Direct Comparison of Sporadic E from COSMIC-2 Radio Occultation and Vertical Wind Shears from ICON/MIGHTI

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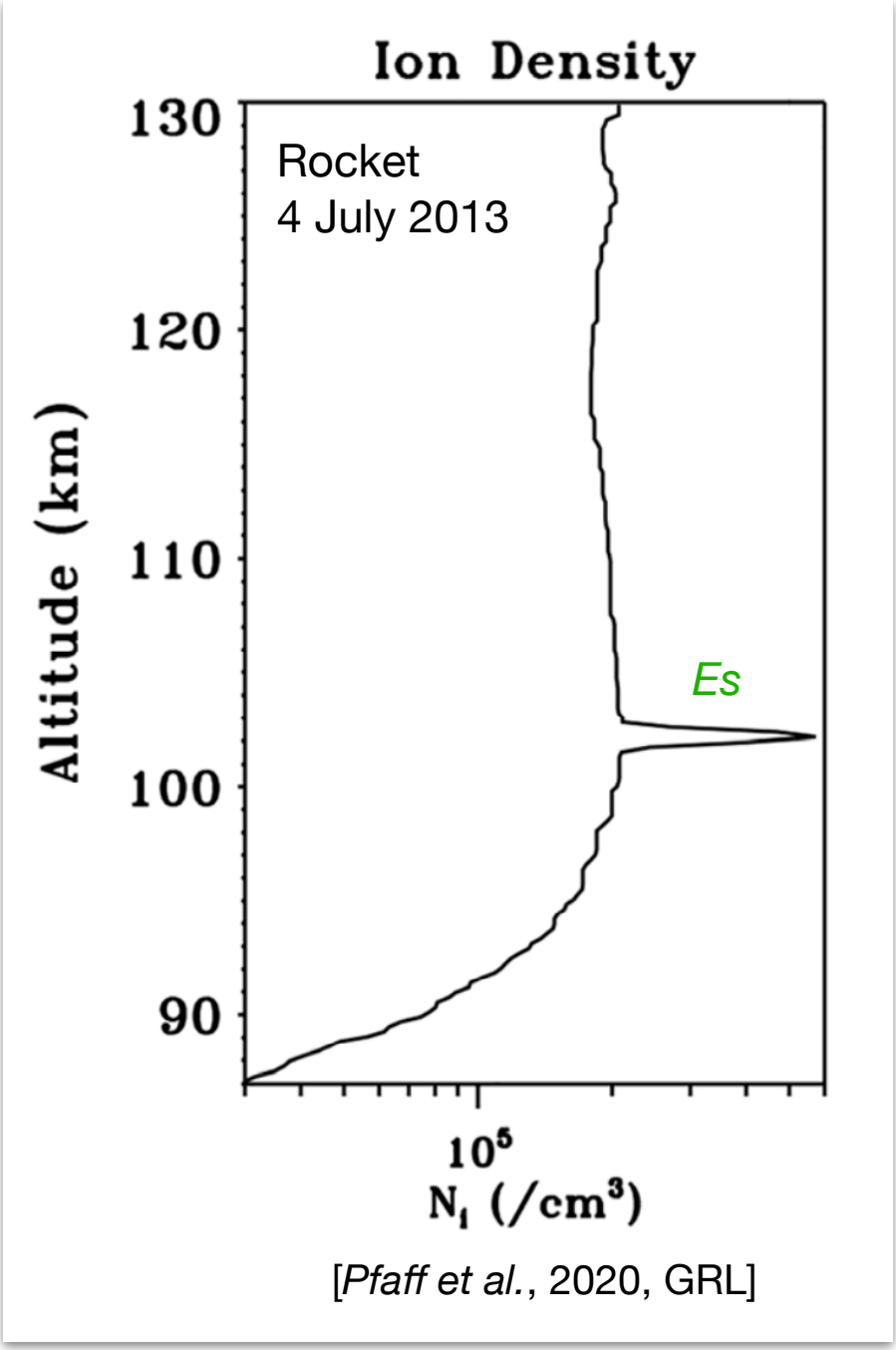
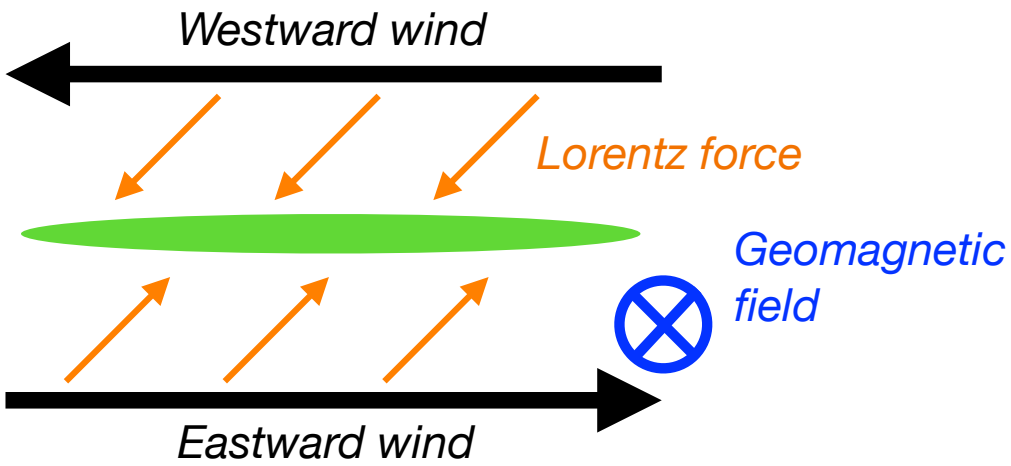
EGU 2022, ST3.2 (EGU22-8954), 27 May 2022

Sporadic E & Wind Shear Mechanism



[*Pfaff et al.*, 2020, GRL]

- Sporadic E (Es): layer of enhanced plasma density at E-region heights
- Consists of metallic ions (e.g., Fe^+, Mg^+)
- Theory: wind shear mechanism

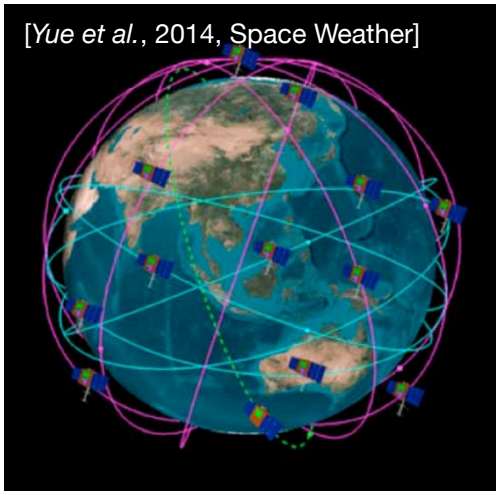


[after *Mathews*, 1998, JASTP]

Q: **Is there always a negative vertical wind shear at Es layer?**

Sporadic E & Wind Shear Data

①

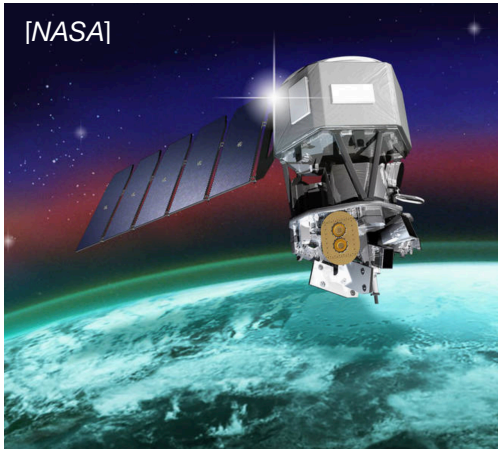


COSMIC-2 RO

⬇

Sporadic E detection

②

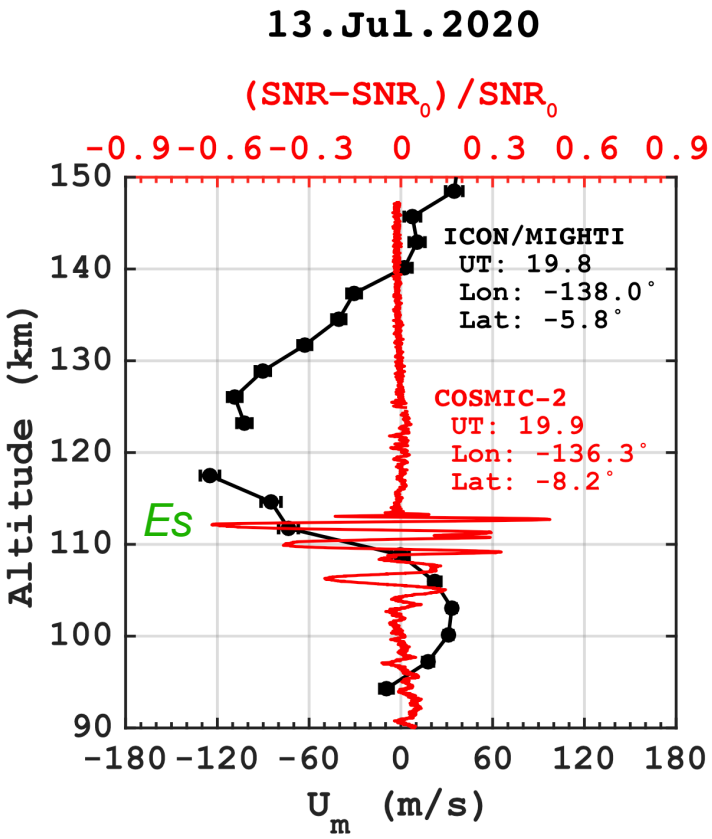


ICON/MIGHTI

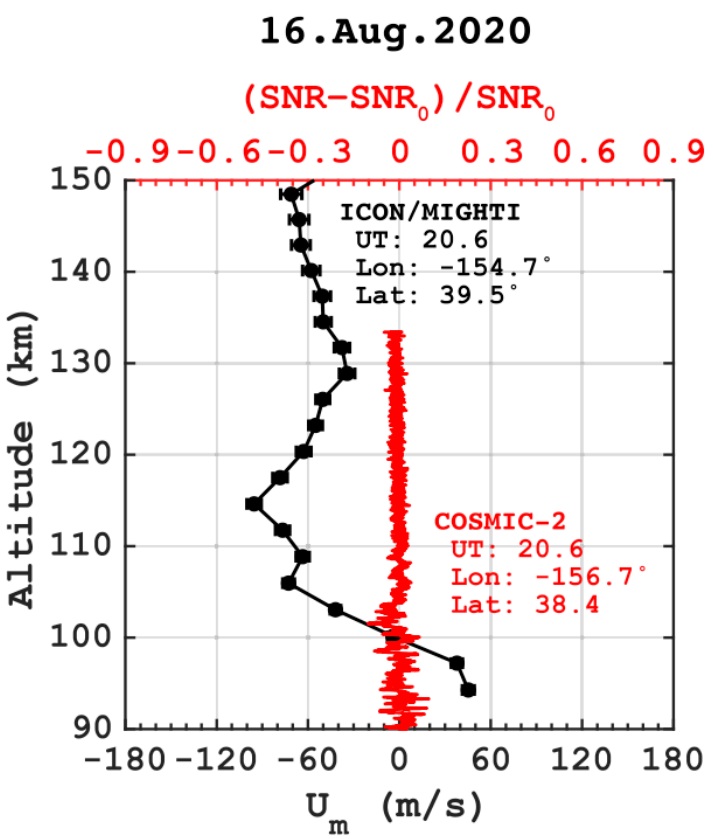
⬇

Neutral wind profile

Simultaneous measurements of **radio occultation (RO)** and **zonal wind** profiles



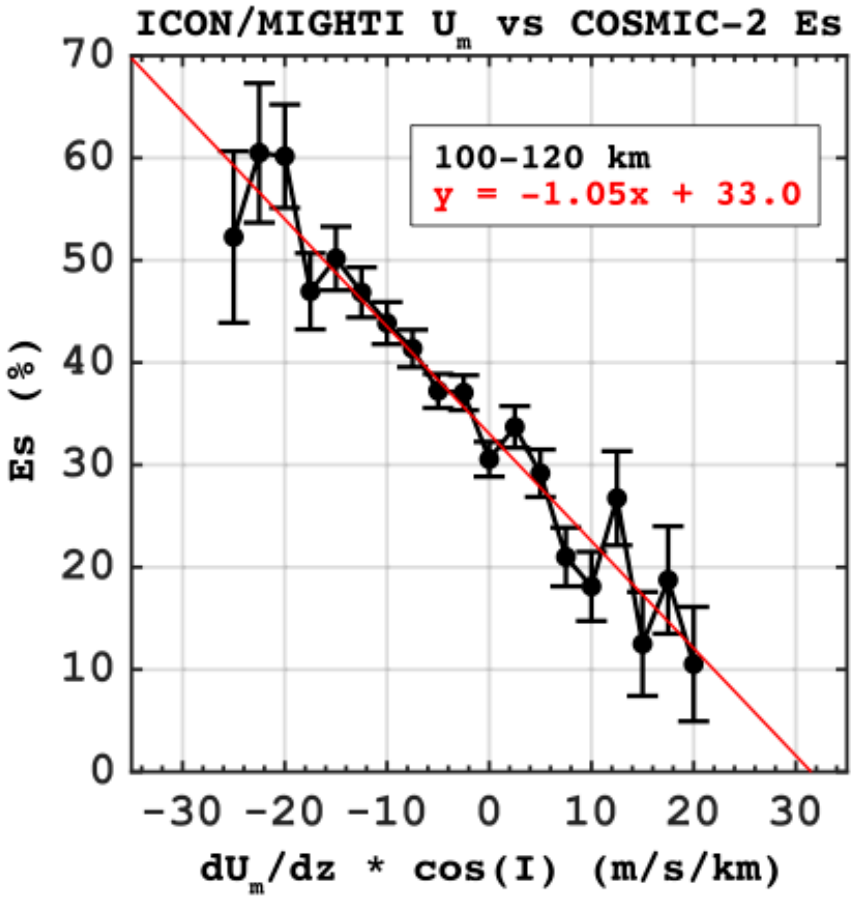
Sporadic E with negative wind shear



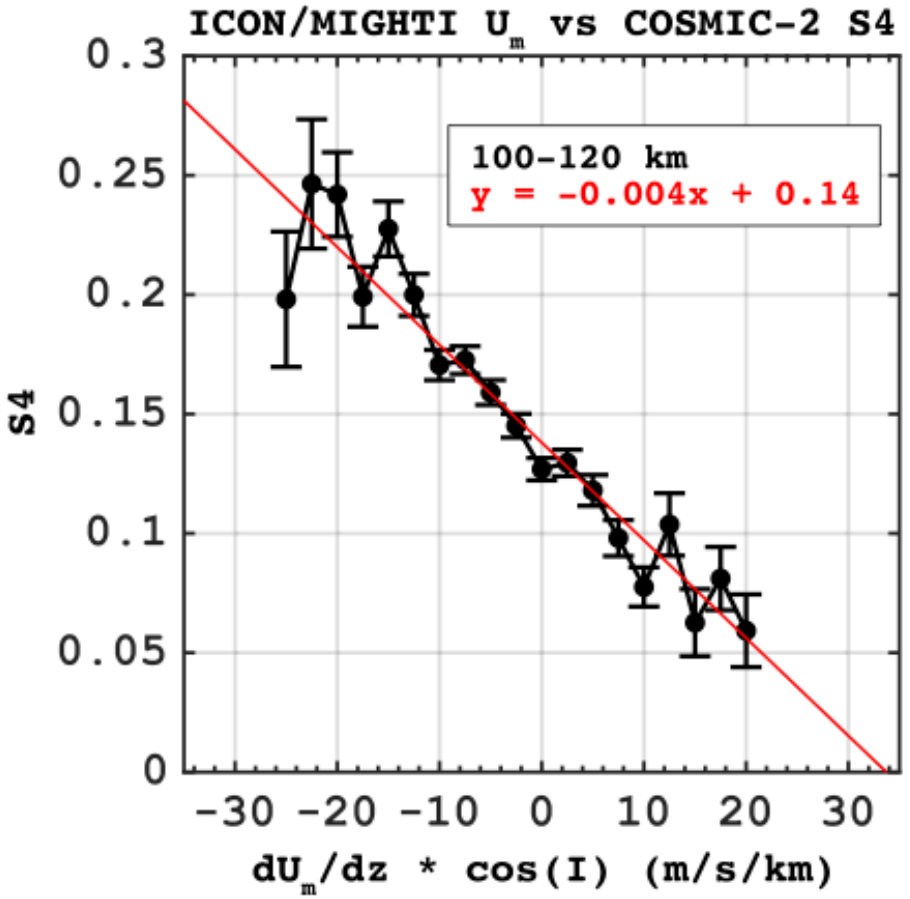
No sporadic E with negative wind shear

Statistical Results

10,751 conjunction measurements during June 2020–May 2021



Es occurrence rate *increases with negative wind shear.*



*S4 (**Es intensity**) increases with negative wind shear.*

Summary

- Conjunction observations of **sporadic E (Es) from COSMIC-2 RO** measurements and **vertical wind shear from ICOM/MIGHTI neutral wind** measurements are compared.
- Es occurrence rate and Es intensity correlate with the negative vertical wind shear of the zonal wind, **consistent with the wind shear theory**.
- Es can be observed even when the vertical wind shear is absent or even negative.

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10.1029/2021GL096202