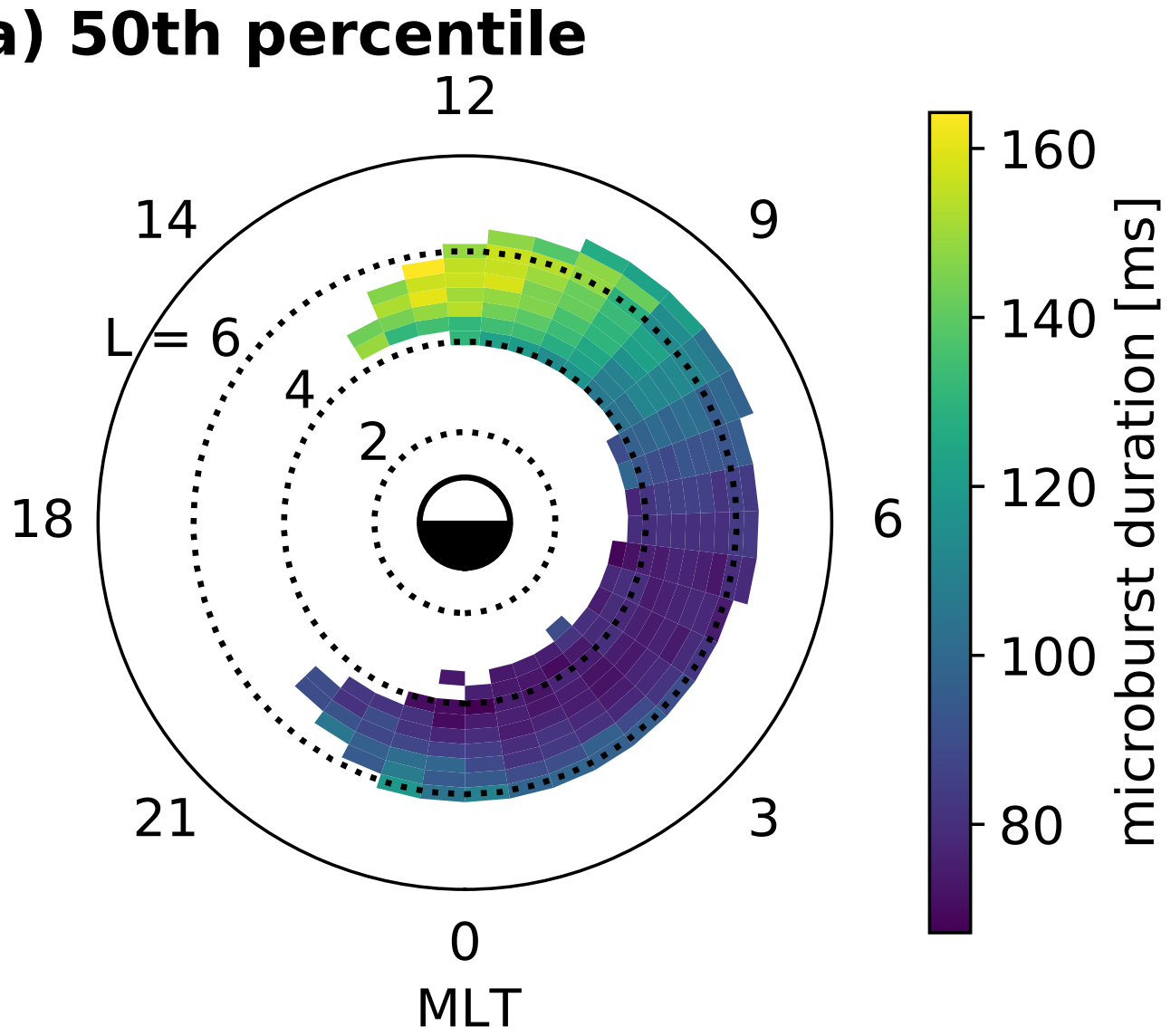
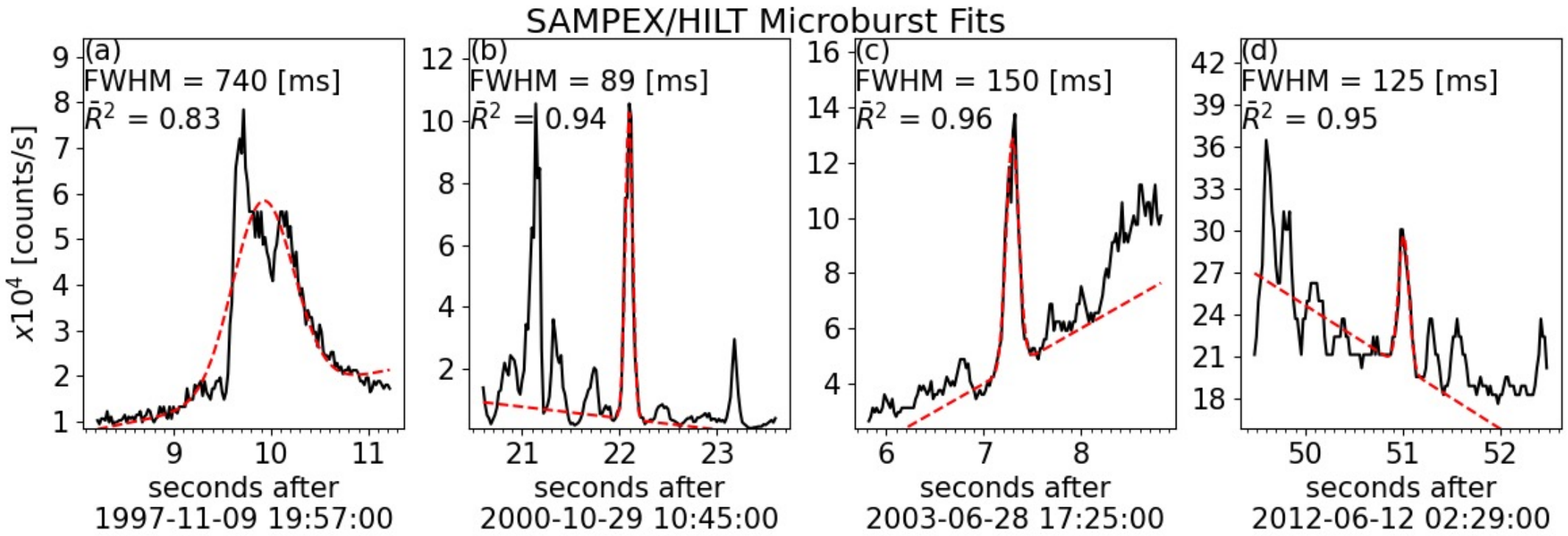
Duration of Individual Relativistic Electron Microbursts: A Probe Into Their Scattering Mechanism

Mike Shumko, Lauren Blum, and Alex Crew



We automatically identified microbursts and estimated their duration.

$$f(t|\boldsymbol{p}) = Ae^{-\frac{(t-t_0)^2}{2\sigma^2}} + (c_0 + c_1 t)$$



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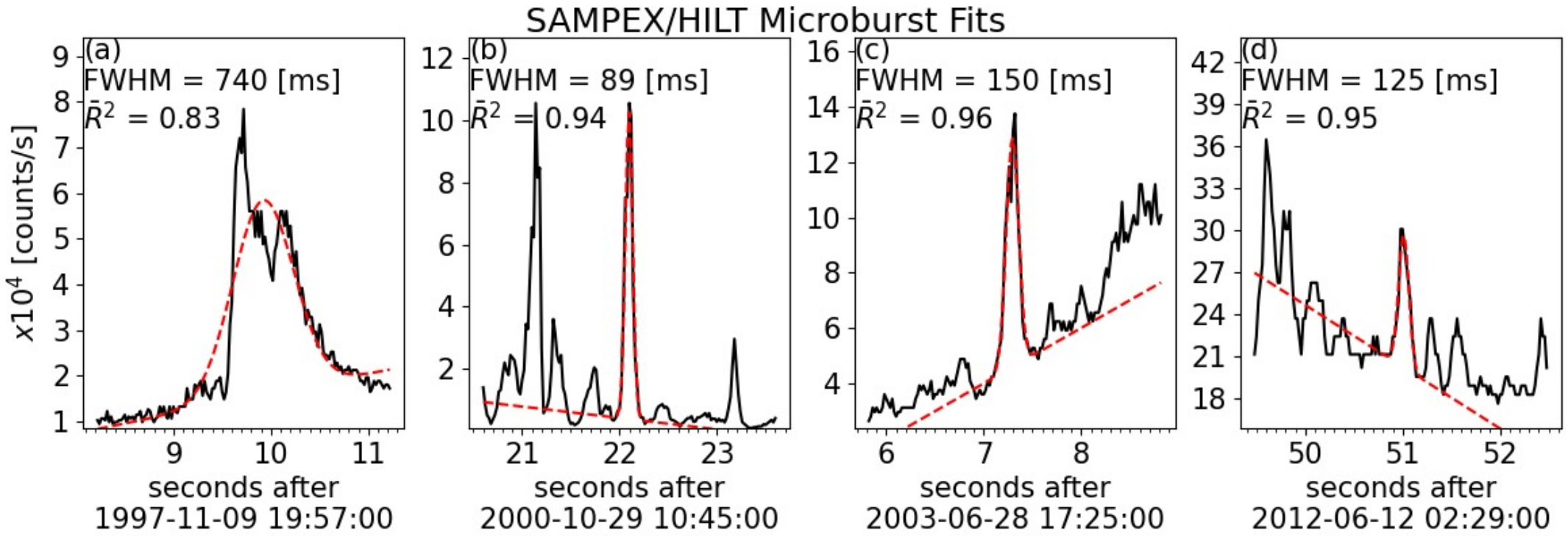
$$R^2 = 1 - \frac{\sum_i (y_i - f_i)^2}{\sum_i (y_i - \bar{y})^2}$$



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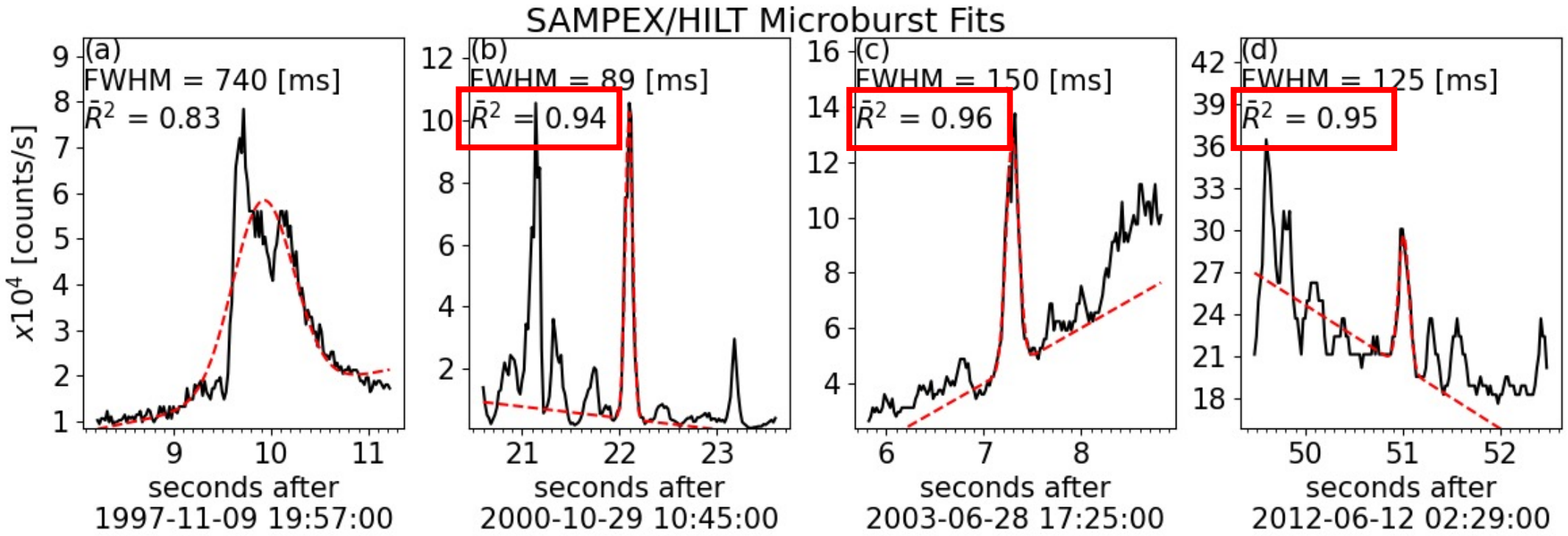

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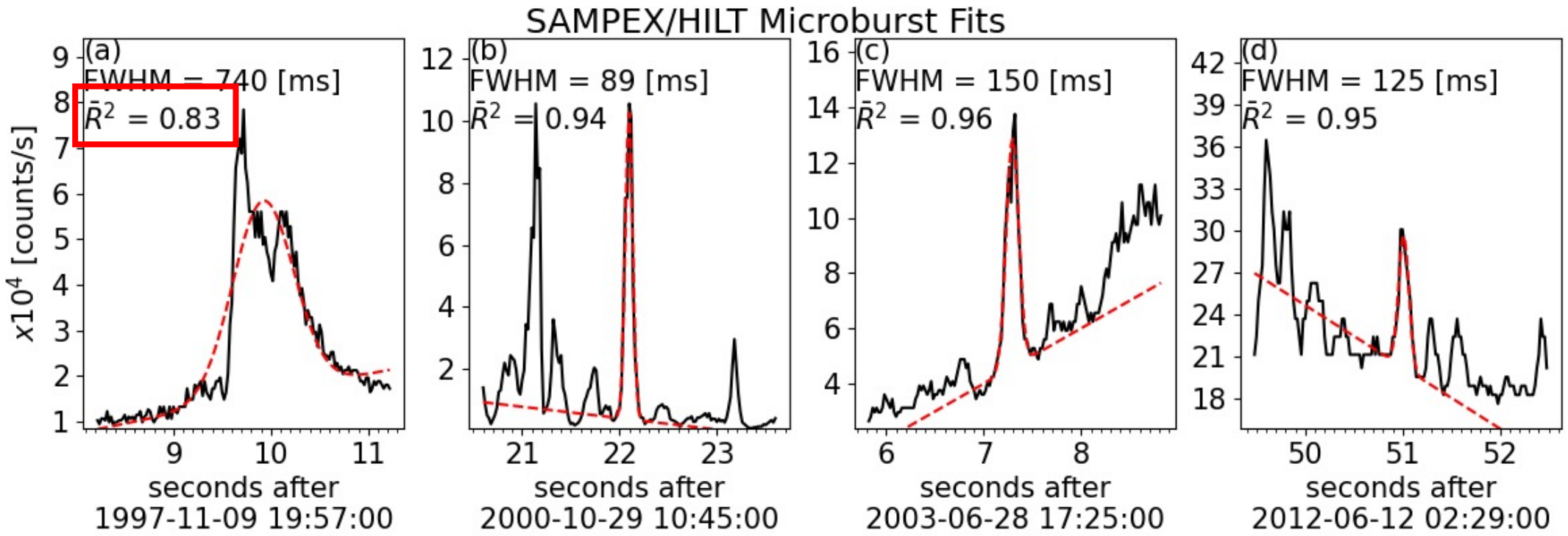
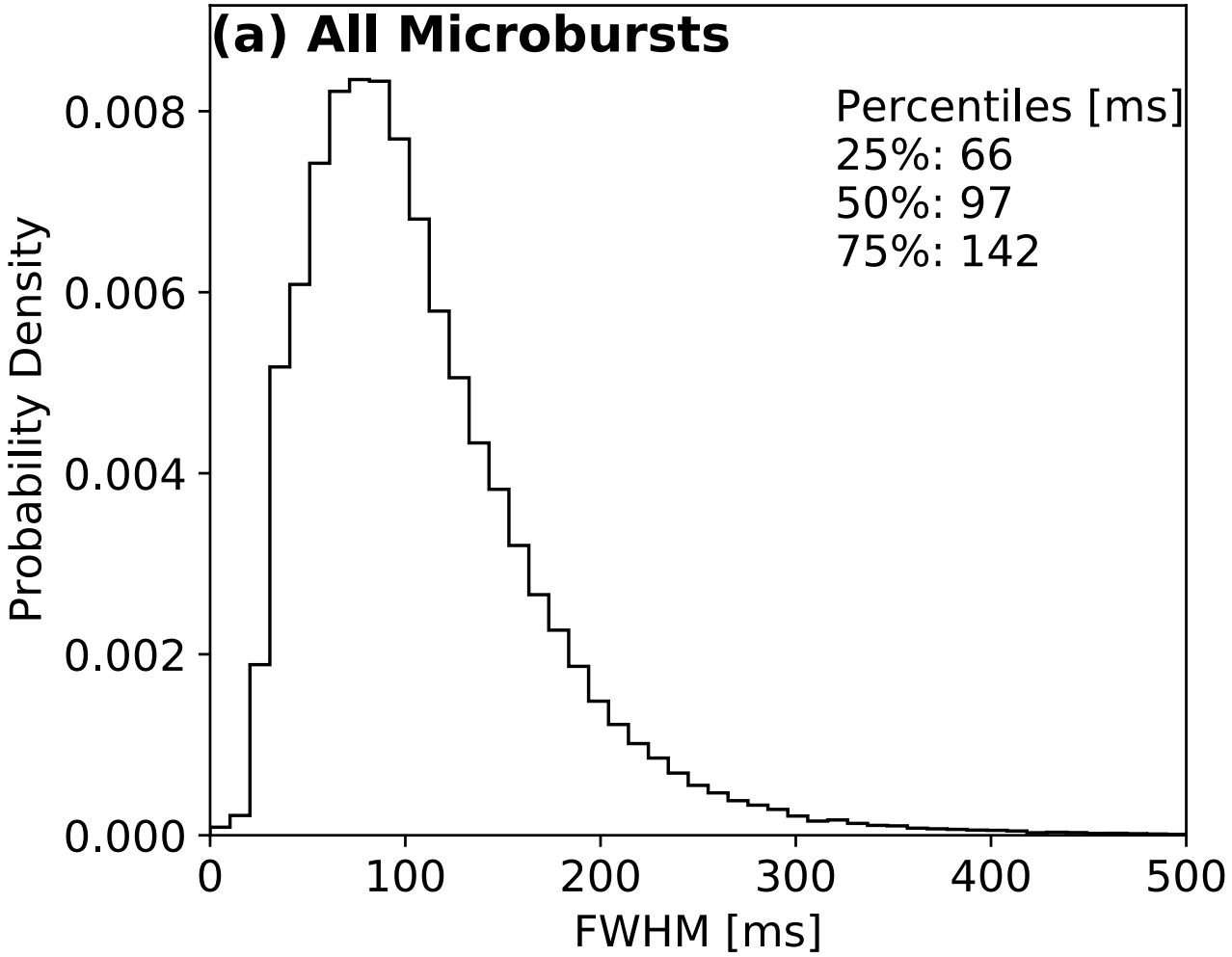
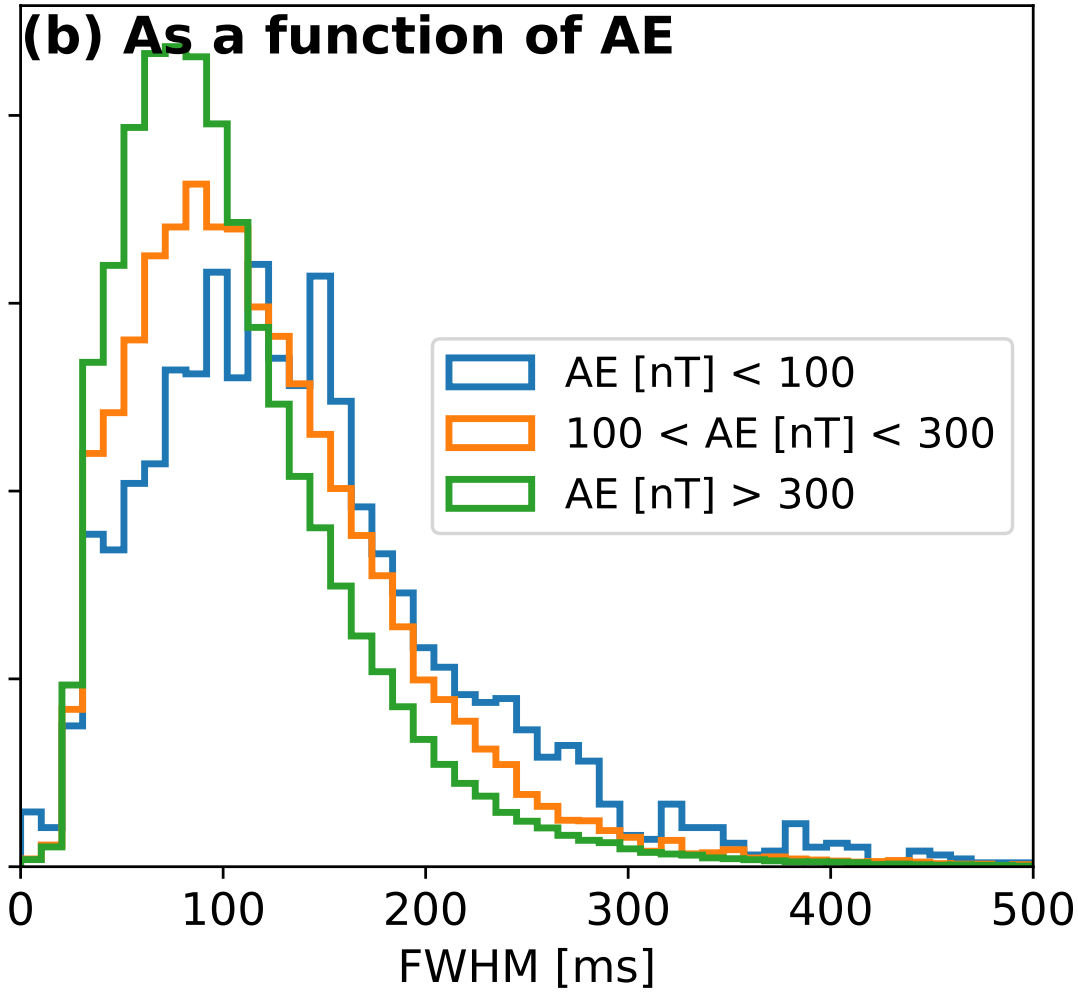
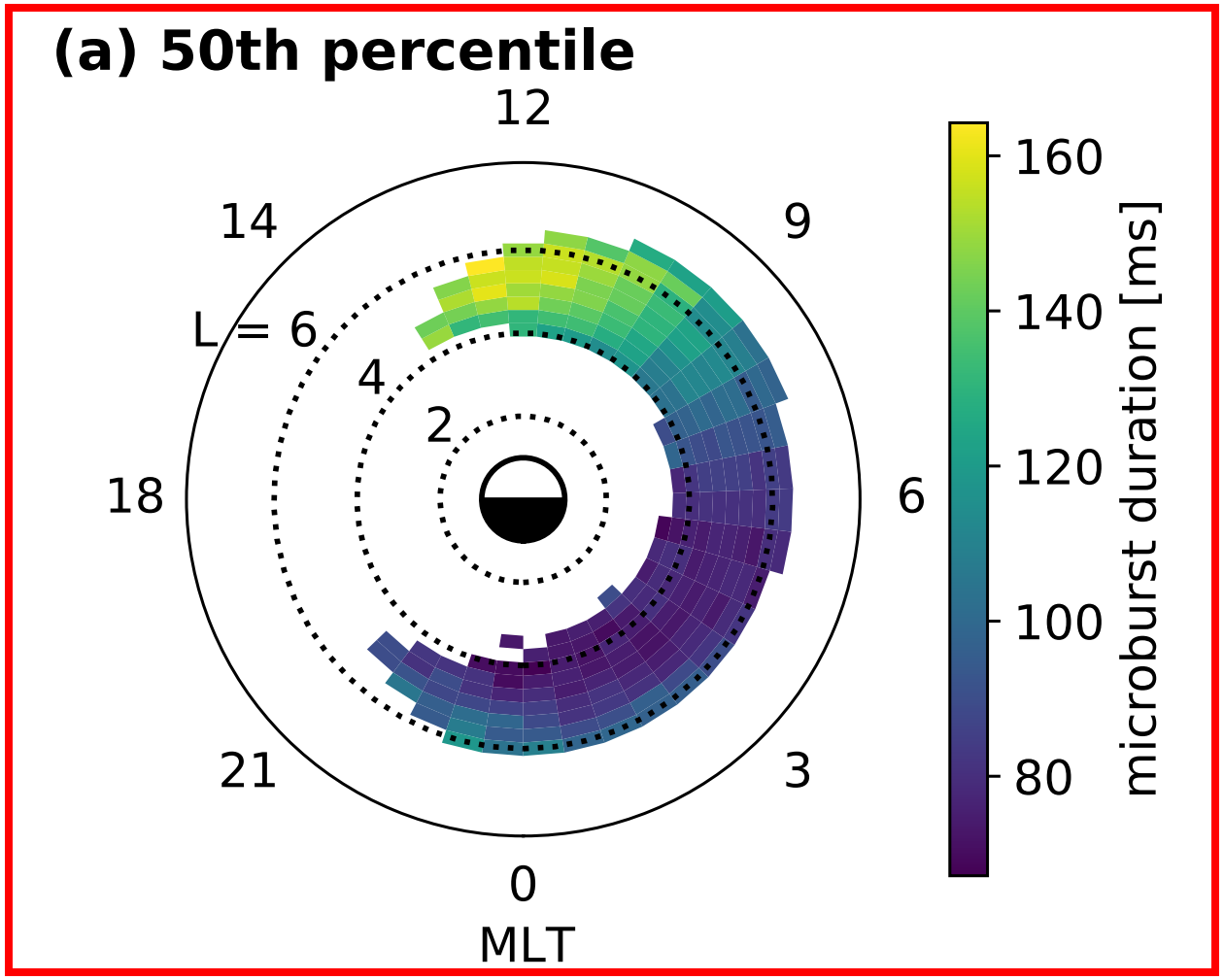


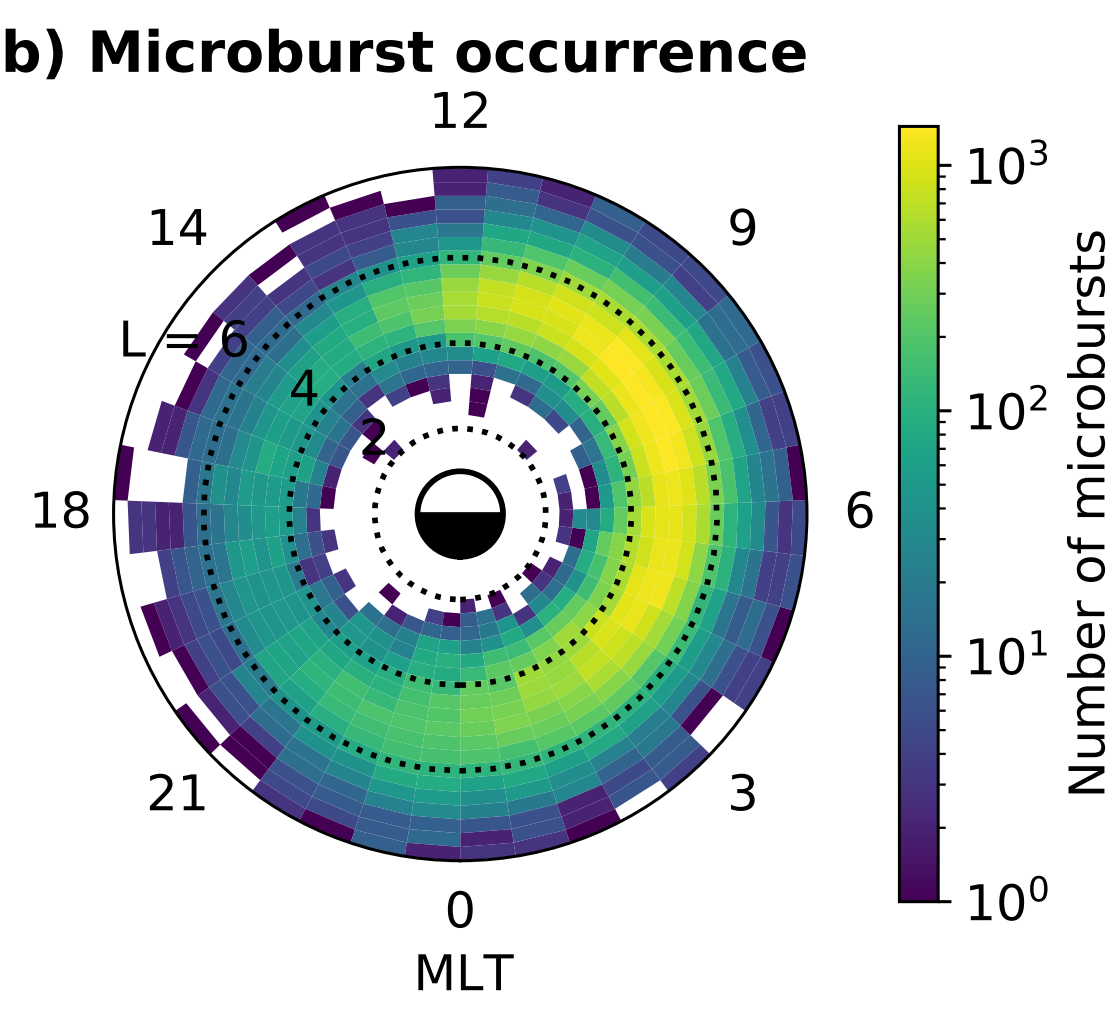
Distribution of > 1 MeV Microburst Duration
SAMPEX/HILT





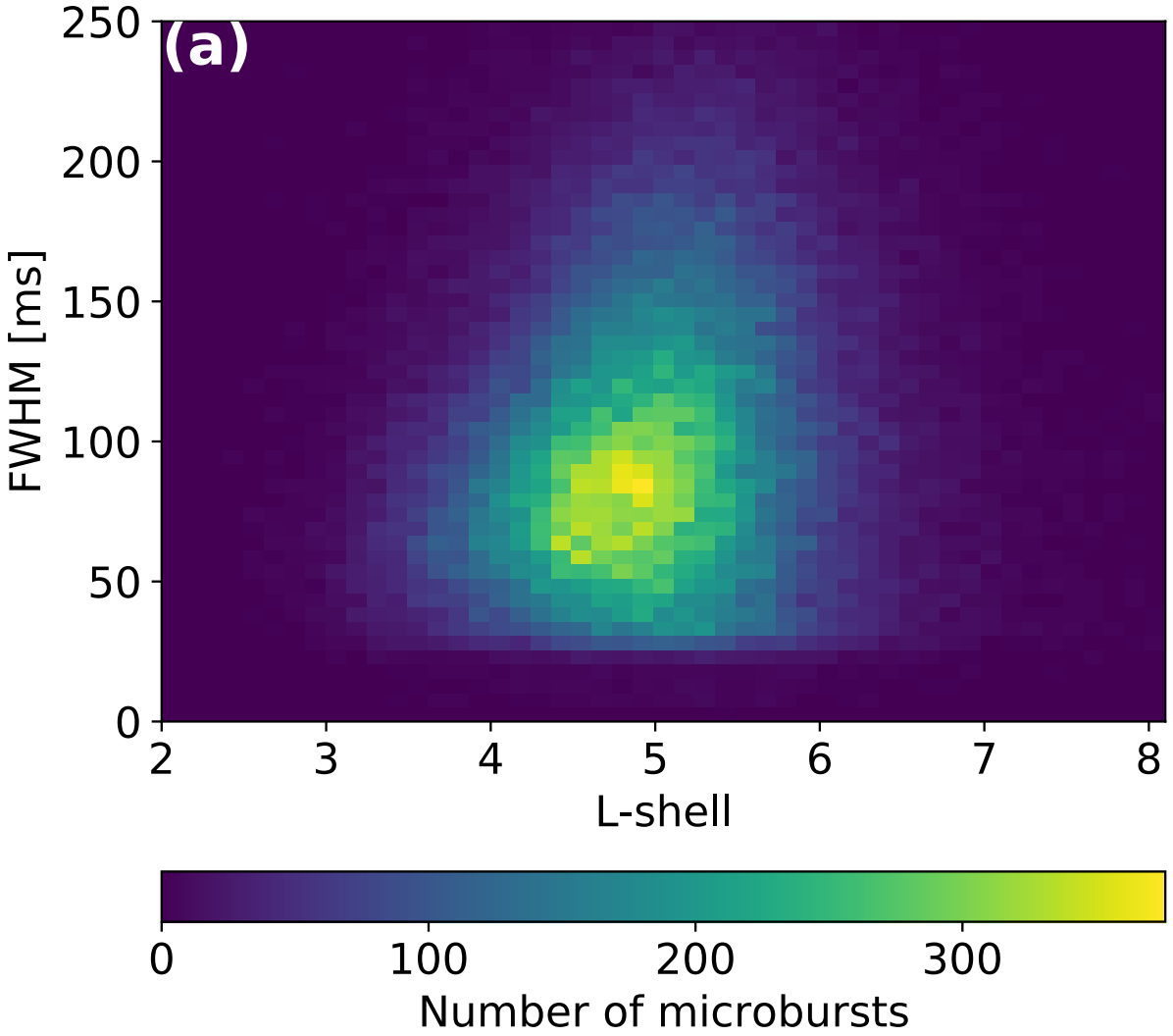
Distribution of SAMPEX microburst durations in L-MLT

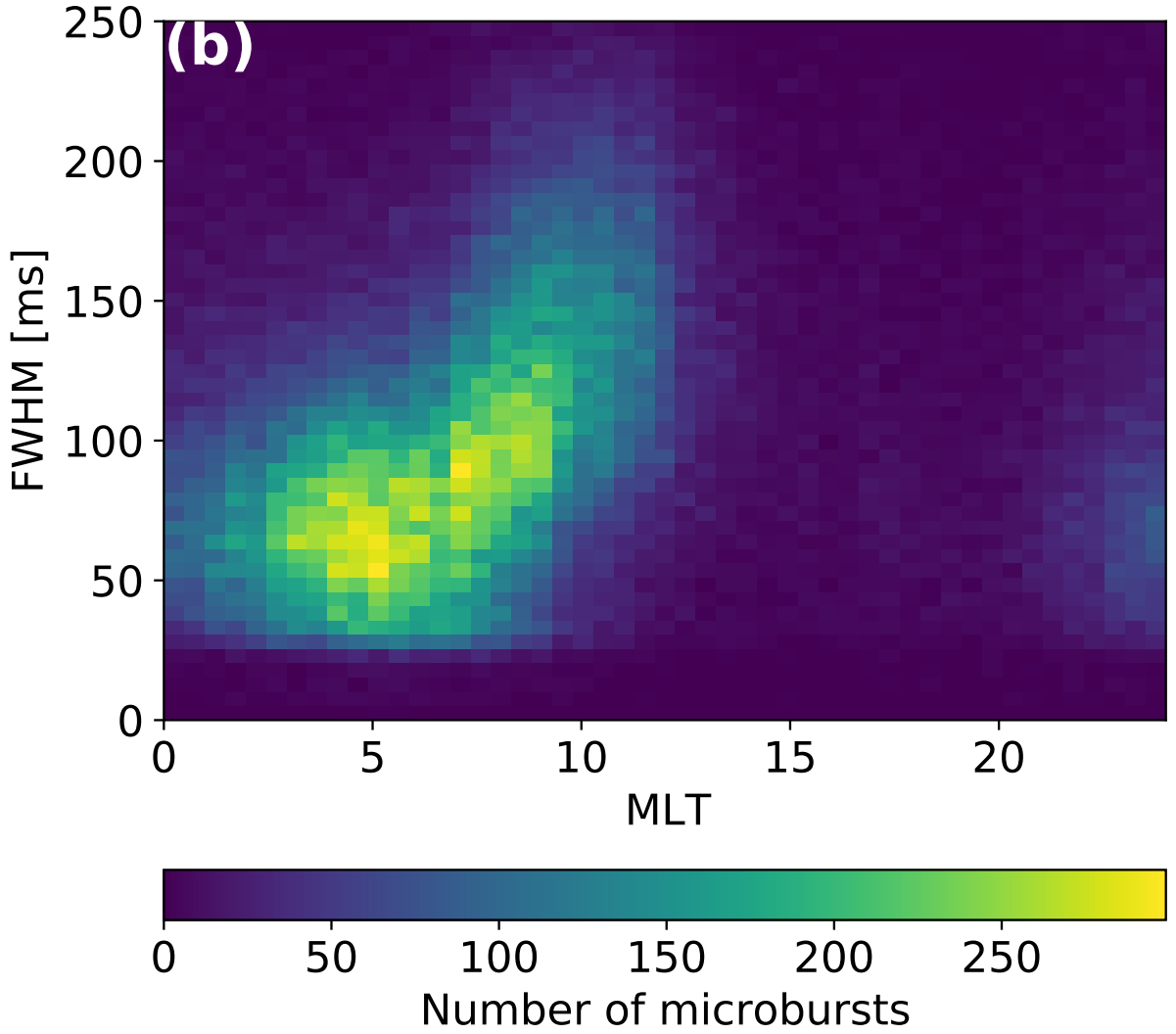




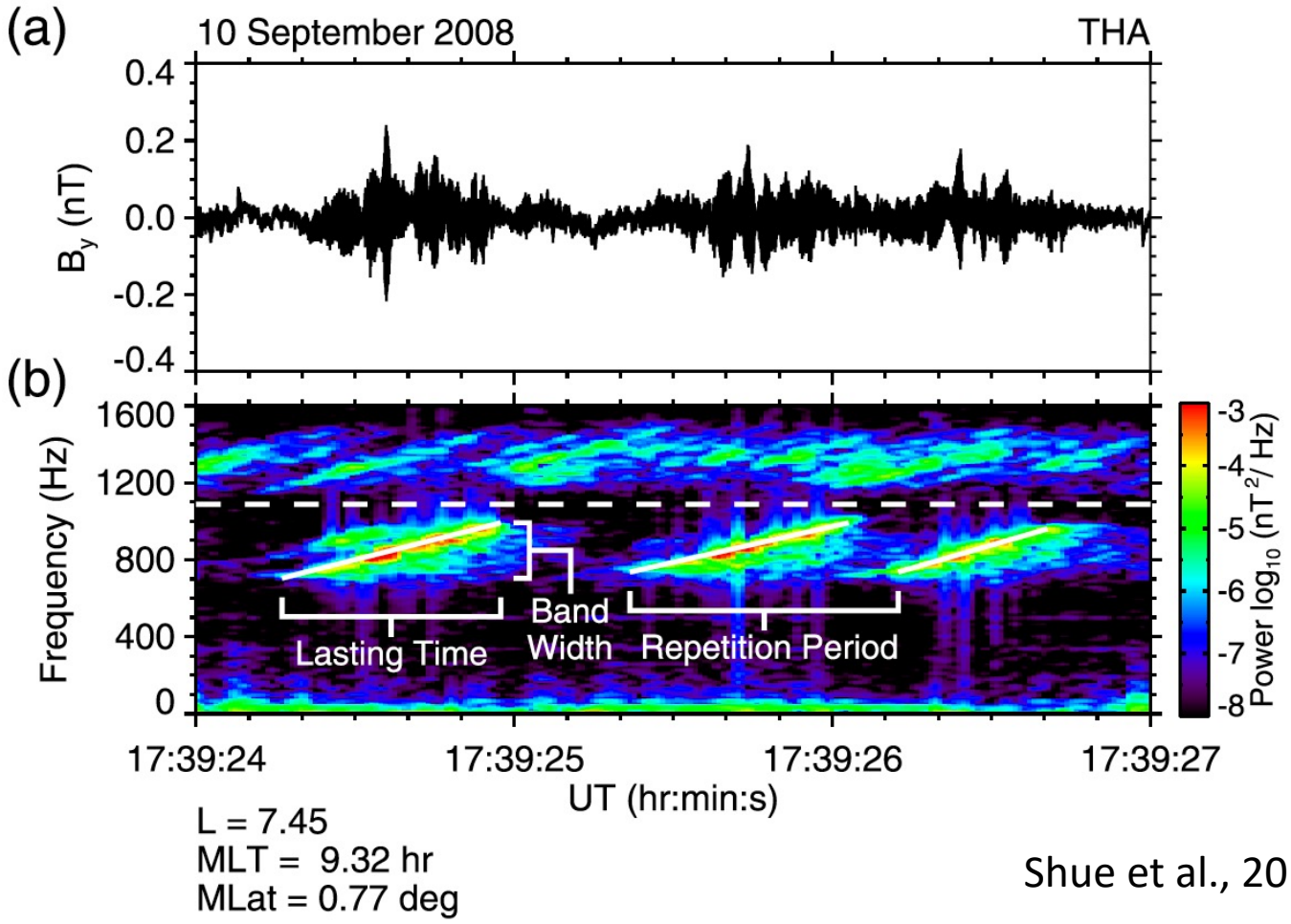
Strong MLT dependence---median microburst duration doubles from 80 to 160 ms

Distribution of SAMPEX microburst durations in L and MLT

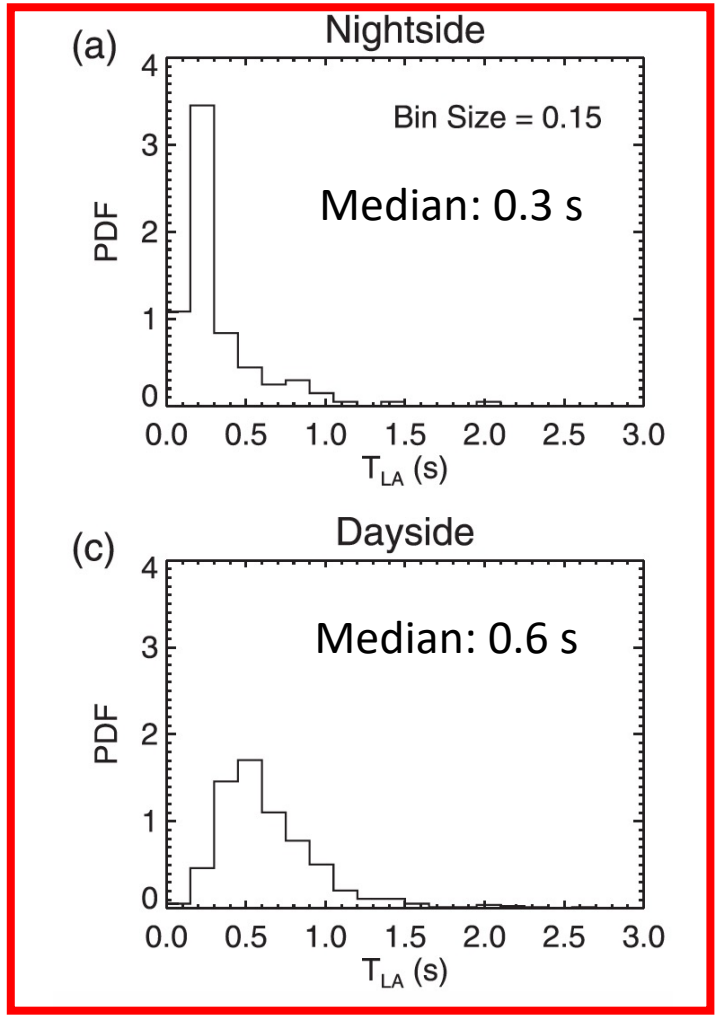




The chorus rising tone element duration follows a similar pattern.

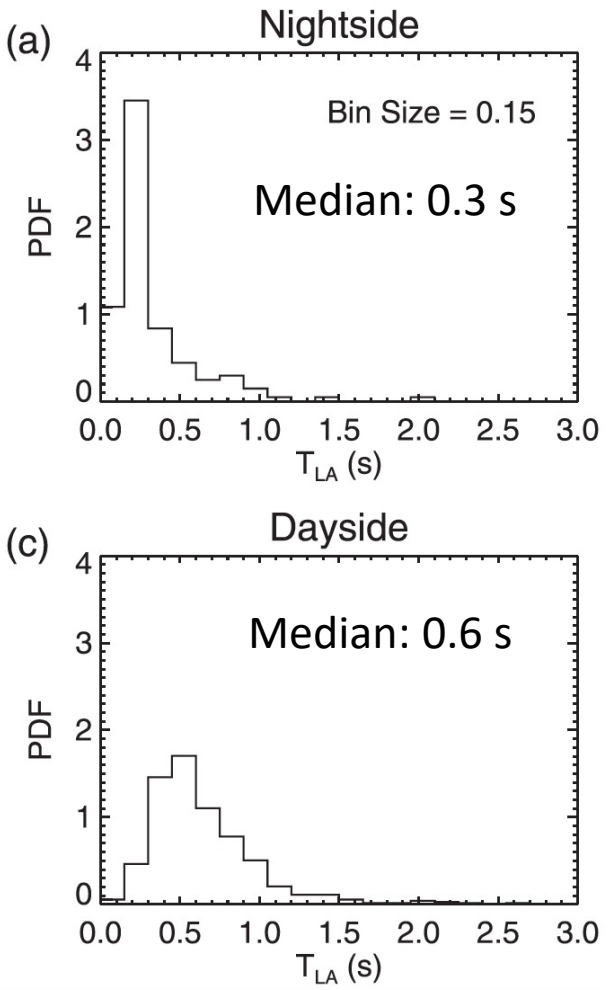


Shue et al., 2019



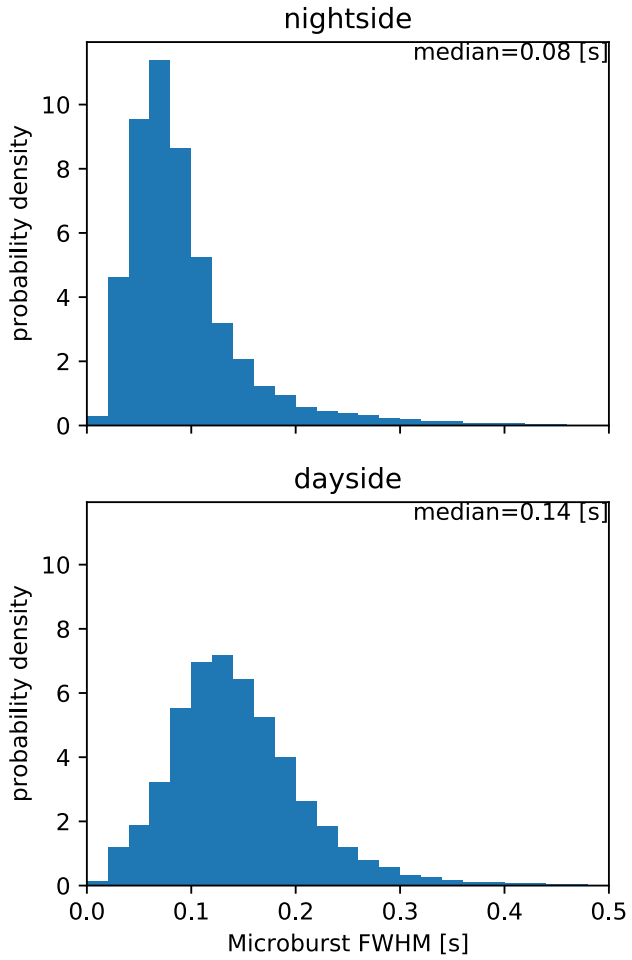
Duration of microbursts and chorus **double** between the nightside and dayside. But the absolute microburst duration is **3-4x shorter**

Chorus



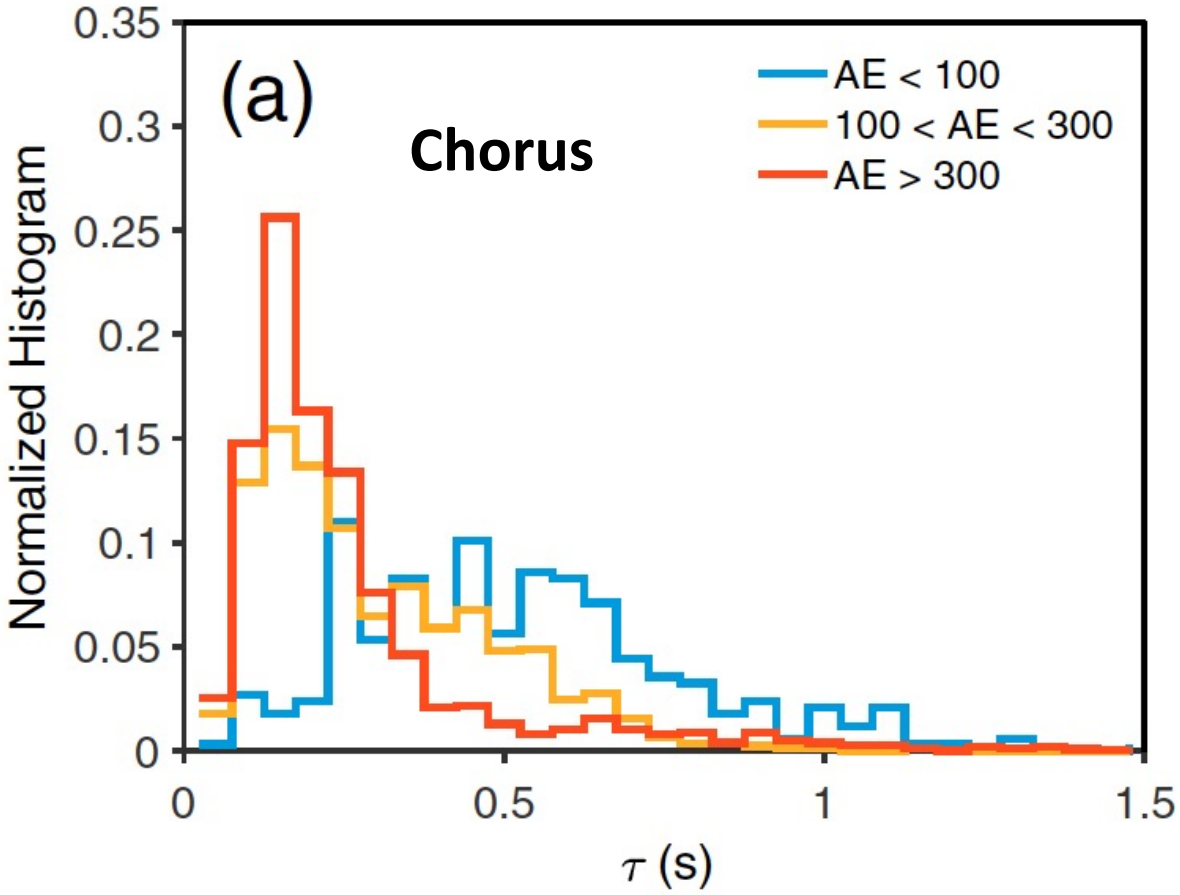
Shue et al., 2019

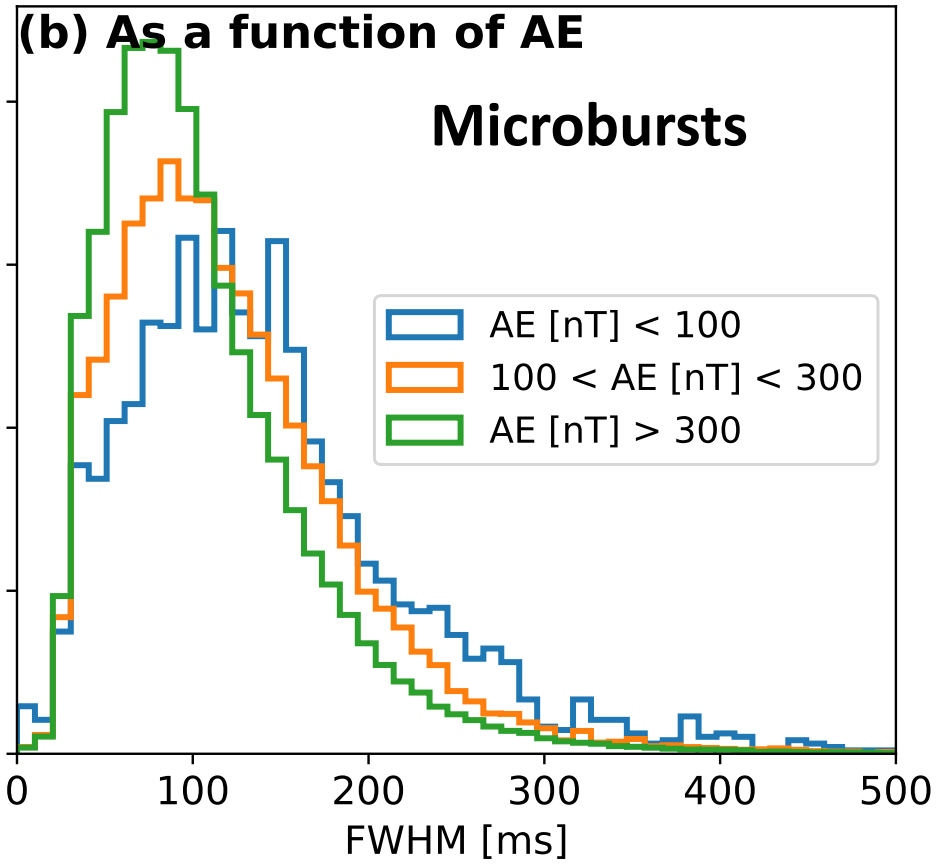
Microbursts



Nightside = 21-3 MLT
Dayside = 9-15 MLT

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





(a) 50th percentile

Question to consider:

The chorus-microburst durations follow a similar MLT trend, but why are chorus wave durations 3x longer?