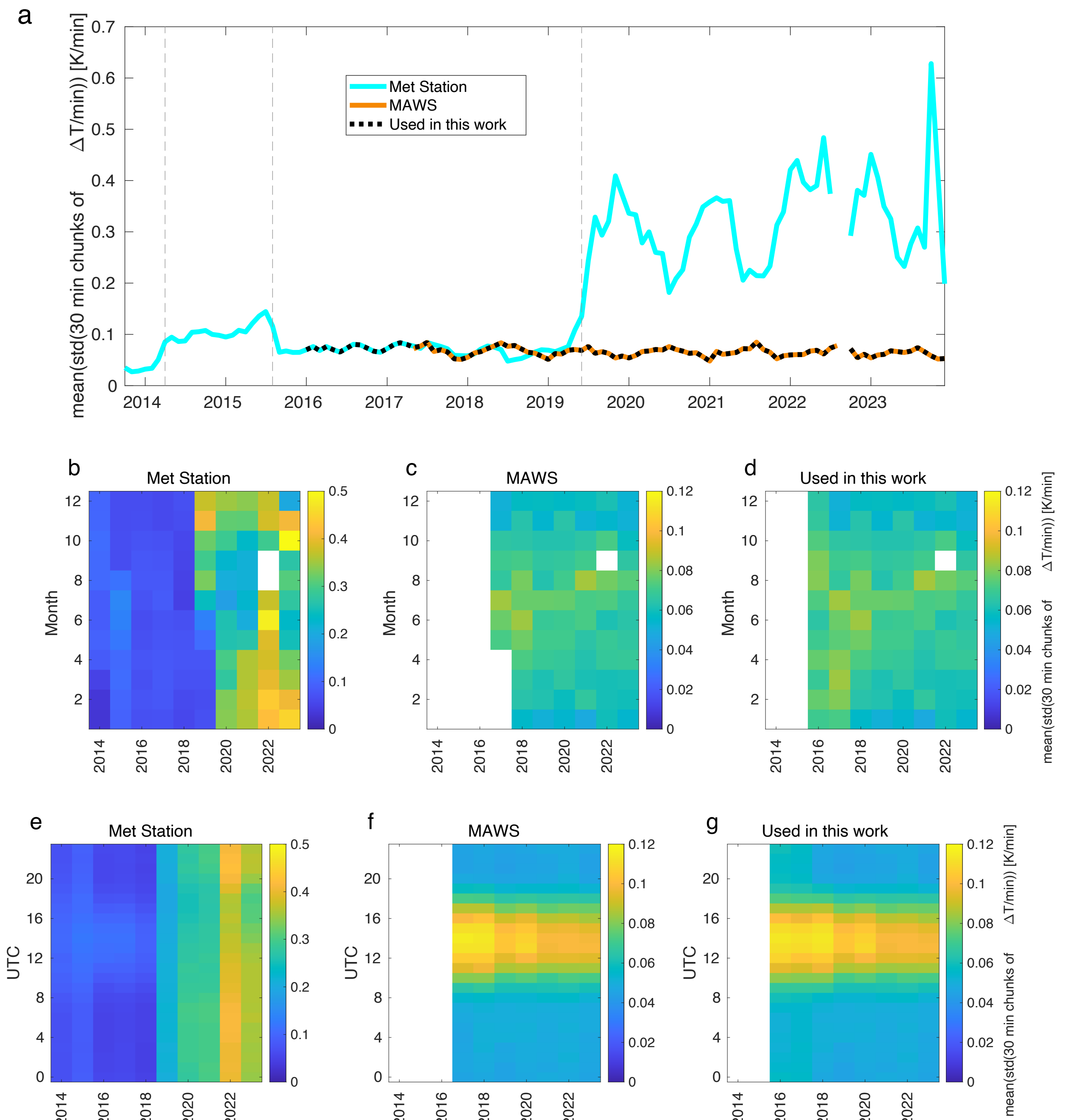
Supplemental Material for
A climatology of cold pools distinct from background turbulence at the Eastern North Atlantic observations site

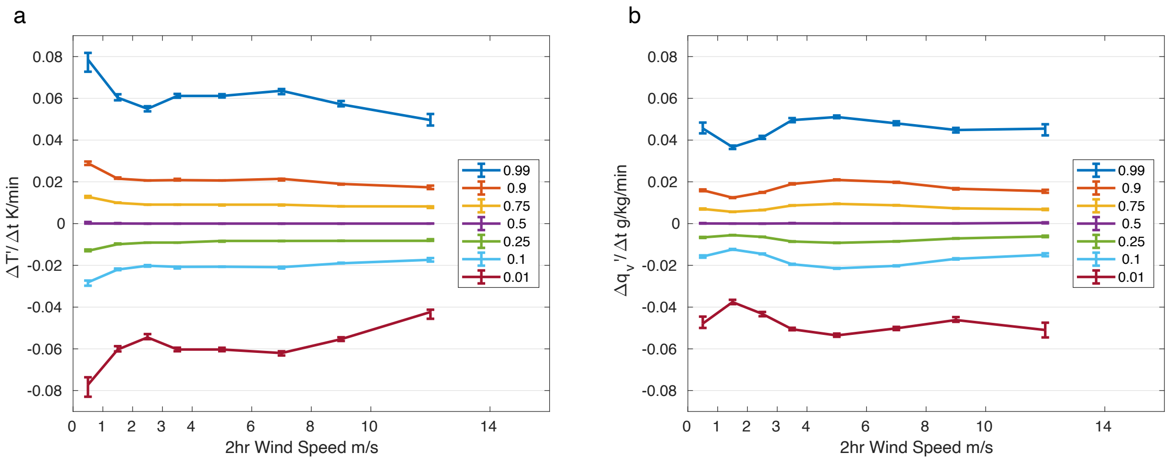
Mark A. Smalley[1,2], Mikael K. Witte[1,2,3], Jong-Hoon Jeong[1], Maria J. Chinita[1,2]

[1]Joint Institute for Regional Earth System Science and Engineering, University of California, Los Angeles, Los Angeles, California
[2]Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California
[3]Naval Postgraduate School, Monterey, California

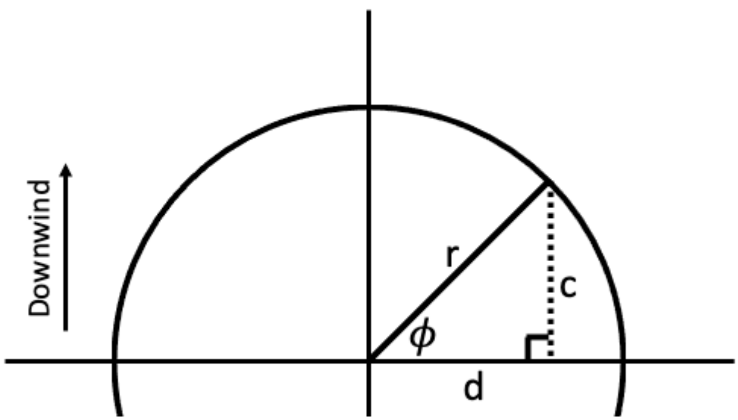
Correspondence to: Mark A. Smalley (mark.a.smalley@jpl.nasa.gov)



Supplemental Figure 1: Mean values of the standard deviation of 30-minute chunks of temperature deviations presented as (a) monthly values for all ENA months and (b-d) monthly values separated by year and (e-g) hourly values separated by year. In (a), vertical dashed lines designate the approximate times of apparent changes in noise characteristics of the MET temperature series.

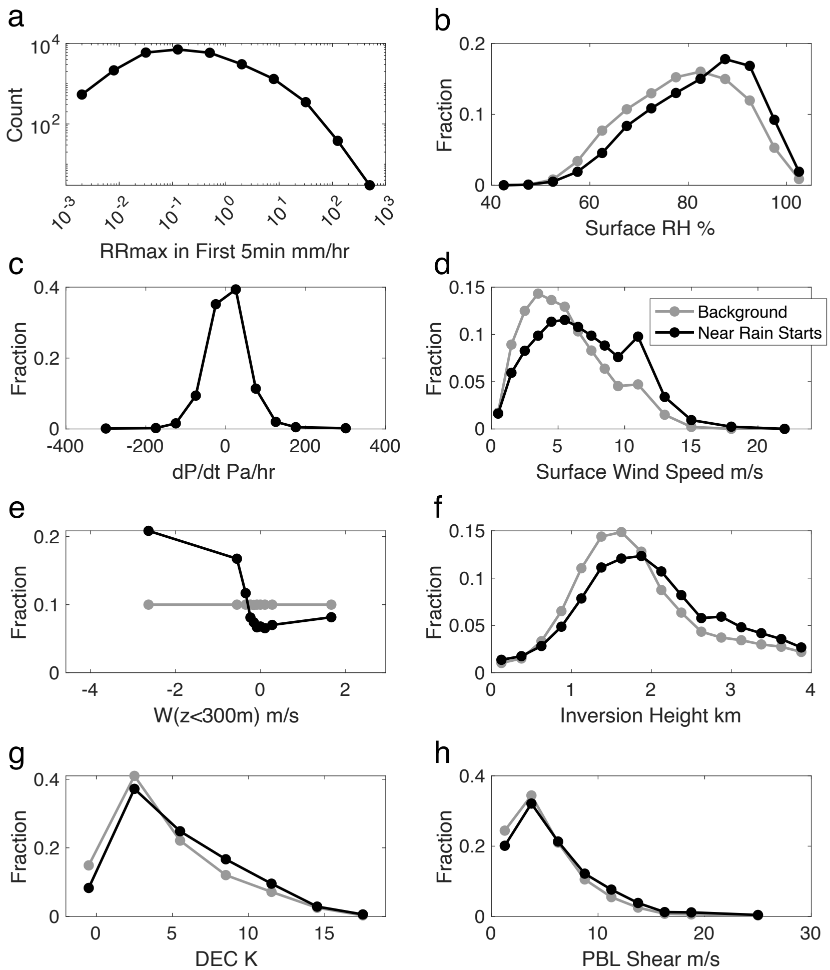


Supplemental Figure 2: Percentiles of temperature (a) and moisture (b) deviations as a function of wind speed in periods more than 6 hours from the nearest gauge-observed rain.



Supplemental Figure 3: Illustration of the geometric relations between variables necessary for estimating a cold pool candidate's radius.

Supplementary Figure 3 illustrates the geometry consistent with our assumptions of 1. Circular cold pools, 2. random intersections with the met station, and 3. the average wind speed during the cold pool temperature decrease represents the cold pool propagation speed. The lone ancillary variable is the intersection cord length (c), estimated from the mean wind speed and CP candidate duration. The intersection displacement (d) across the cold pool candidate is unknown and assumed to have a uniform distribution with a minimum value of zero (r=c; met station observes the exact center of the cold pool candidate) to much larger values if the met station observes the extreme edge of the circular CP candidate. The angle □ is then computed from the arccosine of the ratio of c to the uniform distribution of 10,000 d values and represents their angles in the unit circle. From there, the cord length estimates (c), are divided by the sine of the □ values, producing a distribution of potential cold pool candidate radii that are consistent with our assumptions. These values are collected into 50 evenly spaced radii bins between 0 and 50 km, resulting in a histogram of a CP candidate's radius values. The histogram for the population of CP candidates is computed as the sum of the histograms from individual CP candidates but weighted by each CP candidate's resample weight (Figure 8).



Supplementary Figure 4: Normalized histograms showing the distributions of cold pool relevant environmental variables for all times (gray) and near the start of contiguous rain objects (black).