

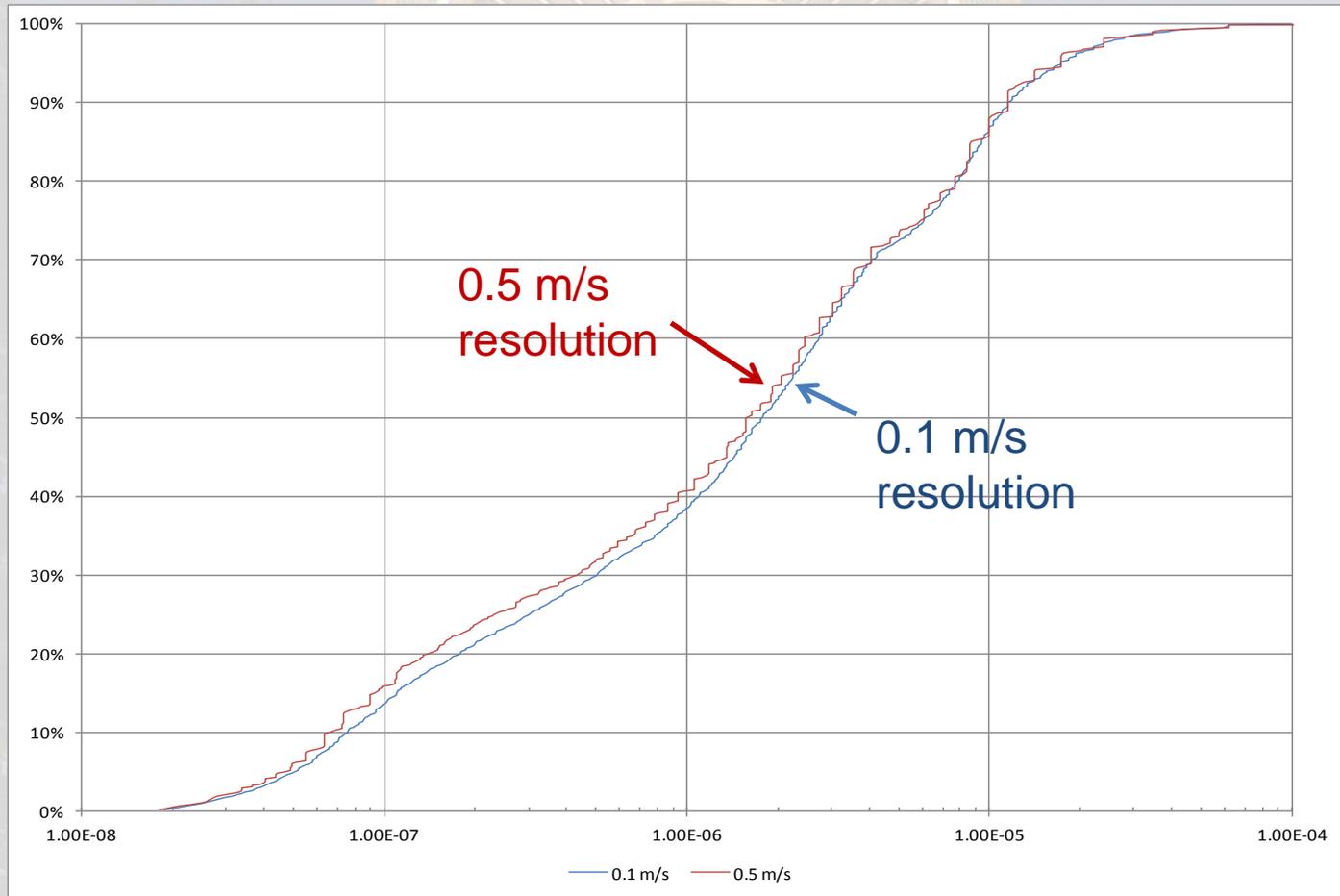
MACCS2 SQA Issue

A DMCC Team Assessment

An Engineer's Report to the Safety Software Experts Working Group (SSEWG)

- Compared X/Q values using wind speed data with 0.5 m/s and 0.1 m/s resolution.
- Mentioned “small discontinuities” when using wind speed data with 0.5 m/s resolution.
- This initially raised concerns about a quality assurance problem in MACCS2, but this seemed unlikely to me.
- I've struggled with wind speed data resolution issues in the distance past...

MACCS2 Results



Close-Up of top of curve...

X/Q (%)

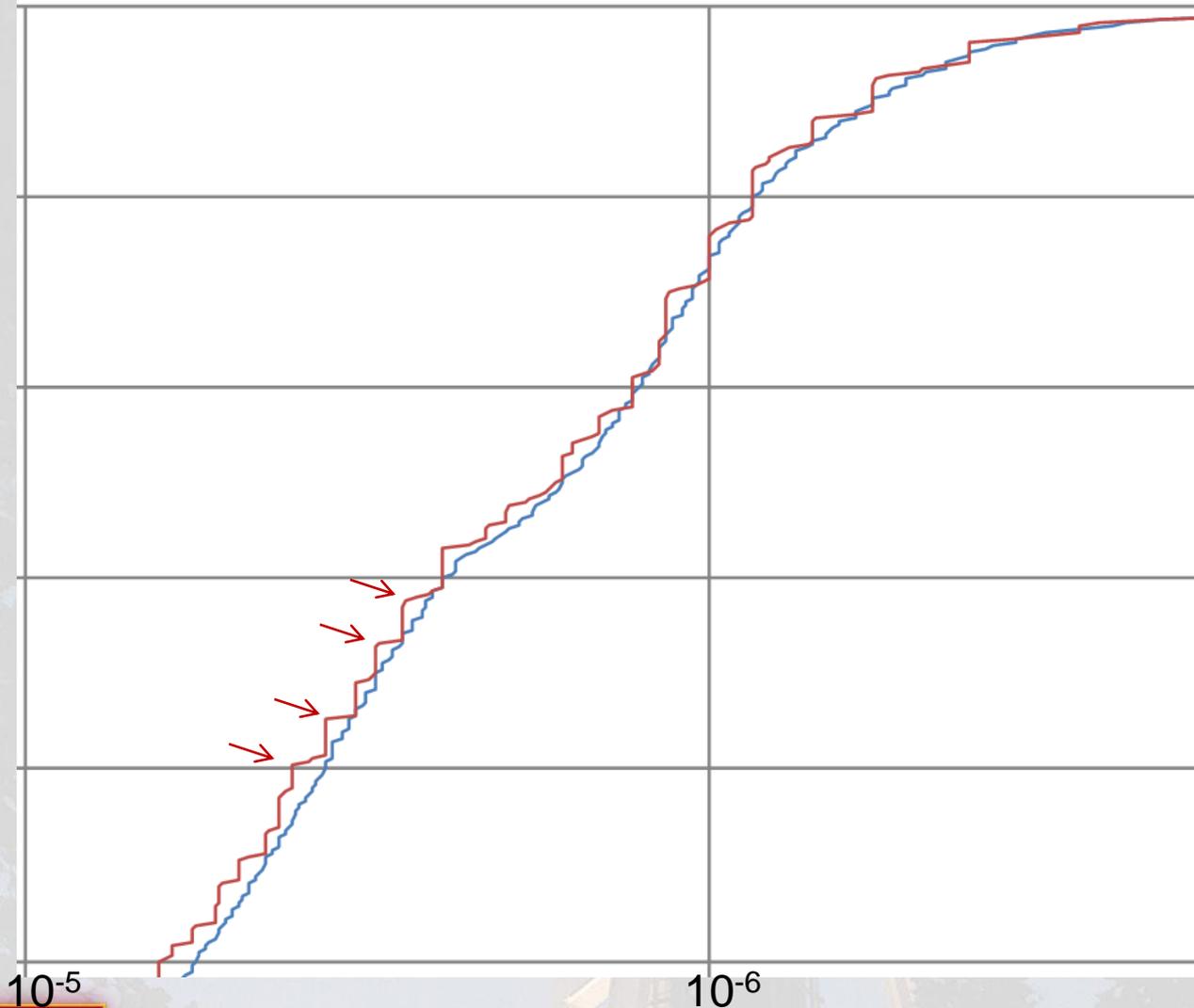
100%

90%

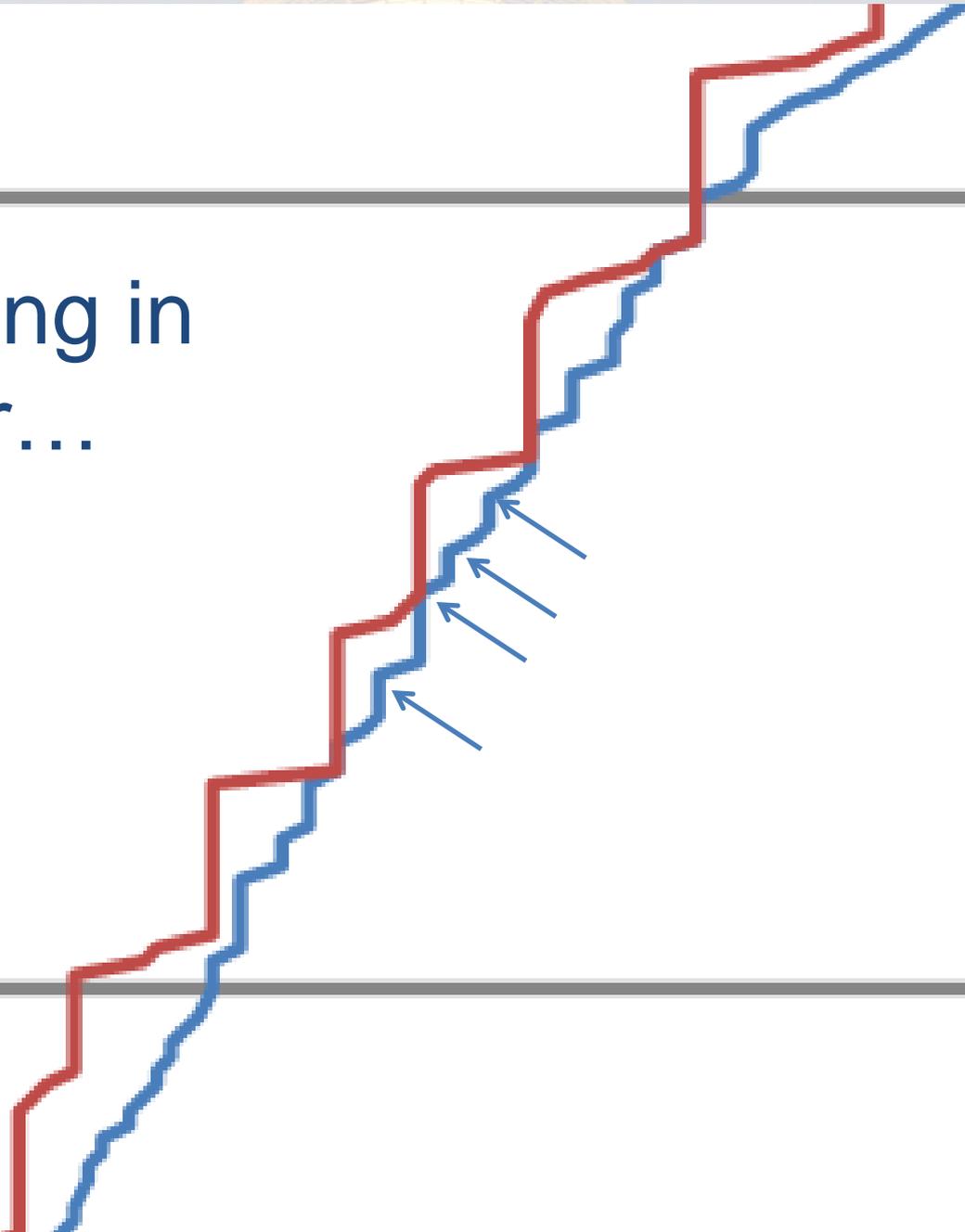
80%

70%

60%



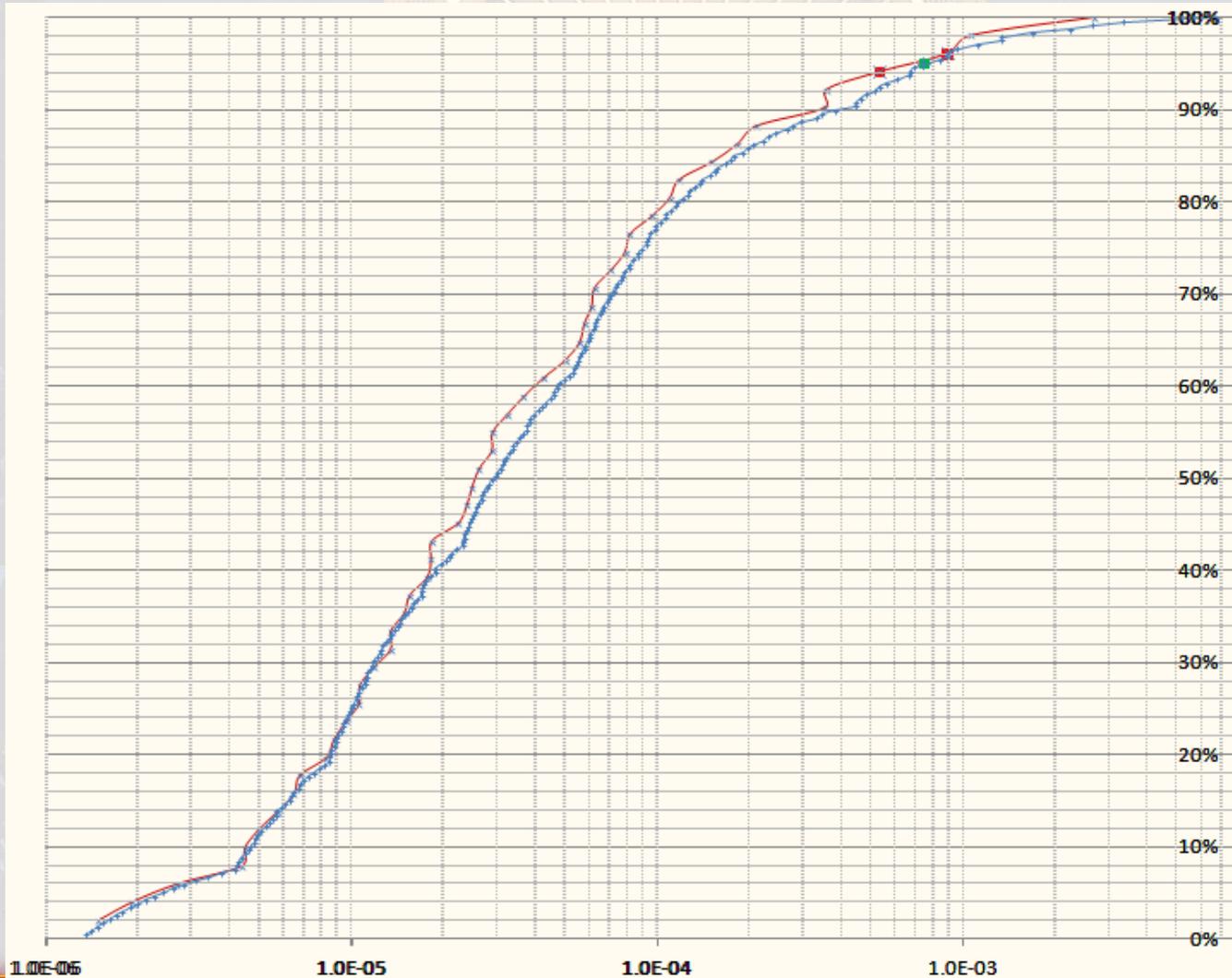
Zooming in
further...



Are smooth curves to be expected?

- Results didn't seem unusual to me.
- With 0.5 m/s resolution there are only about 50 – 70 potentially valid wind speed and stability categories.
- With 0.1 m/s resolution there are about 5 times more potentially valid wind speed and stability categories.

Test data set: Assumed an equal frequency distribution of all wind speed and stability combinations...



Another issue raised...

- Is met data averaged over 15-min more conservative than data averaged over 1-min?
- Perhaps, but then by extension wouldn't data averaged over 1-hr be even more conservative?
- How about averaged over 6-hours or averaged over 6-weeks?
- Vector averaging acts to reduce wind speeds
- Under the plume centerline, ground release, $z=0$:

$$X/Q = 1 / (3.14 * u * \sigma_y * \sigma_z)$$

Conclusions

- Engineers are as skilled at meteorology, as meteorologists are skilled in bridge building...
- *"A meteorologist, a meteorologist, my kingdom for a meteorologist!"* – paraphrasing Richard III by William Shakespeare
- MAACS2 is fine, but how should we provide guidance on the use of meteorological data?.