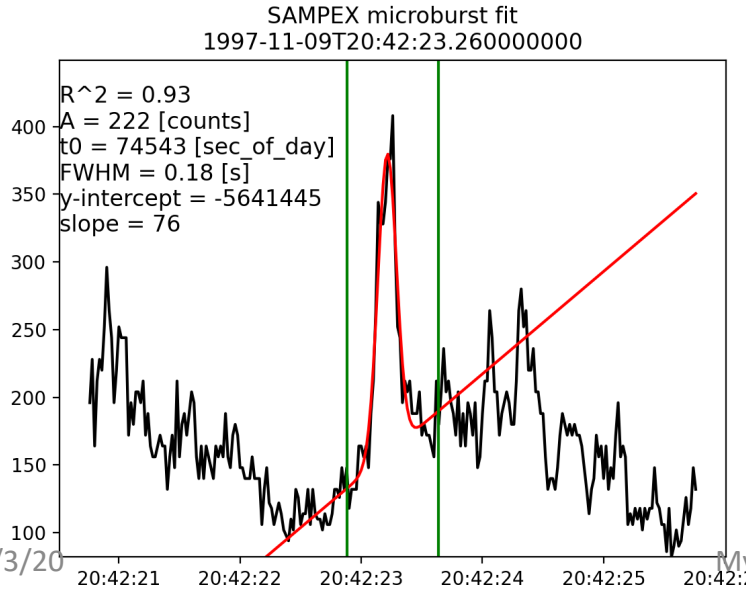
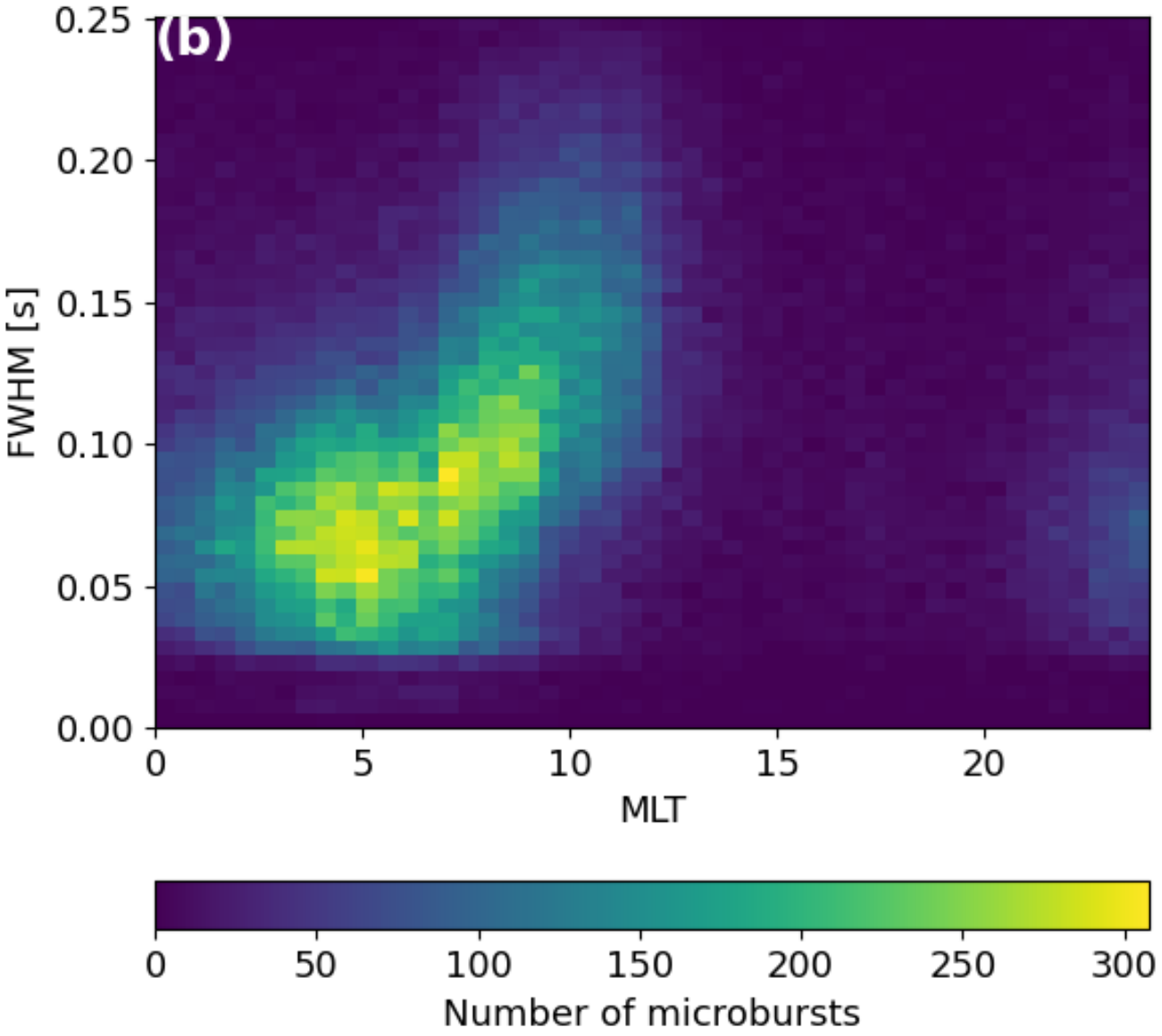
Duration of Individual Relativistic Electron Microbursts: A Probe Into Their Scattering Mechanism

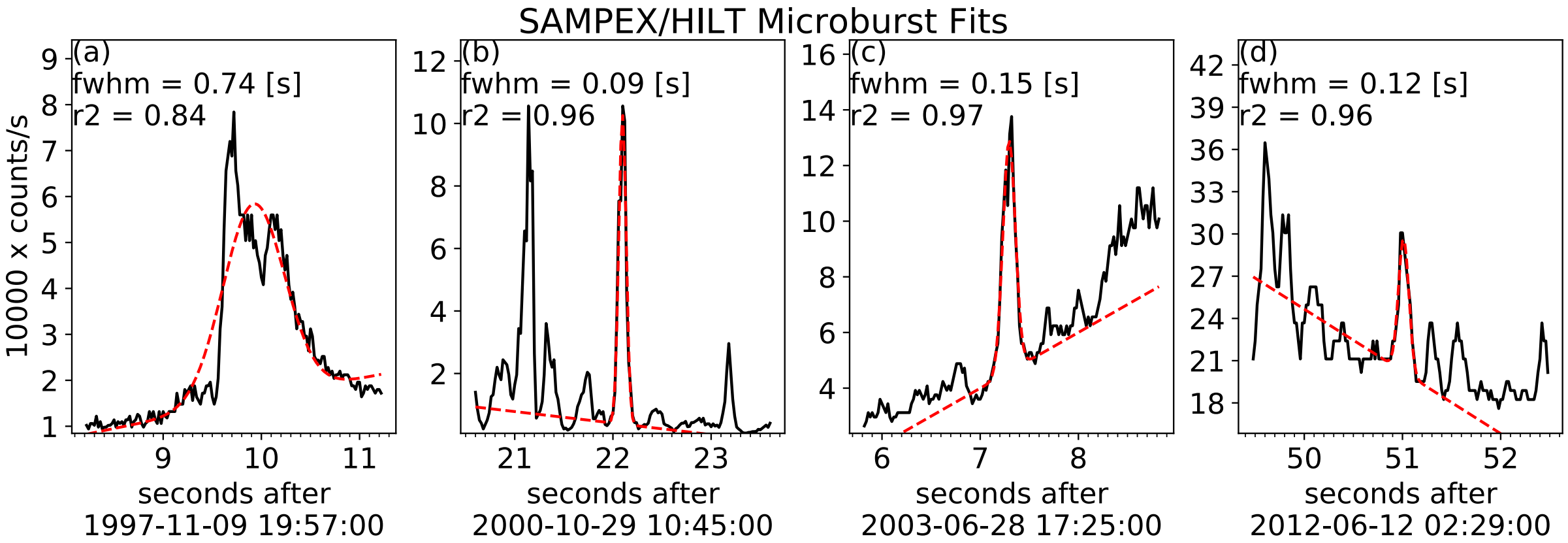
Mike Shumko, Lauren Blum, and Alex Crew





We automatically identified microbursts and estimated their duration.

$$f(t|\boldsymbol{p}) = Ae^{-\frac{(t-t_0)^2}{2\sigma^2}} + (y_0 + mt)$$



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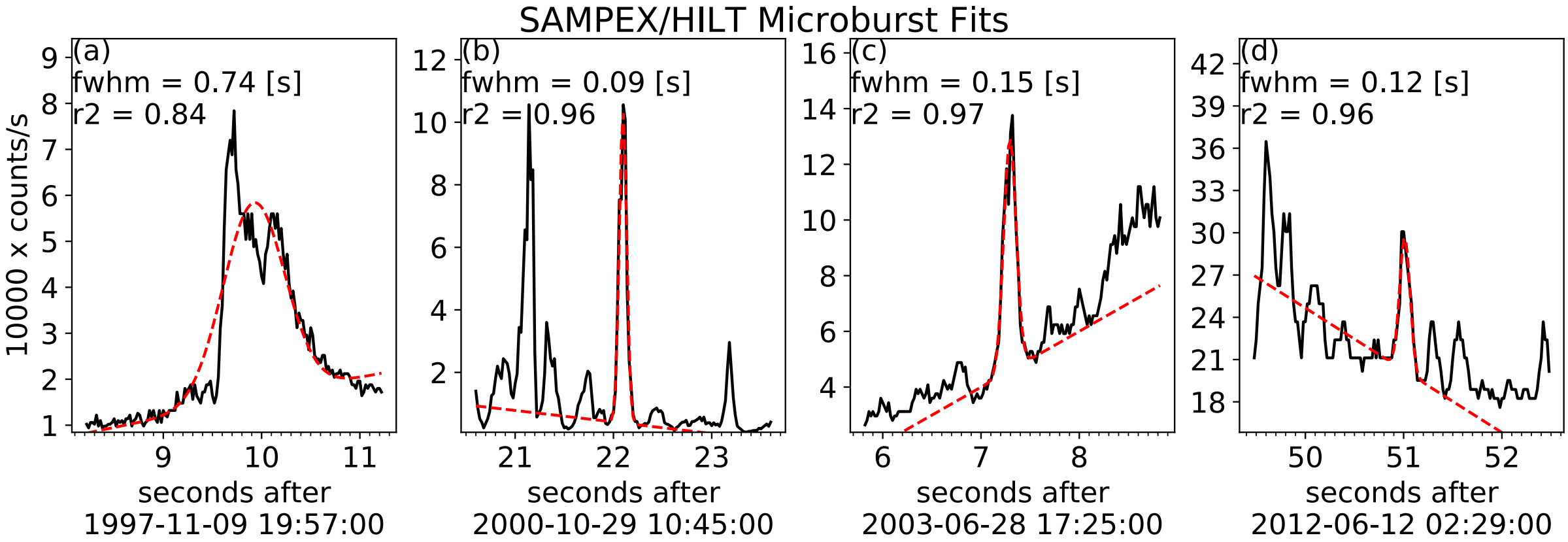
$$R^2 = 1 - \frac{\sum_i (y_i - f_i)^2}{\sum_i (y_i - \bar{y})^2}$$



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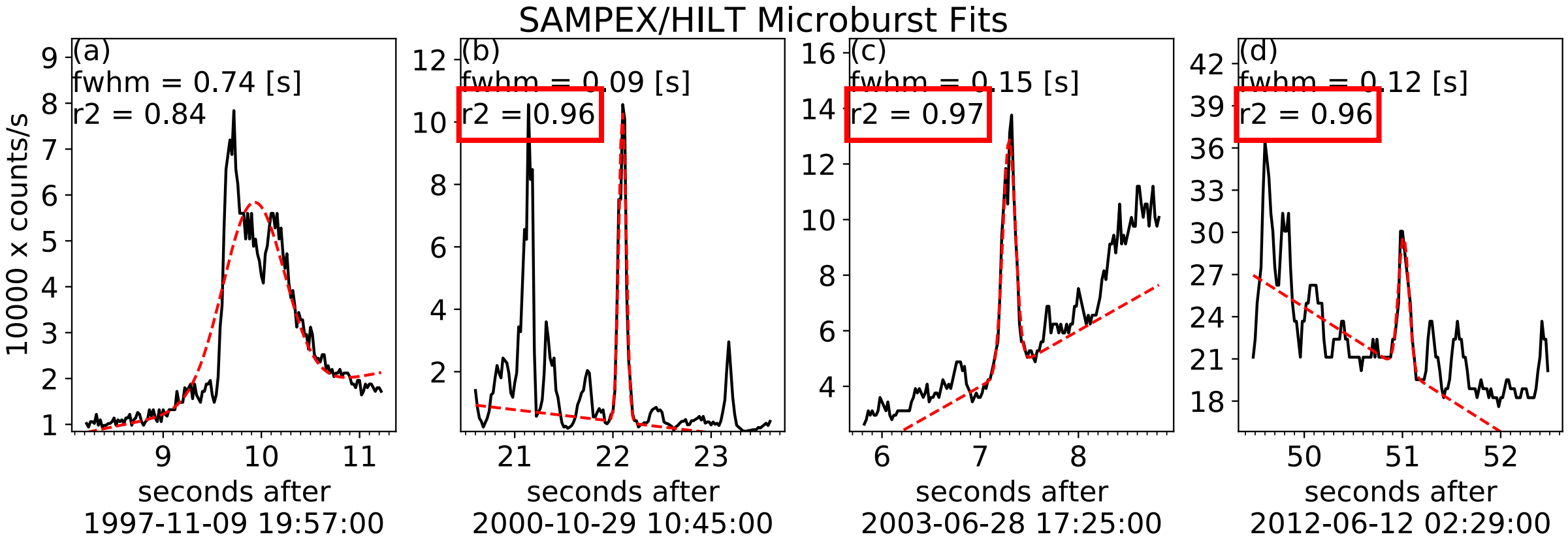

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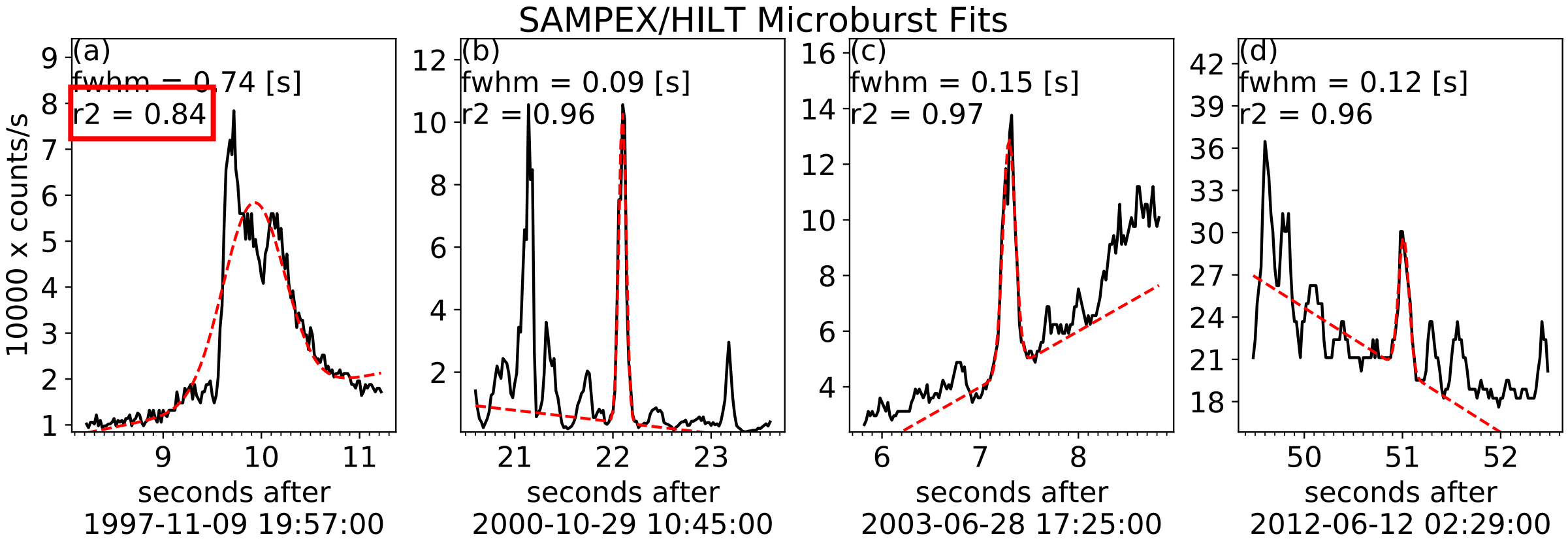
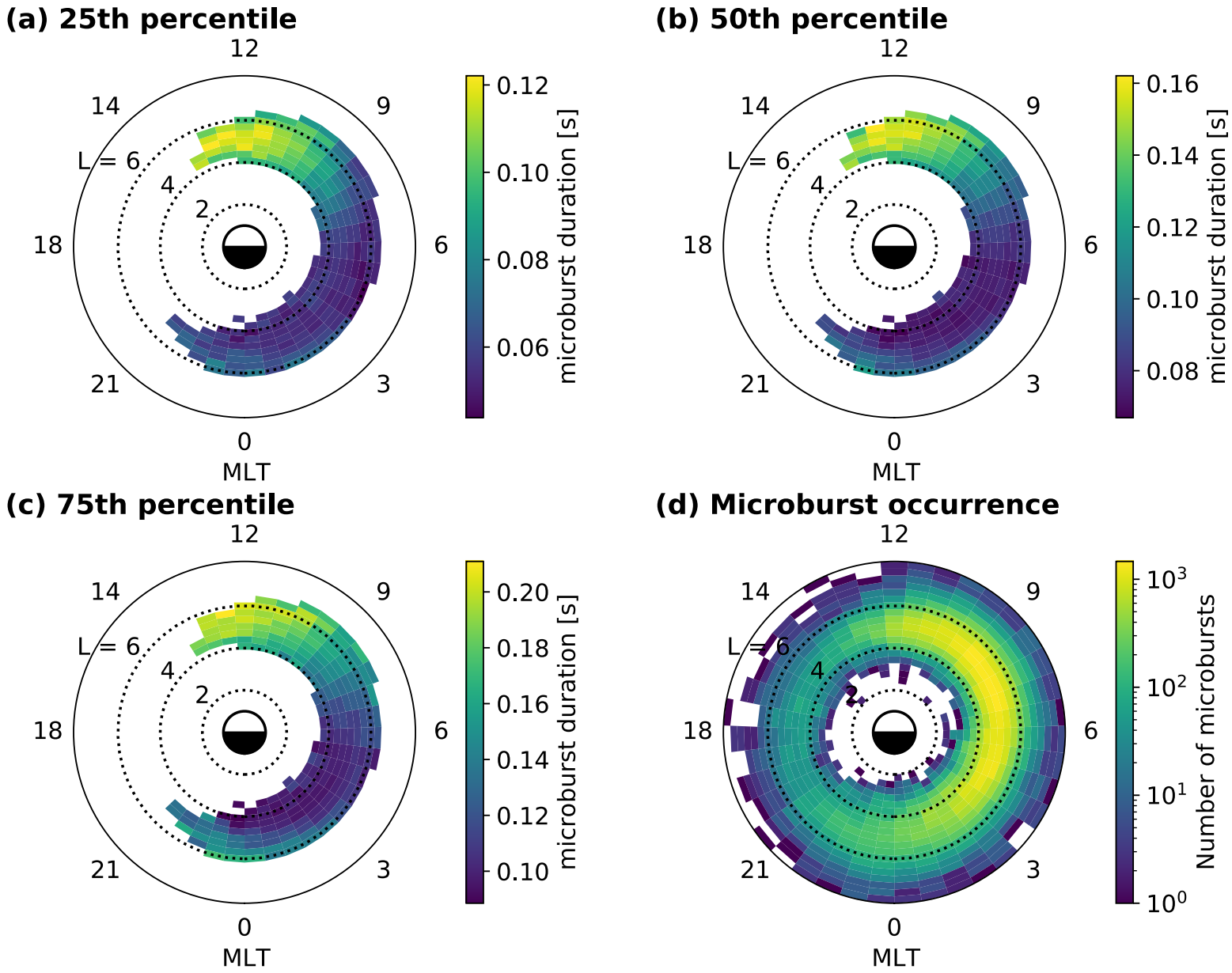


Distribution of SAMPEX microburst durations in L-MLT

The microburst duration is smallest at midnight and increases towards noon MLT. The trend is independent of the distribution quantiles.

Median: 80 -> 160 ms.



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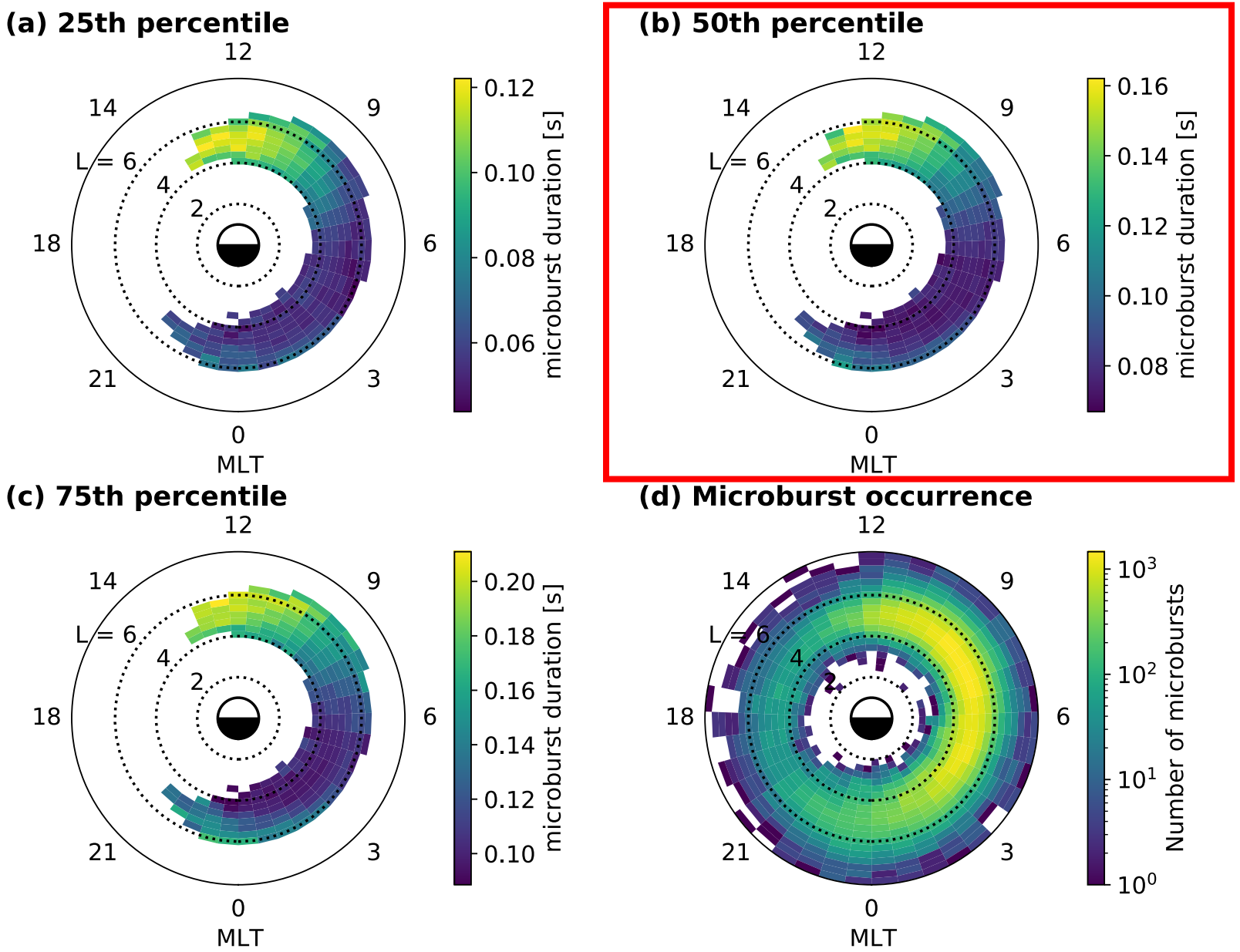
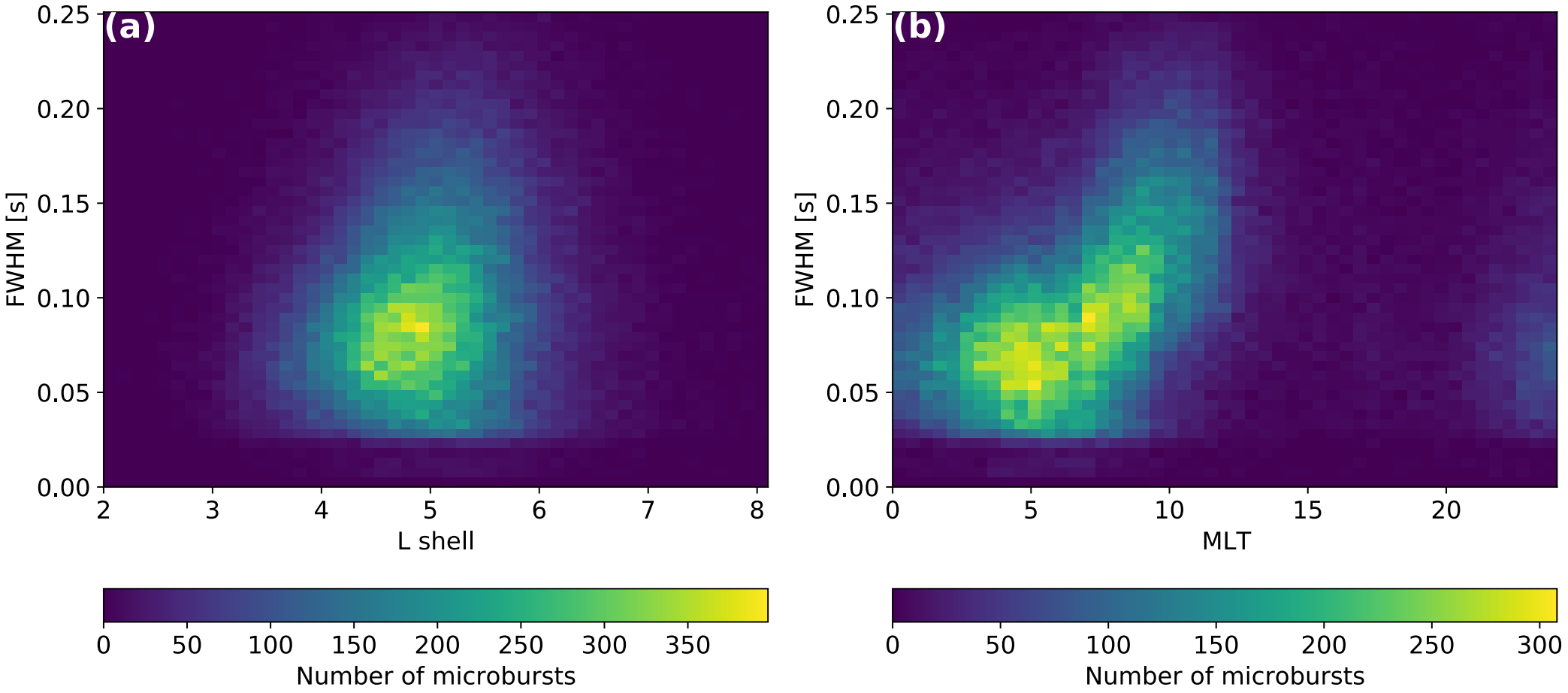
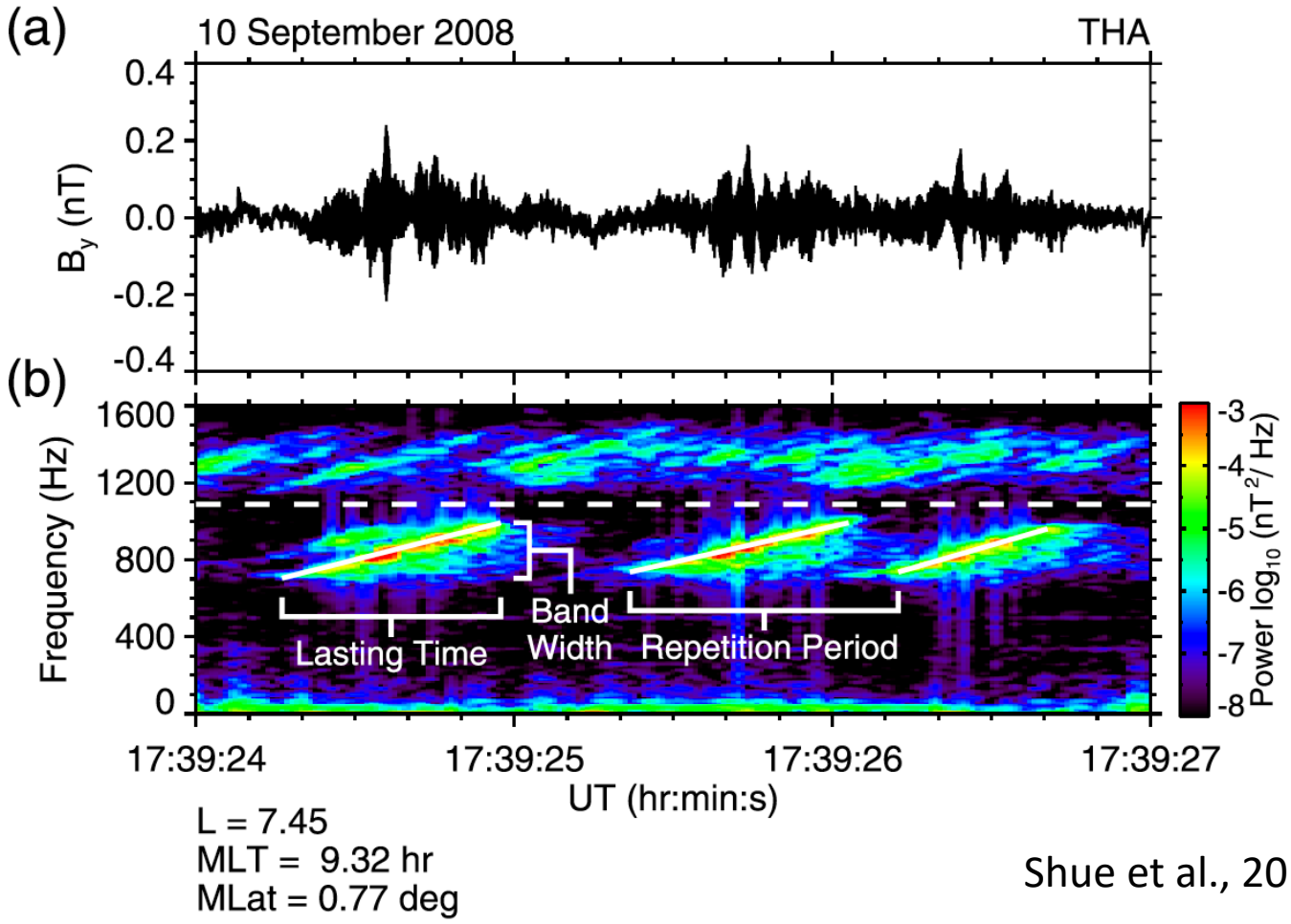


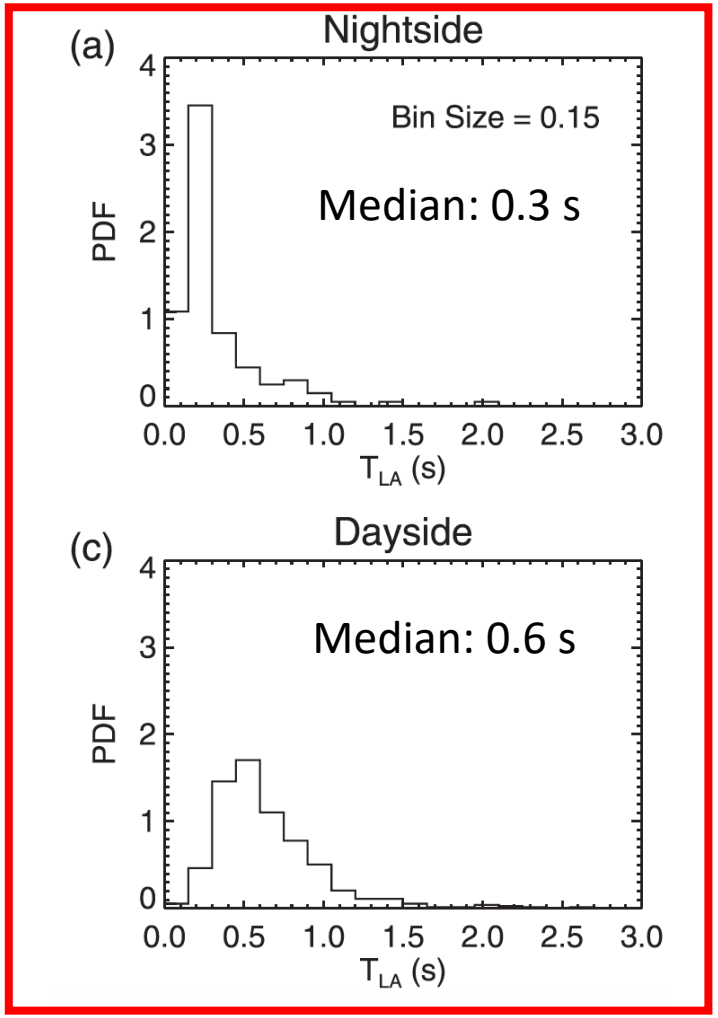
The trend is most pronounced in MLT



The chorus rising tone element duration follows a similar pattern.

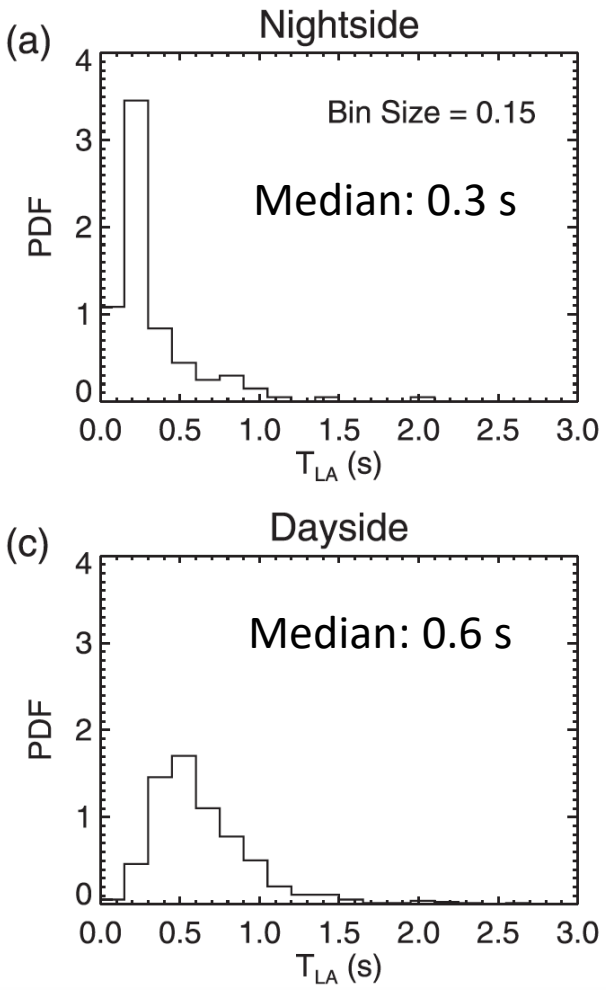


Shue et al., 2019

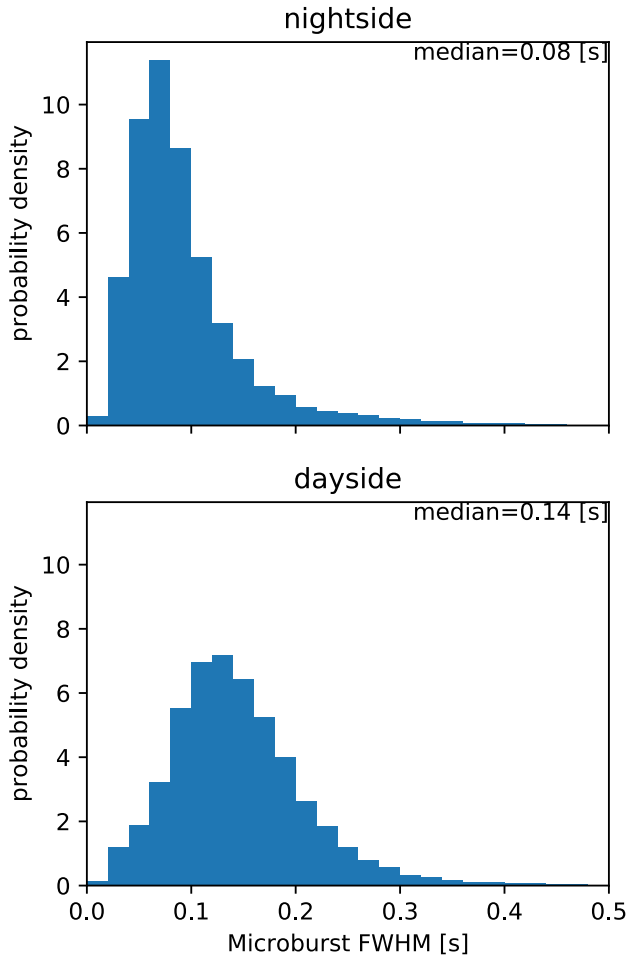


How to the chorus and microburst duration distributions compare?

Chorus

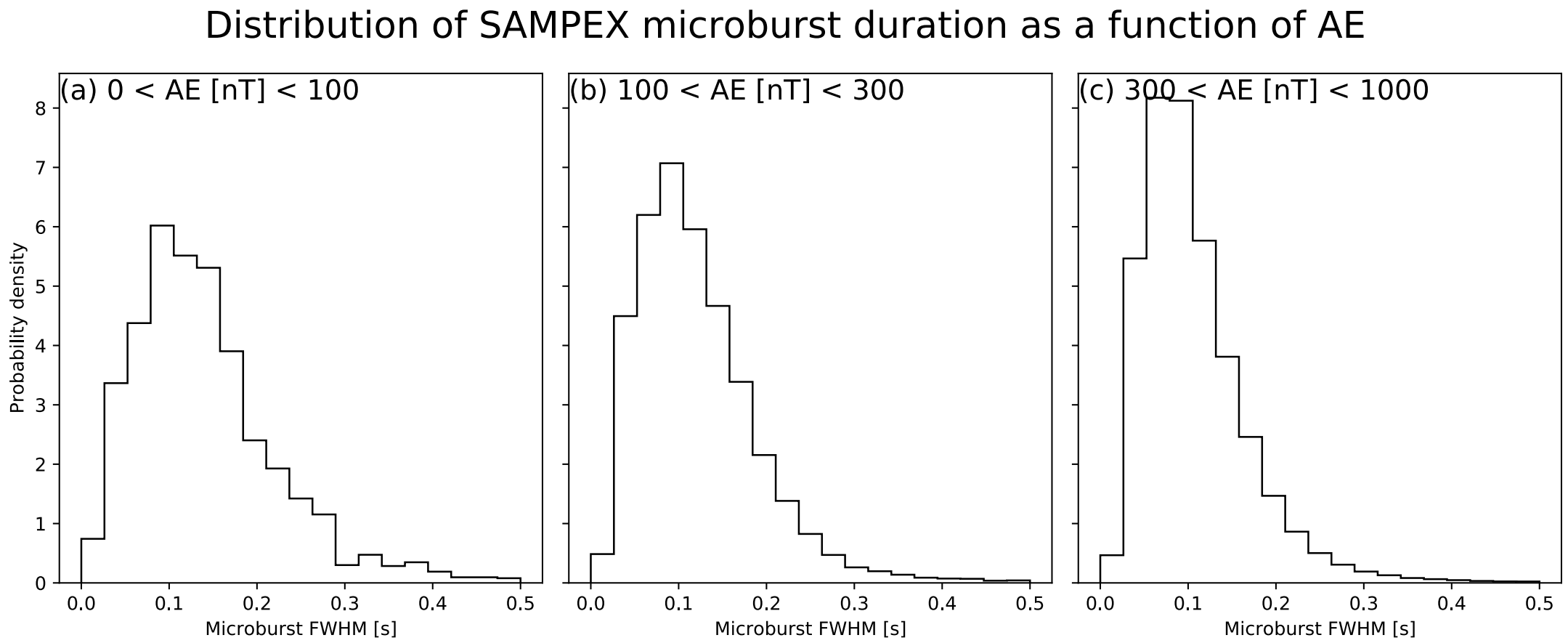


Microbursts

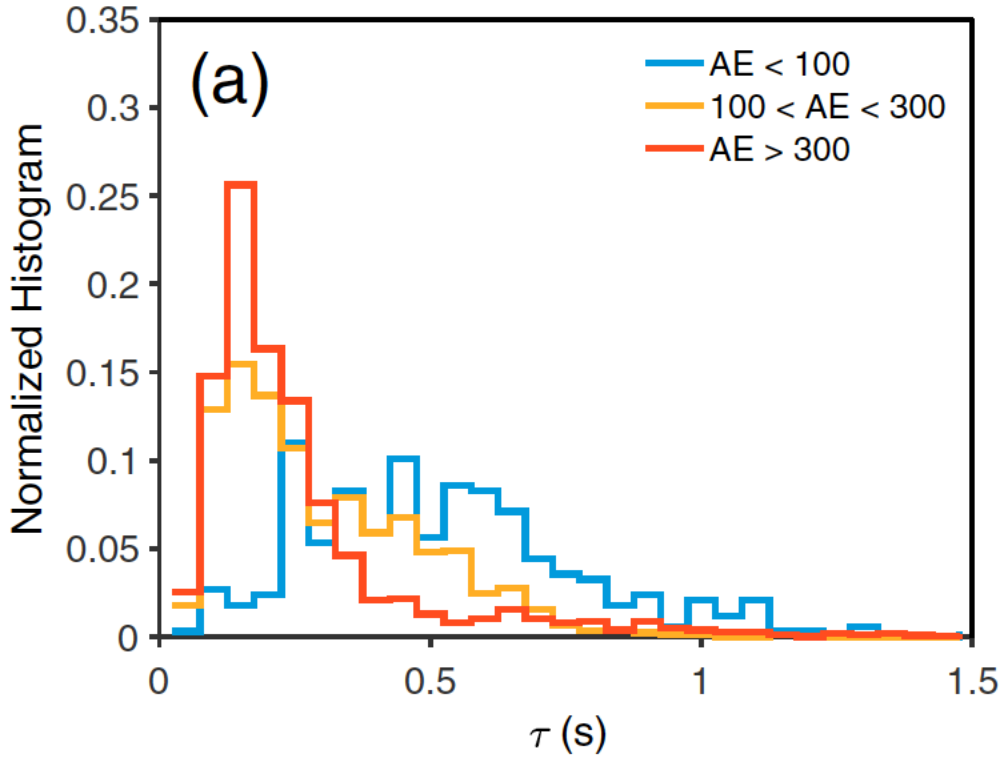


Shue et al., 2019

The width distribution as a function of AE is similar, but the distribution becomes more peaked at 0.1 s at higher AE.



Teng et al., 2017 found that chorus rising tone elements also shortened with increasing AE.



Question to consider:
The chorus-microburst durations follow a similar trend, but why are chorus wave durations typically longer?

Questions?