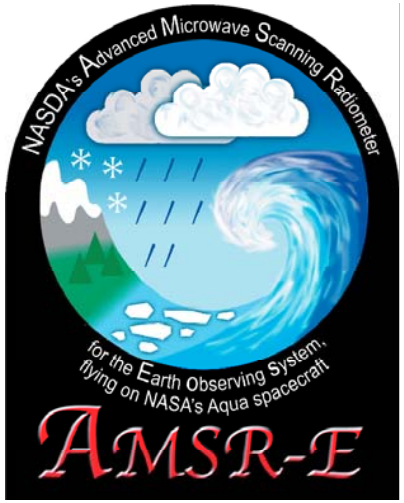
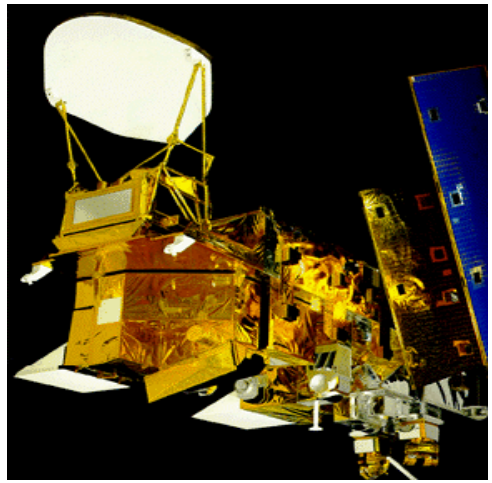


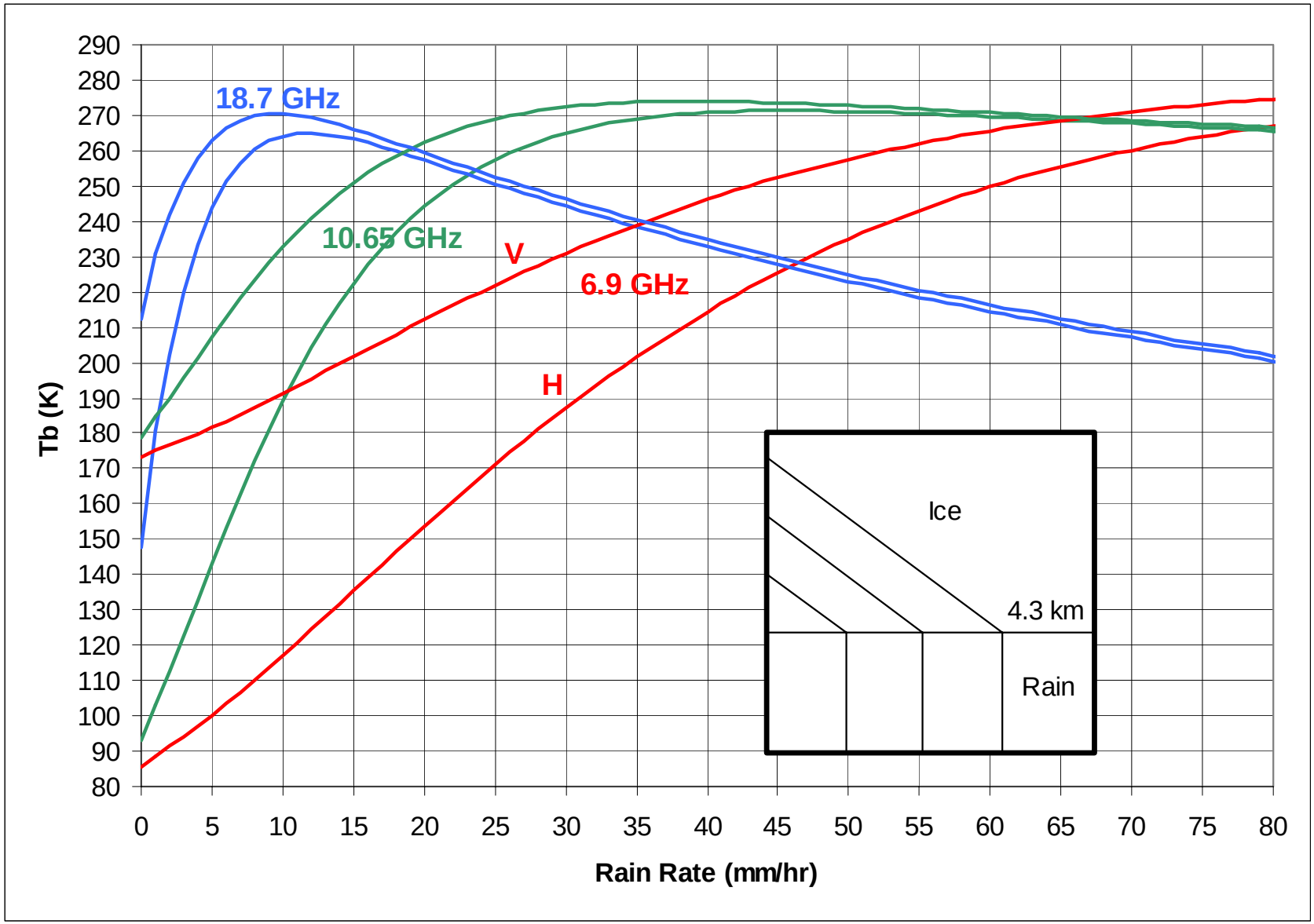


Rainfall Footprint Filling Signatures in AMSR-E Data

Roy W. Spencer
William D. Braswell
The University of Alabama in Huntsville

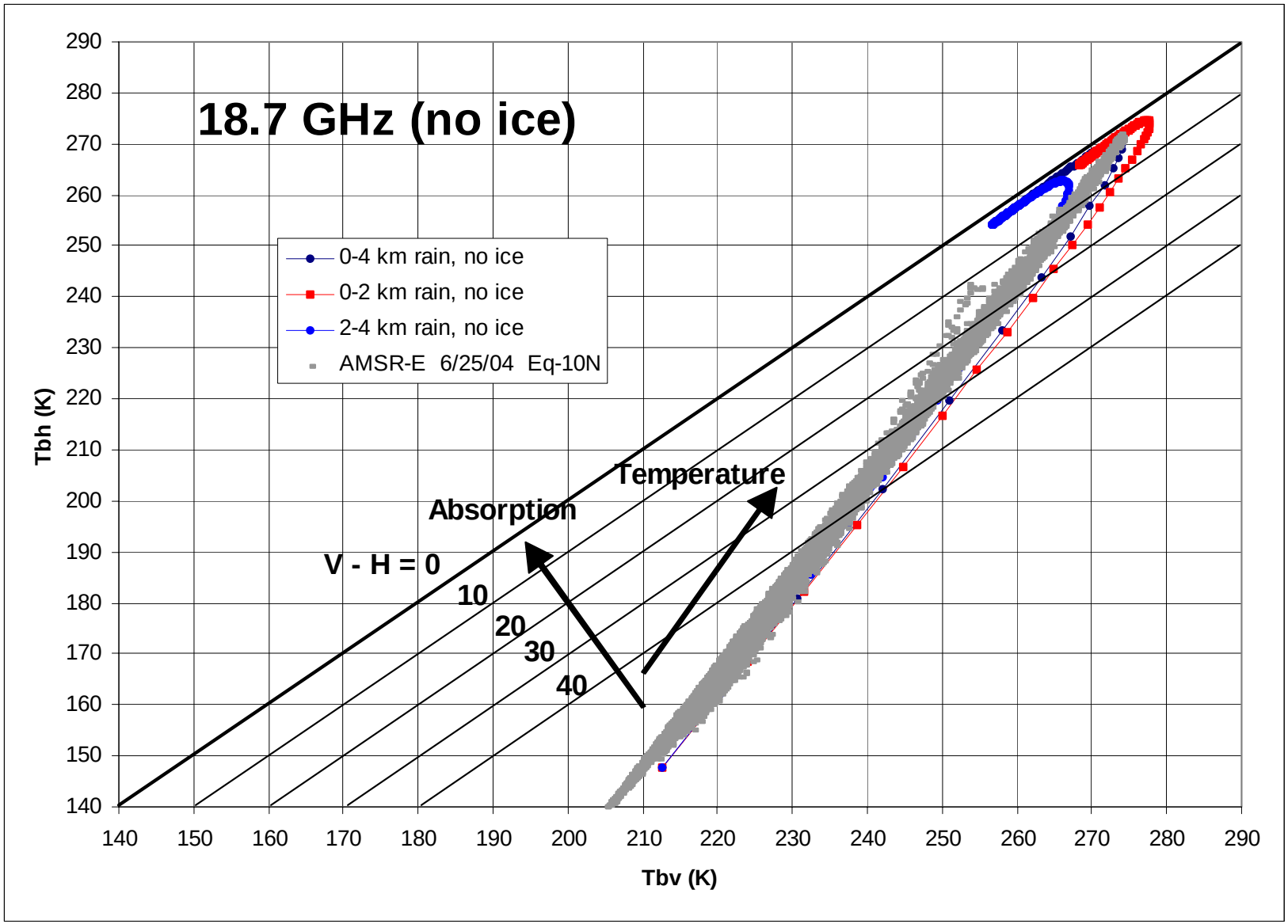
4 August 2004
Ft. Collins, CO

Character of Attenuation by Rainfall is Frequency- & Polarization-Dependent



Liu model, 55 deg. EIA; AFGL tropical atmosphere with 80% RH

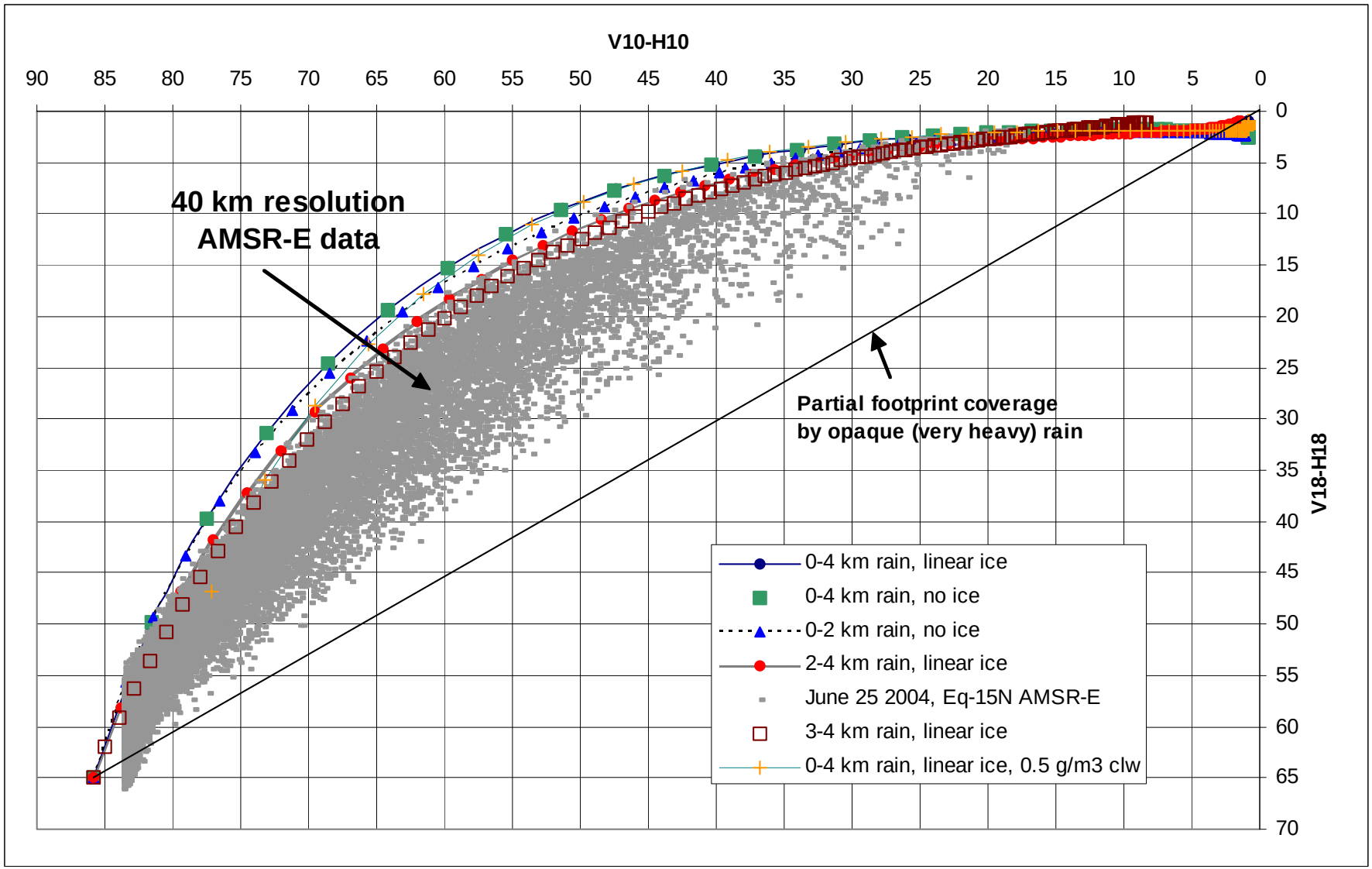
For Dual-Polarization Tb at 1 frequency:
Hydrometeor **Temperature (altitude)** & **Footprint Filling Effects**
can not be distinguished from each other



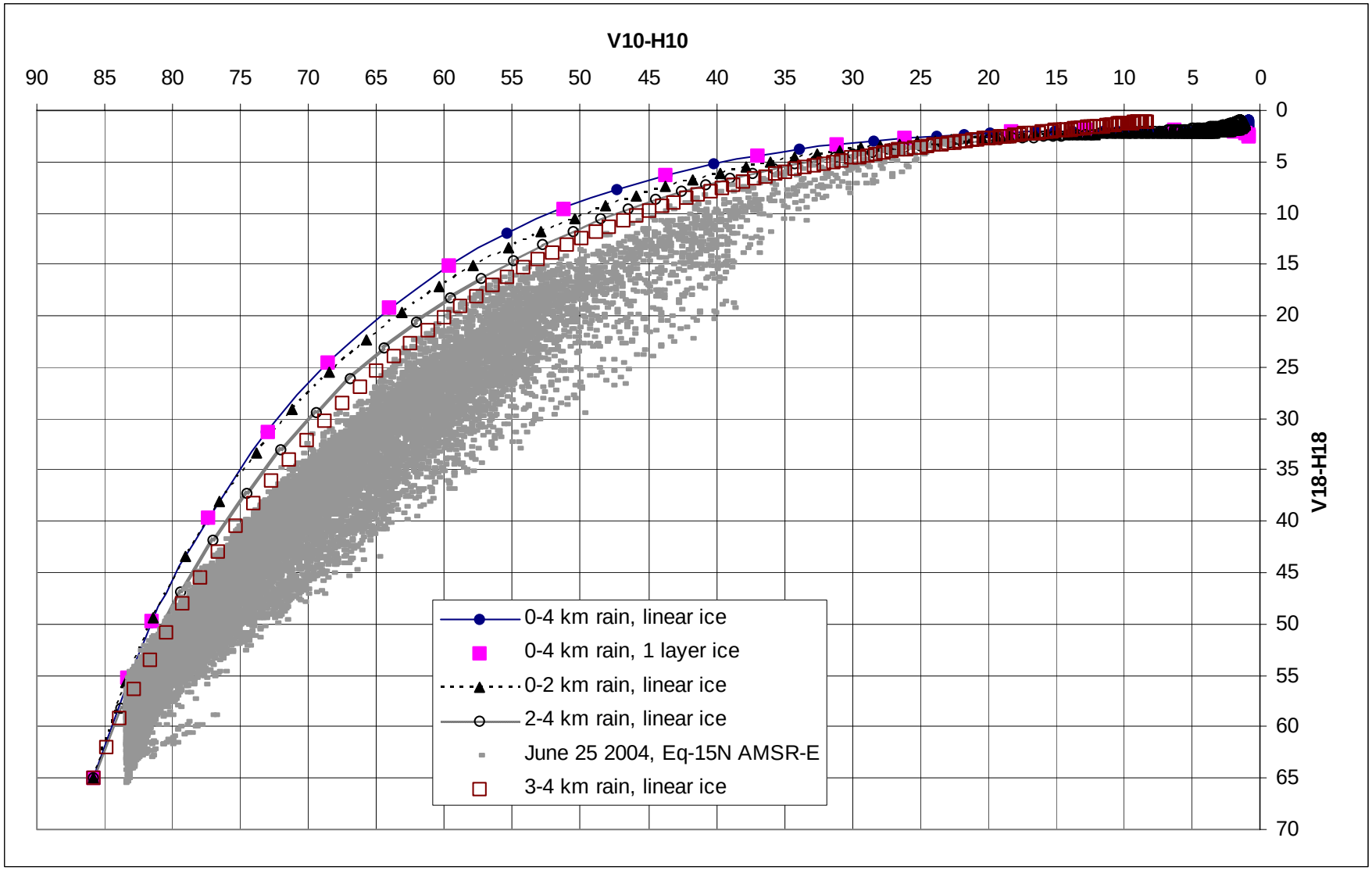
Differential Attenuation at 18.7 and 10.65 GHz

(V-H) signatures seem to *require* footprint filling effects

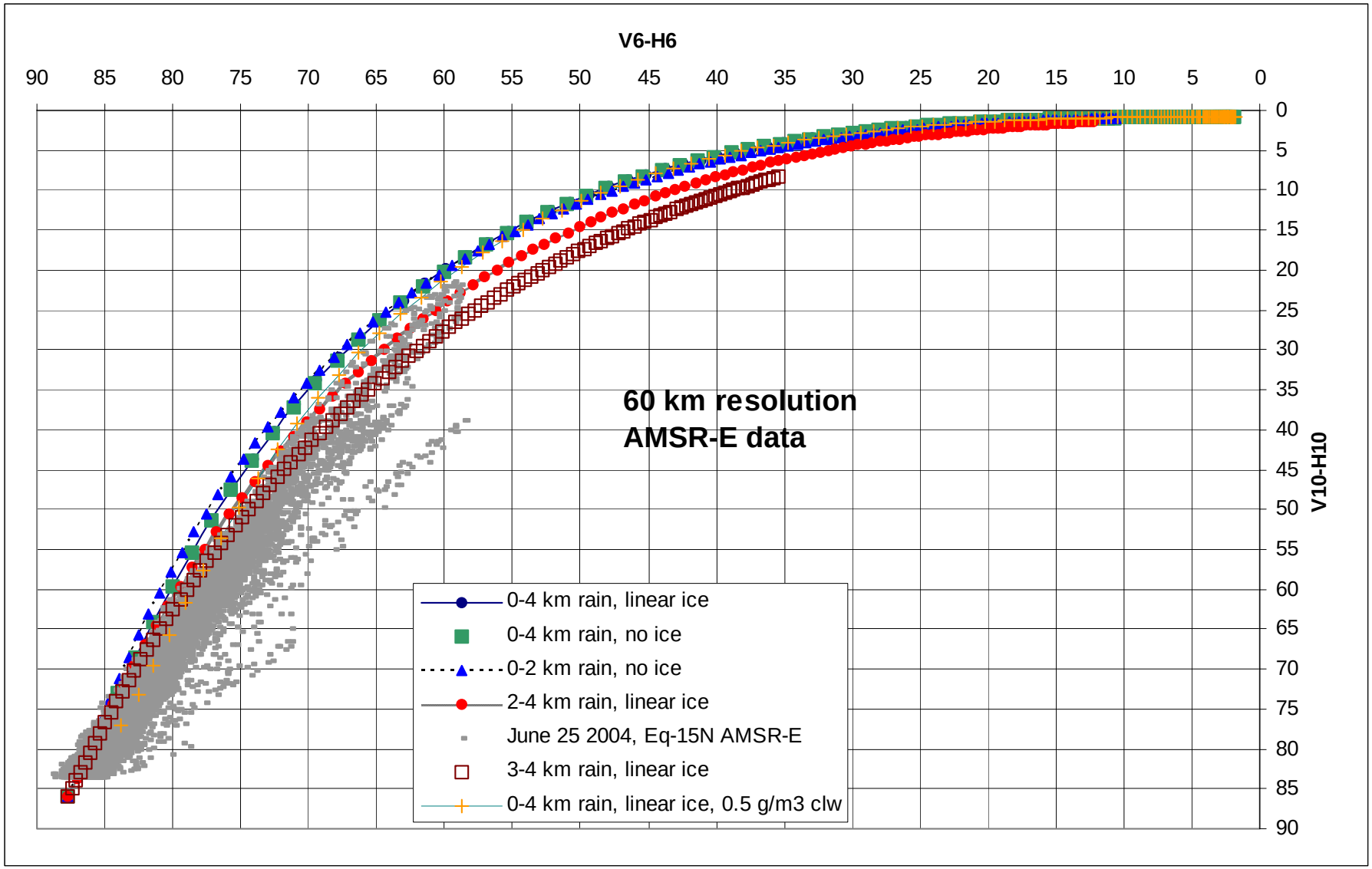
(not explainable by ice, rain layer thickness or altitude, cloud water)



60 km resolution:
Data separate from footprint-filled model only *very slightly*
=> *40 km still not approaching scale of individual rain rates*

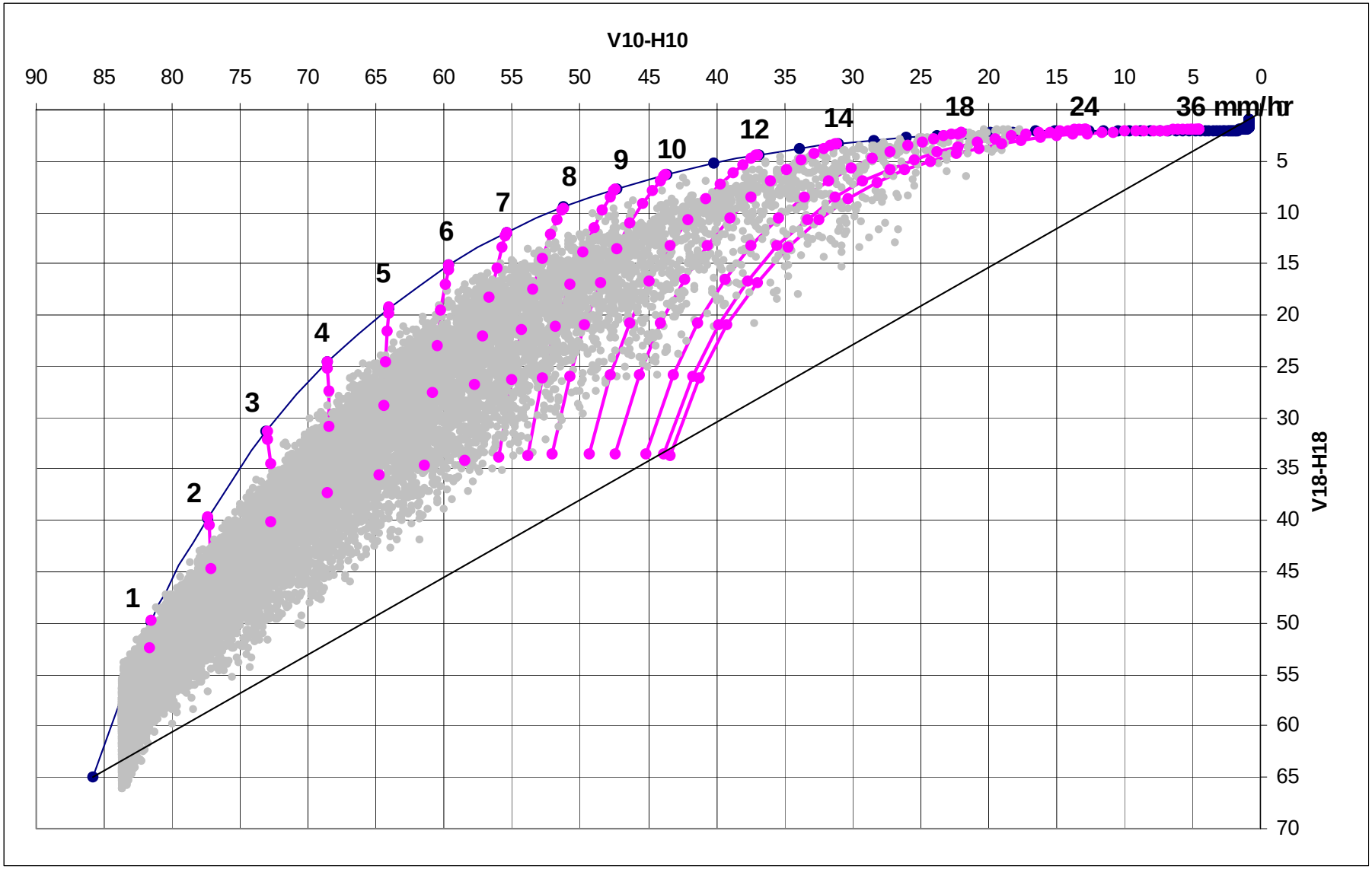


6.9 & 10.65 GHz data suggests footprint filling effects (even at) 10.65 GHz



Very Simple Beamfilling Model to Illustrate Effect:

Assume two rain rates, 50% footprint coverage by each



Conclusion

Tropical oceanic AMSR-E data depart from "single rain rate" theory in a manner that appears to be only explainable by the footprint-filling effect.

The magnitude of this departure can be considered as a quantitative signature of the degree of footprint-filling.

This could provide a basis for retrieval of rain rate distributions within individual footprints.