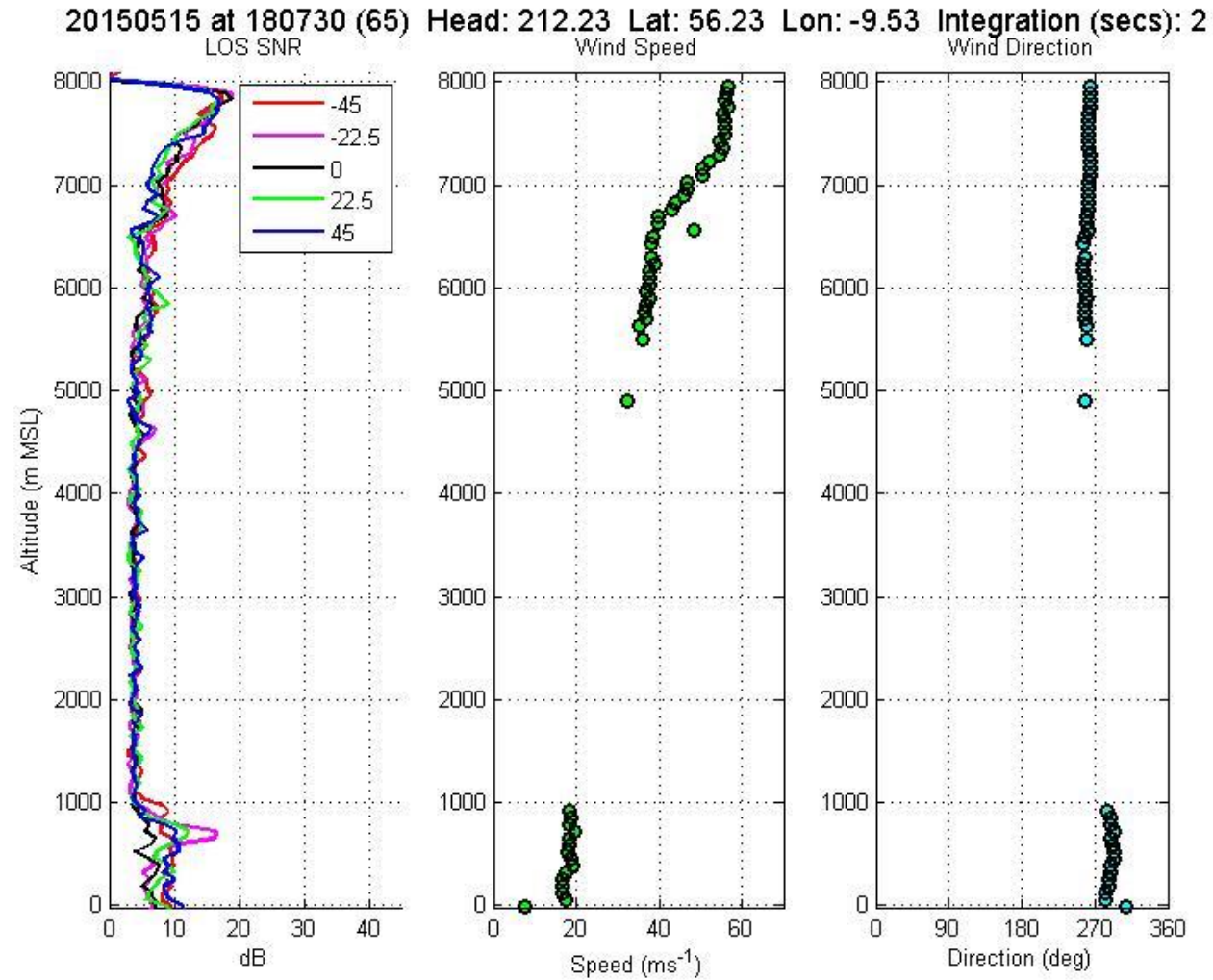
(51 hours not including ferry hours)

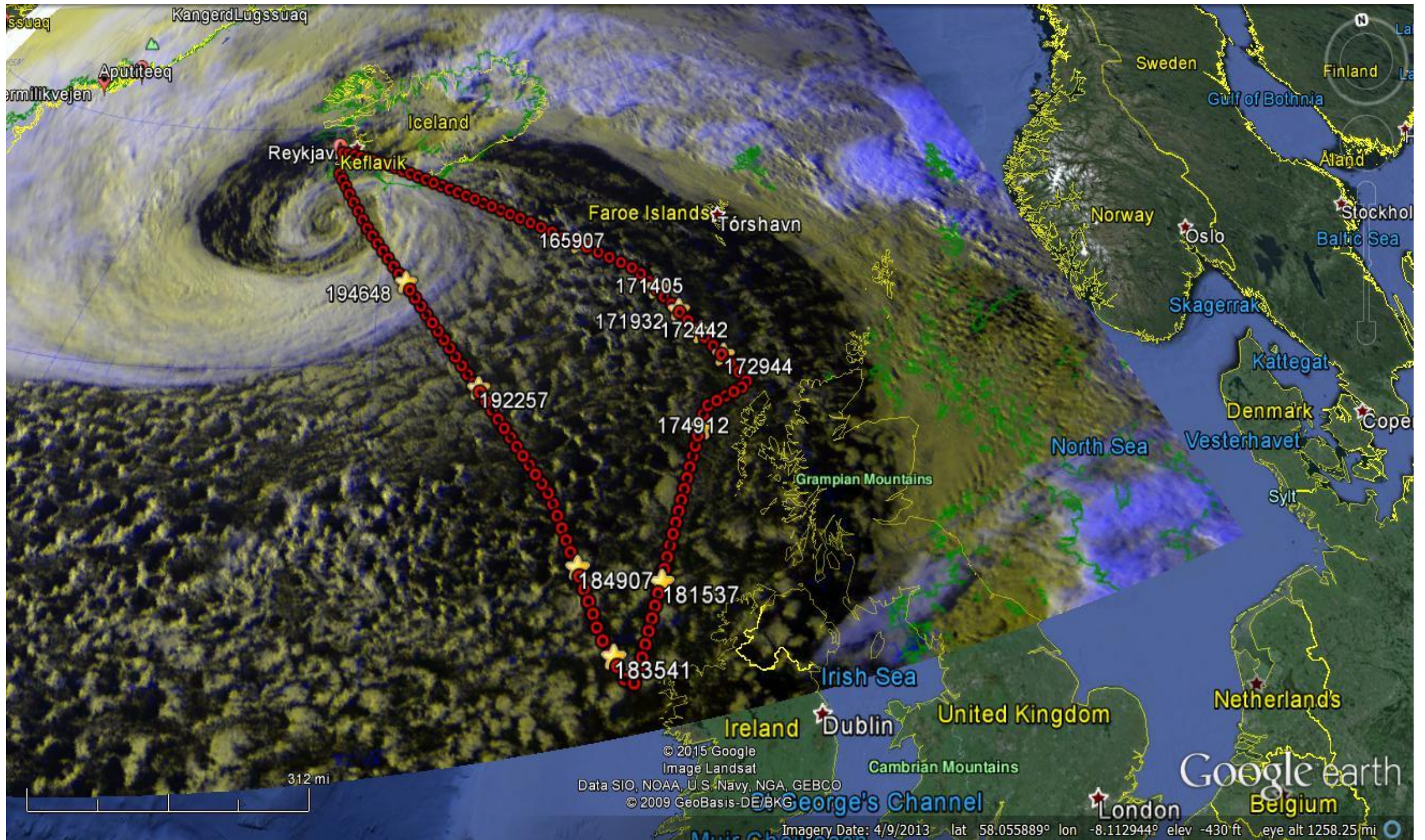
Date	Mission	DC-8	Falcon	Drops	DAWN	TWiLiTE
5/11	Iceland flow splitting with NE BL winds	x		3/5	x	x
5/13	TDS underflight(DLR/NASA) and Greenland CIZ (NASA)	x	x	5/6	X	X
5/15	Upper level jet between Iceland and Scotland	x	x	10/12	X	X
5/16	ADM cal/val over Greenland ice cap; CIZ and Kat-winds	x	x	8/10	X	x
5/17	CALIPSO, MODIS, ASCAT underflights; CIZ;Tip jet	x		8/9	X	X
5/19	Upper level jet over southern Greenland; Tip jet	x	x	7/8	X	X
5/21	Barrier jet	x		7/11	X	X
5/23	Katabatic flows off Greenland east coast; ADM cal/val CIZ	x	x	15/19	X	
5/24	Baffin Strait ice edge west coast of Greenland; rolls	x		11/12	X	
5/25	Upper level jet south of Iceland	x	x	5/6	X	X

Boundary layer work (10,000')



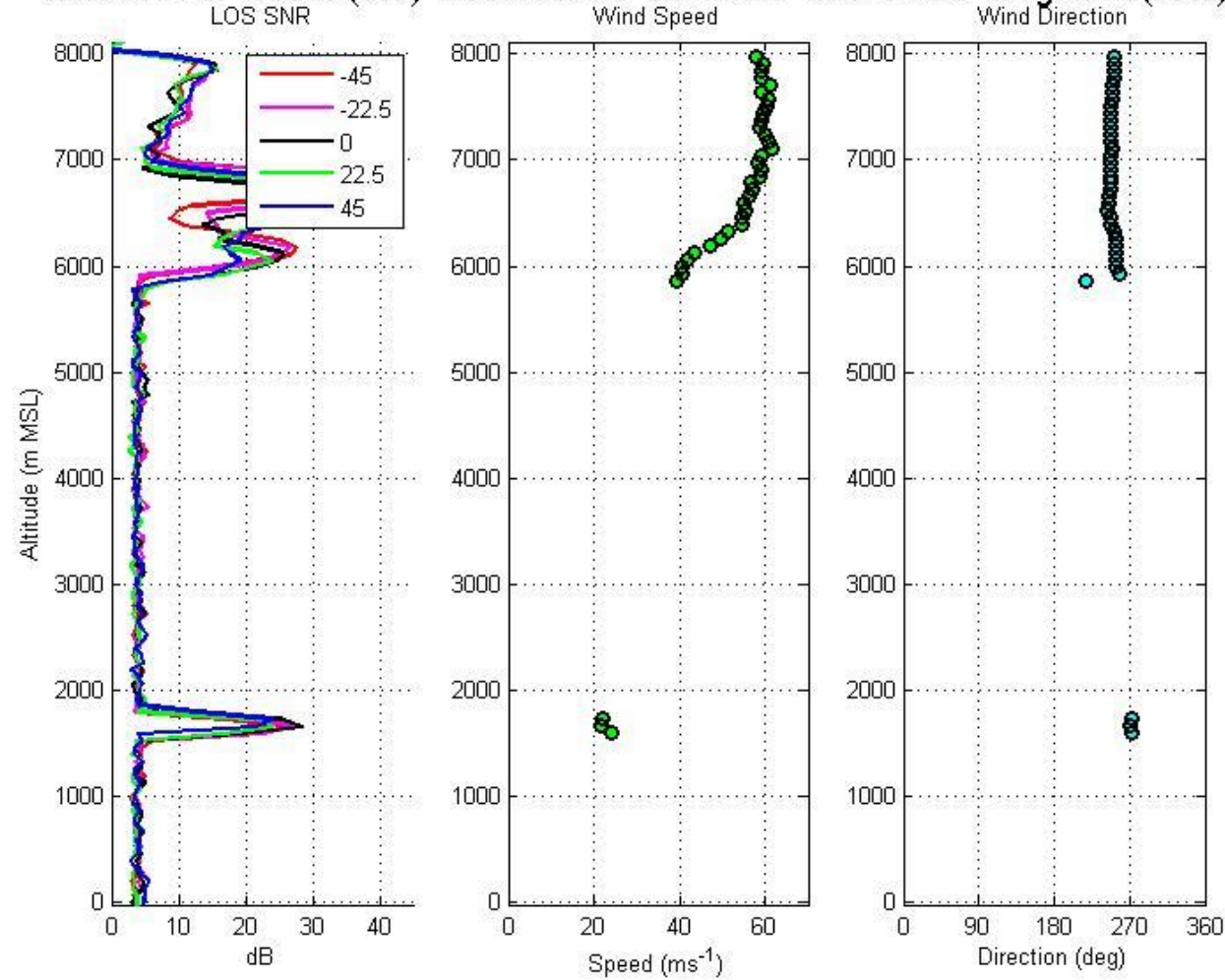
05_15_15 Upper Level Jet





05_19_15 Upper Level Jet

20150519 at 141248 (253) Head: 210.64 Lat: 59.57 Lon: -43.29 Integration (secs): 2



DAWN under performance

- DAWN designed for 220mJ and 10Hz was operated at 100mJ and 5 Hz during Campaign II based upon system performance analyses conducted at LaRC between Campaigns I and II.
- While the wind observations obtained with DAWN are judged to be very reliable, the vertical coverage of the soundings was less than expected based upon designed system capabilities.
- DAWN is currently scheduled to undergo an external (Beyond Photonics) evaluation followed by steps to recover the designed performance.

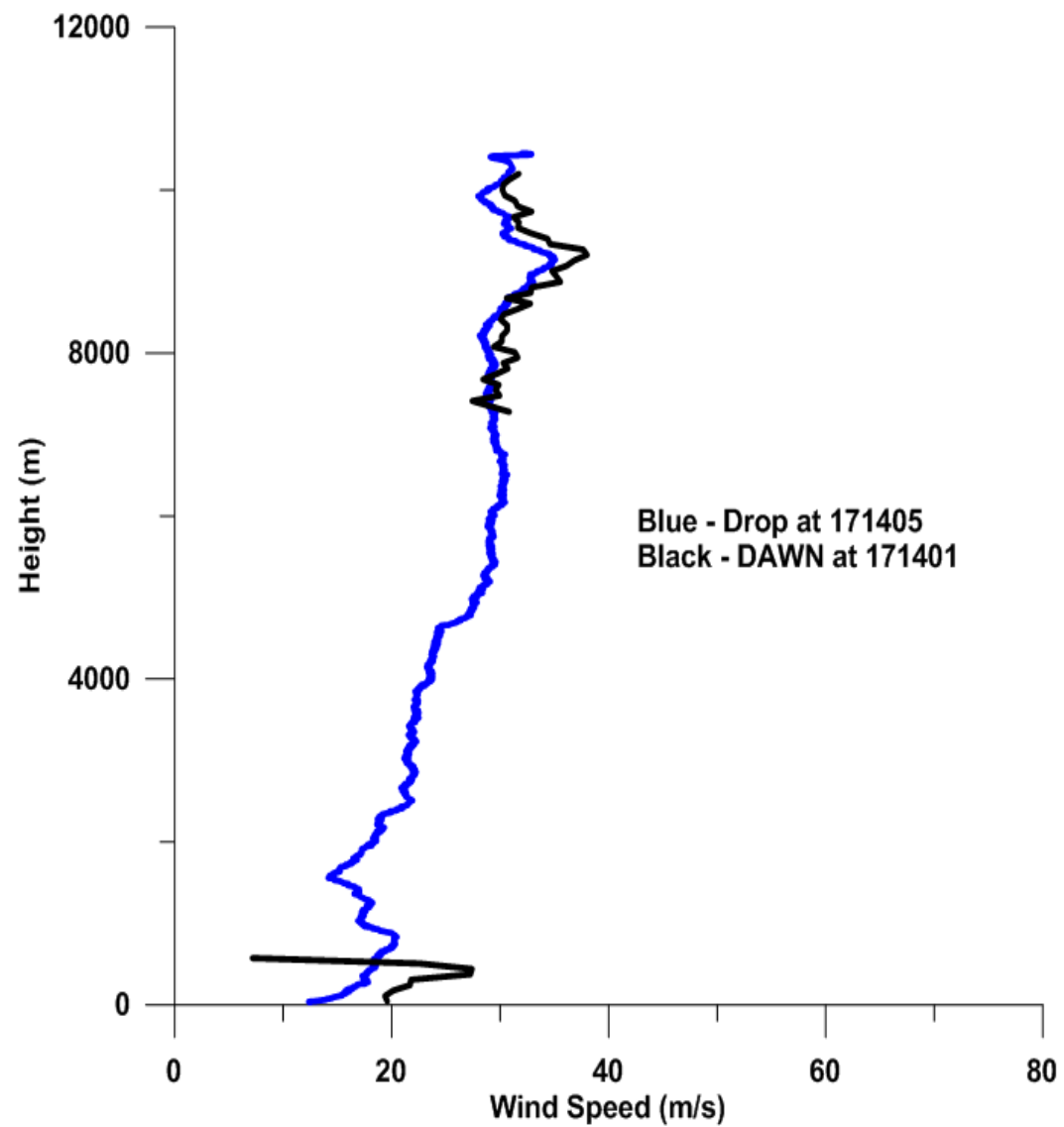
DAWN comparison with dropsondes

- 101 Yankee dropsondes were released from the NASA DC-8 during the 10 missions
- 17 returned no data
- All remaining sondes reported useful wind data for most of descent.
- Slow mode descents take ~ 10 – 15 minutes (from 19Kft)
- Fast mode descents take ~ 5 – 6 minutes
- DAWN takes 35 seconds (20 shot) or 115 seconds (100shot) per 5 point scan.
- DC-8 moves ~ 7.7 km (20 shot scan) or 25.3 km (100 shot scan)
- General conclusion: DAWN and Dropsondes agree quite well.

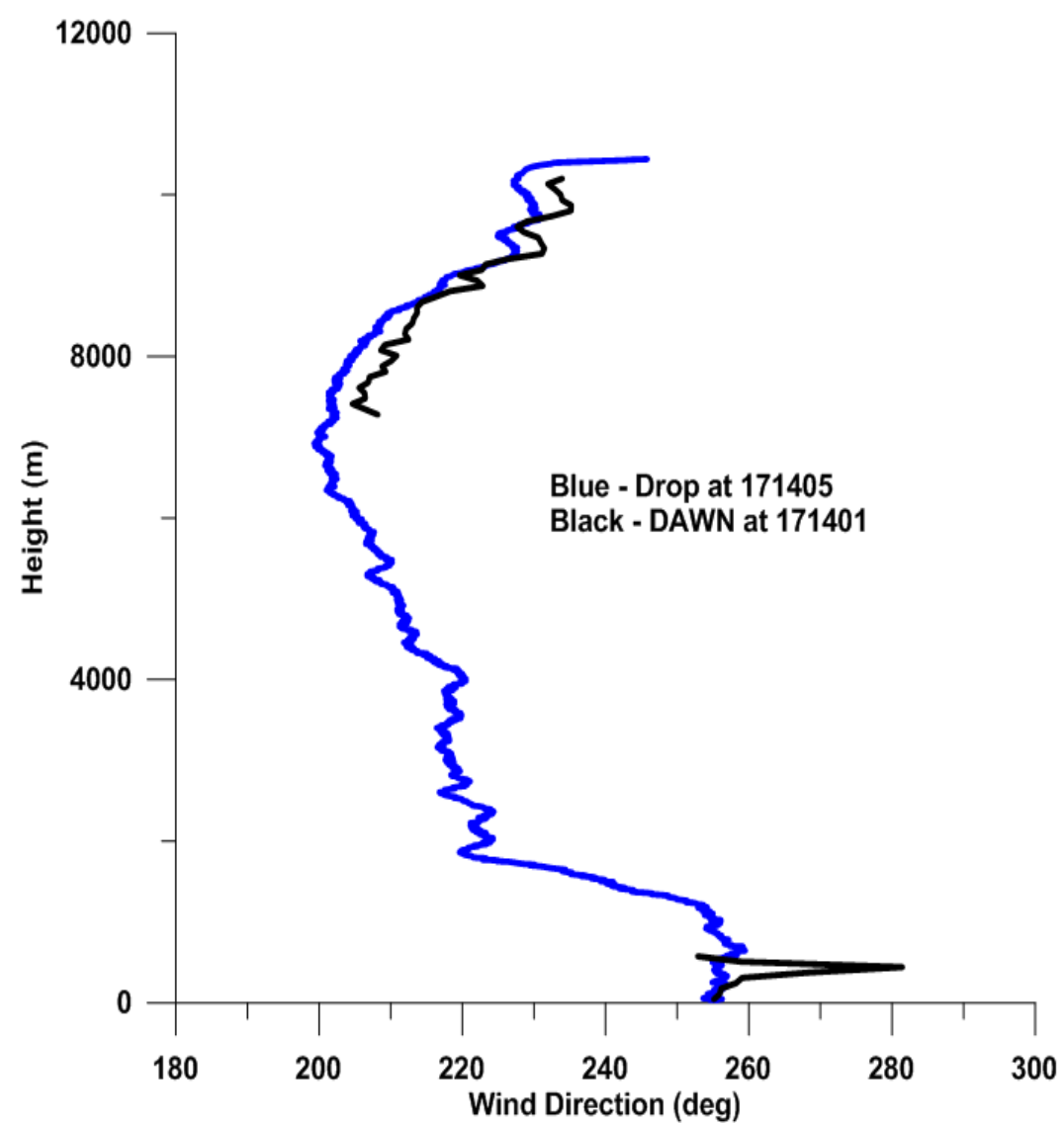
DAWN vs Dropsonde

15.05.2915

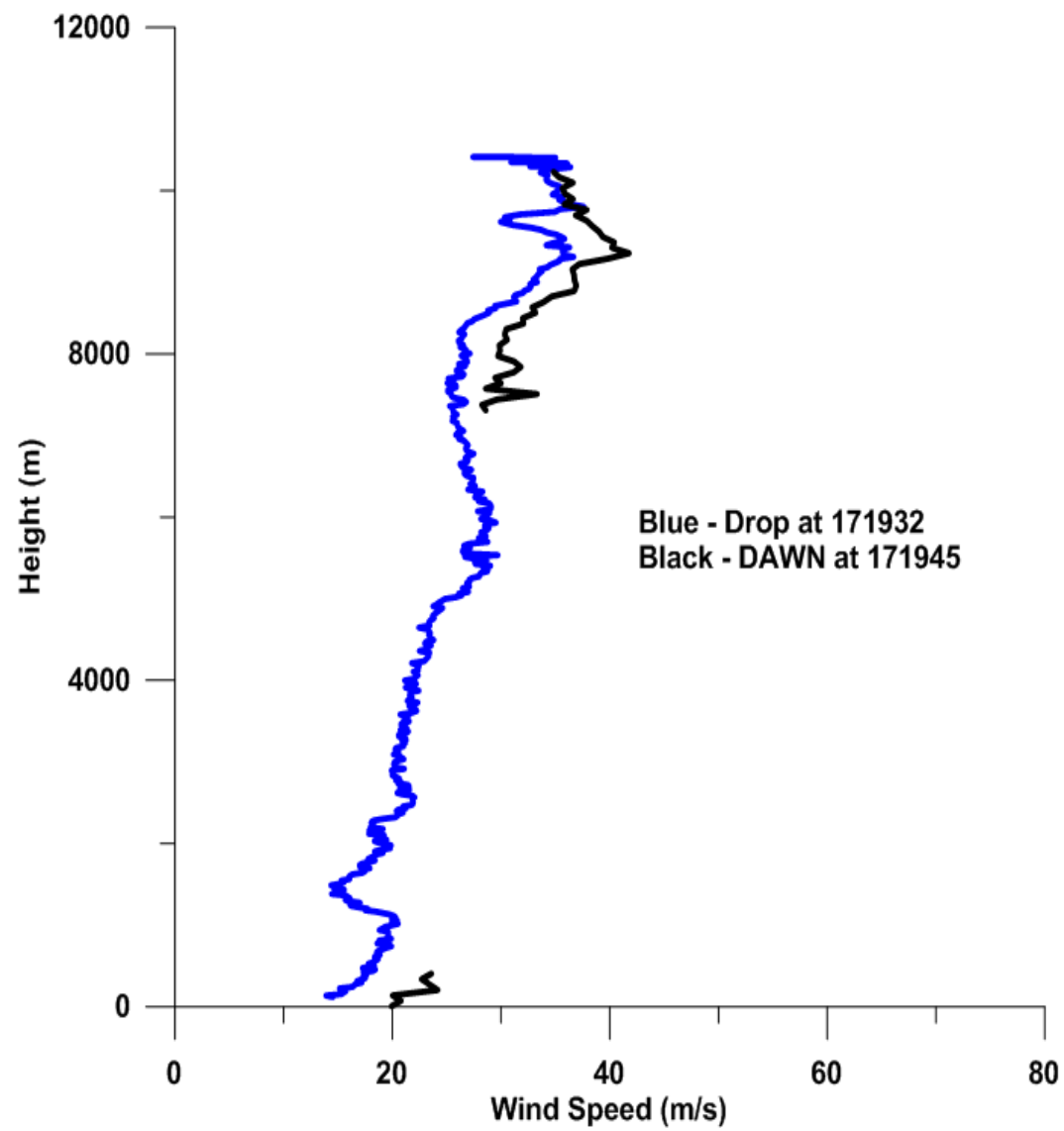
Wind Speed



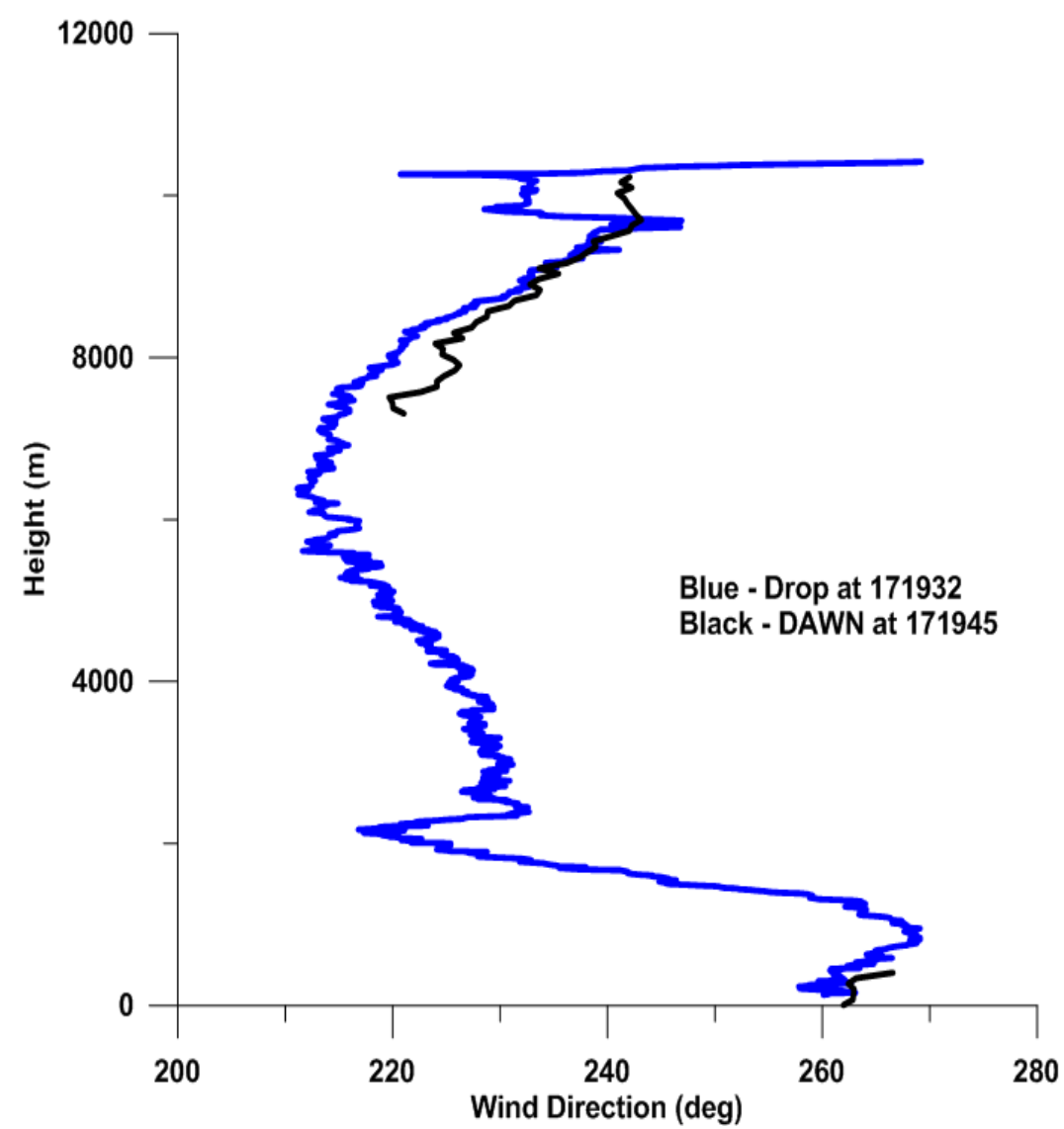
Wind Direction



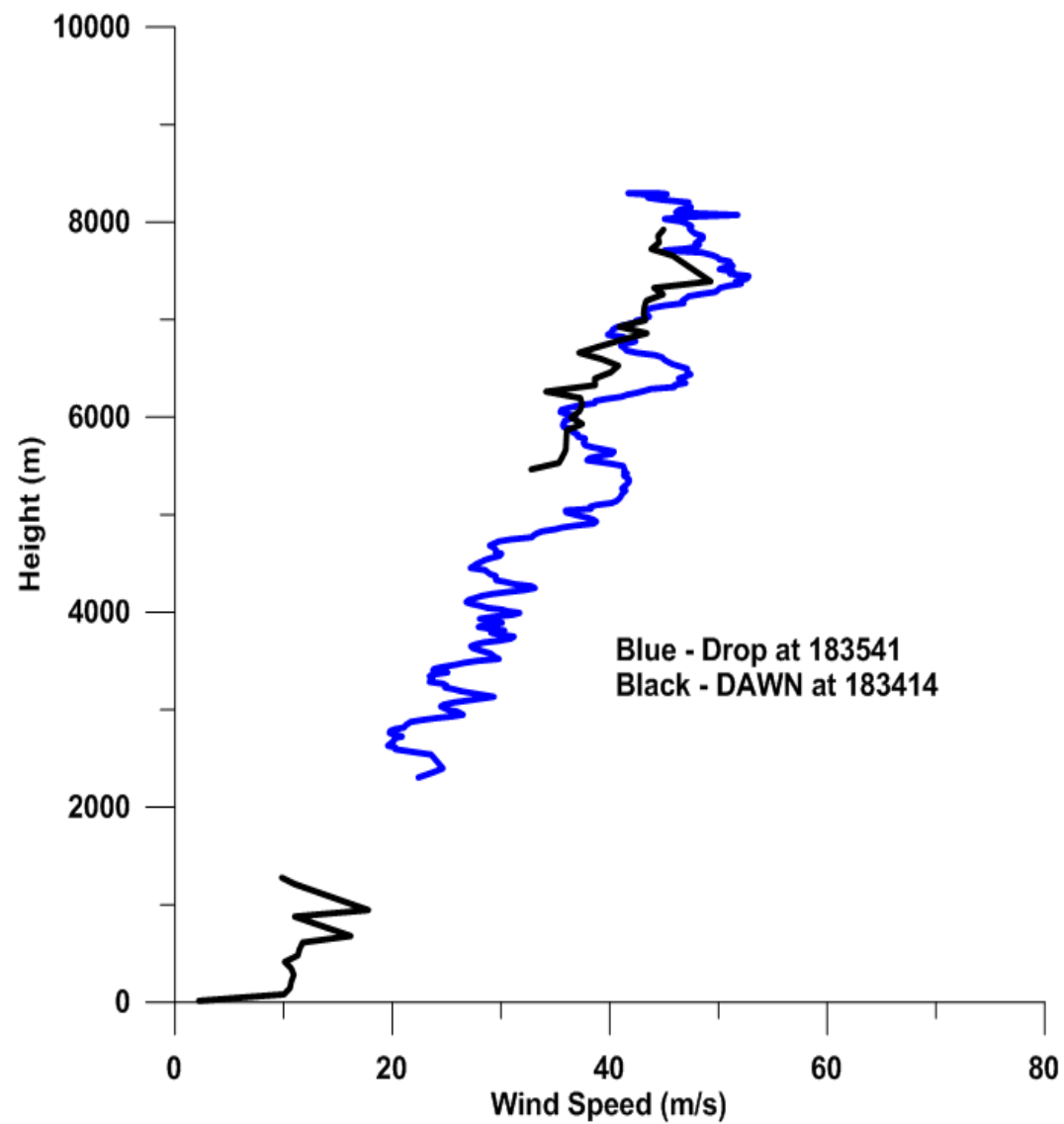
Wind Speed



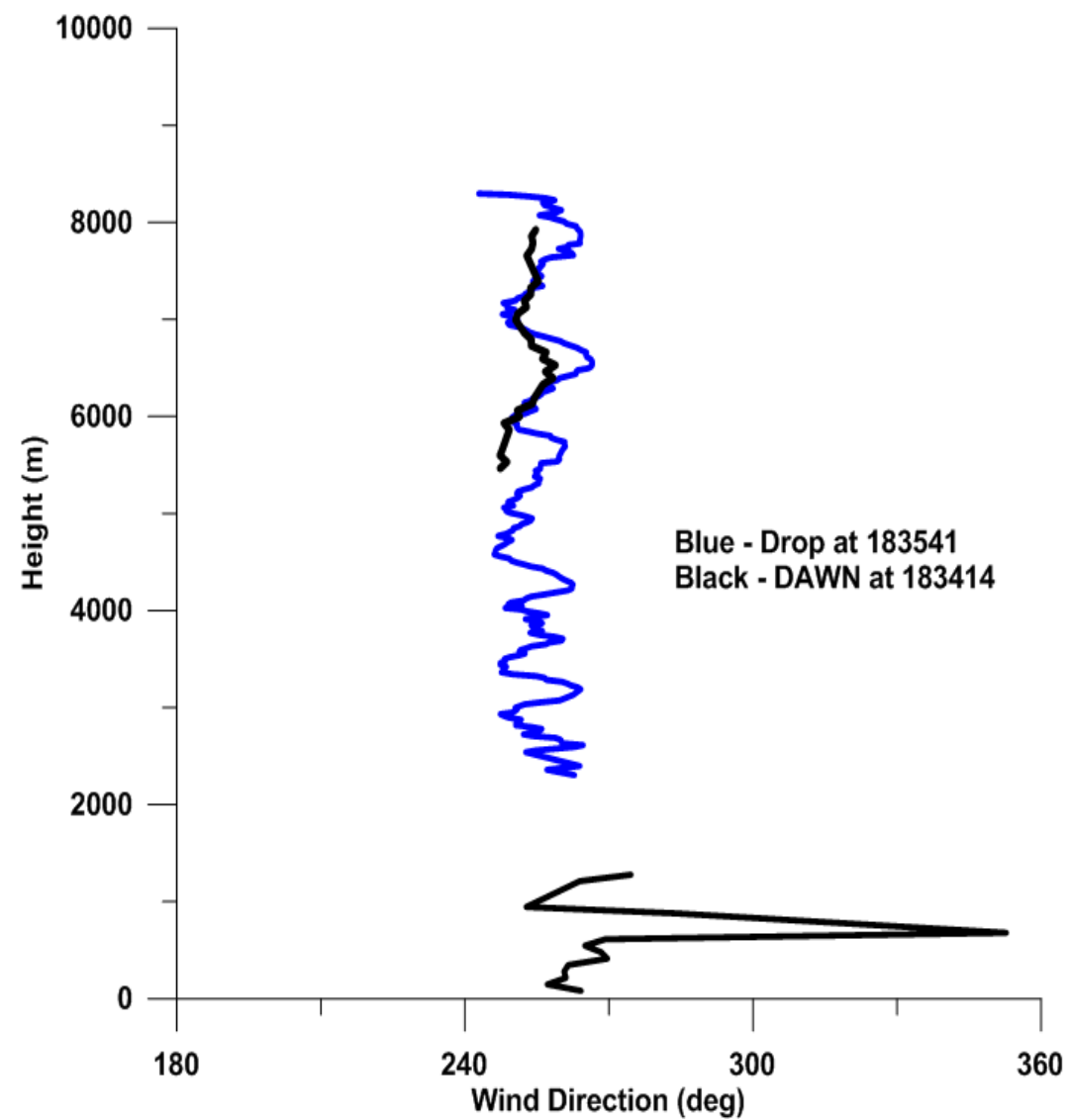
Wind Direction



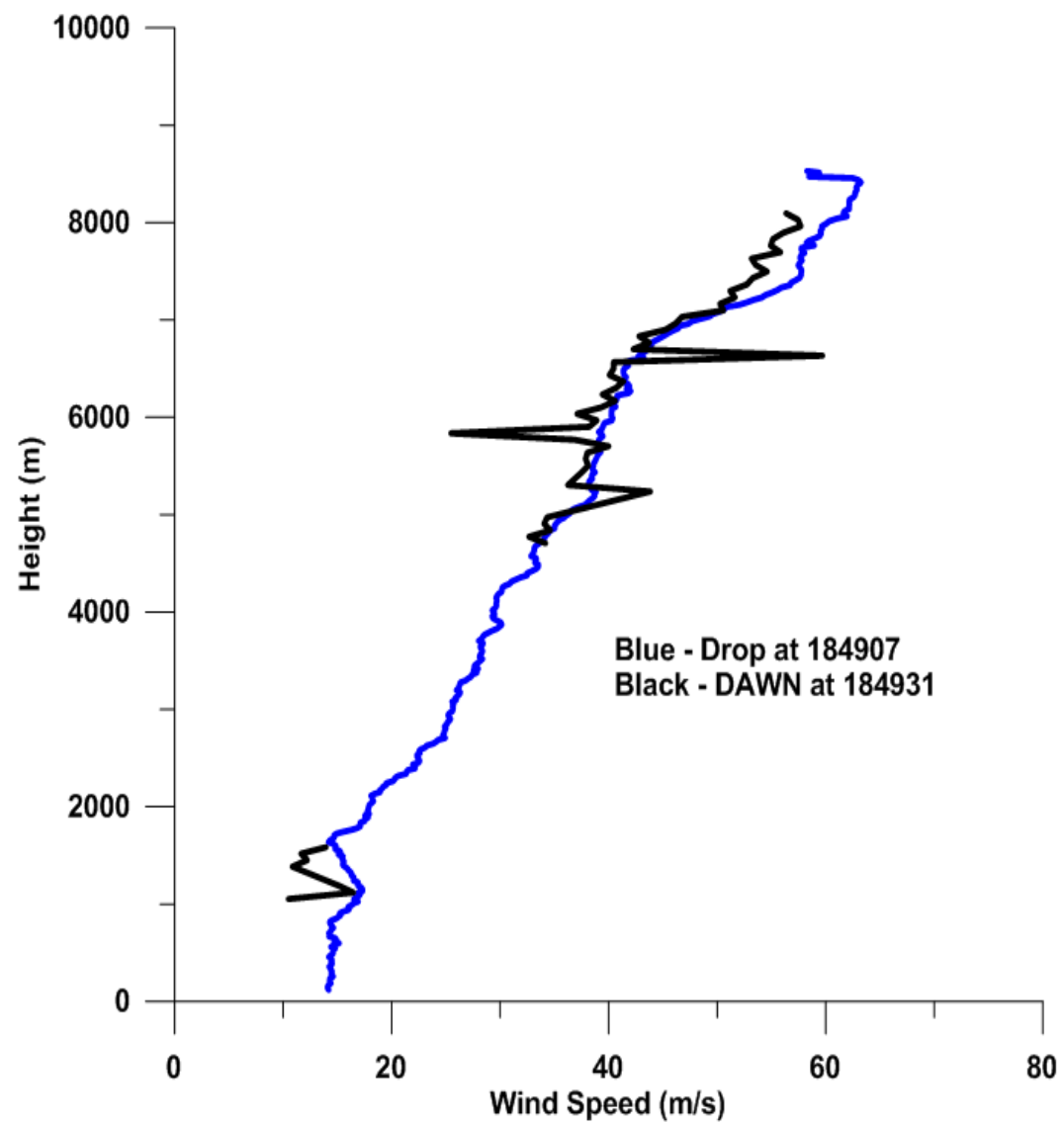
Wind Speed



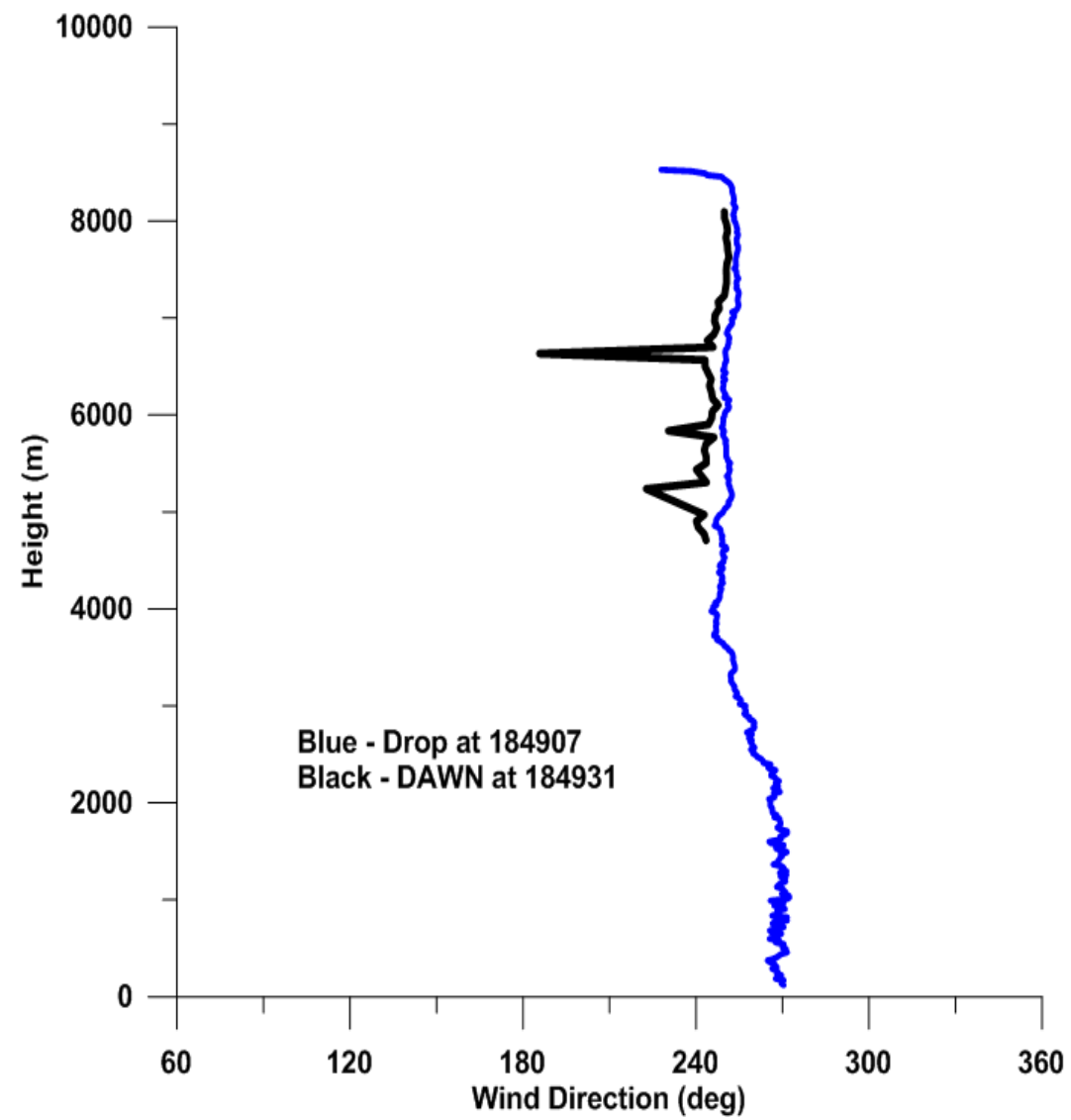
Wind Direction



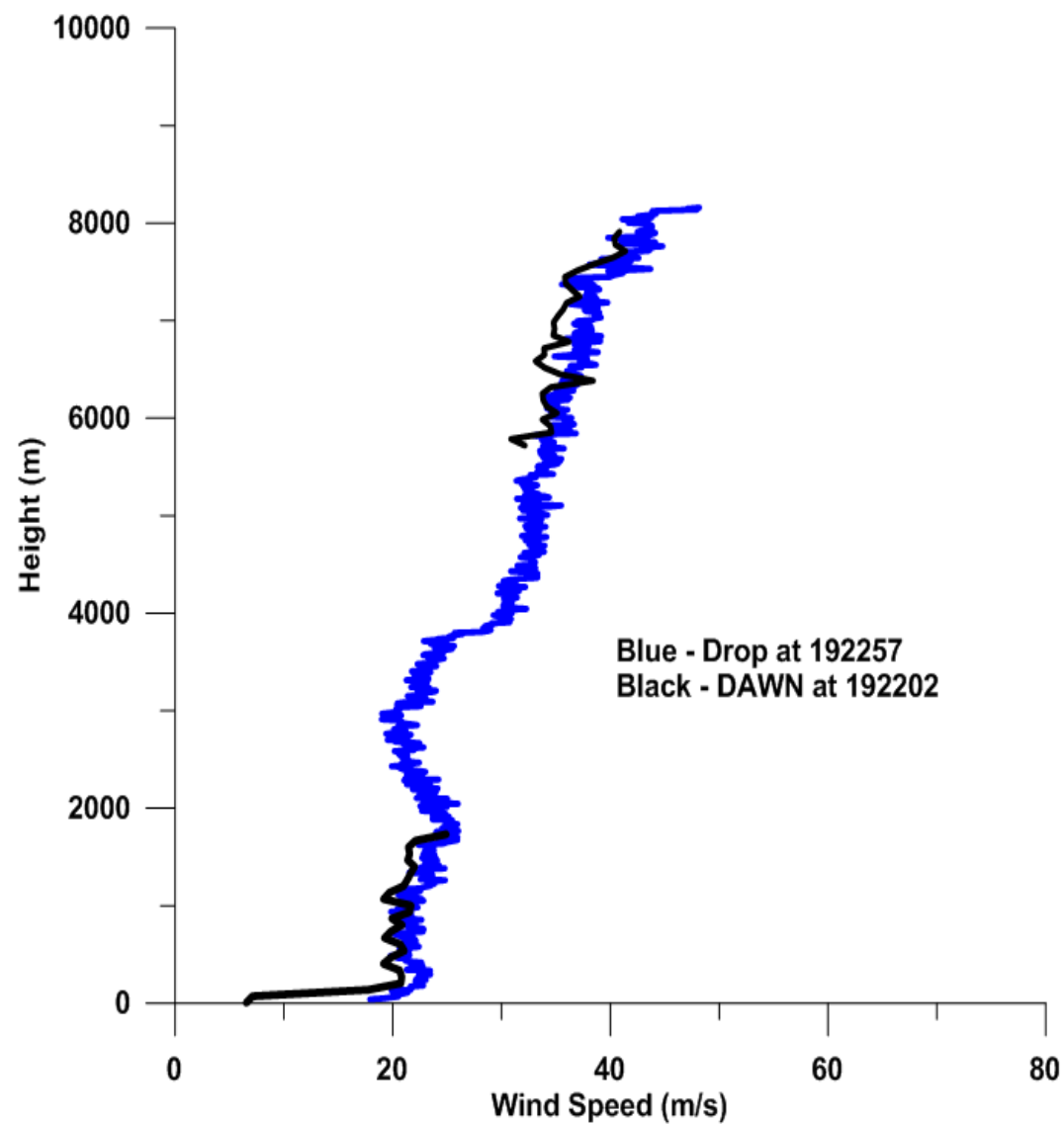
Wind Speed



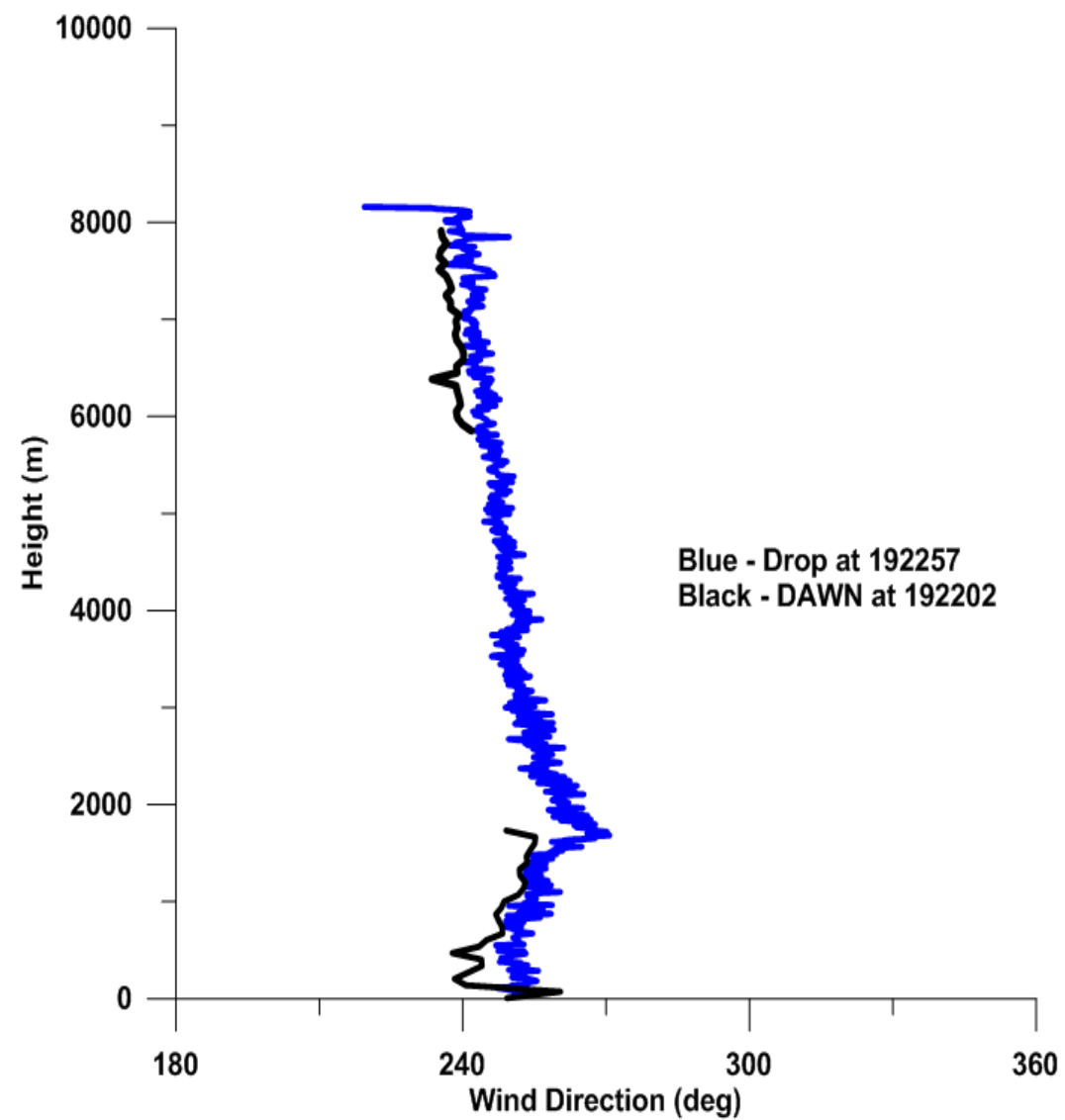
Wind Direction



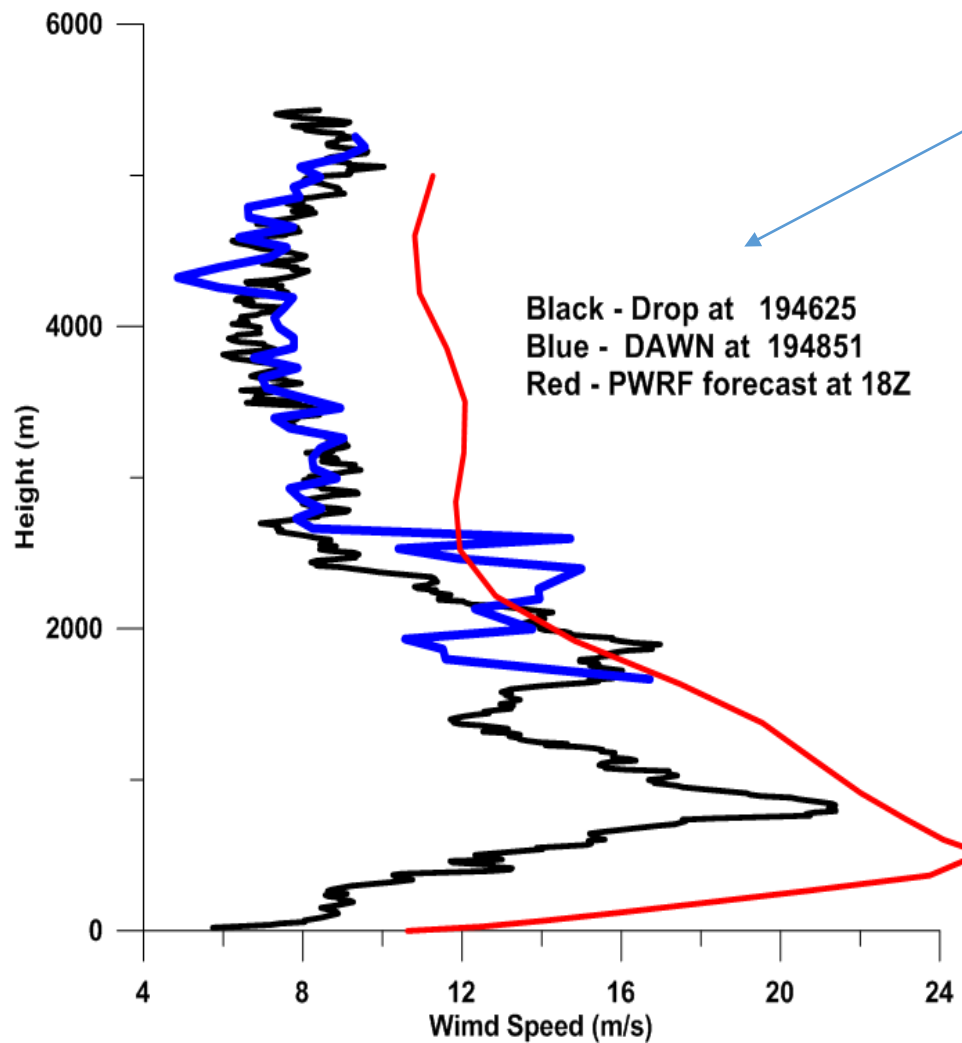
Wind Speed



Wind Direction



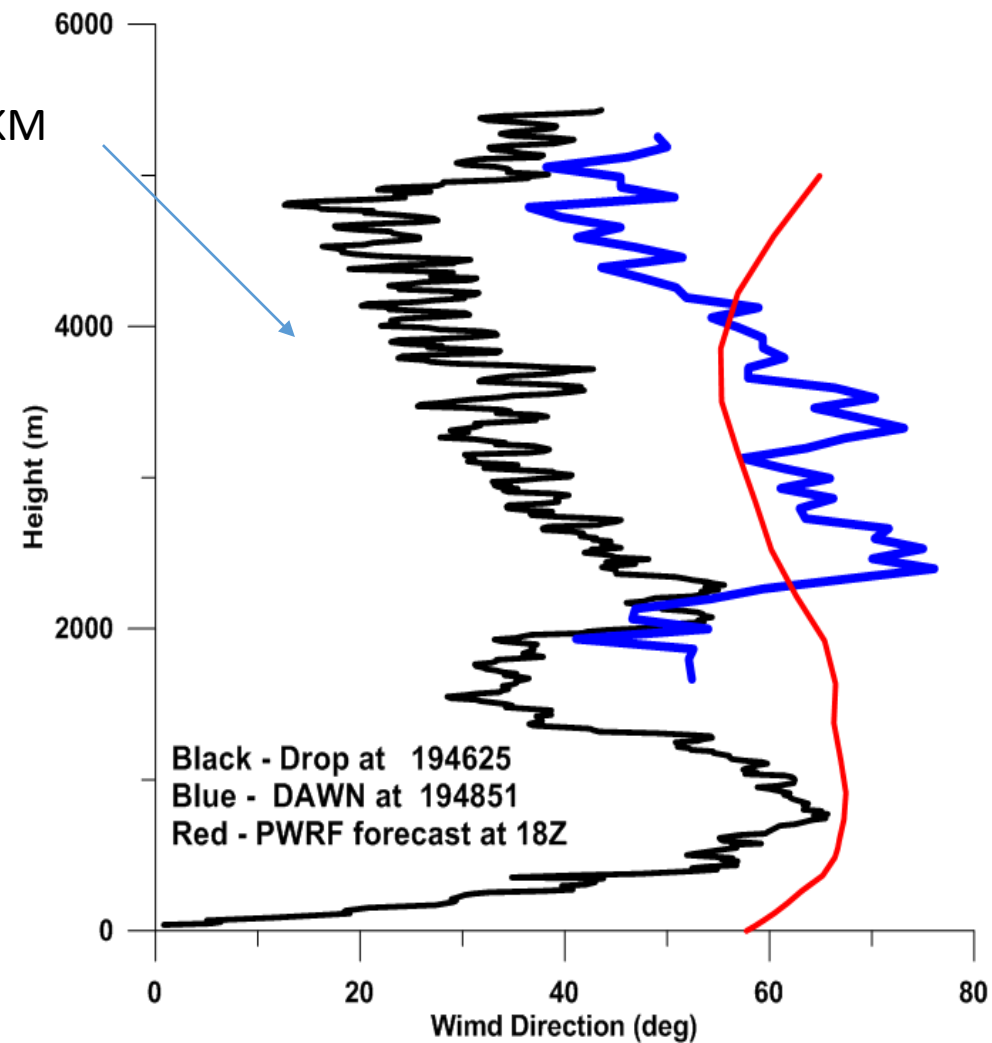
Drop_20150521_194625 Wind Speed (m/s)



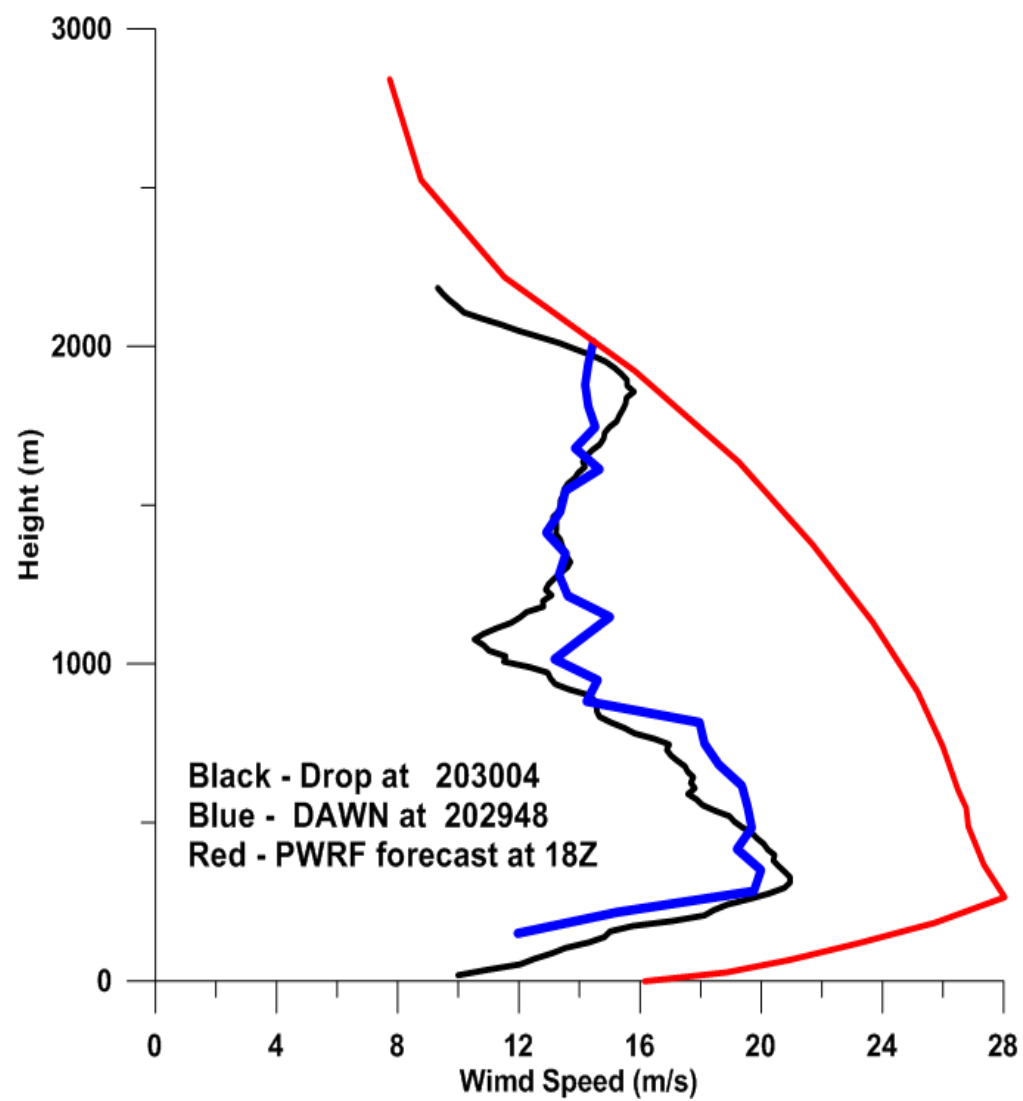
Clouds Around 2KM



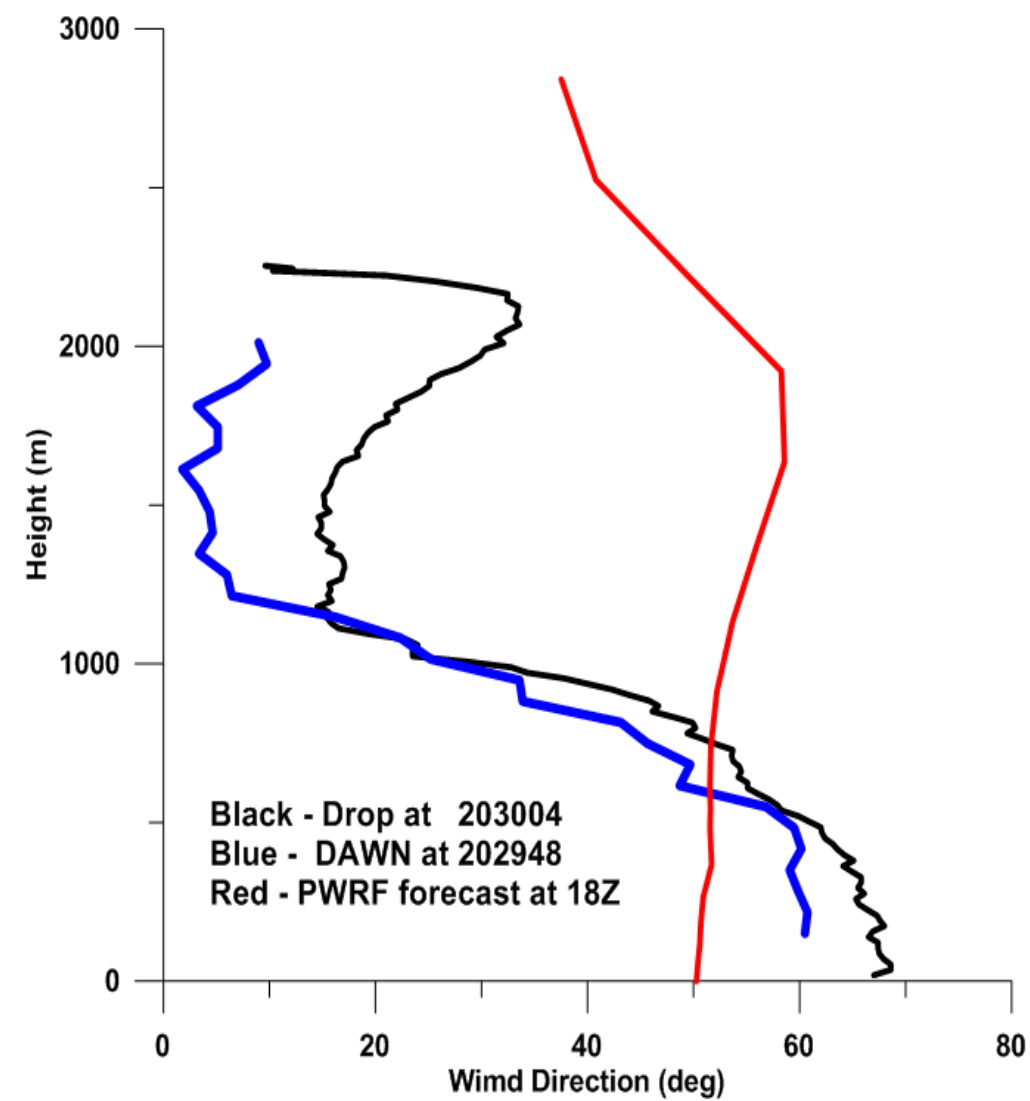
Drop_20150521_194625 Wind Direction (deg)



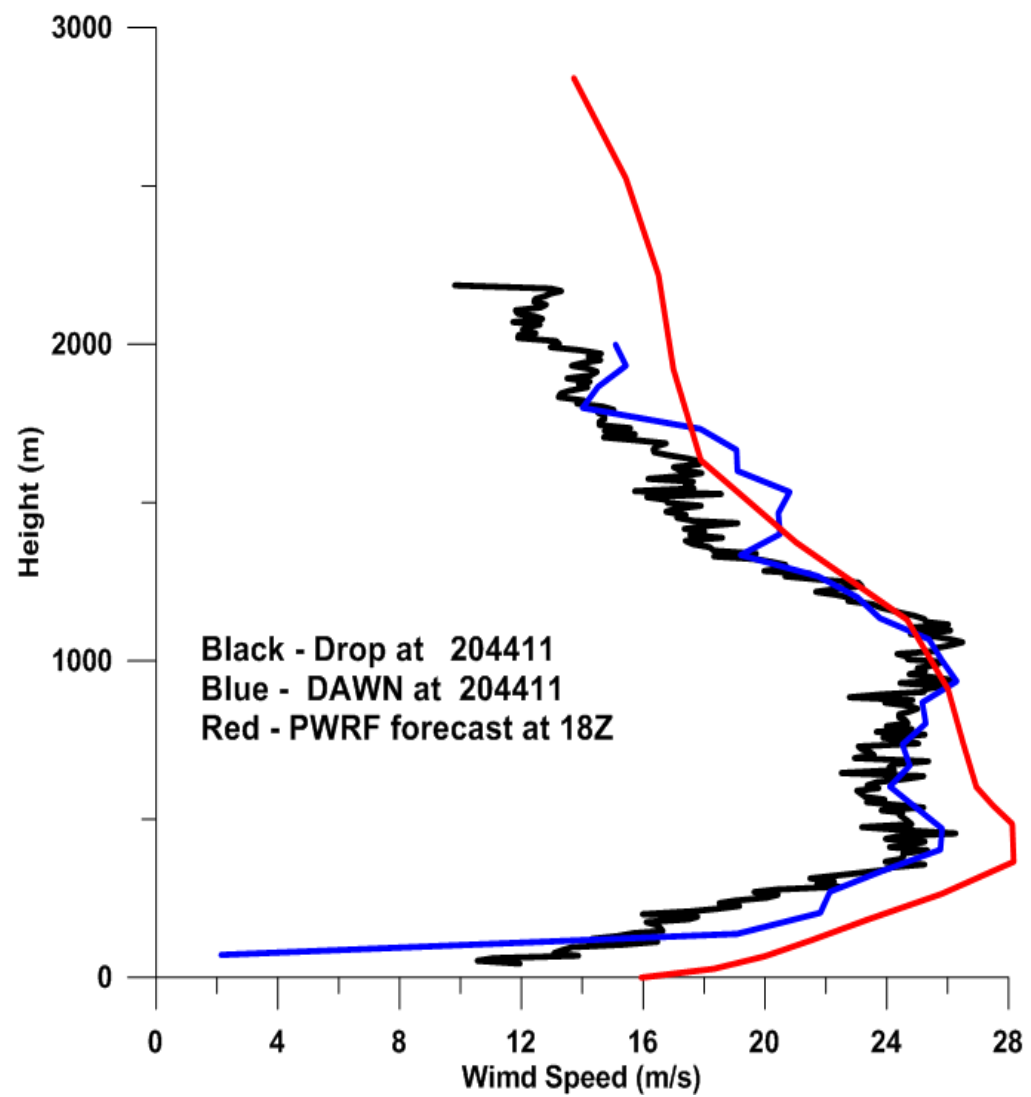
Drop_20150521_203004 Wind Speed (m/s)



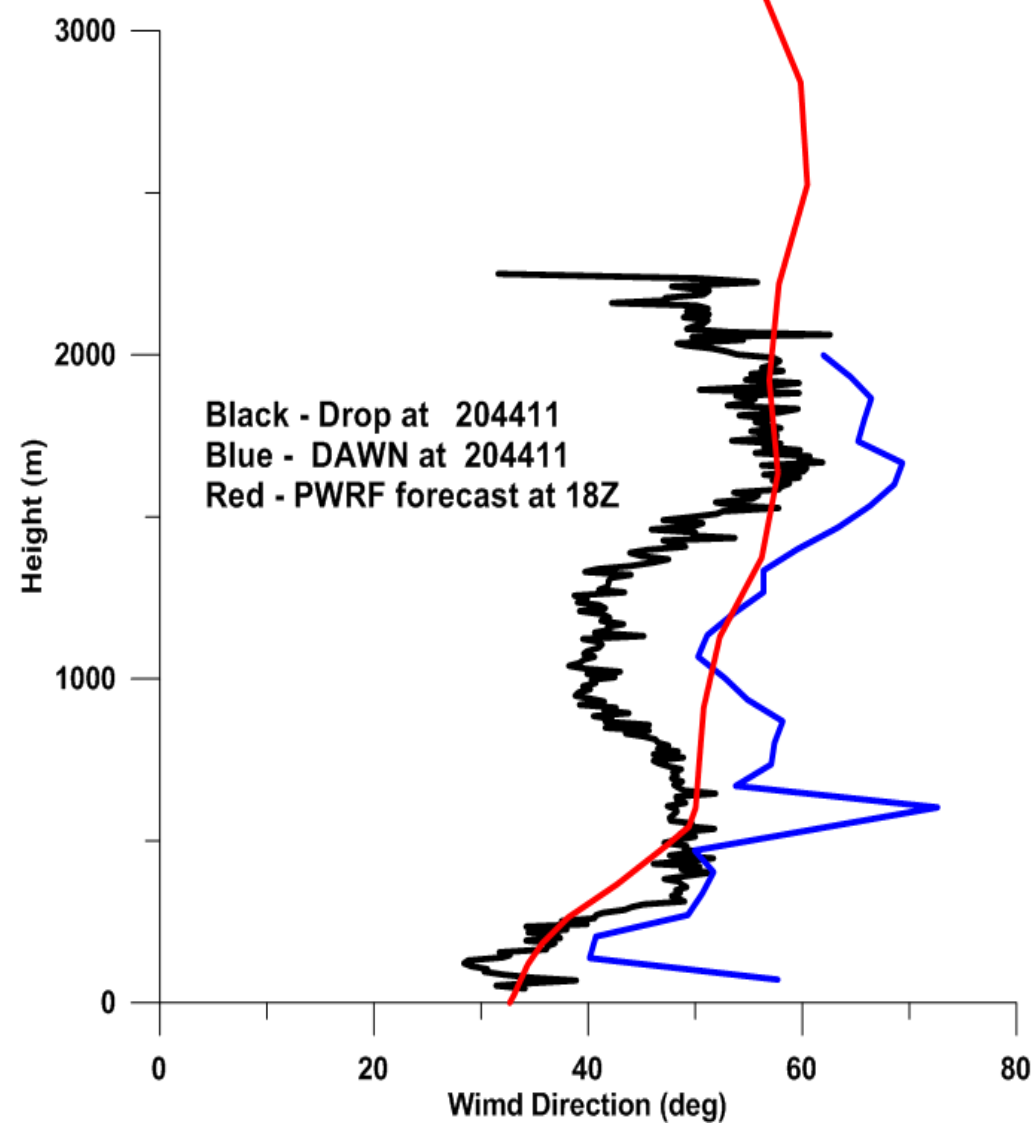
Drop_20150521_203004 Wind Direction (deg)



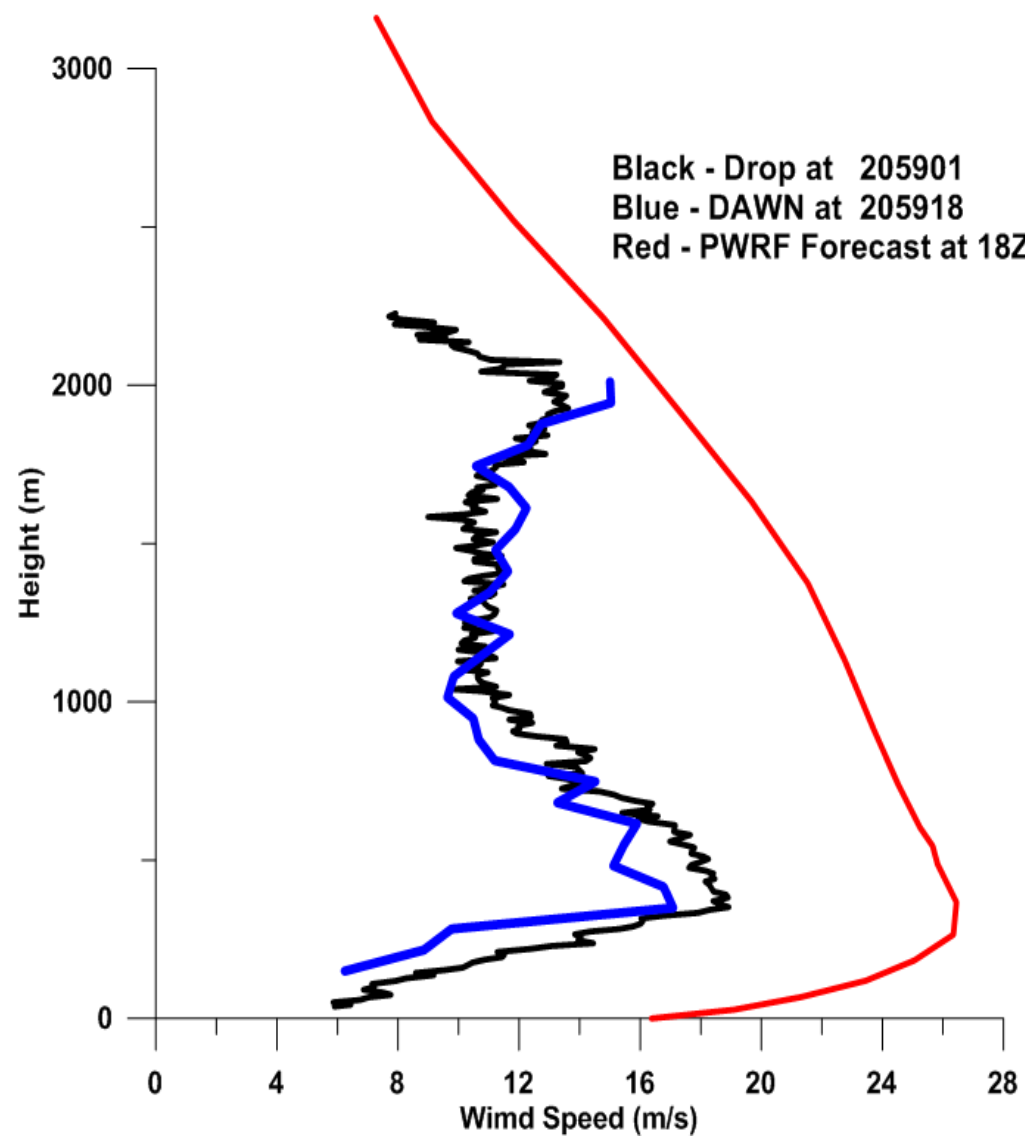
Drop_20150521_204411 Wind Speed (m/s)



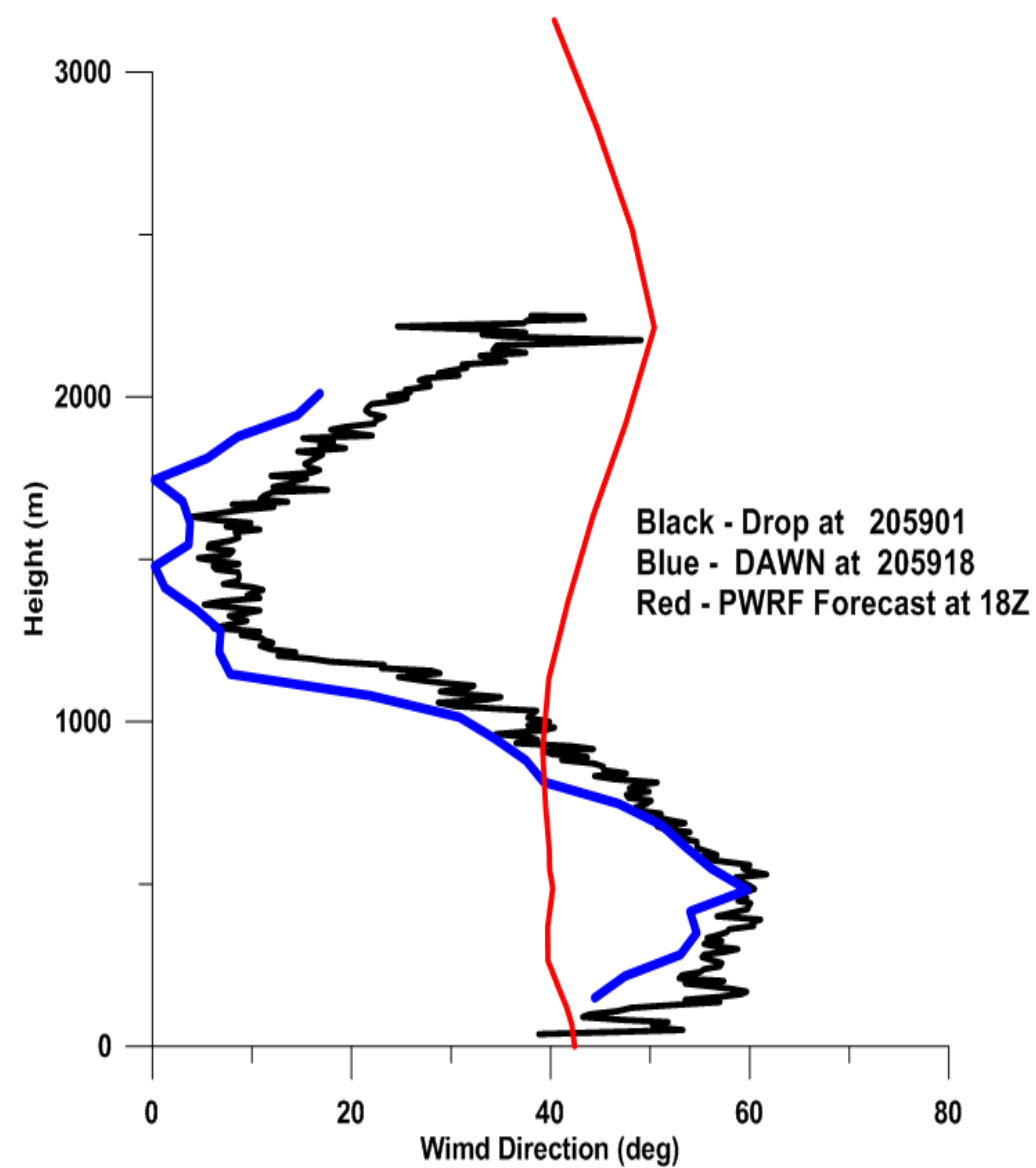
Drop_20150521_204411 Wind Direction (deg)



Drop_20150521_205909 Wind Speed (m/s)



Drop_20150521_205909 Wind Direction (deg)

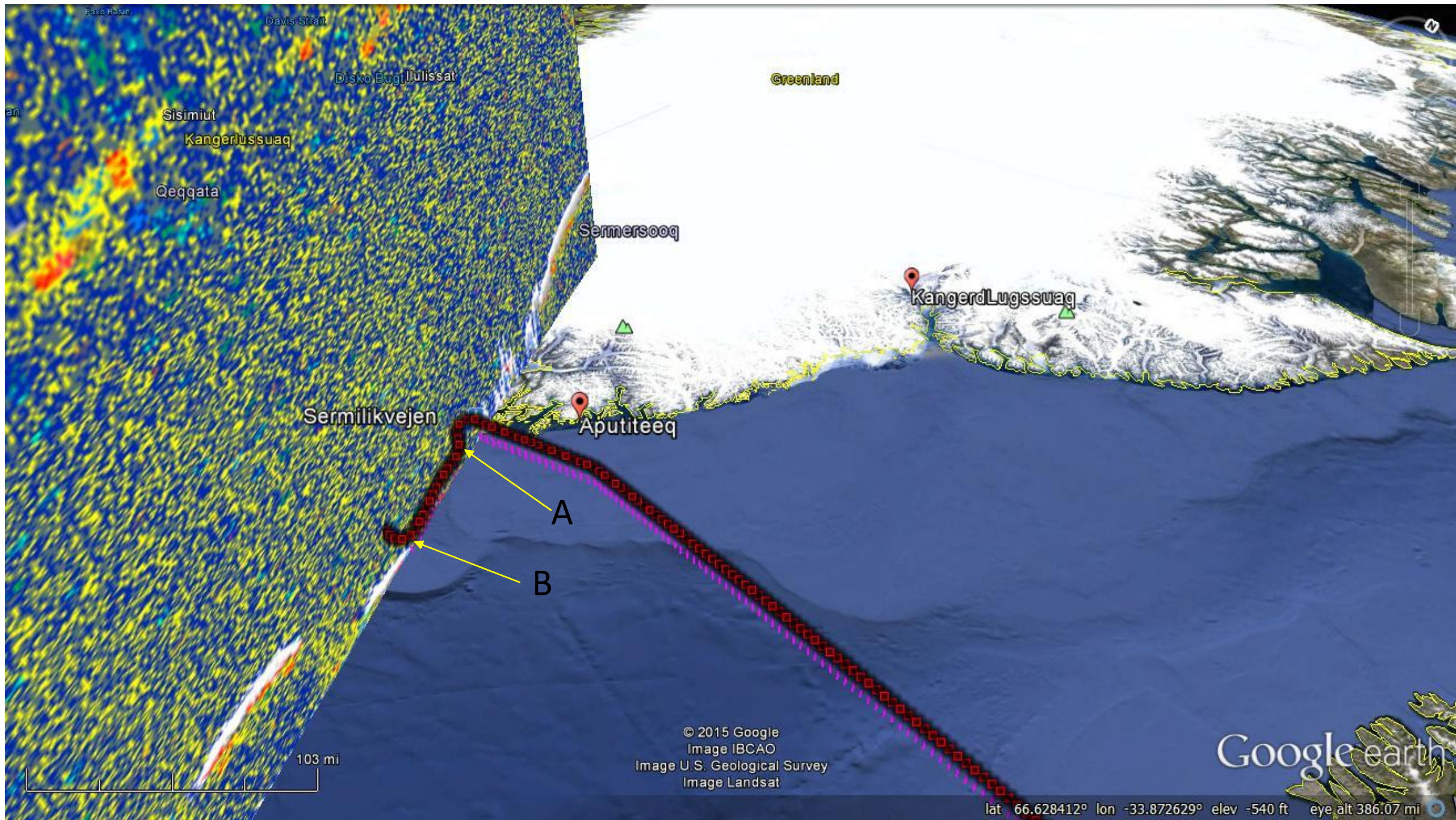


Data processing status

- Mission summaries
 - With model, satellite, pictures, tracks etc. by June 30 (Complete)
- DAWN
 - SWA complete quicklook processing for all cases by June 30 (Complete)
 - NASA/LaRC performance review plots by June 30 (Complete)
 - Final DAWN processing for distribution by November 30 (In progress)
- TWiLiTE
 - First look products by July 15 for priority case(s) (In progress)
- Dropsondes
 - First tier processing by June 30. (completed 6/15/15) (Complete)
 - Final processing by July 30. (not needed)

Data processing plan FY16

- Implement surface return based pointing corrections over ice on a case by case basis.
- Finish MatLab coding and evaluation of SWA's Supervised Search Window and Adaptive Integration Algorithm using Campaign II DAWN and dropsonde data.
- Provide “final” DAWN profiles to ESA for use in ADM Cal/Val efforts derived from Campaign II.
- Continue special studies
 - Ice movement velocity vs. wind and current
 - CALIPSO and DAWN comparisons in the presence of clouds given priority
 - Rolls over ice, near tip jet and over west coast of Greenland.
 - More Polar WRF studies
 - Collaborative studies with ESA/DLR



051715 1458Z - Polar Winds CALIPSO Underflight

