

SEDIMENT FLUX ESTIMATES DERIVED FROM DIFFERENT INSTRUMENTS.

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Fig. 1 shows the instrument suite used for this study. Figs. 2-9 show the data calibration and analysis. Table 1 shows the results. Additional details can be found at: <https://www.hou.usra.edu/meeting/s/planetinsitu2022/pdf/7003.pdf>

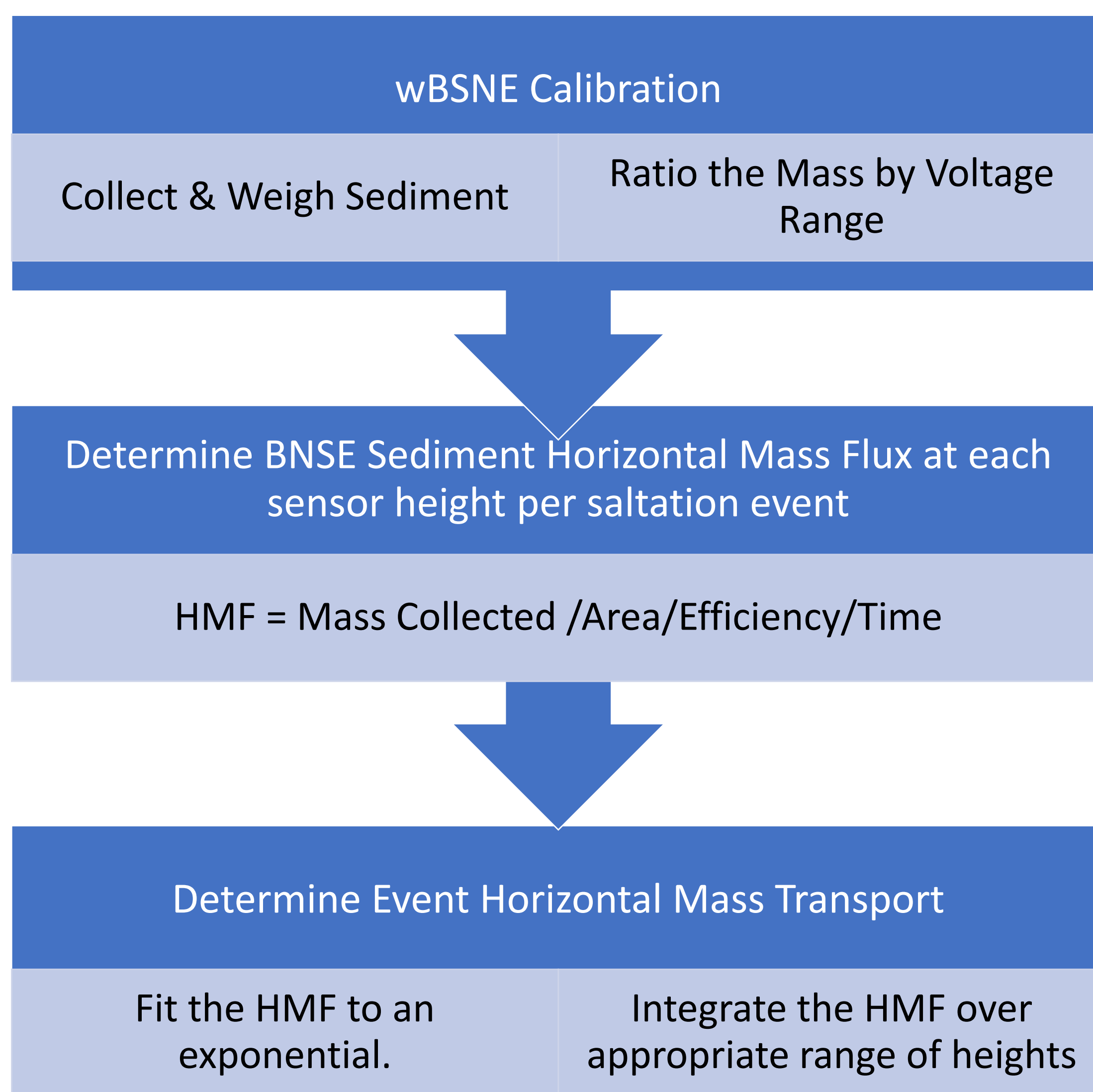


Figure 2: Flow chart showing the steps to convert weighing sediment catcher data into horizontal mass transport.

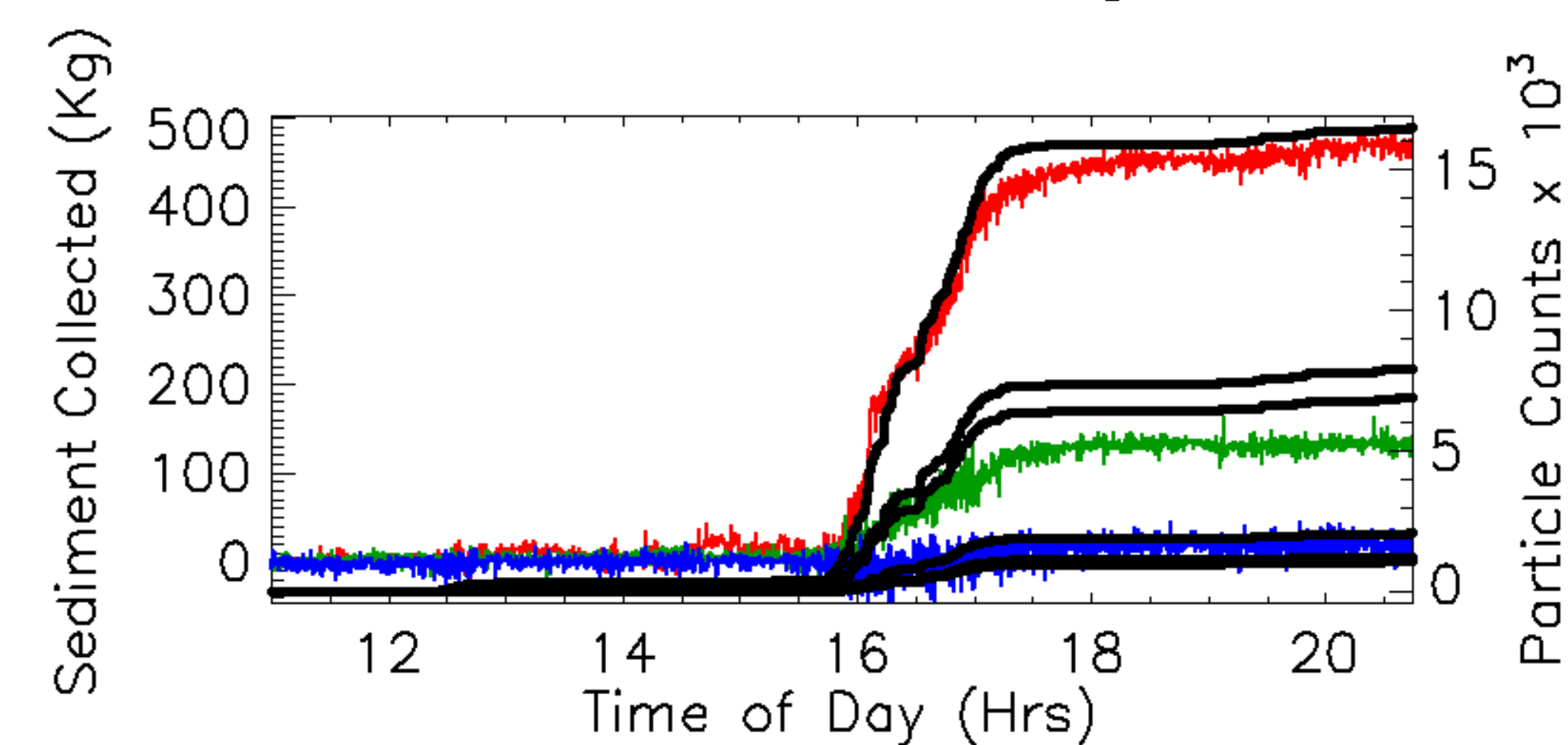


Figure 3: wBSNE accumulation of mass over a few hours. Red, green, and blue lines correspond to sensors 1 through 3, respectively. The black lines are raw particle counts from the six SSs.

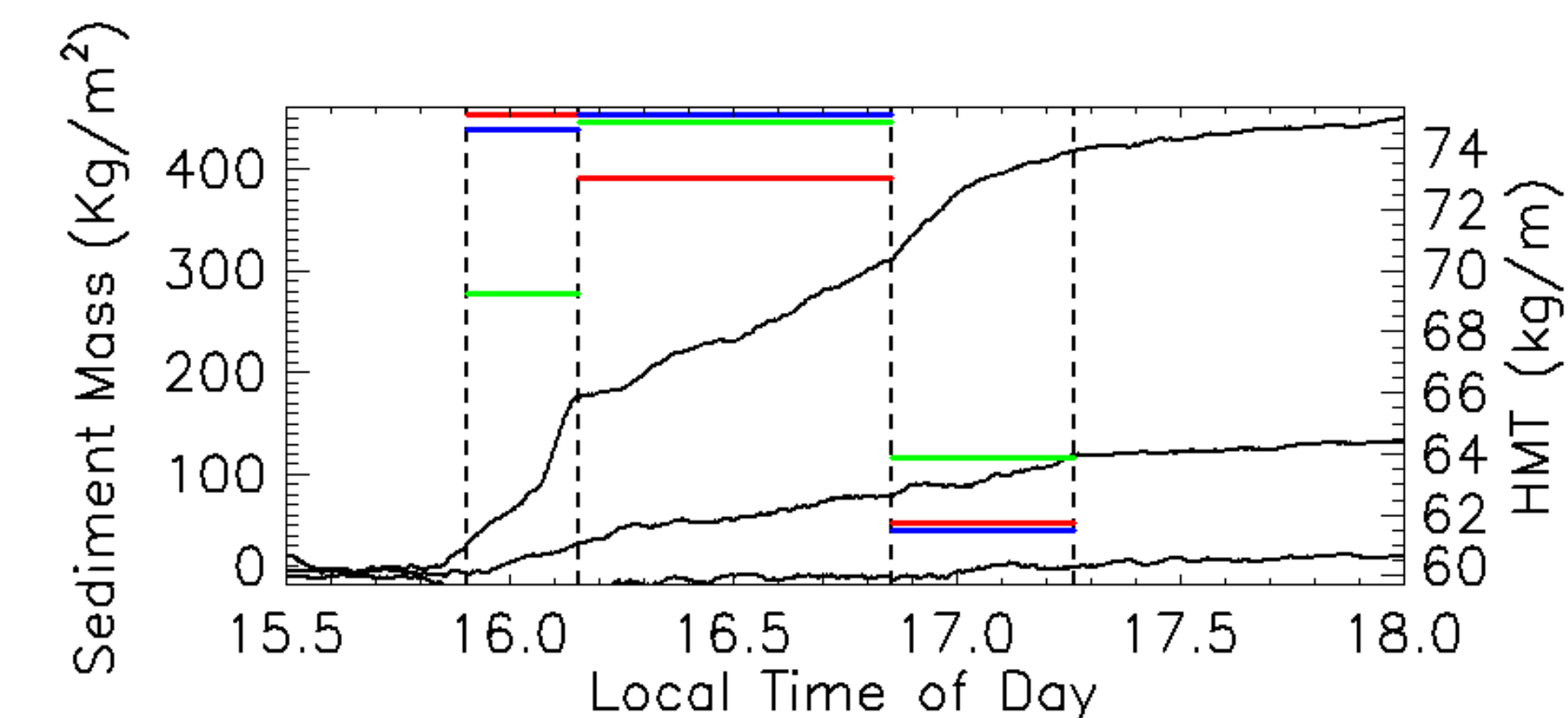


Figure 4: Comparison of three estimates for HMT for three time-intervals using the wBSNE data. Red uses method 1. Green uses method 2. Blue uses method 3. See abstract for additional details.

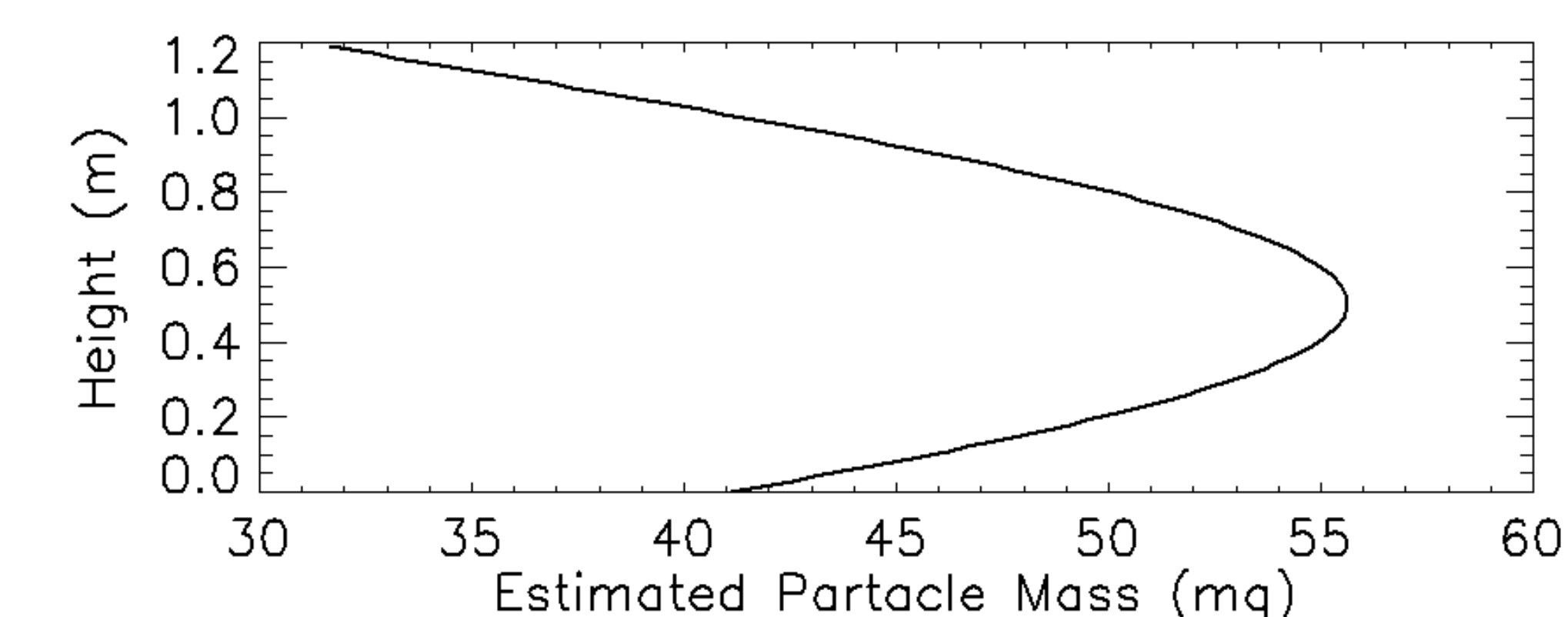


Figure 5: Estimated particle mass based on saltation sensor particle counts and sediment mass collected. Particle mass peaks near a height of 0.5 m.



Figure 1: The suite of instruments to measure horizontal mass transport (HMT) are shown with the BSNEs on the left, the saltation sensors in the middle and the anemometers on the right. In the center foreground is a fourth BSNE that monitored sediment volume.

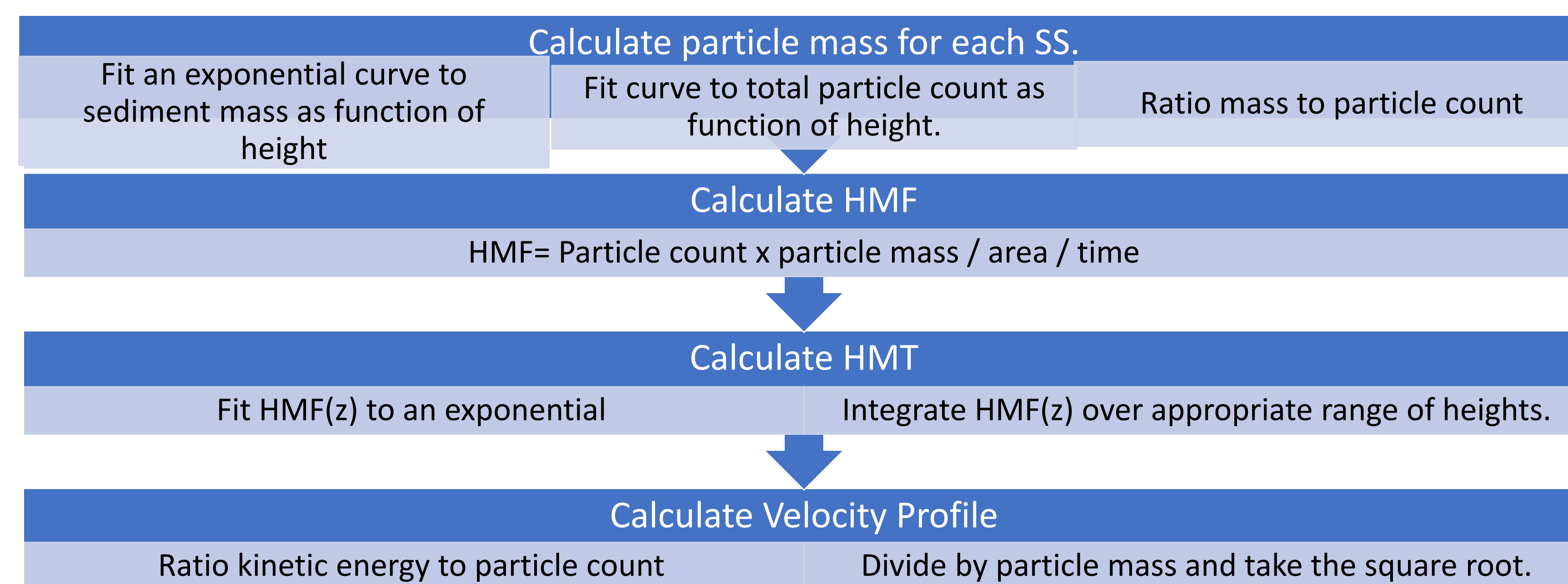


Figure 6: Flow chart showing the steps to convert saltation sensor data into horizontal mass transport.

Time Interval			HMT Calc. Method (kg/m)				
Start	End	Time (min)	wBSNEs #1	wBSNEs #2	wBSNEs #3	Saltation Method #2	Drift Potential
15.90	16.15	14.83	75.14	69.24	74.65	58.69	70.00
16.15	16.86	42.17	73.02	74.84	75.12	128.41	128.41

Table 1: Calculated HMT for three intervals during the saltation event. HMT calculated from three different fits as described in the text. HMT was also derived from the saltation sensors. The drift potential was scaled to the saltation sensors HMT estimates.

Summary

- “Weighing” sediment catchers can be used to estimate HMT for individual saltation events.
- Piezoelectric saltation sensors can be used to estimate HMF, HMT, and velocity profiles over temporal ranges of seconds to hours (if particle mass is known).
- Resultant drift potential can be compared to HMT to determine wind stress threshold and the scaling coefficient.

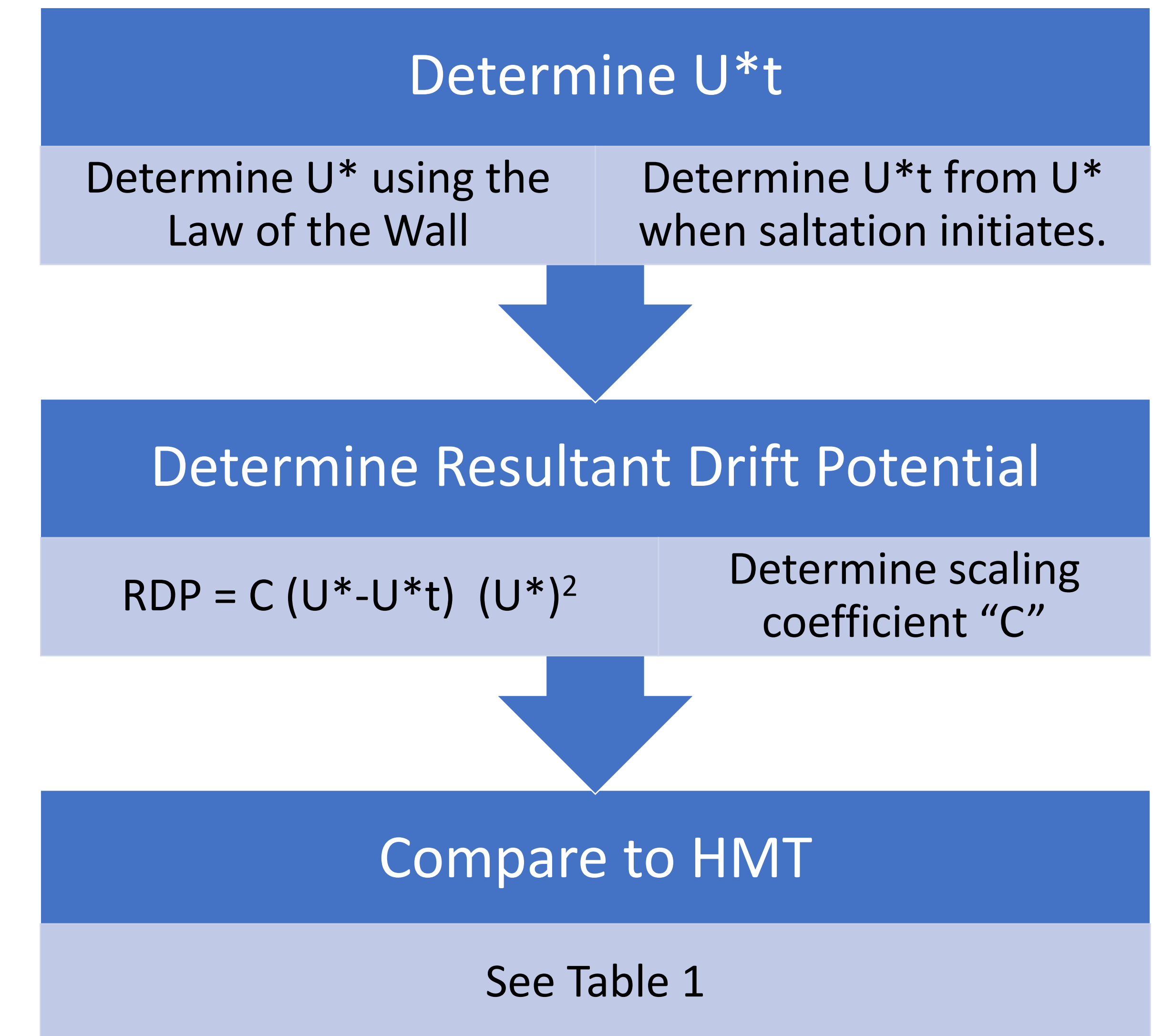


Figure 7: Flow chart showing the steps to convert wind data into drift potential.

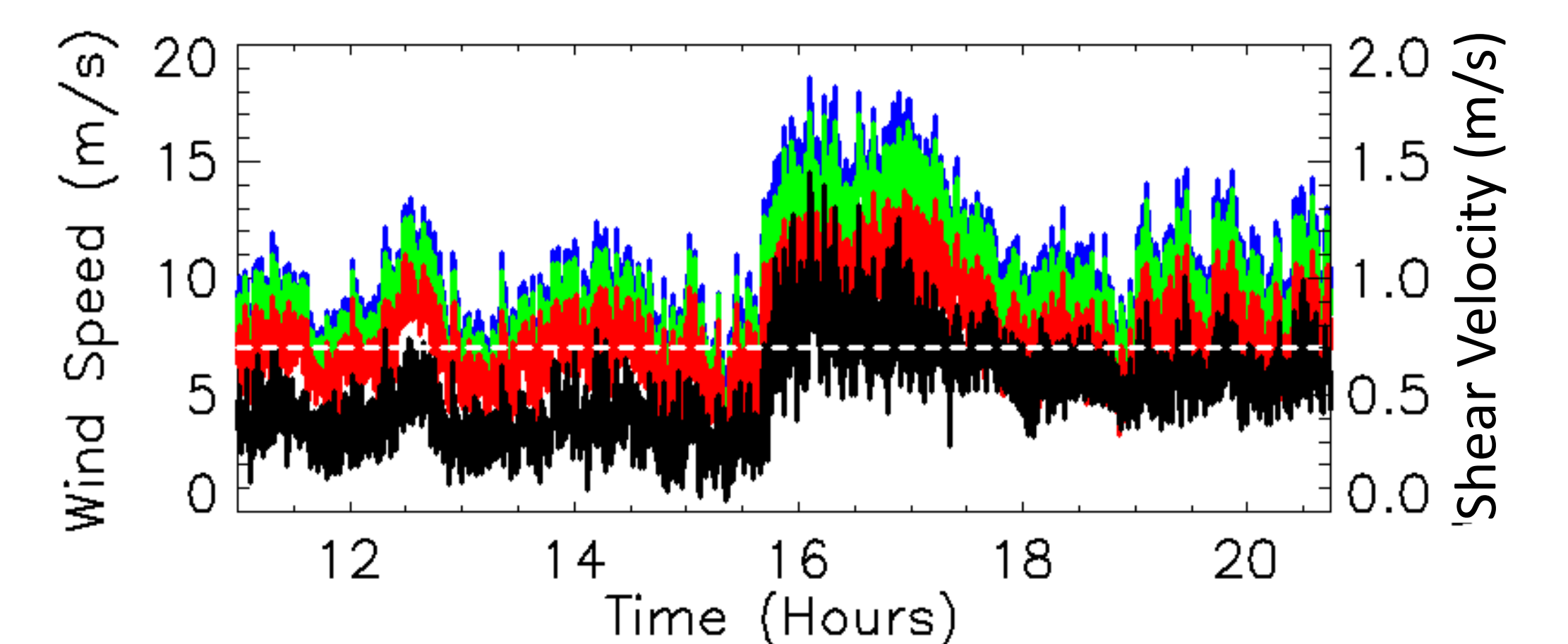


Figure 8: Wind speed and shear. The blue, green, and red lines show wind speeds at 1.05 m, 0.61 m, and 0.21 m, respectively. The black line is the calculated wind shear, u^* . The dashed horizontal line shows the value of 0.7 m/s, which is the value used for the shear threshold.

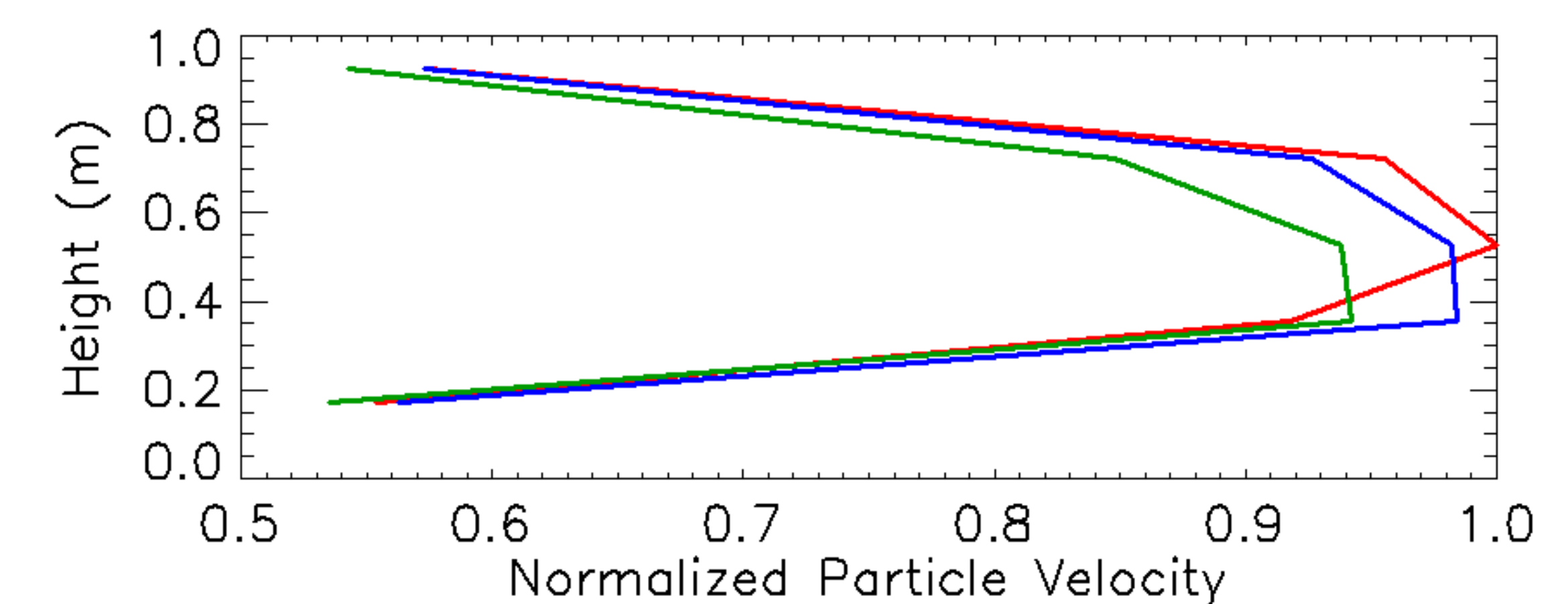


Figure 9: Saltation Sensor heights vs. normalized saltating particle velocity.

Acknowledgments:

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- The collection of the data used in this study was funded through a NASA PSTAR grant. The data can be downloaded from the USGS ScienceBase <https://doi.org/10.5066/P9IYGDGQ>.
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