



Supplement of

The impact of MISR-derived injection height initialization on wildfire and volcanic plume dispersion in the HYSPLIT model

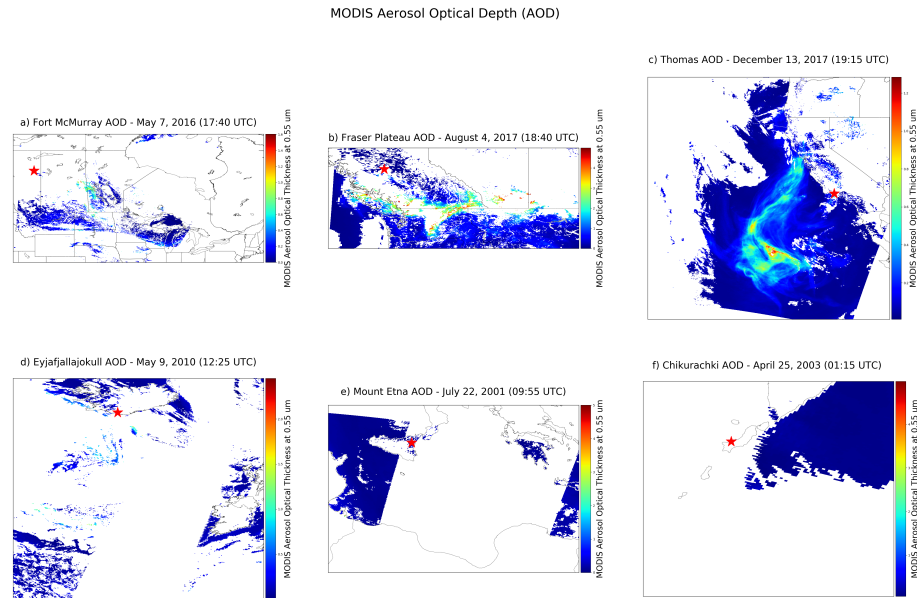
Charles J. Vernon et al.

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Supplemental Material

Figure S1



Yosemite Rim Fire Plume, August 2013

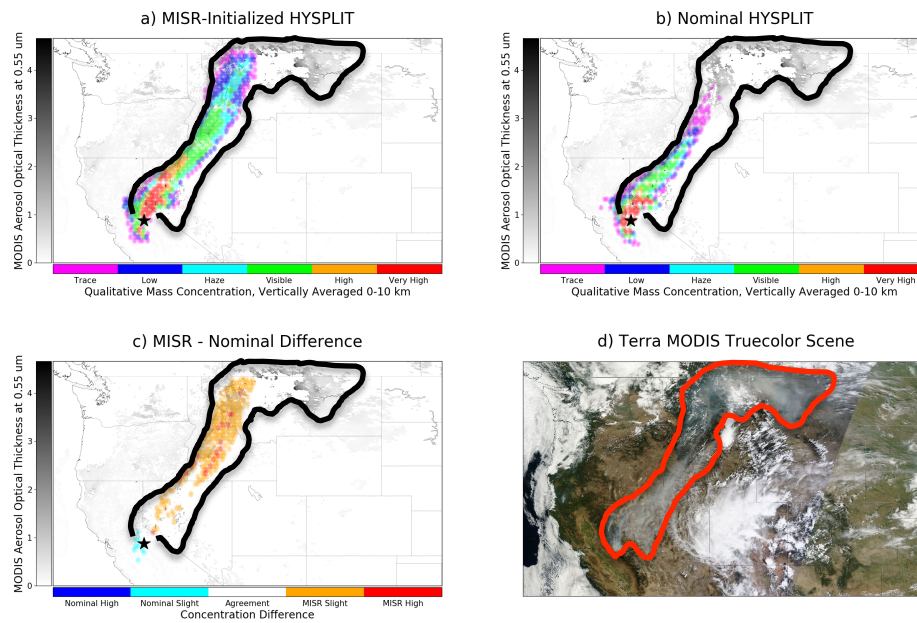
The Yosemite Rim Fire was also one of the simulations performed for this study but is temporarily being left in supplemental material. It is possible that the method used to convert BlueSky data into a HYSPLIT compatible format or the BlueSky data itself could be inaccurate since there was an older version of BlueSky in 2013. We are currently waiting on confirmation from the National Center for Environmental Prediction about whether we can call this simulation nominal. The analysis of the simulations that were performed can be found below.

August 23rd, 2013, Day 1 of our Yosemite Rim Fire simulations, shows noticeable differences between the nominal and MISR-initialized plumes. Figure 2b shows the sounding at KRNO (August 24th, 2013 00 UCT) just north of Yosemite, which indicates that the PBL height is approximately 4.5 kilometers. The GDAS meteorological fields The MINX injection height was 6.2 kilometers and the HYSPLIT calculation placed the injection height at 3 kilometers. This case again indicates the importance of accurately initializing the smoke plume height, especially when it is above the top of the boundary layer. The wind shifts just above the PBL changing from 10 knots out of the west to 15-20 knots out of the south. As the nominal HYSPLIT simulation injects the smoke below the height where this occurs, Figure 4 shows that the plume does not extend nearly as far downwind as the MISR-initialized plume. In this case, the MISR-initialized plume reaches from the United States north beyond the border with Canada. Both the optical depth map and the visible imagery show a well defined, optically thick smoke plume

1 extending from Yosemite past the border and then looping back to the southeast. The
2 nominal model simulation has visible smoke extending only to the southern border of
3 Idaho, whereas the MISR-initialized run shows visible smoke reaching the border, in
4 much better agreement with observations.

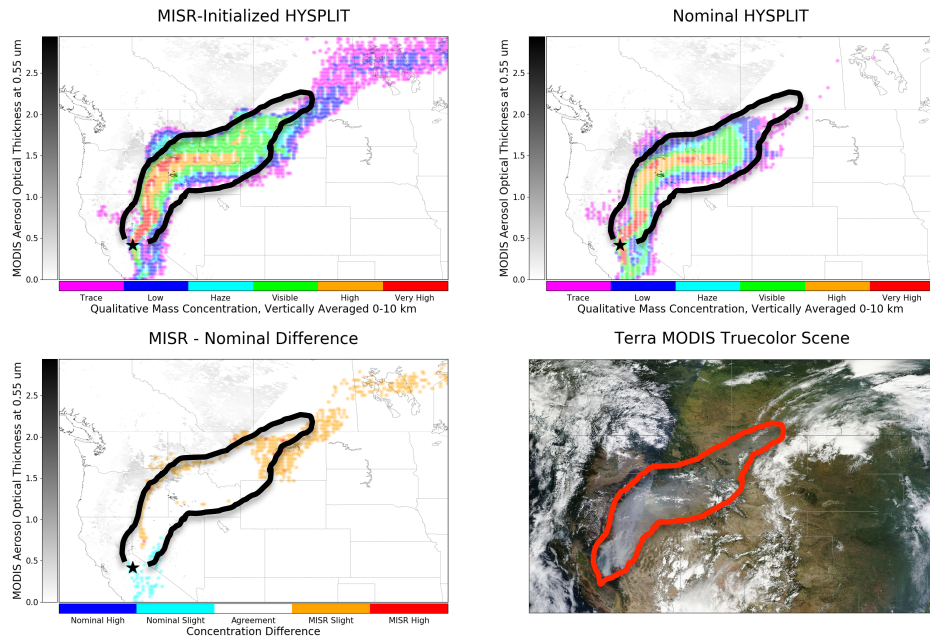
5
6 **Figure S2**
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4) Yosemite Rim Fire Simulation - August 23, 2013 (18:55 UTC)



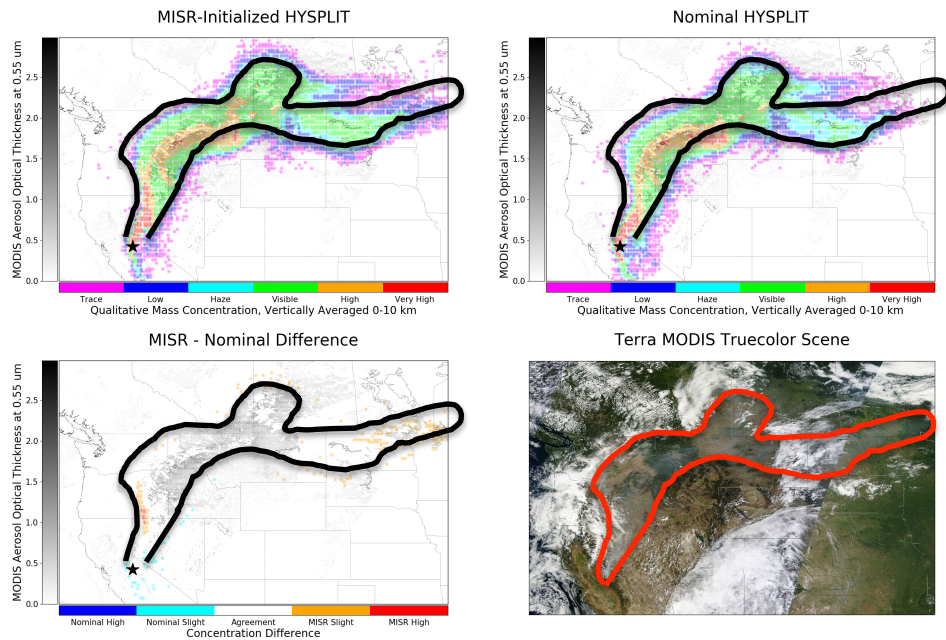
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10
11 **Additional Figures**
12
13 Yosemite
14 **Figure S3**

Yosemite Rim Fire Simulation - August 24, 2013 (21:15 UTC)



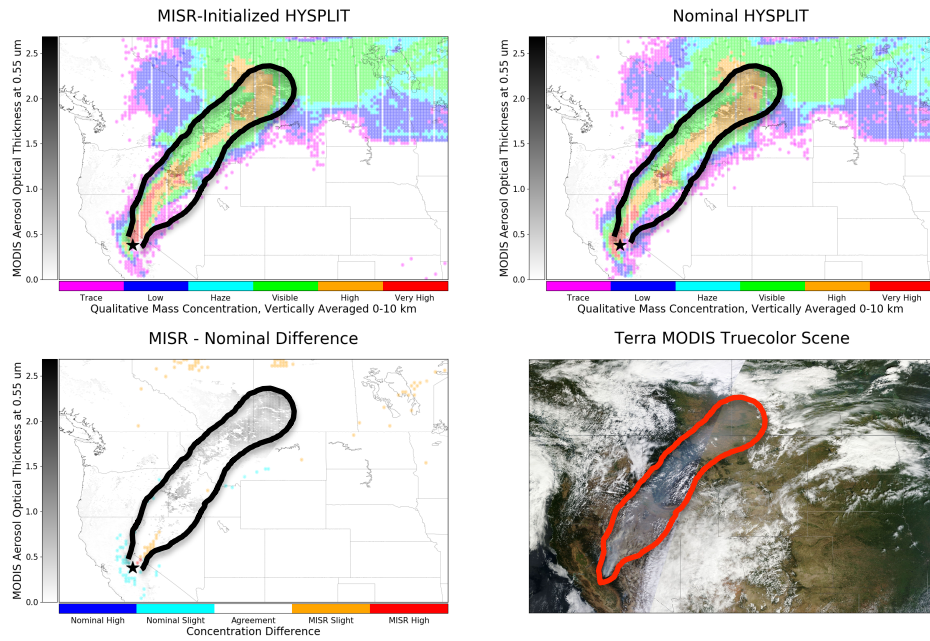
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2 **Figure S4**

Yosemite Rim Fire Simulation - August 25, 2013 (18:45 UTC)



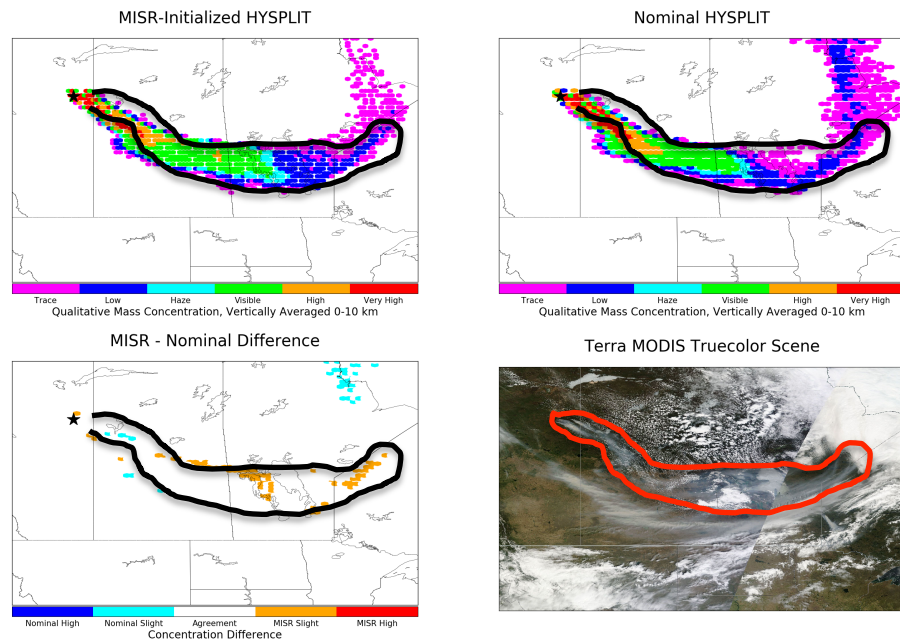
3
4 **Figure S5**

Yosemite Rim Fire Simulation - August 26, 2013 (19:25 UTC)



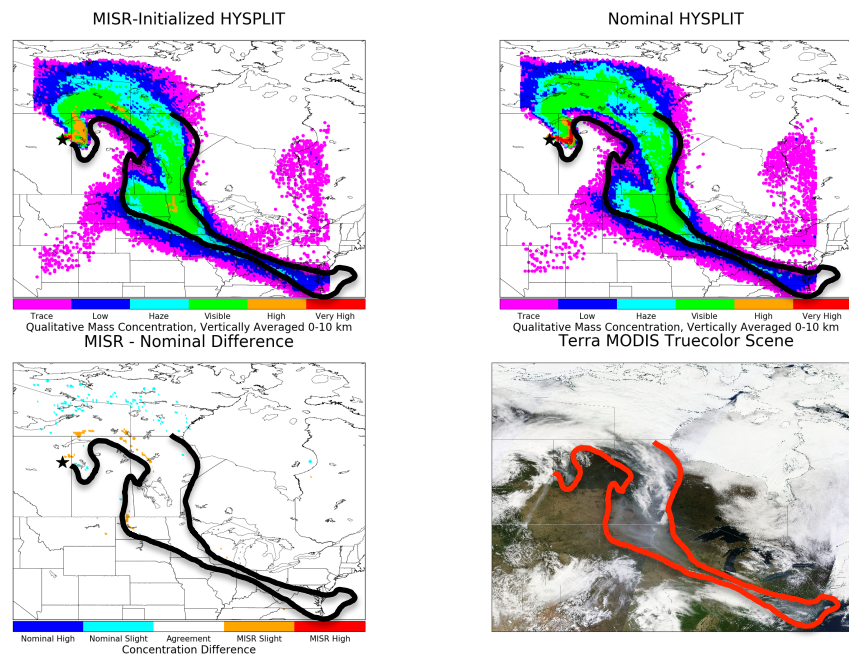
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2
3 Fort McMurray
4 **Figure S6**

Fort McMurray Wildfire Simulation - May 6, 2016 (18:35 UTC)



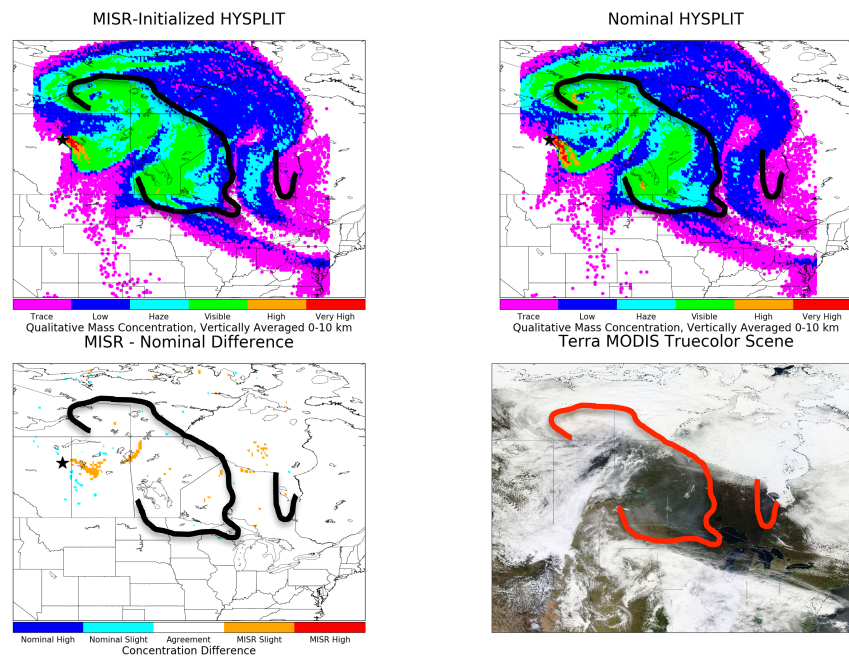
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6 **Figure S7**

Fort McMurray Wildfire Simulation - May 8, 2016 (18:20 UTC)



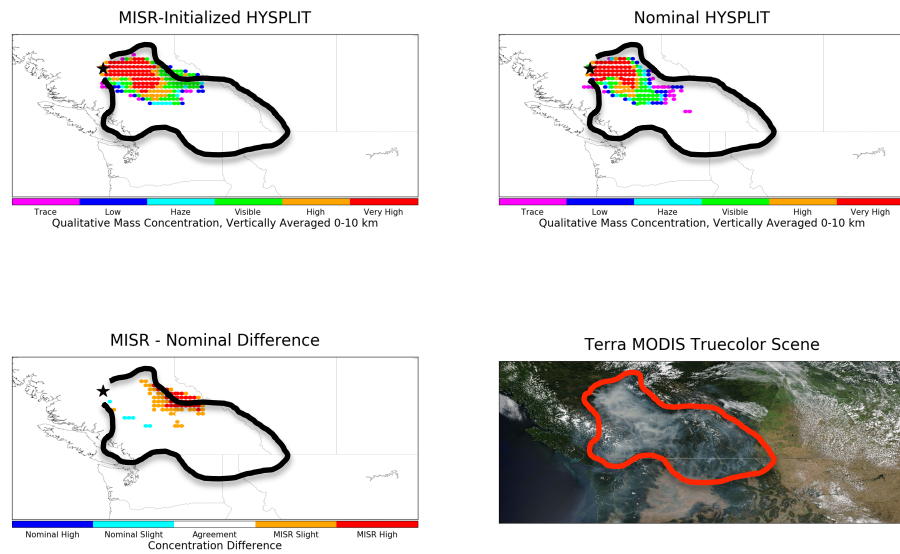
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2 **Figure S8**

Fort McMurray Wildfire Simulation - May 9, 2016 (19:10 UTC)



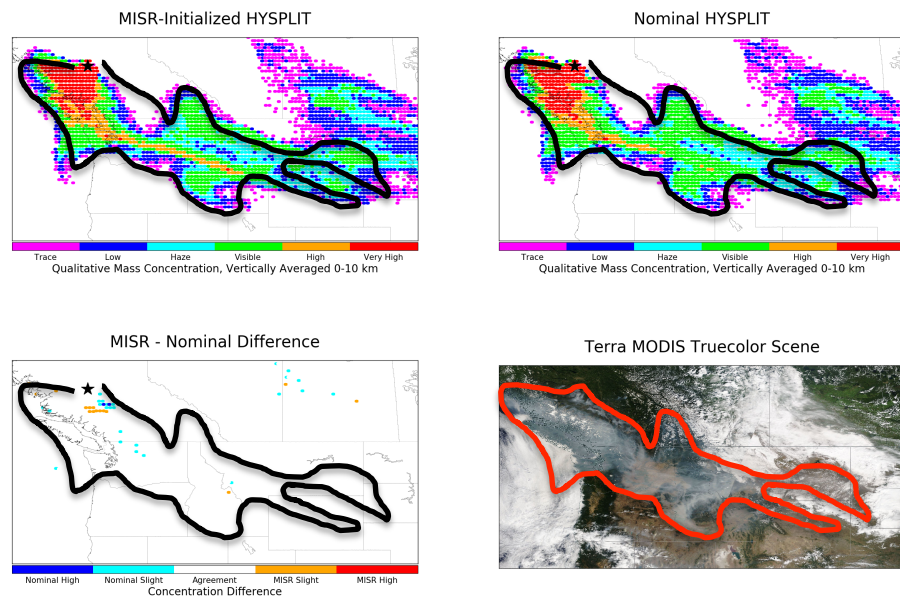
3
4
5 Fraser Plateau
6 **Figure S9**

Fraser Plateau Wildfire Simulation - August 3, 2017 (19:35 UTC)



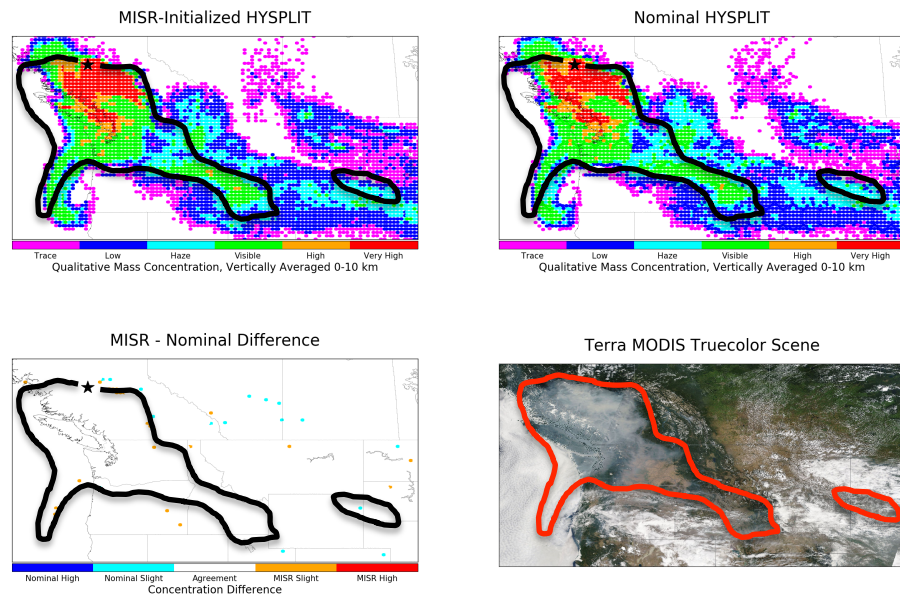
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2 **Figure S10**

Fraser Plateau Wildfire Simulation - August 5, 2017 (21:10 UTC)



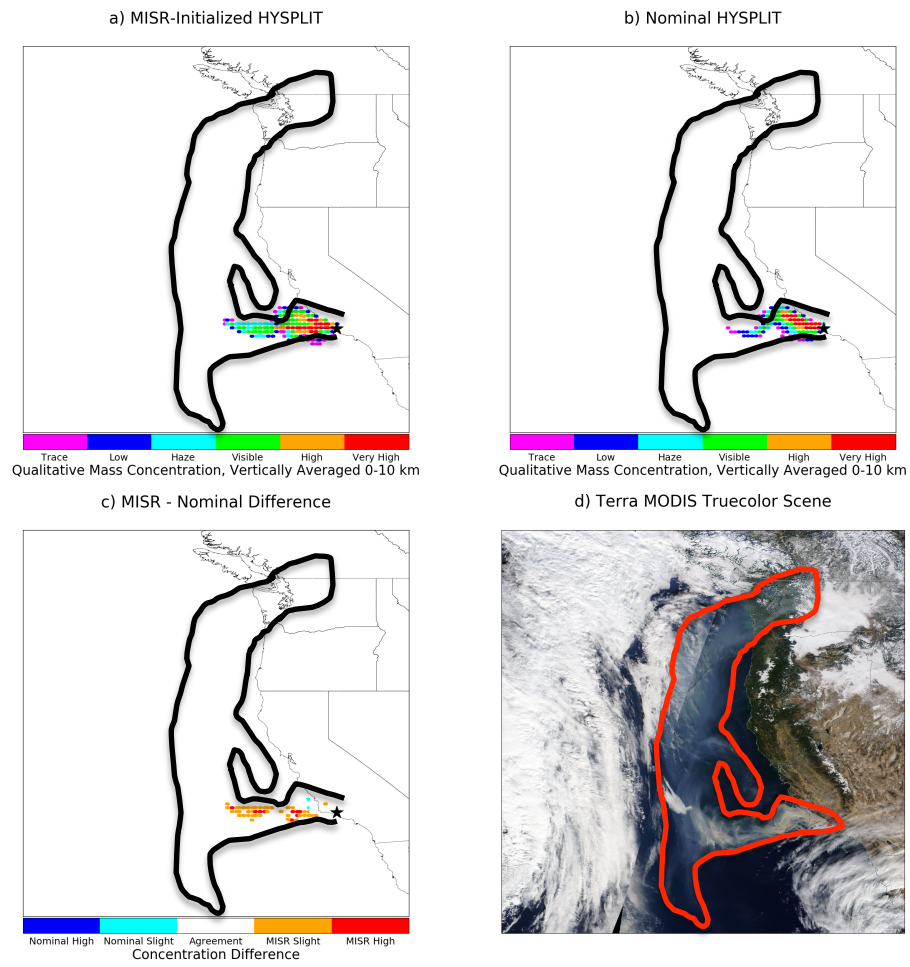
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4 **Figure S11**

Fraser Plateau Wildfire Simulation - August 6, 2017 (18:30 UTC)



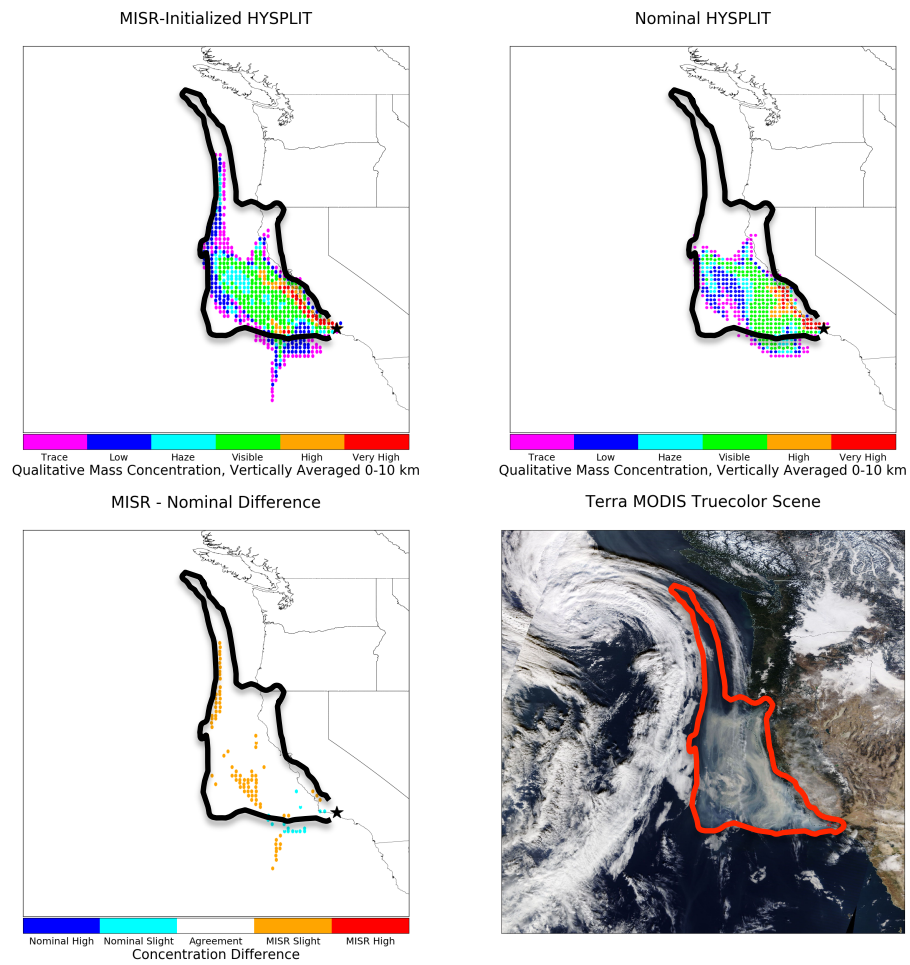
1
2
3 Thomas Fire
4 **Figure S12**

Thomas Wildfire Simulation - December 10, 2017 (18:45 UTC)



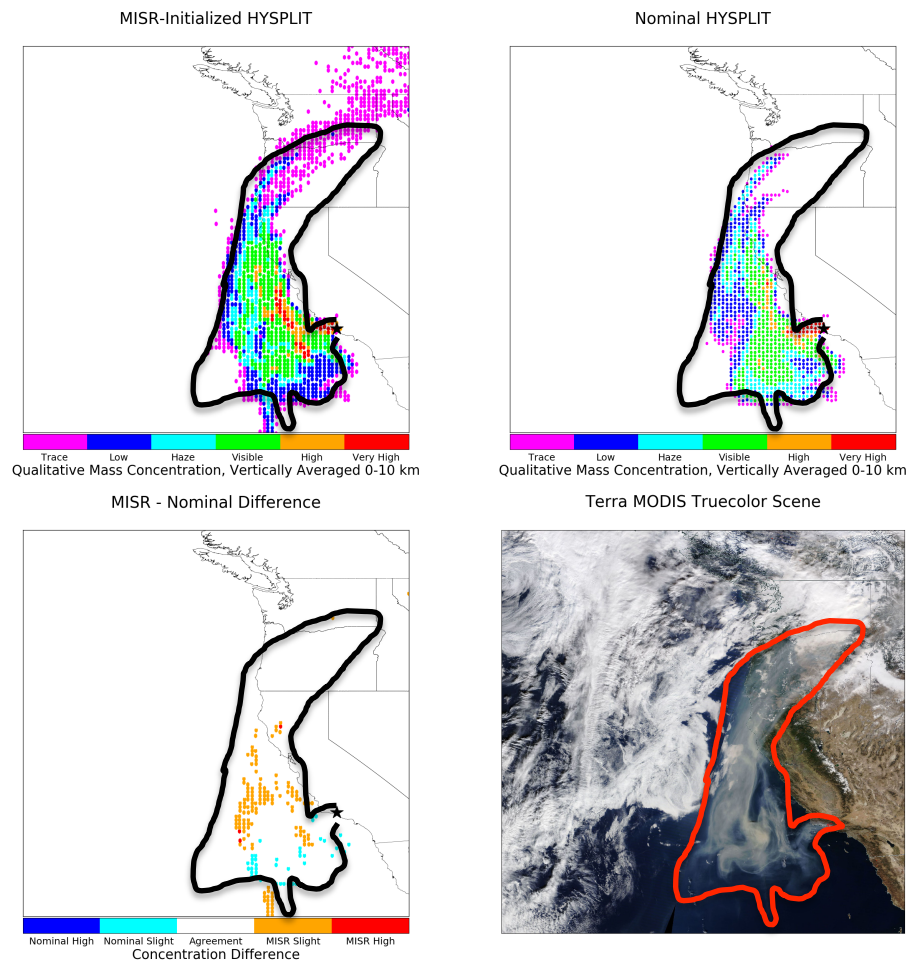
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2 **Figure S13**

Thomas Wildfire Simulation - December 11, 2017 (19:25 UTC)



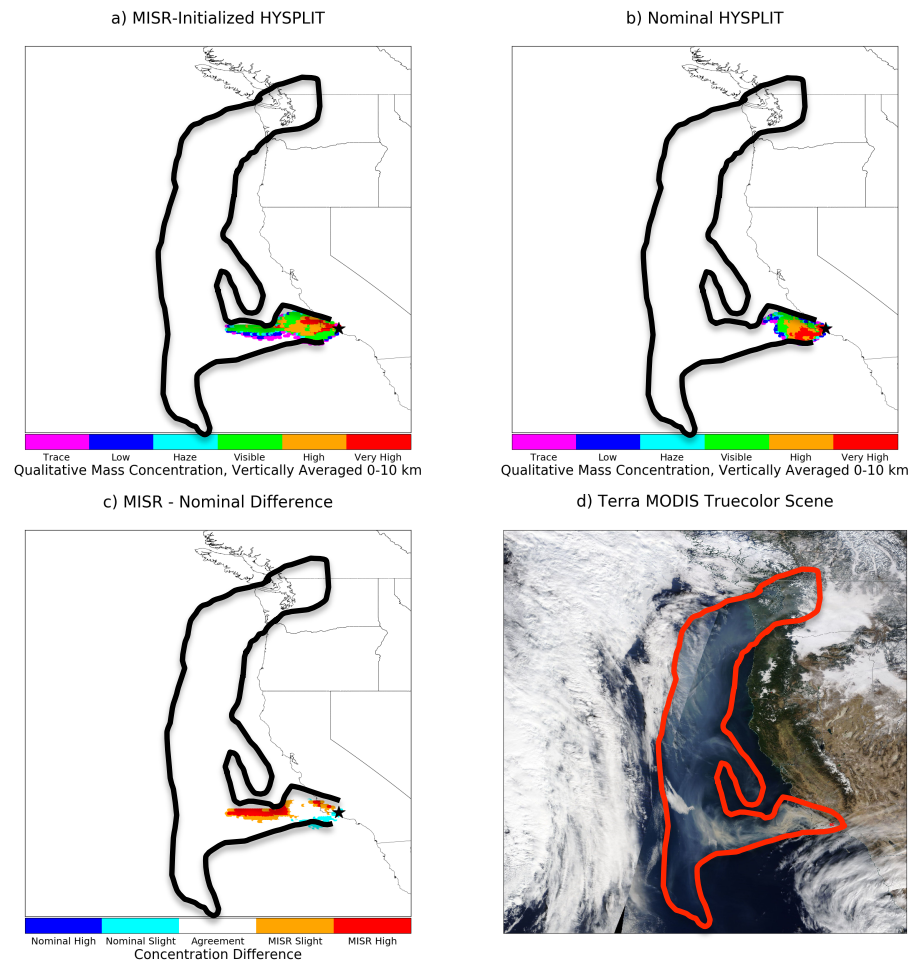
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2 **Figure S14**

Thomas Wildfire Simulation - December 12, 2017 (18:30 UTC)



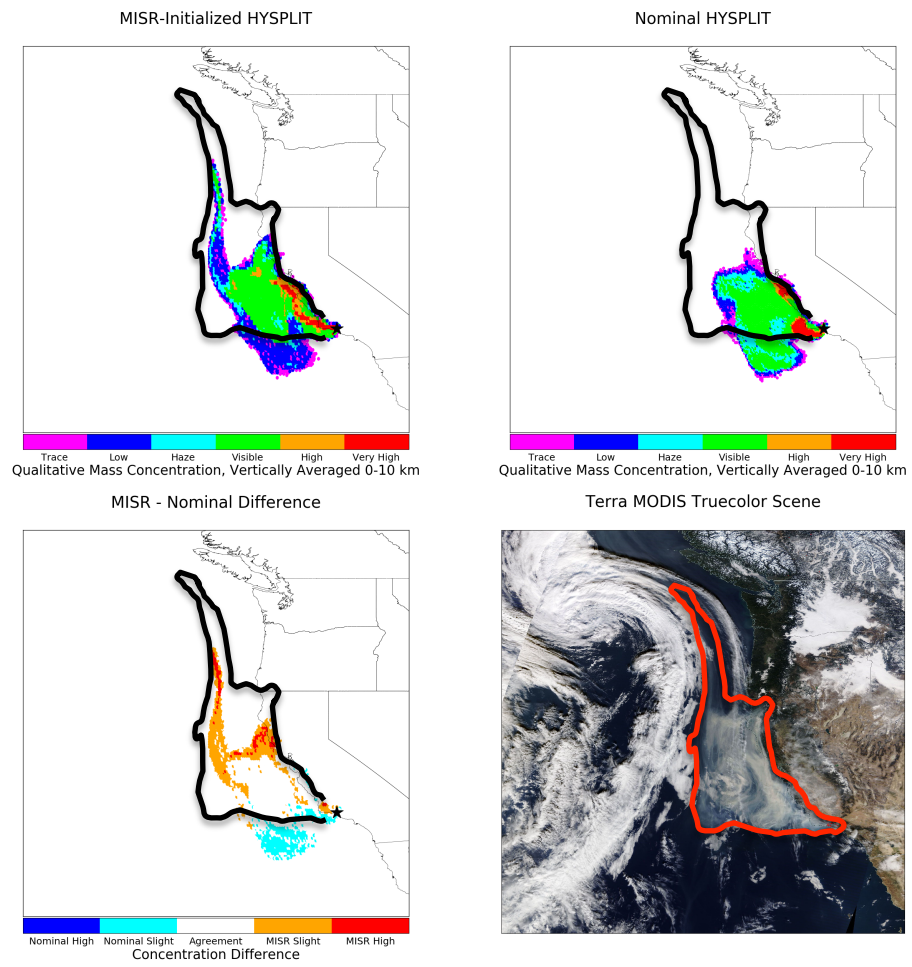
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- 2
- 3 Thomas Fire with NAM12
- 4 **Figure S15**

Thomas Wildfire Simulation (With NAM12) - December 10, 2017 (18:45 UTC)



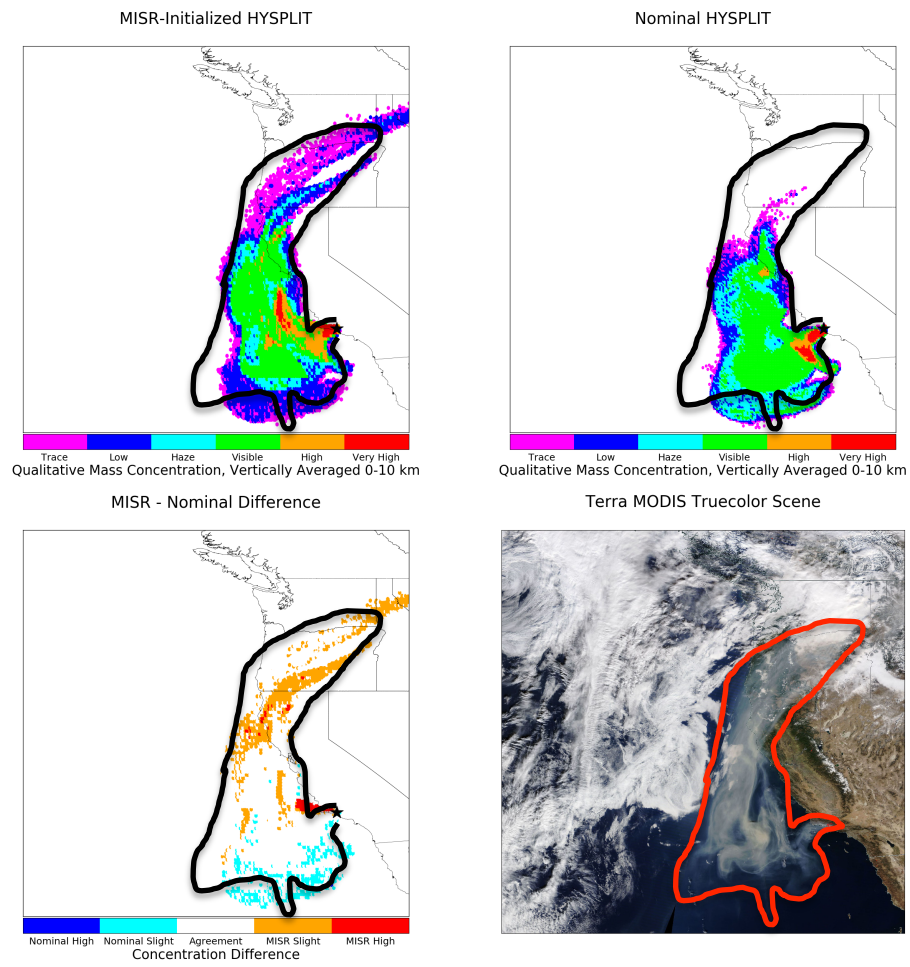
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2 **Figure S16**

Thomas Wildfire Simulation (With NAM12) - December 11, 2017 (19:25 UTC)



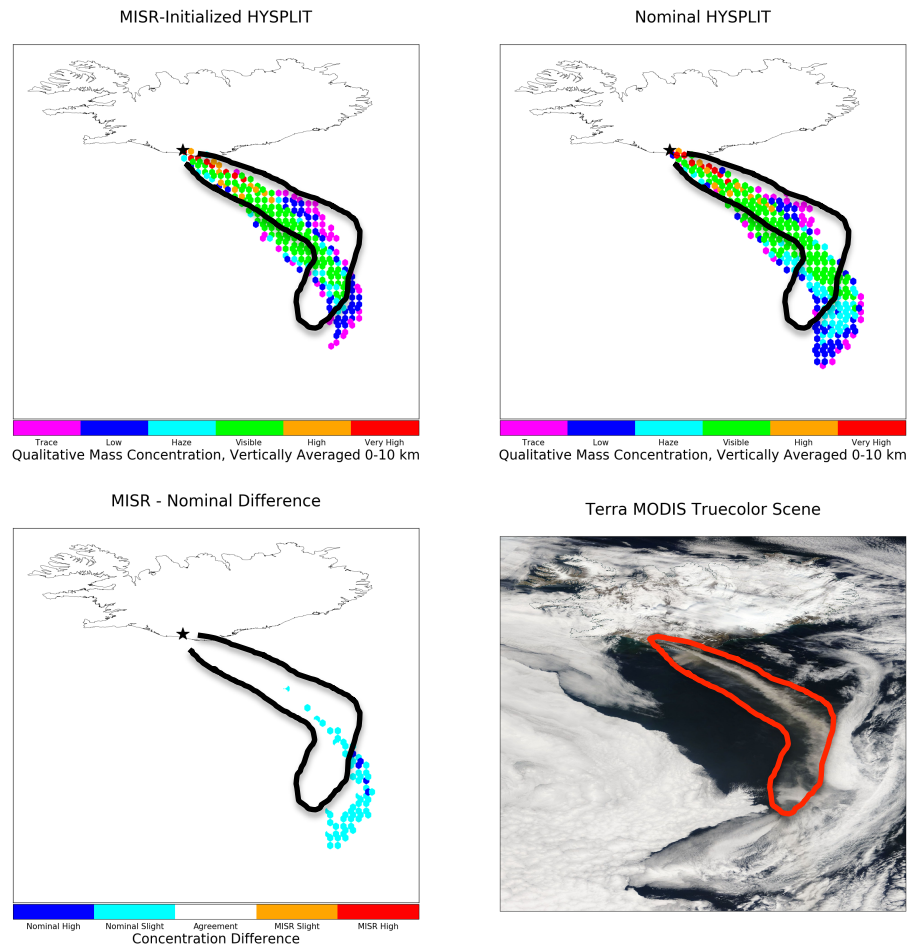
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2 **Figure S17**

Thomas Wildfire Simulation (With NAM12) - December 12, 2017 (18:30 UTC)



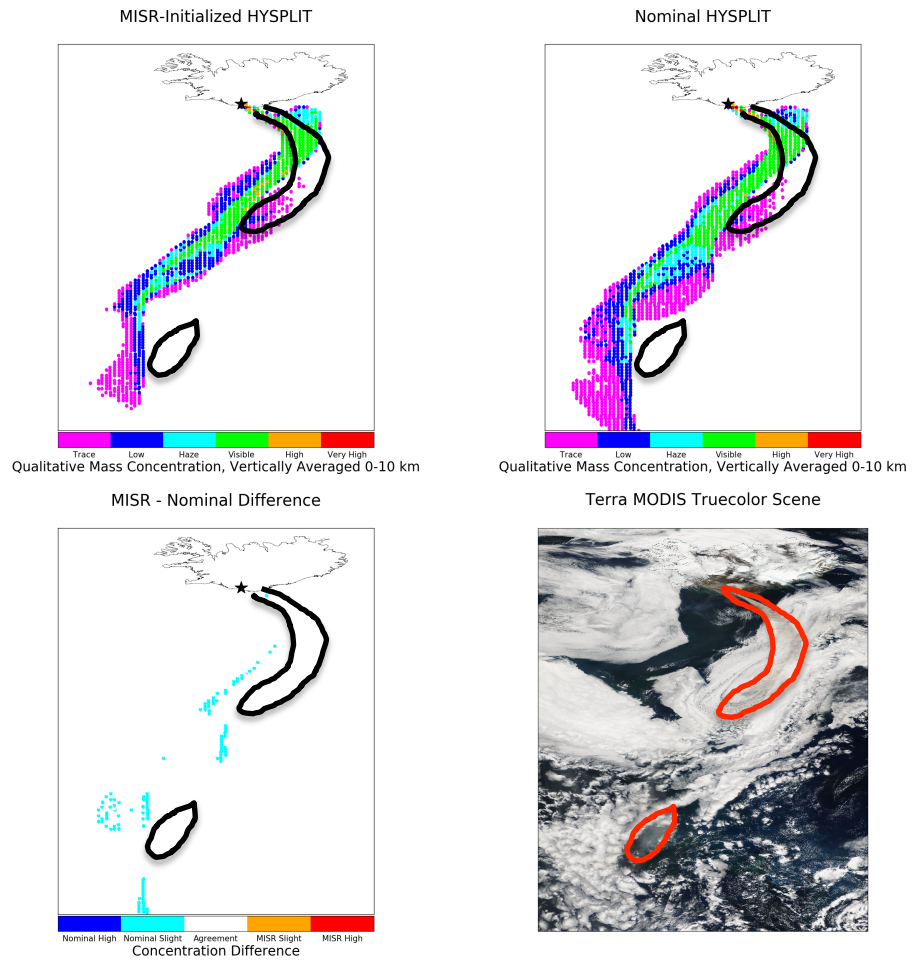
- 1
- 2
- 3 Eyjafjallajokull
- 4 **Figure S18**

Eyjafjallajokull Eruption Simulation - May 7, 2010 (12:35 UTC)



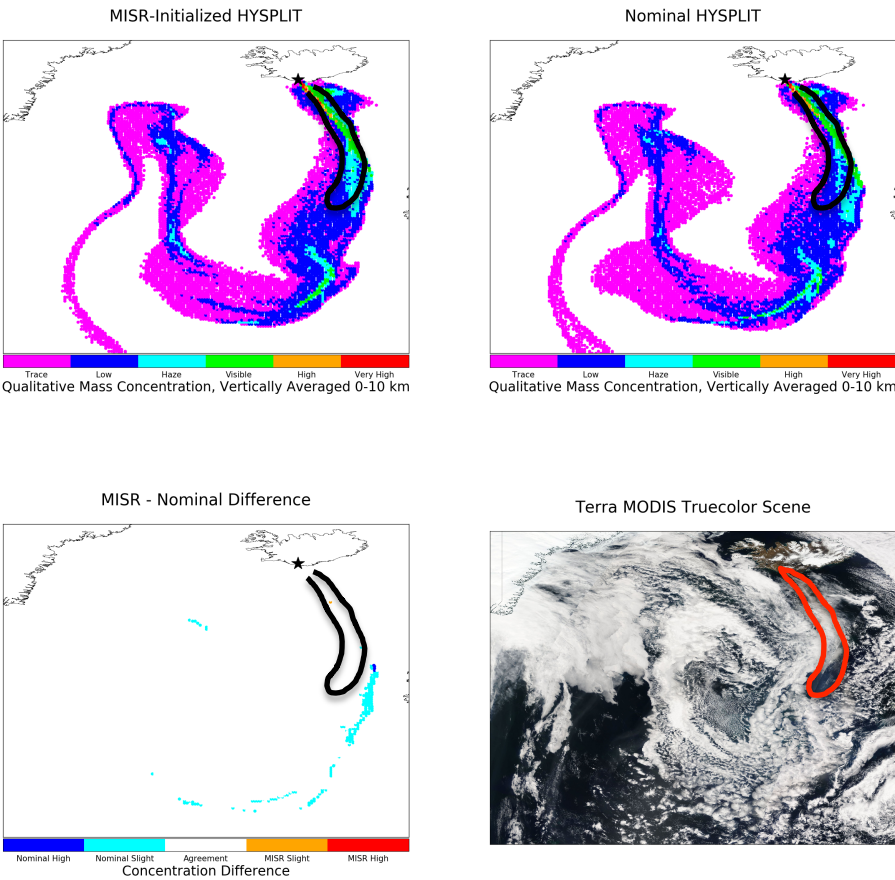
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2 **Figure S19**

Eyjafjallajokull Eruption Simulation - May 8, 2010 (13:20 UTC)



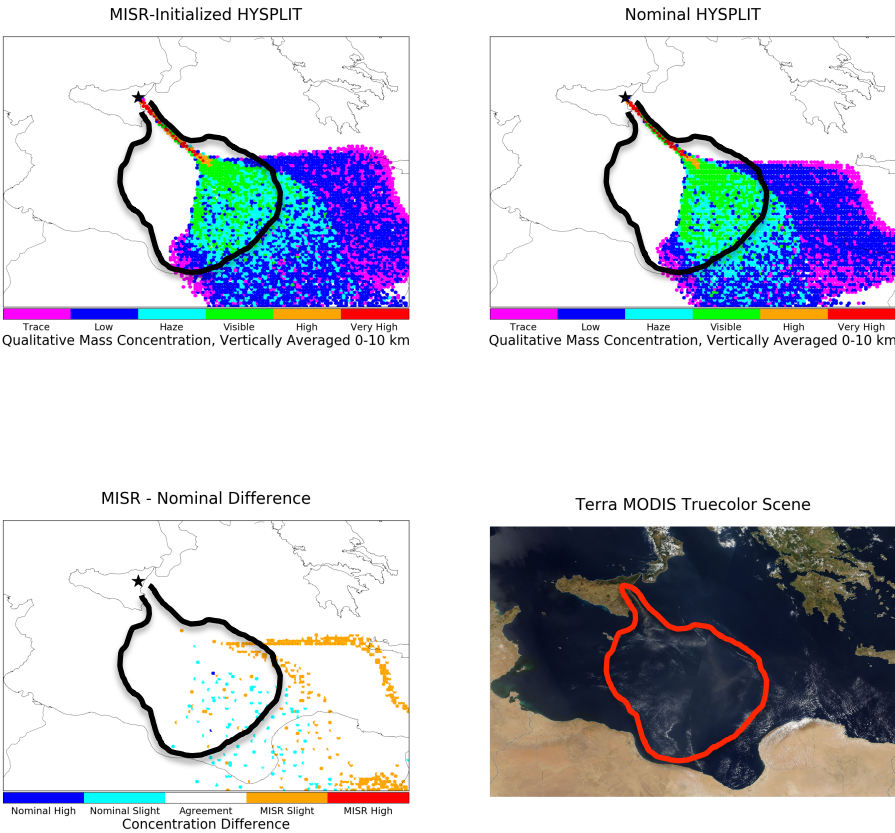
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2 **Figure S20**

Eyjafjallajokull Eruption Simulation - May 10, 2010 (13:25 UTC)



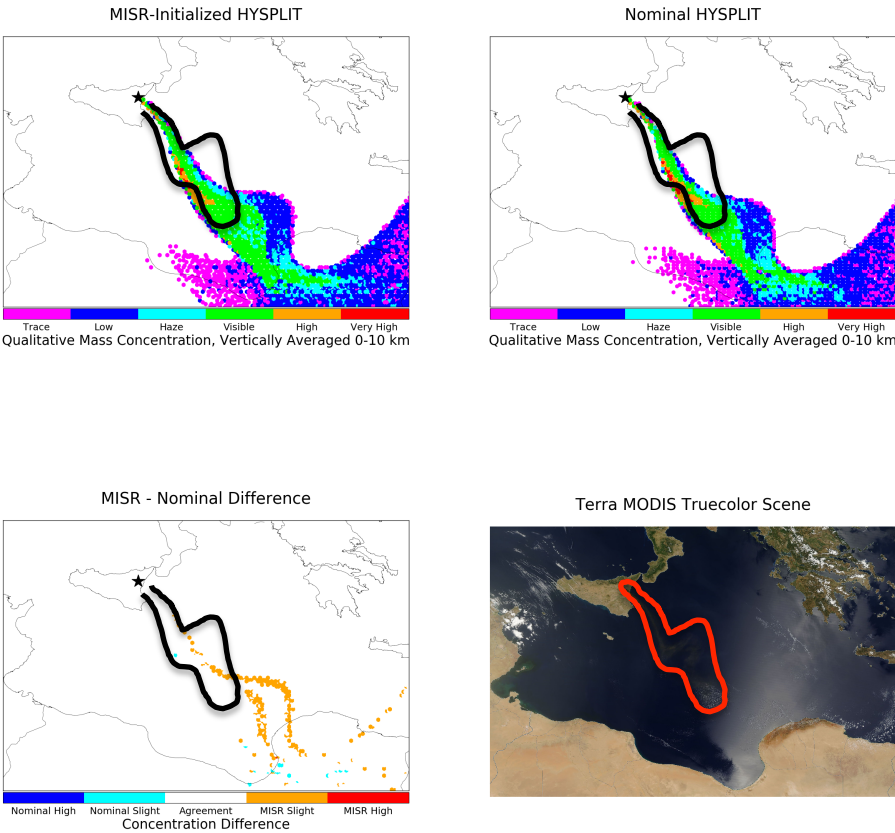
1
2
3 Etna
4 **Figure S21**

Mount Etna Eruption Simulation - July 23, 2001 (10:35 UTC)



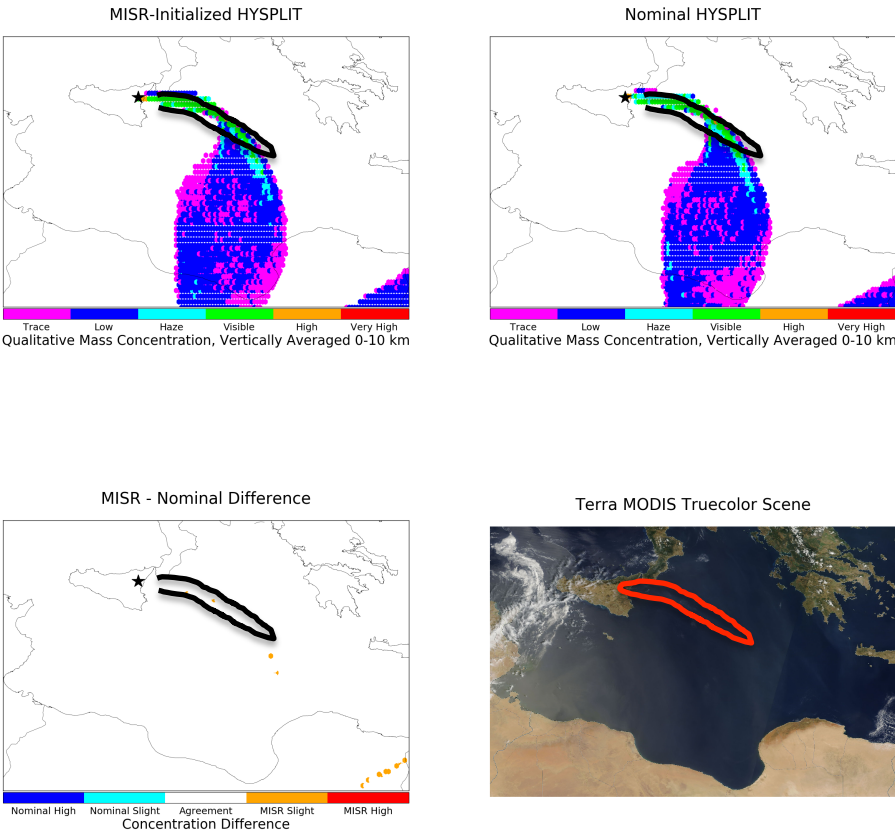
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2 **Figure S22**

Mount Etna Eruption Simulation - July 24, 2001 (09:40 UTC)



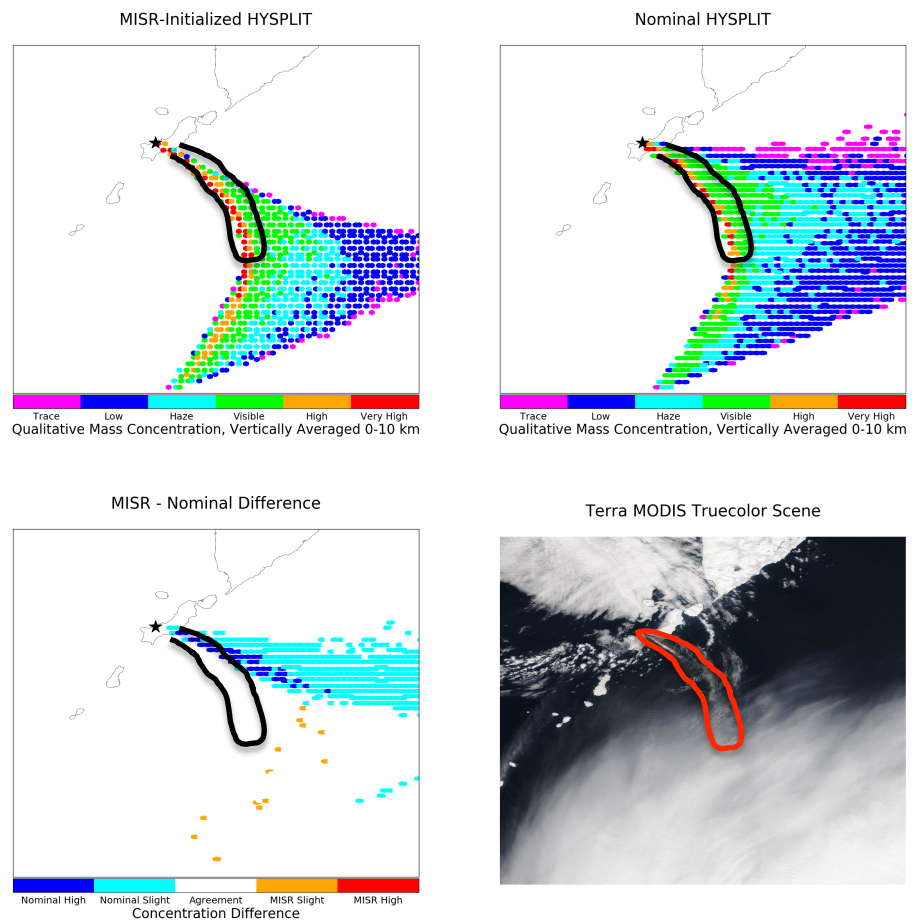
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2 **Figure S23**

Mount Etna Eruption Simulation - July 25, 2001 (10:25 UTC)

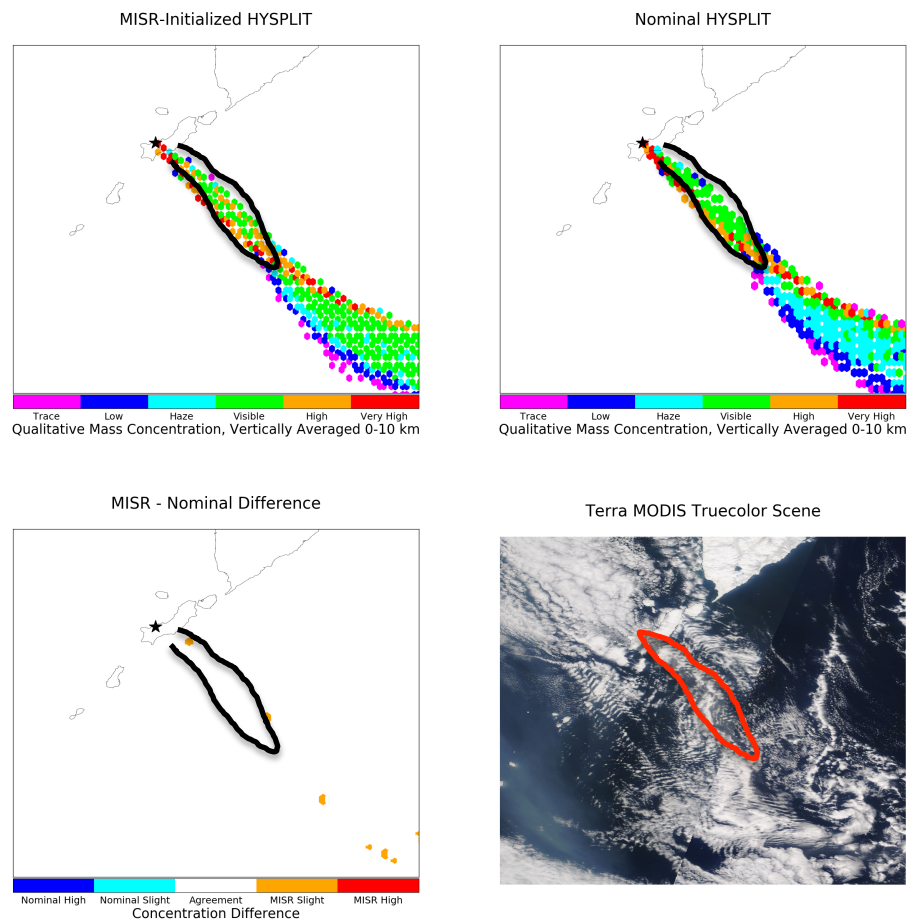


1
2
3 Chikurachki
4 **Figure S24**

Chikurachki Eruption Simulation - April 22, 2003 (00:45 UTC)

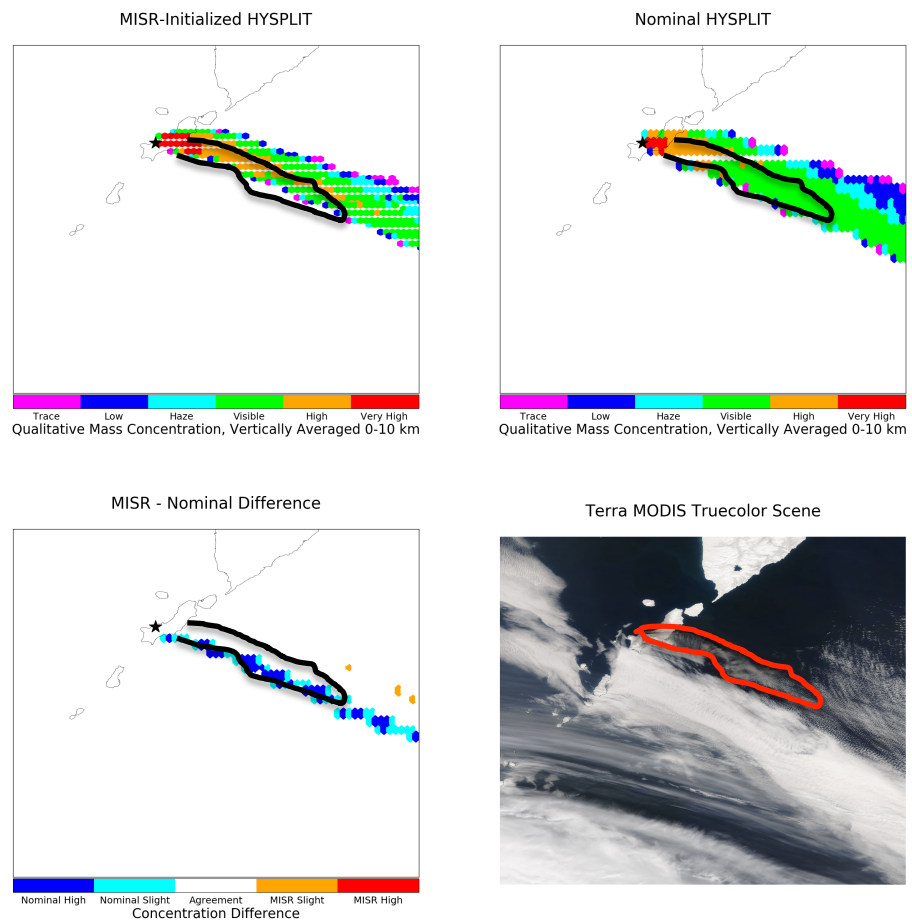


Chikurachki Eruption Simulation - April 23, 2003 (01:25 UTC)

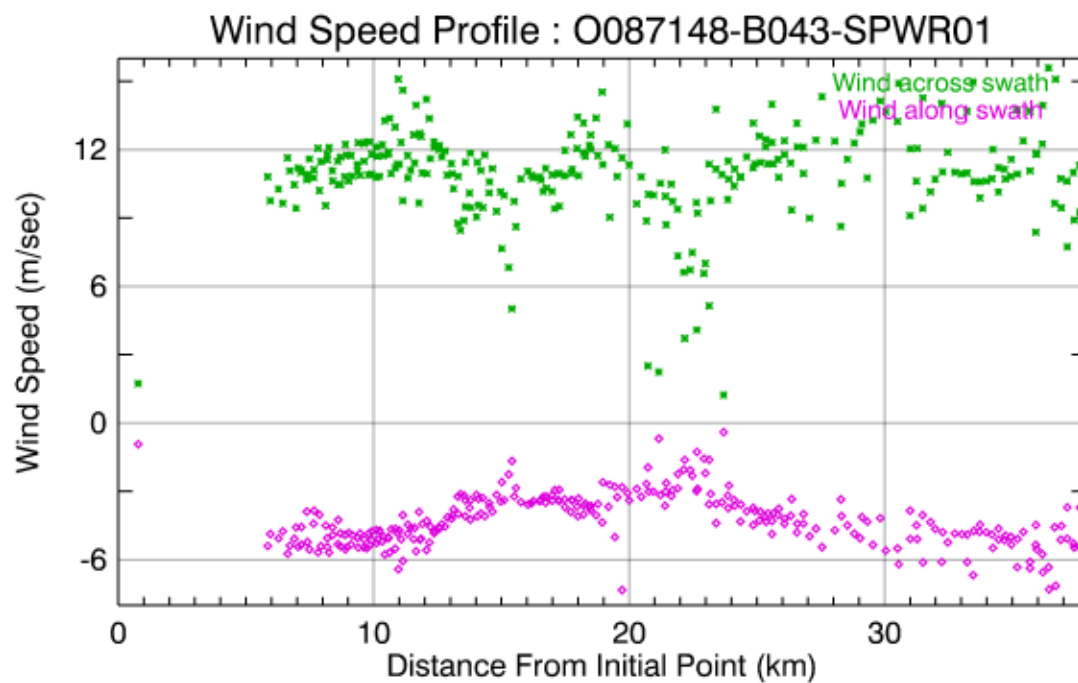
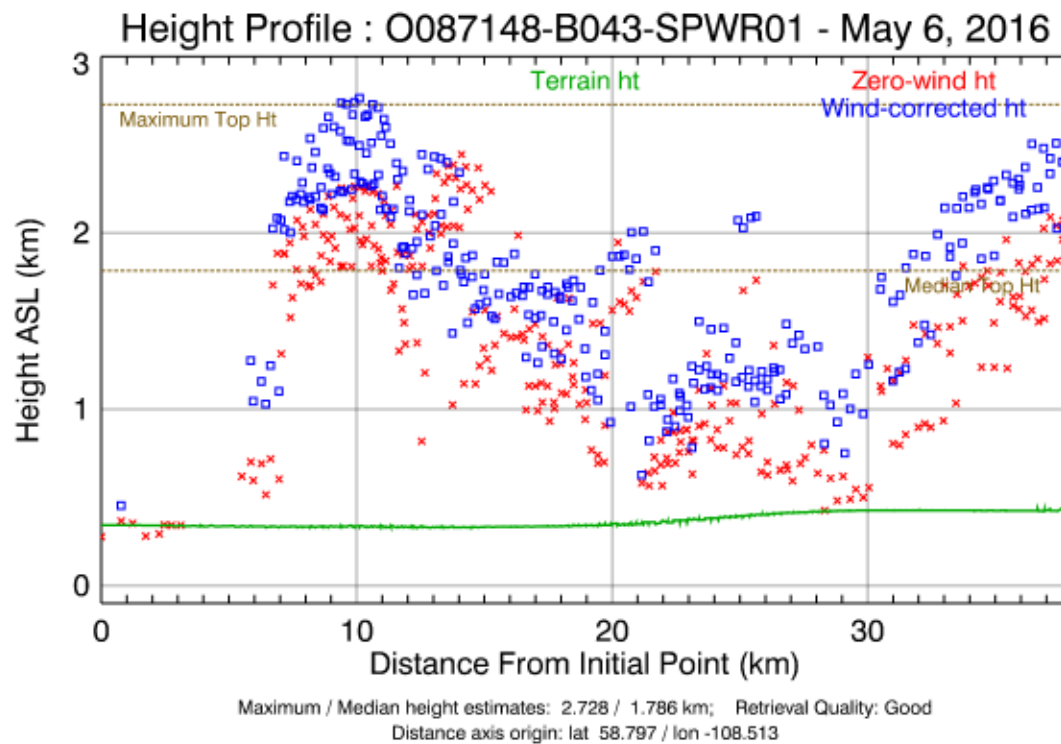


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2 **Figure S26**

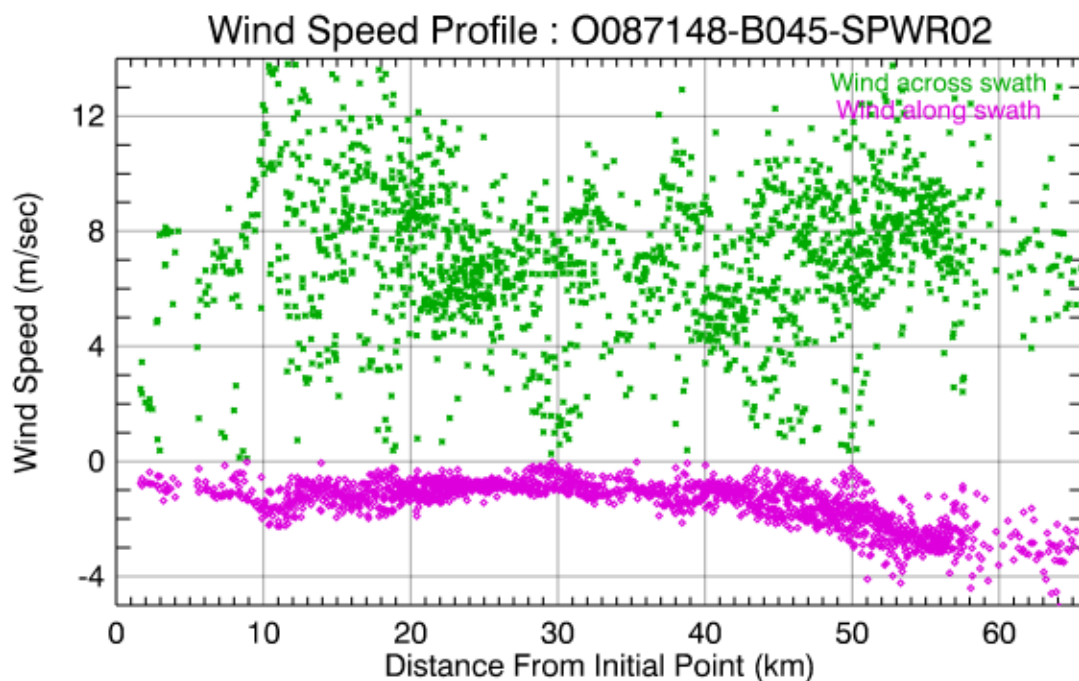
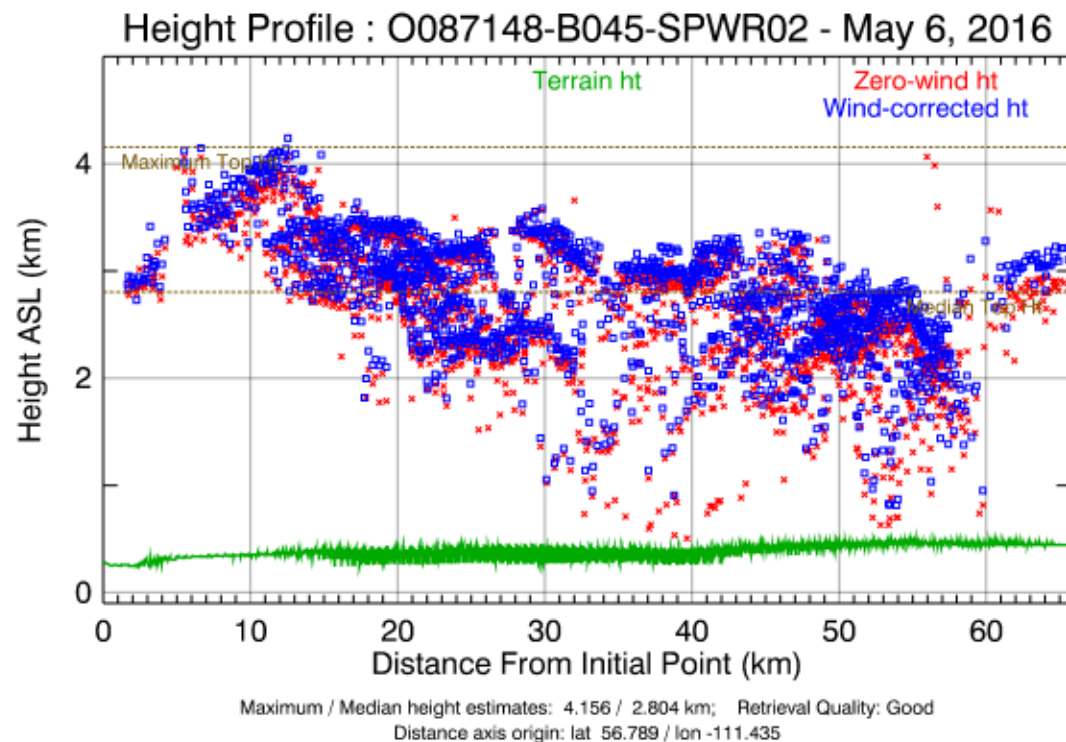
Chikurachki Eruption Simulation - April 24, 2003 (00:30 UTC)



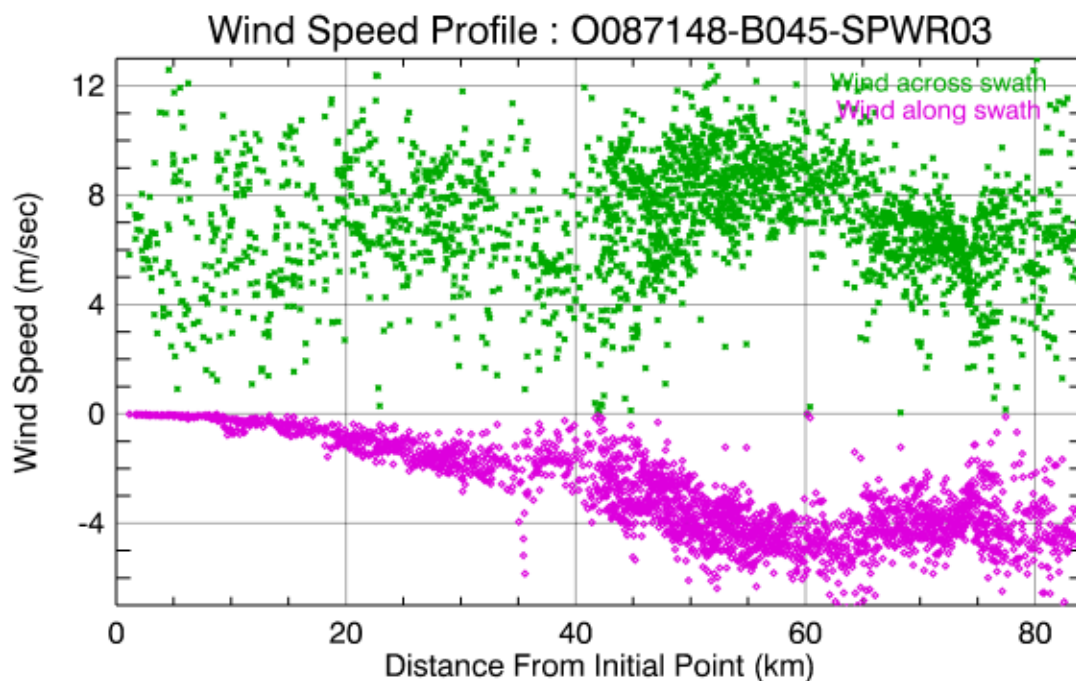
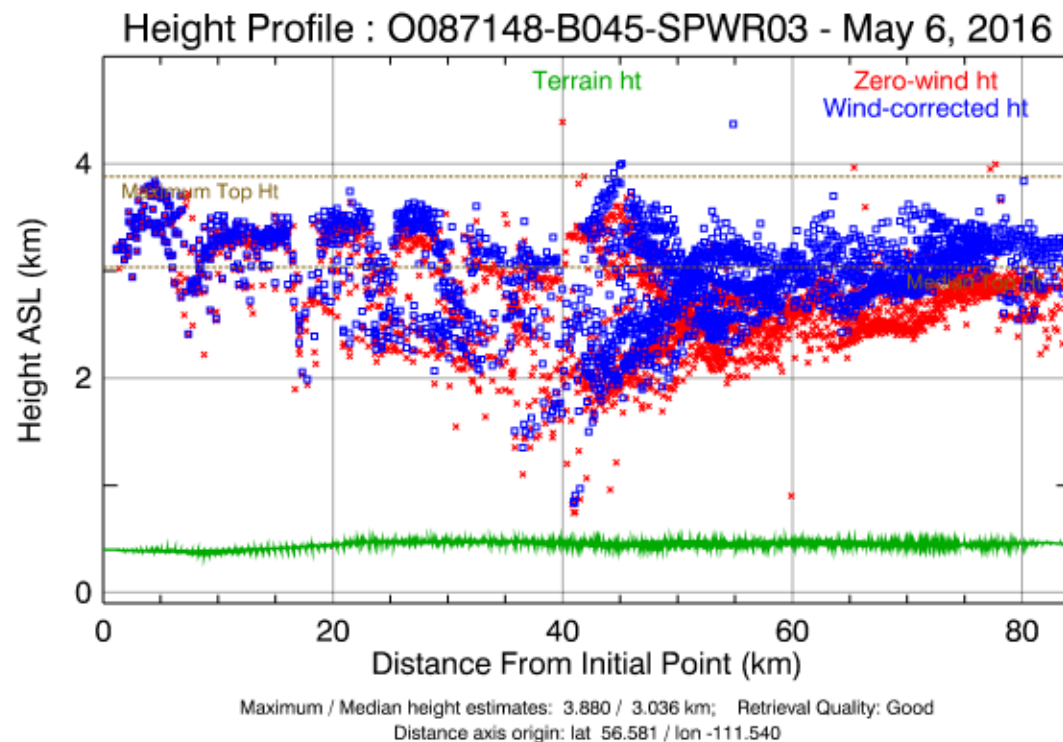
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2
3 **MINX Height and Wind Plots**
4
5 Fort McMurray
6 **Figure S27**



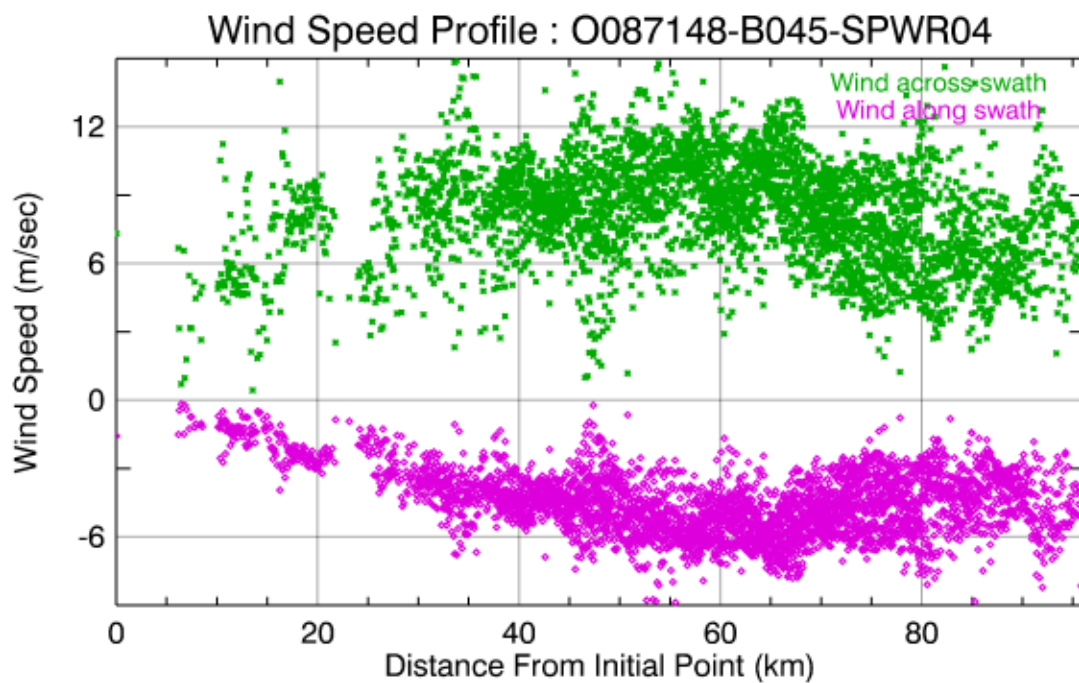
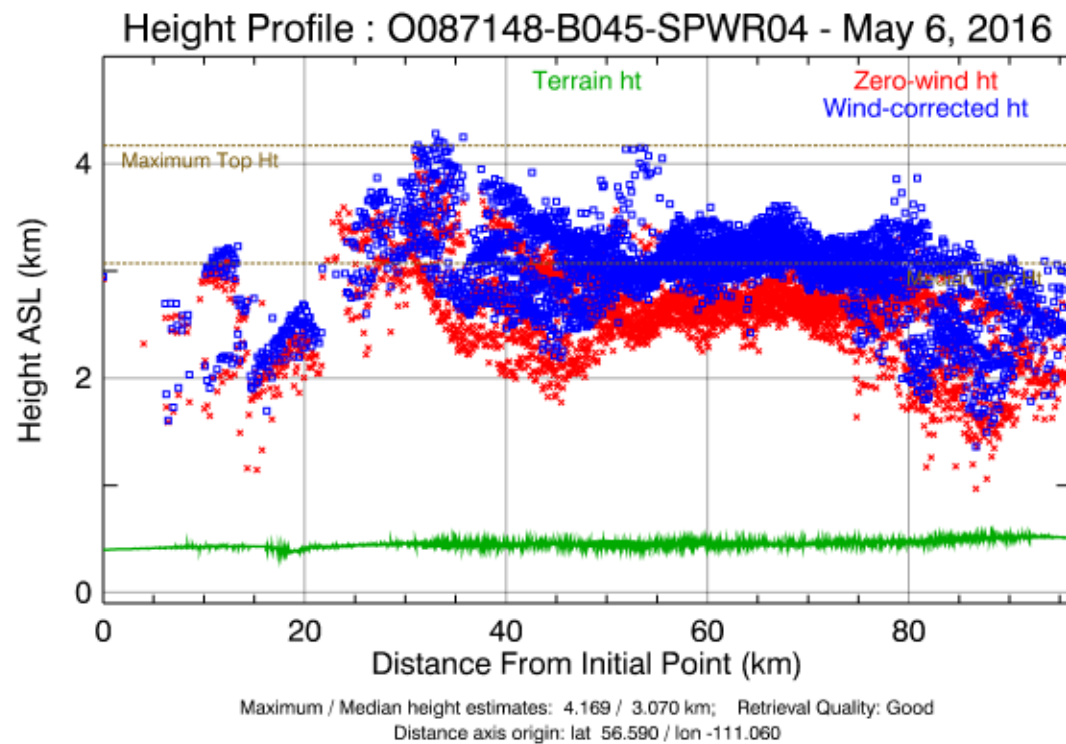
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2 **Figure S28**



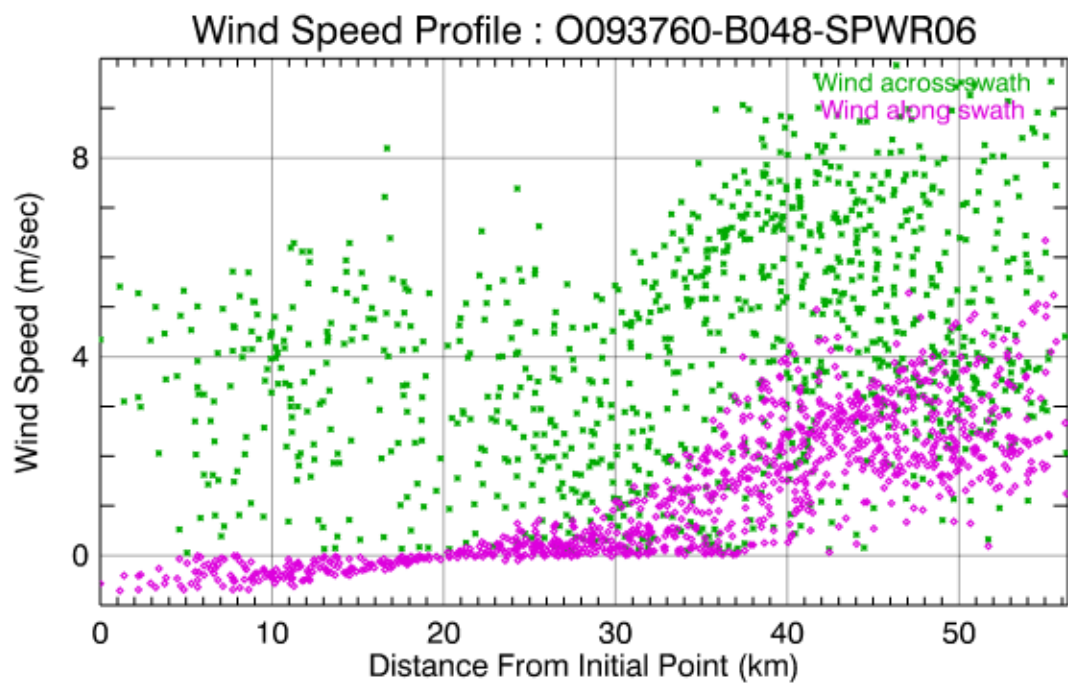
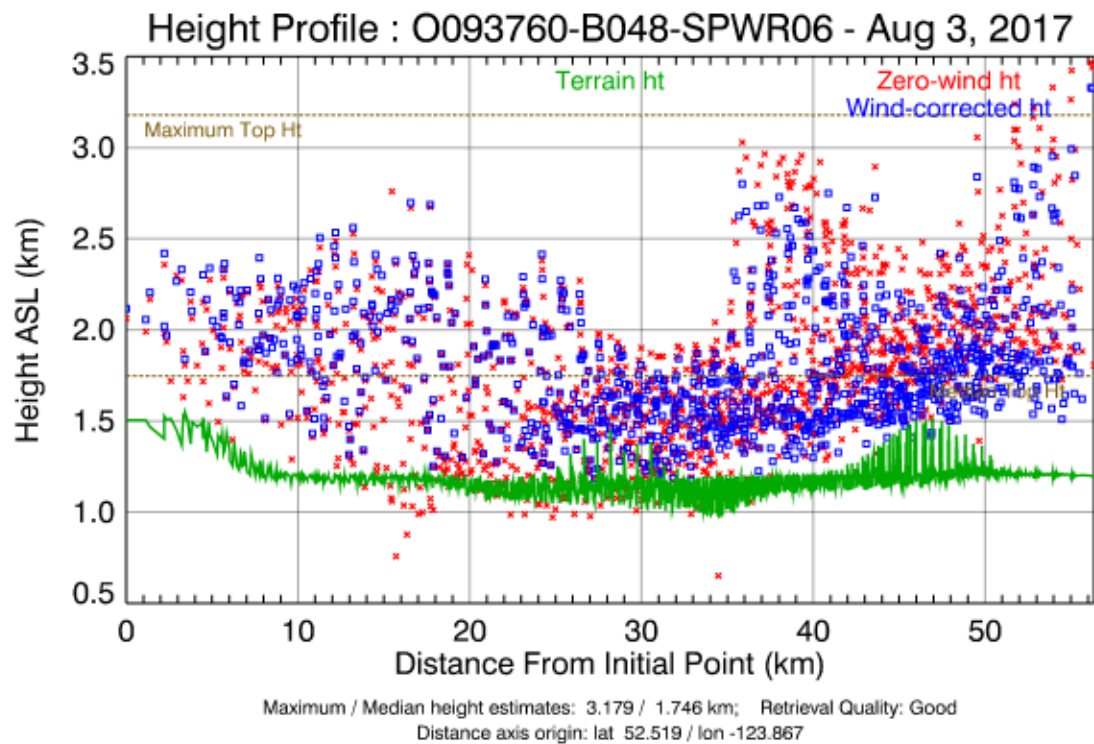
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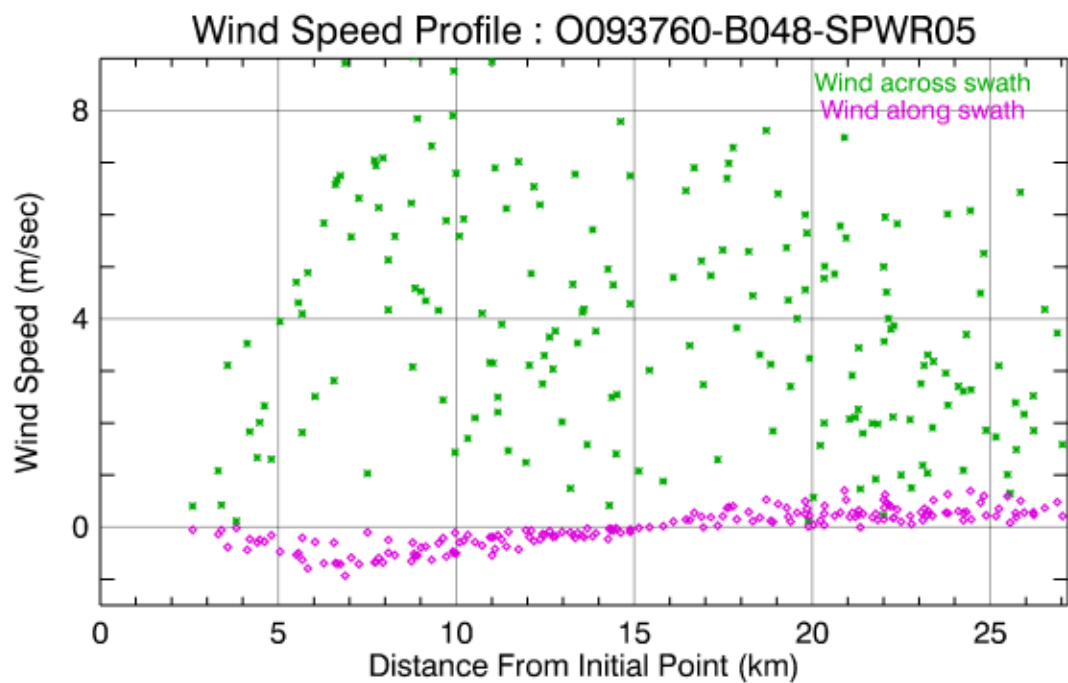
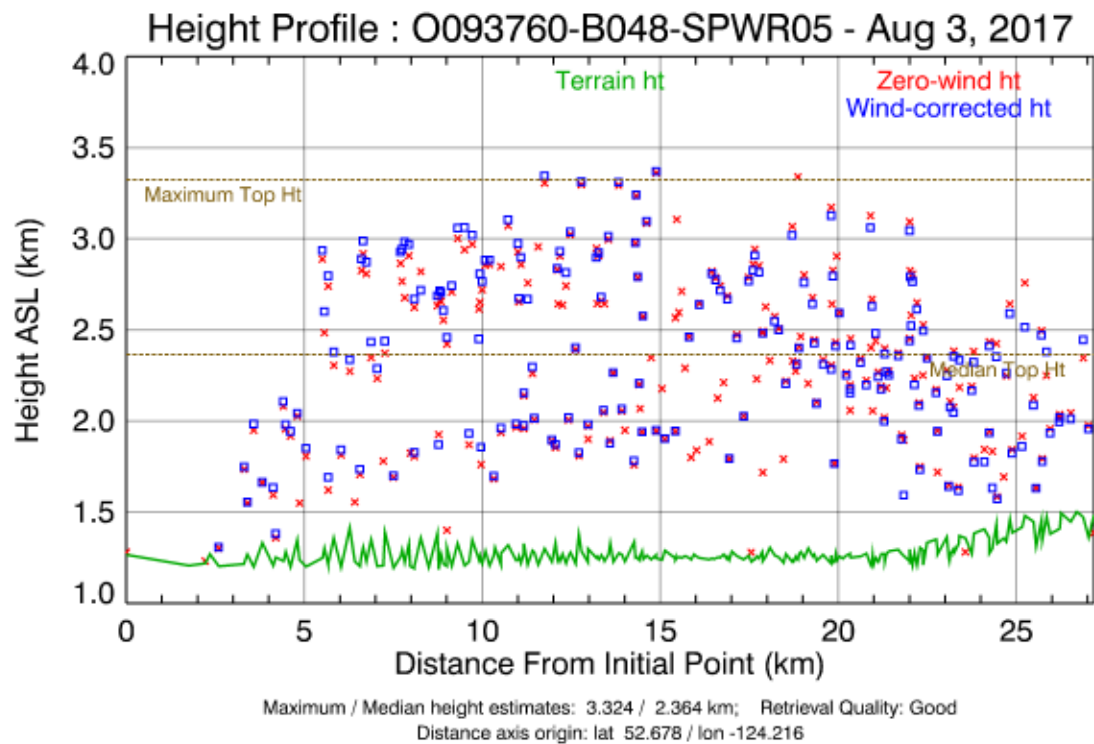
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2 **Figure S30**



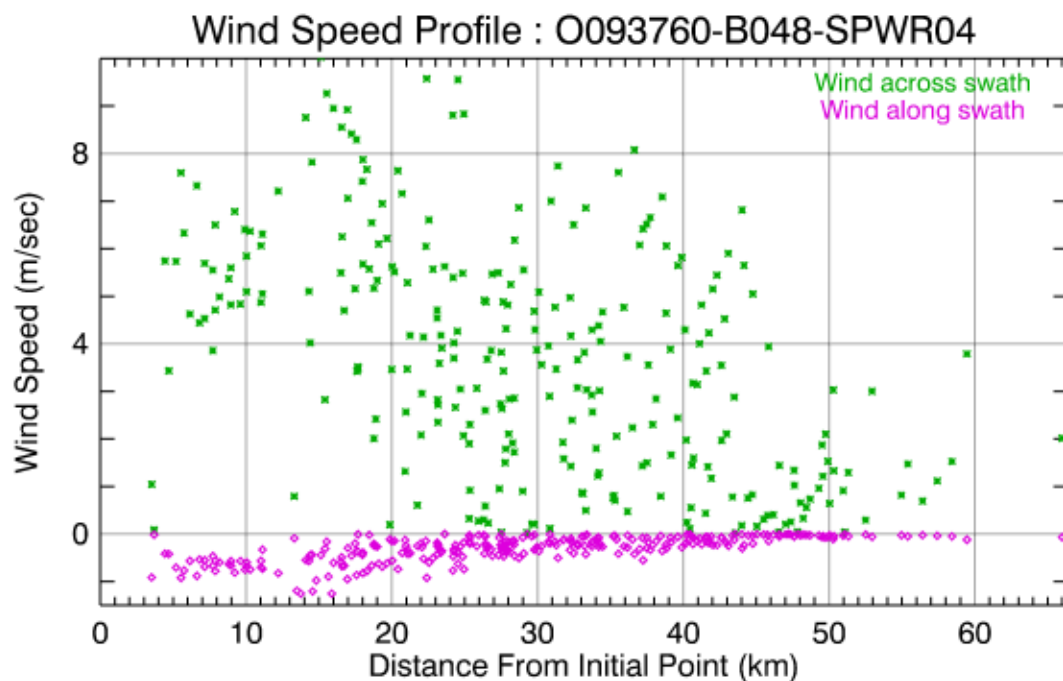
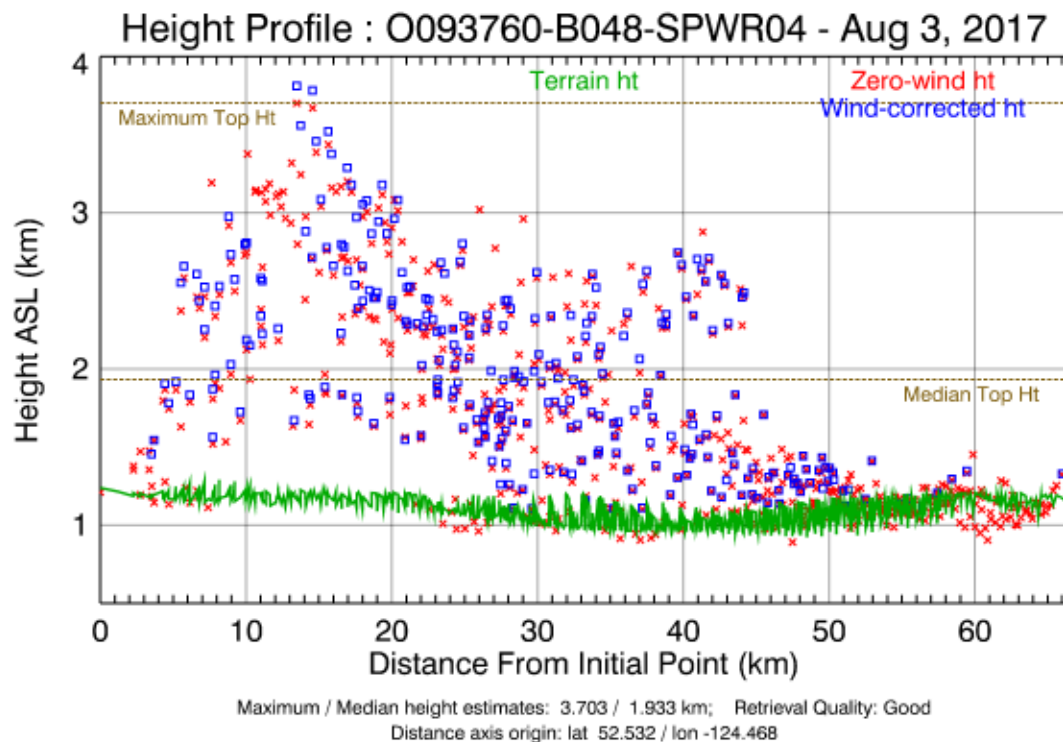
- 1
- 2 Fraser Plateau
- 3 **Figure S31**



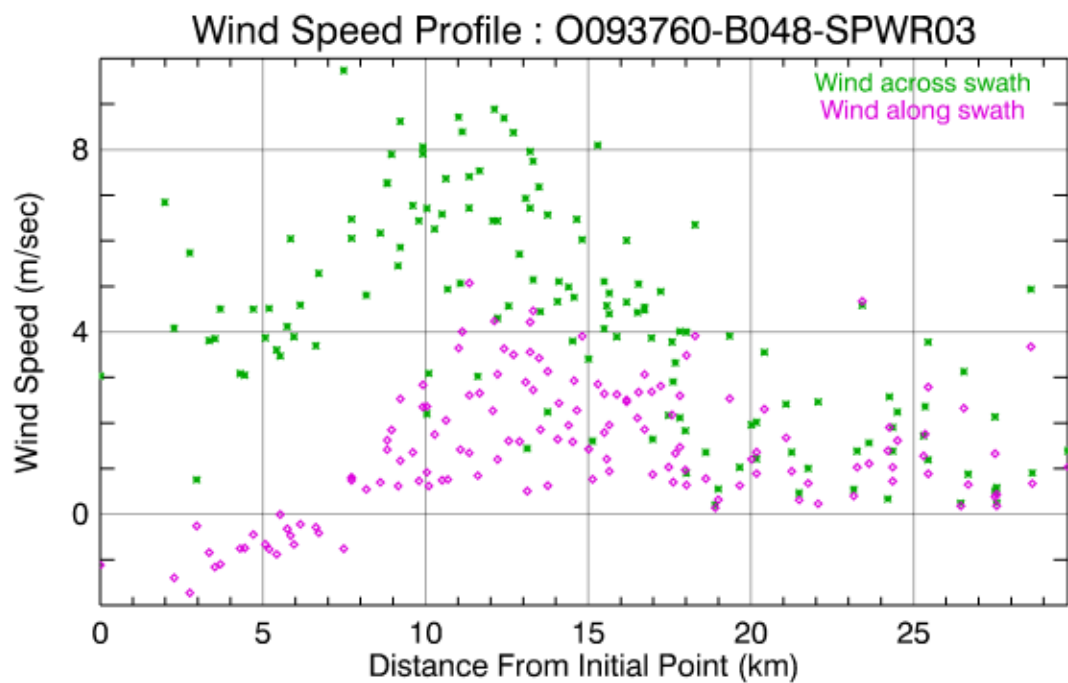
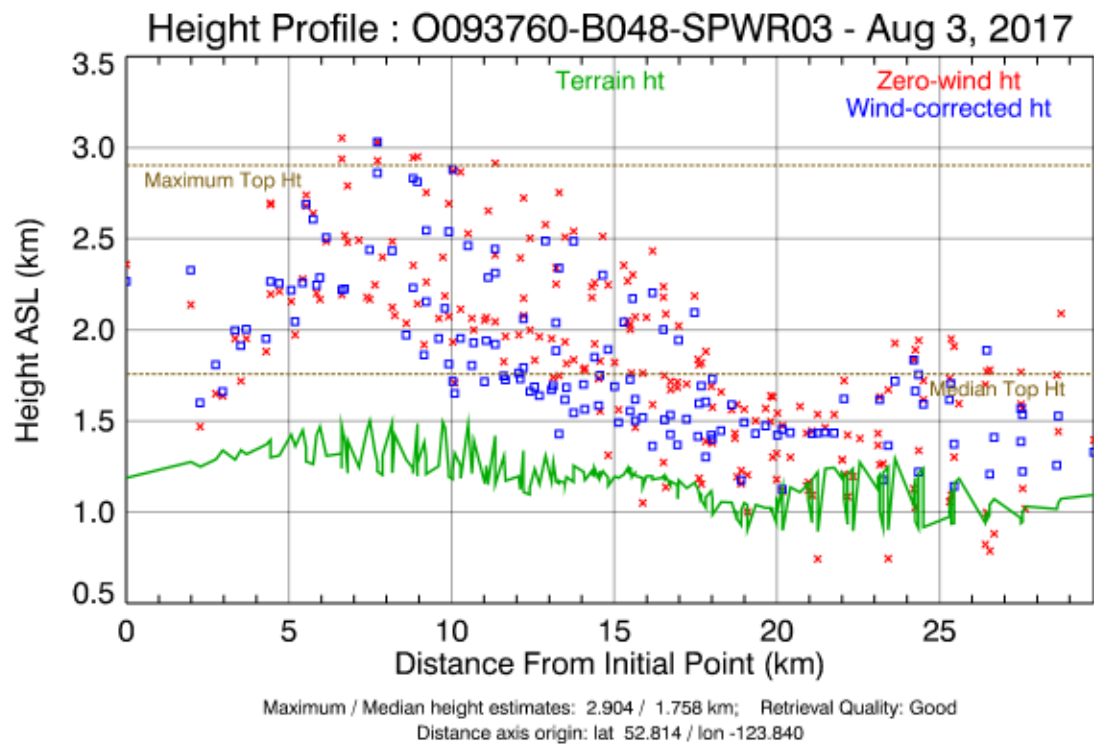
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2 **Figure S32**



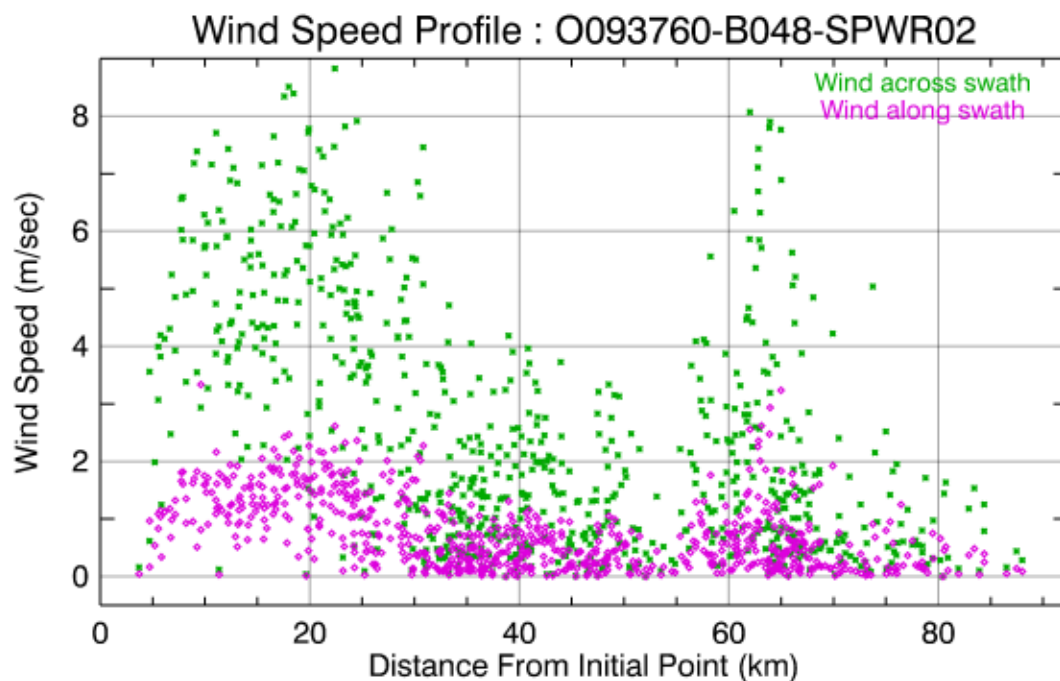
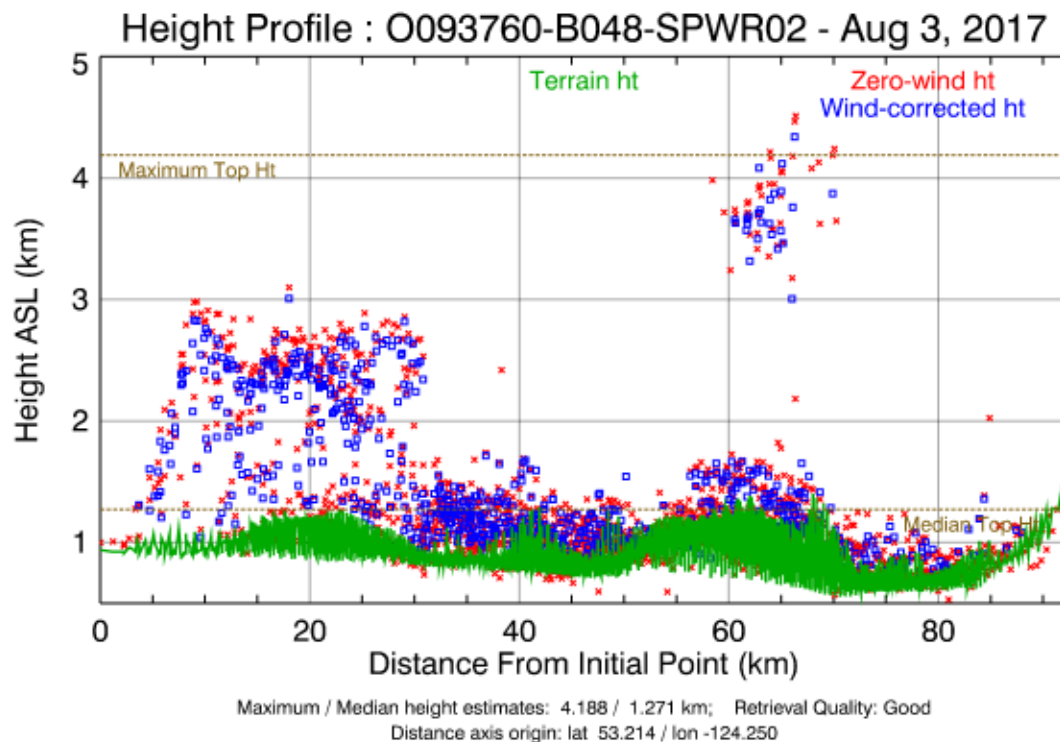
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2 **Figure S33**



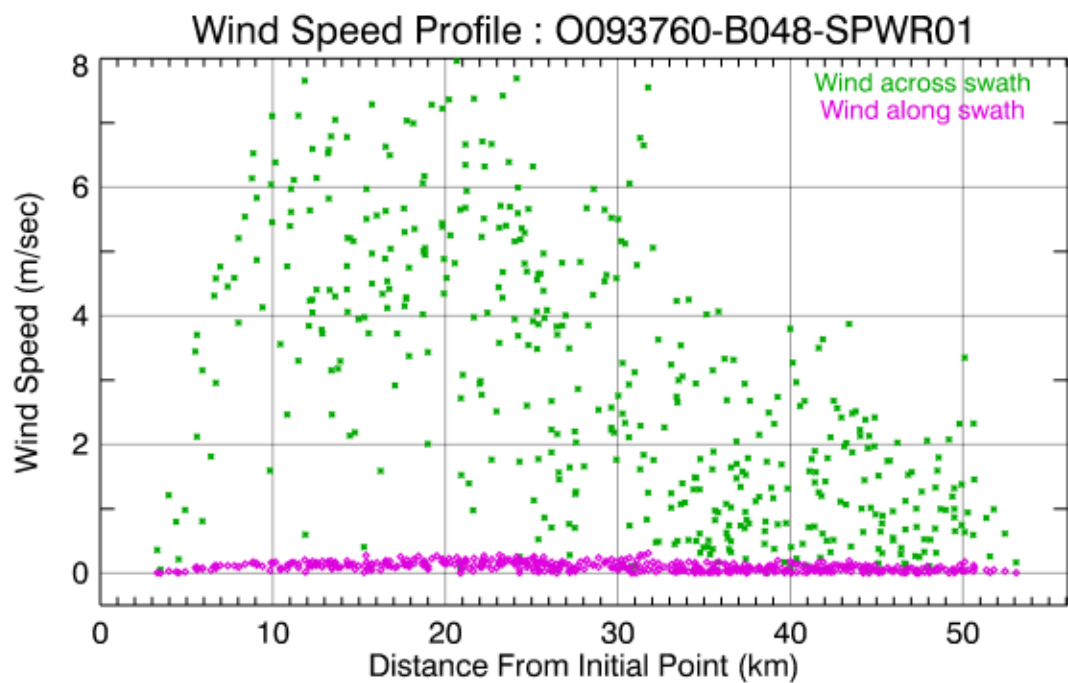
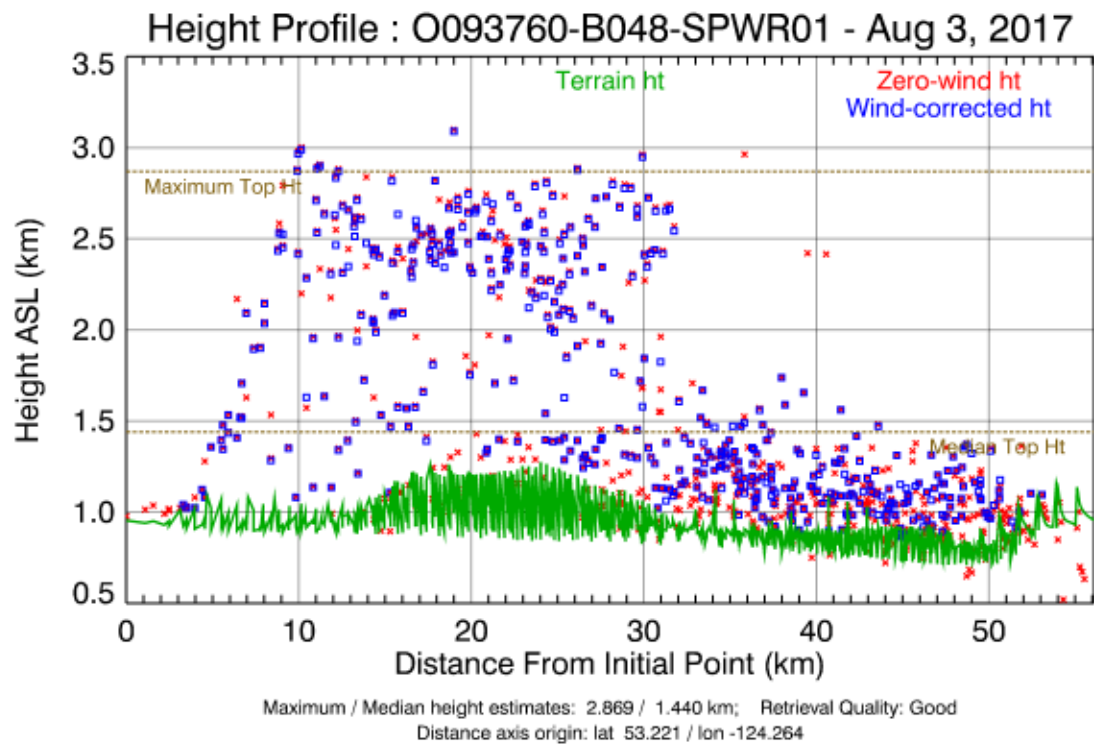
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2 **Figure S34**



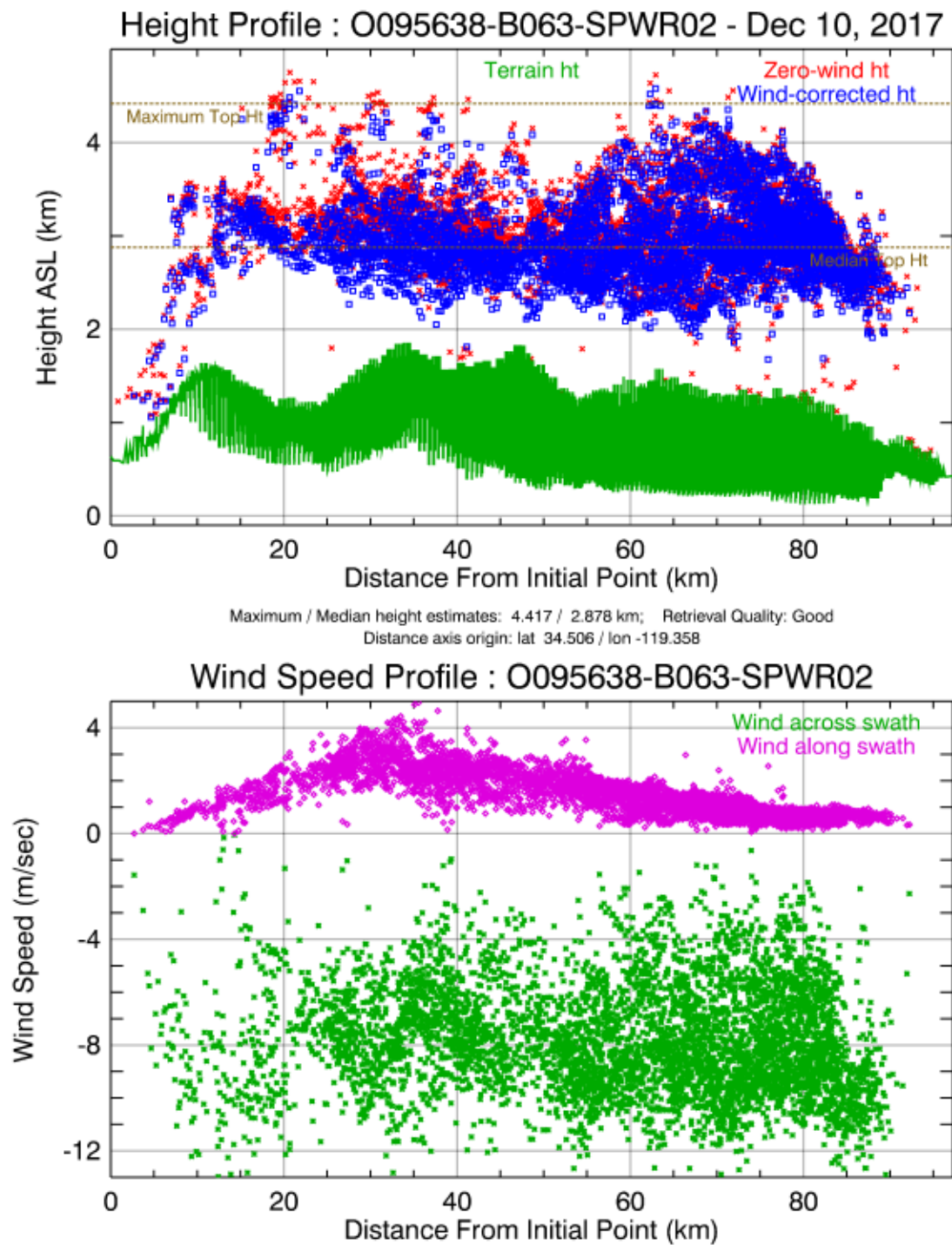
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2 **Figure S35**



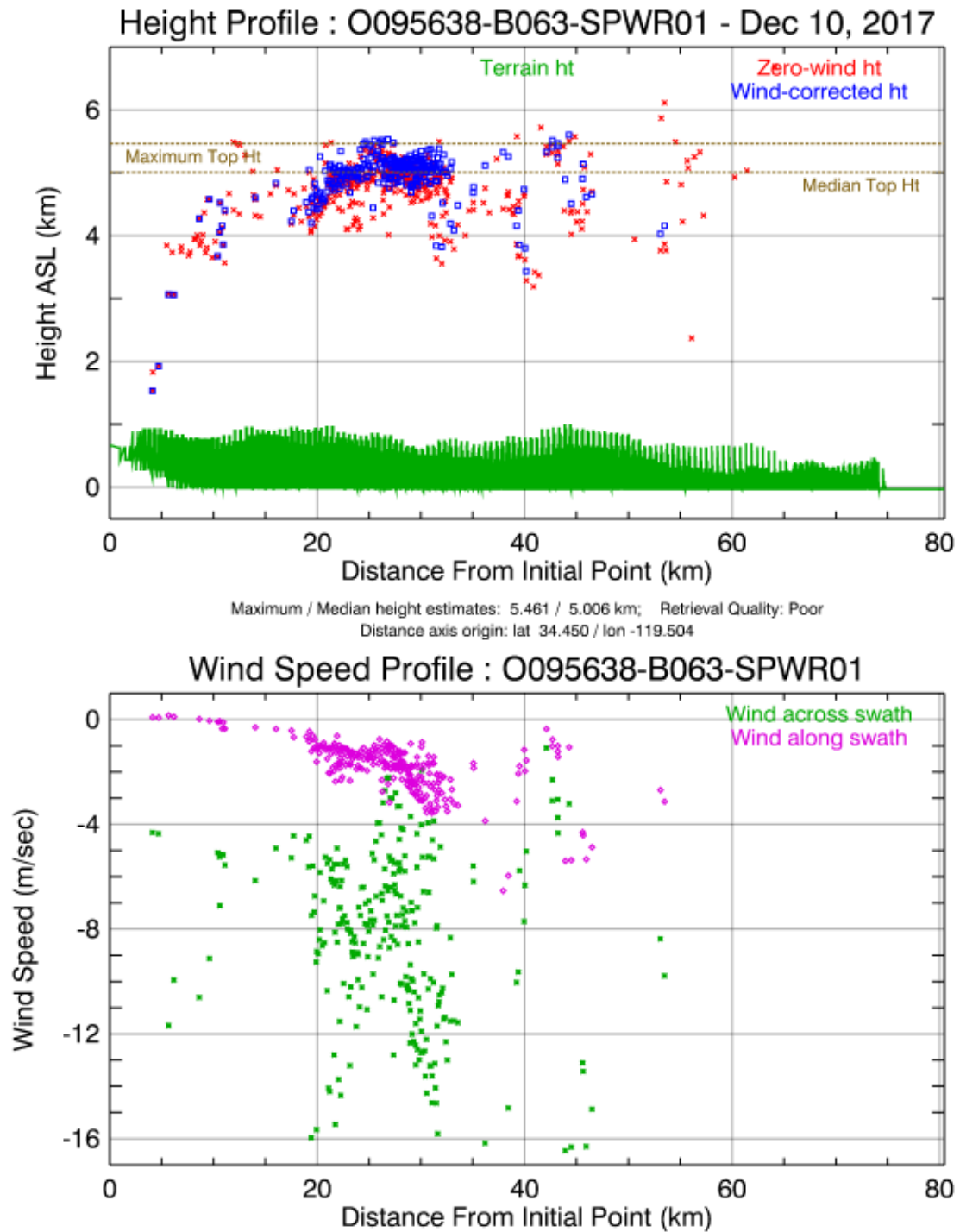
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2 **Figure S36**



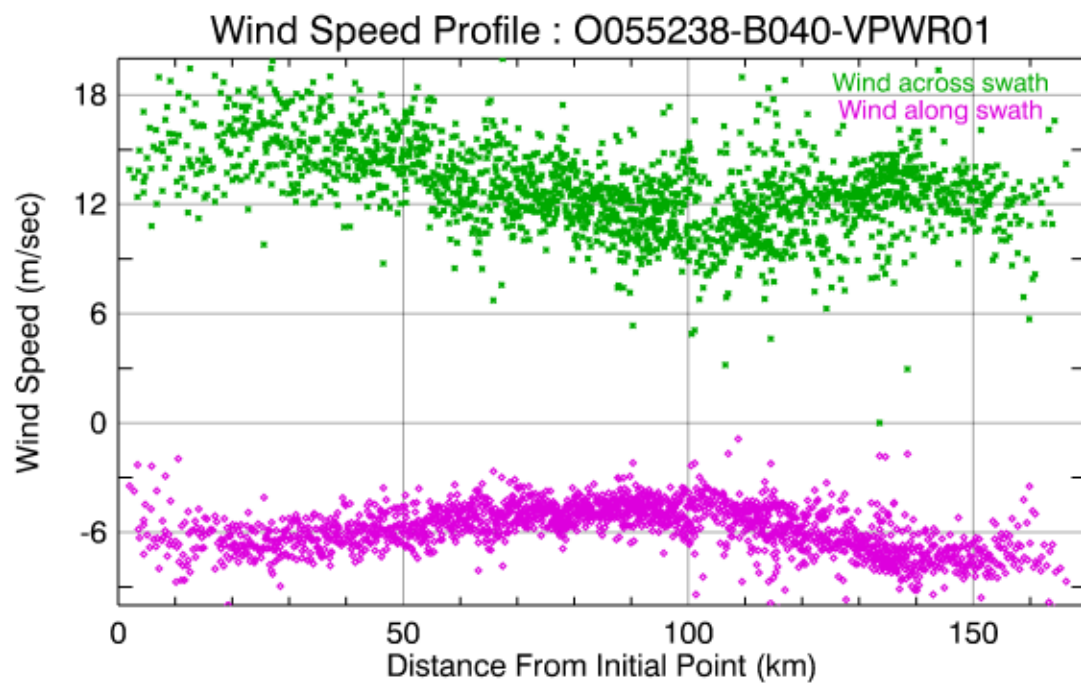
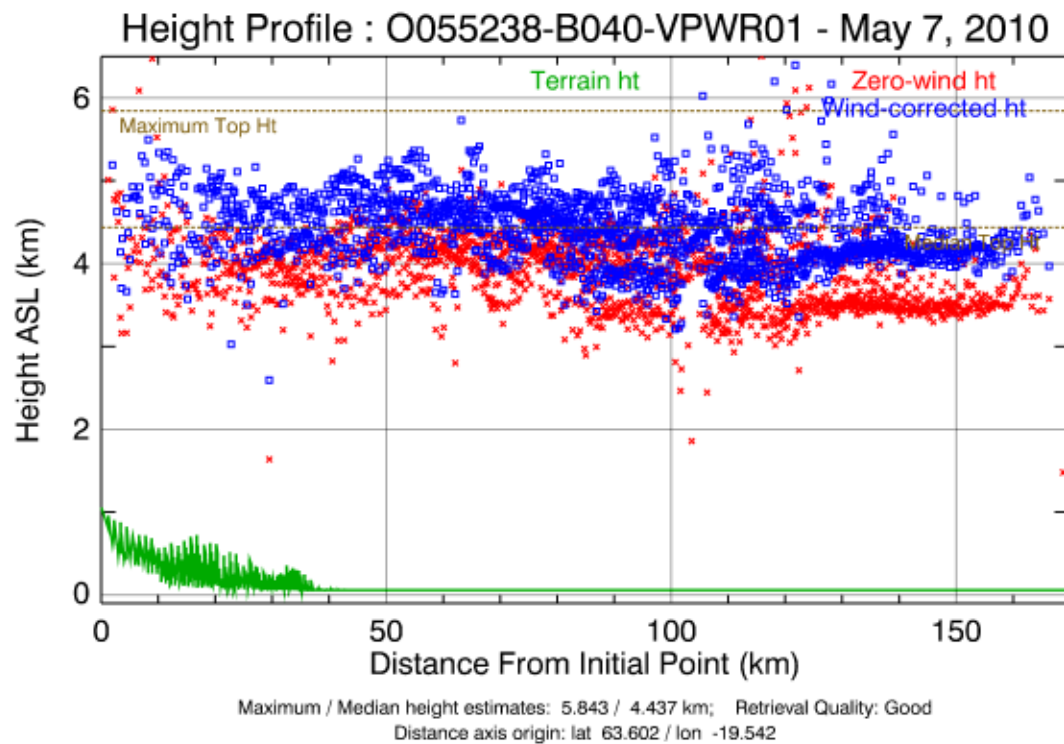
1
2
3 Thomas Fire
4 **Figure S37**



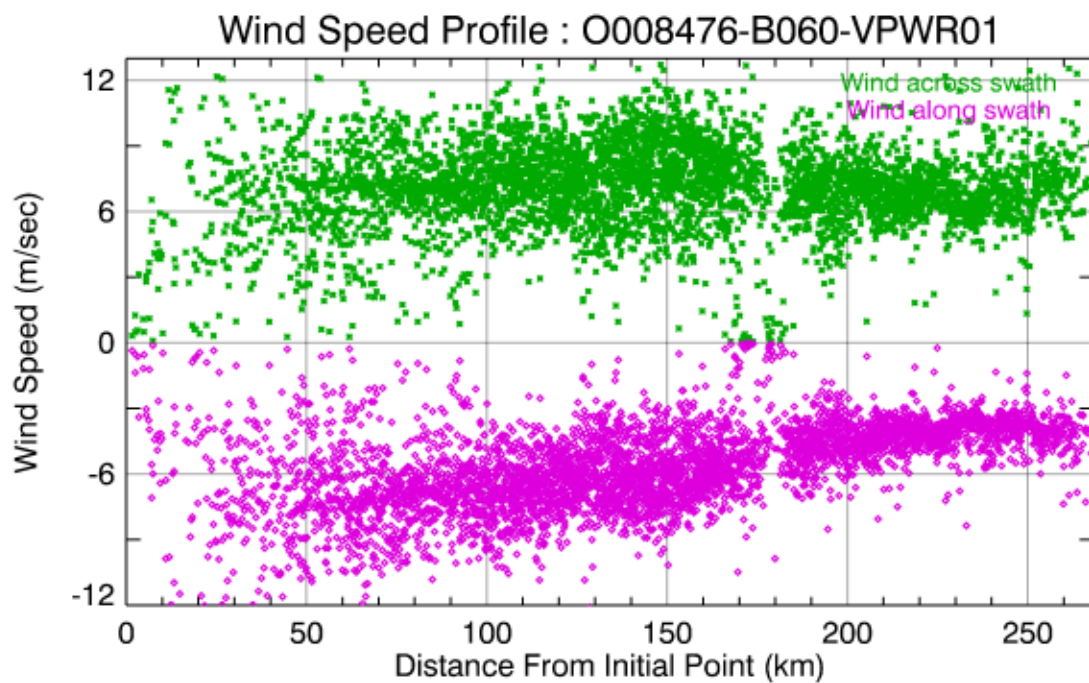
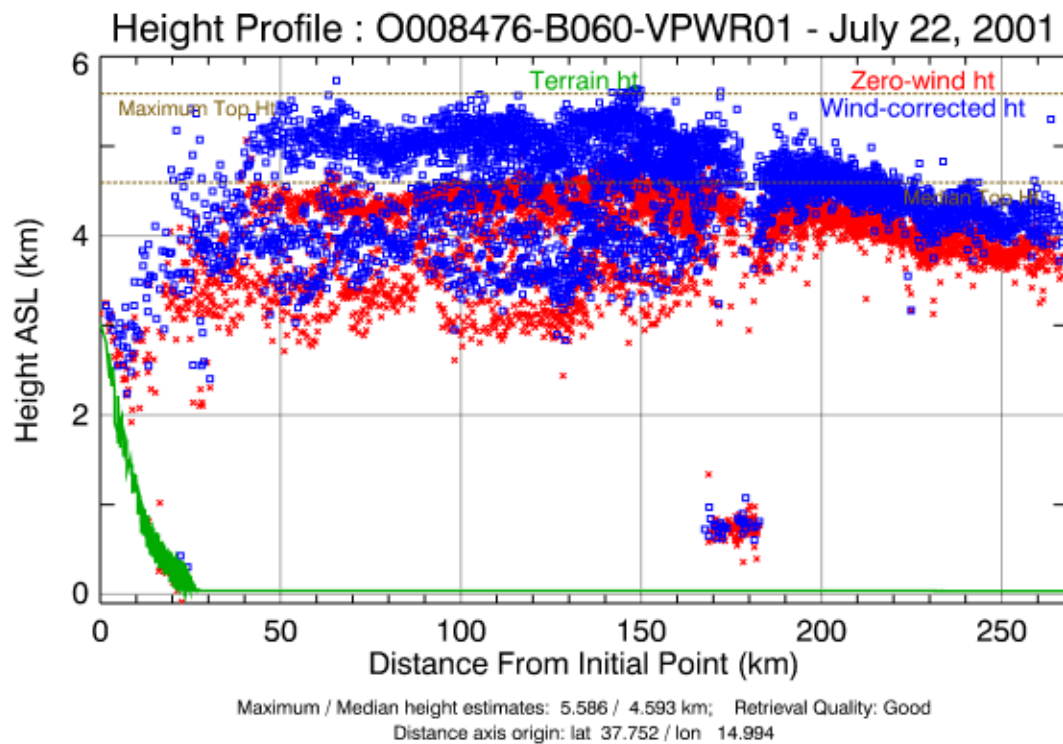
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2 **Figure S38**



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- 3 Eyjafjallajökull
- 4 **Figure S39**

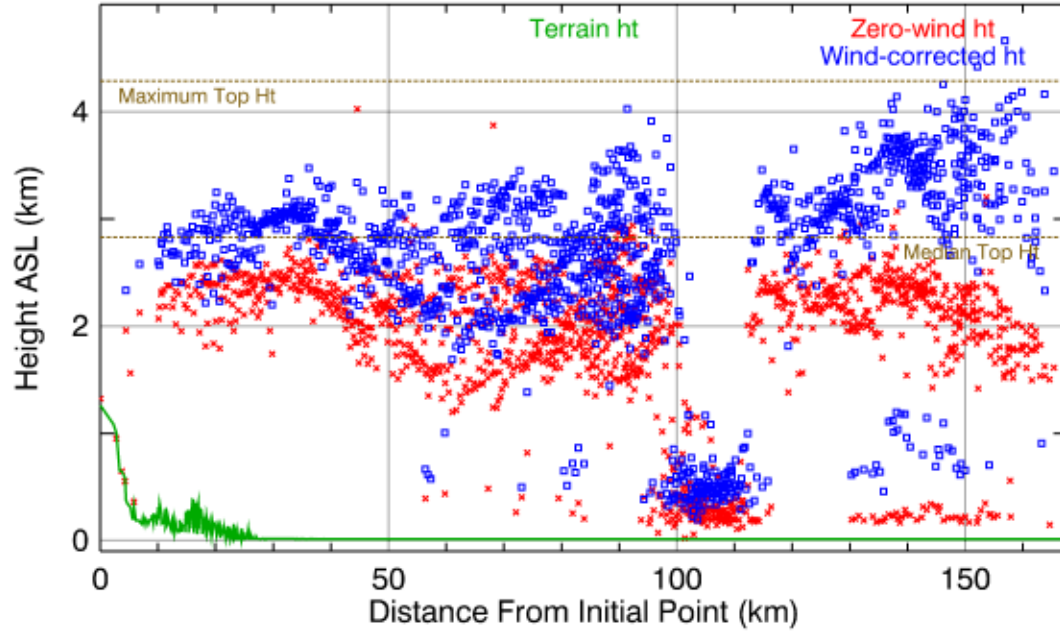


1
2
3 Mount Etna
4 **Figure S40**



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2
3 Chikurachhki
4 **Figure S41**

Height Profile : O017776-B050-VPWR01 - April 22, 2003



Maximum / Median height estimates: 4.287 / 2.830 km; Retrieval Quality: Good
Distance axis origin: lat 50.318 / lon 155.457

Wind Speed Profile : O017776-B050-VPWR01

