

Composite Plots

Measurements (ideal): \mathbf{E} , $\mathbf{E} \times \mathbf{B}$, \mathbf{J}_{meas} , N_e , U_n , N_n , M_i ,

Derived Quantities: Mobility (collision frequencies)

Next Step:

Use measured \mathbf{E} , \mathbf{J} , N_e to find U_n that satisfies
Dynamo Equation:

$$\mathbf{J} = \underline{\underline{\sigma}} \cdot (\mathbf{E} + \mathbf{U} \times \mathbf{B})$$

Then, Compare to measured winds!

$$\mathbf{J} = \underline{\underline{\sigma}} \cdot (\mathbf{E} + \mathbf{U} \times \mathbf{B})$$

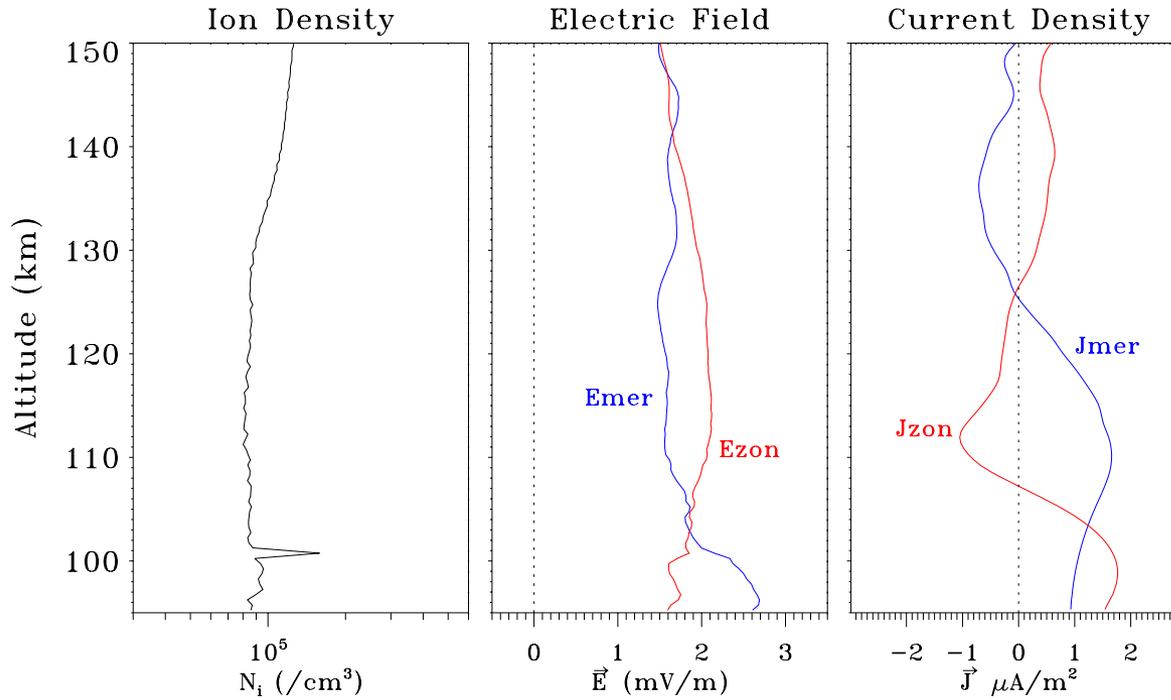
$$\mathbf{J} = \sigma_P (\mathbf{E}_\perp + \mathbf{u} \times \mathbf{B}) + \sigma_H \hat{\mathbf{b}} \times (\mathbf{E}_\perp + \mathbf{u} \times \mathbf{B}) + \sigma_o \mathbf{E}_\parallel$$

$$\sigma_P = e^2 \sum_j \frac{n_j \nu_j}{m_j (\nu_j^2 + \Omega_j^2)}$$

$$\sigma_H = e^2 \sum_j \frac{-n_j \Omega_j}{m_j (\nu_j^2 + \Omega_j^2)}$$

$$\sigma_o = e^2 \sum_j \frac{n_j}{m_j \nu_j}$$

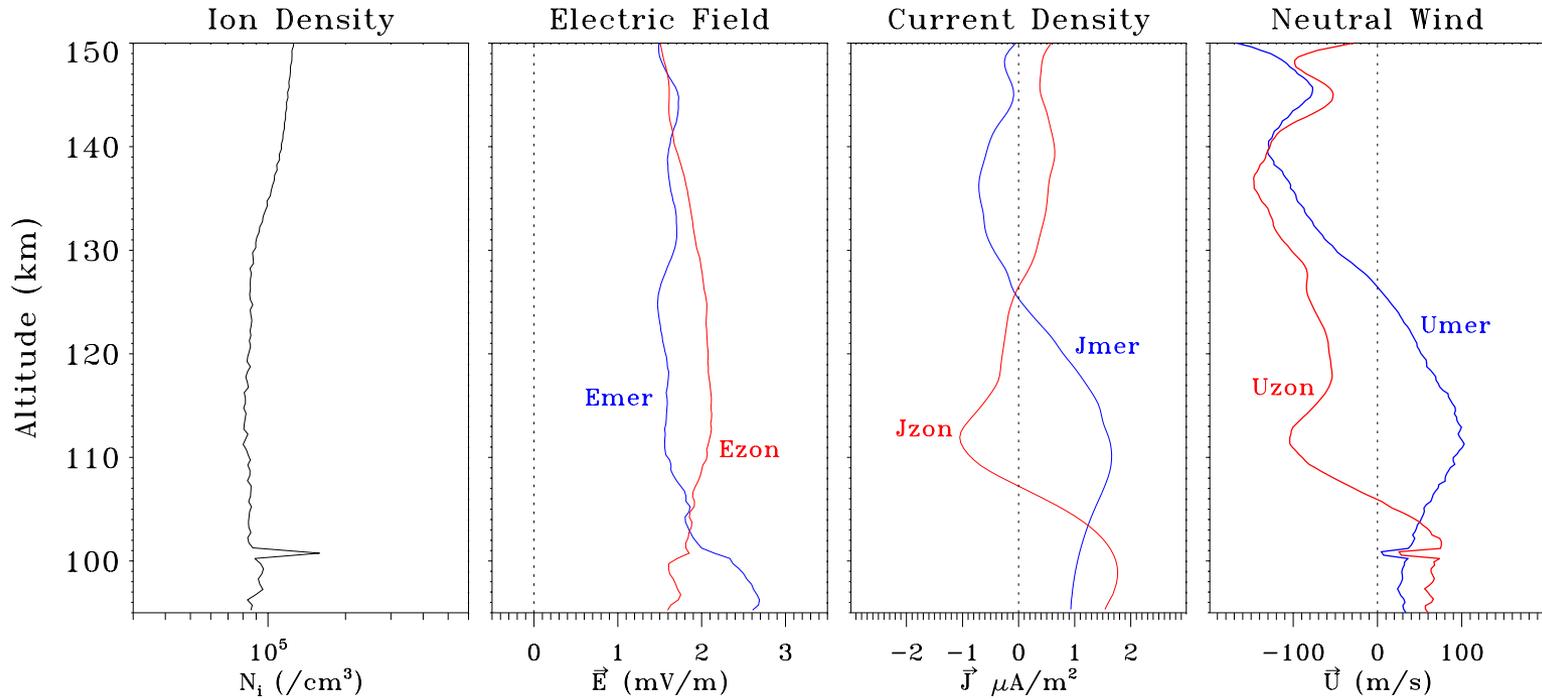
21.141, Downleg: Ion Density, Electric Field, Current Density, Neutral Wind



Neutral Winds are Derived from E, J, and Ne

Zonal is Positive East, Meridional is Positive Up/North

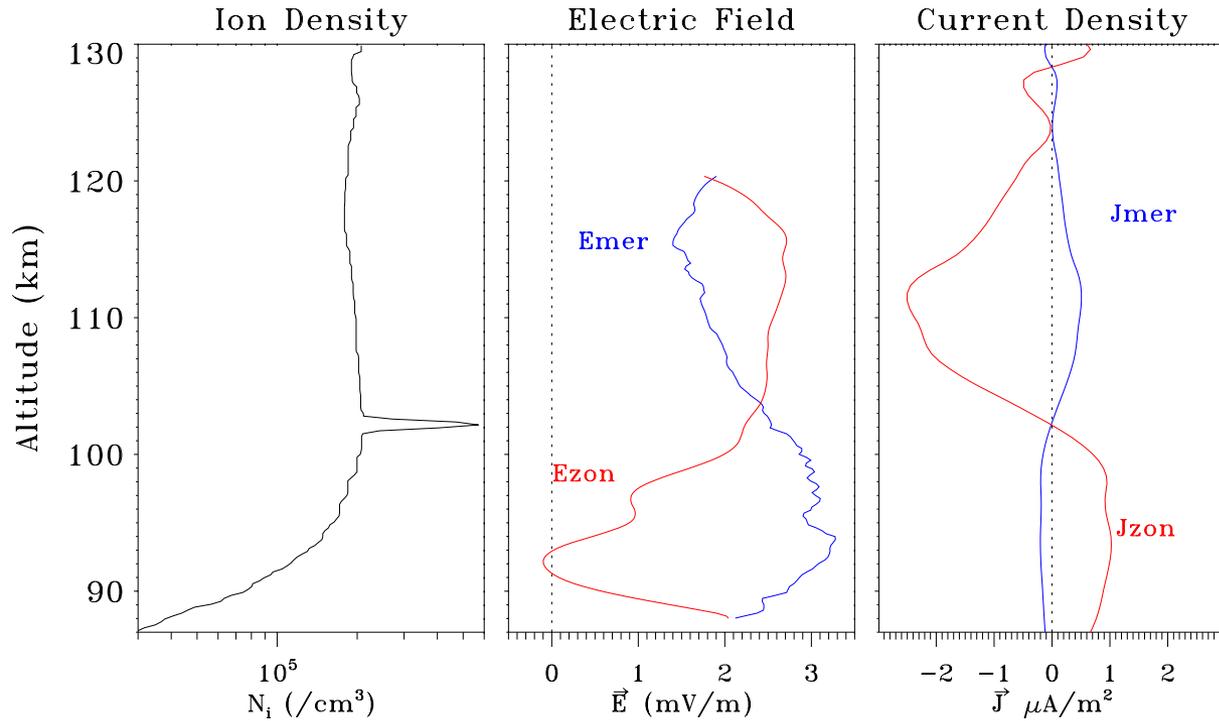
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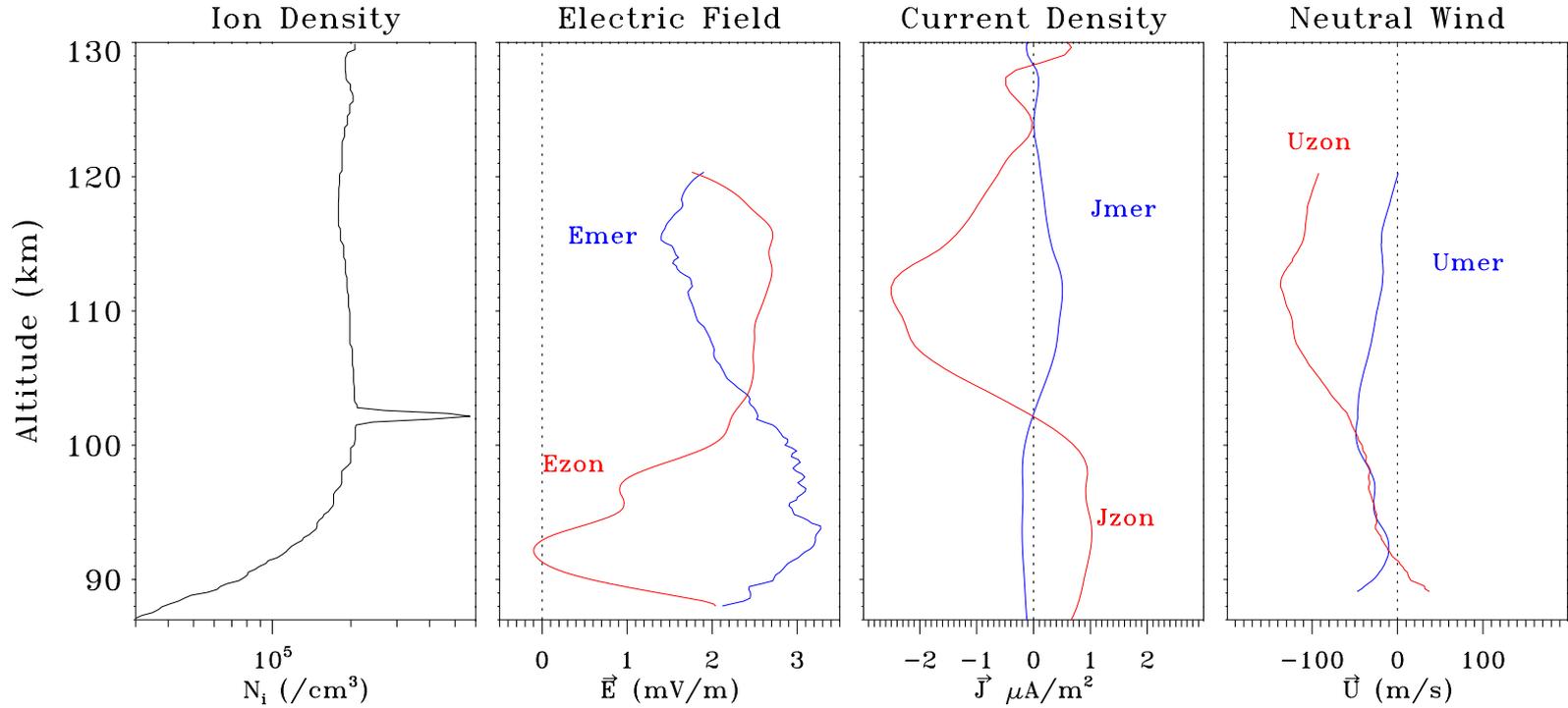
21.140, Downleg: Ion Density, Electric Field, Current Density, Neutral Wind



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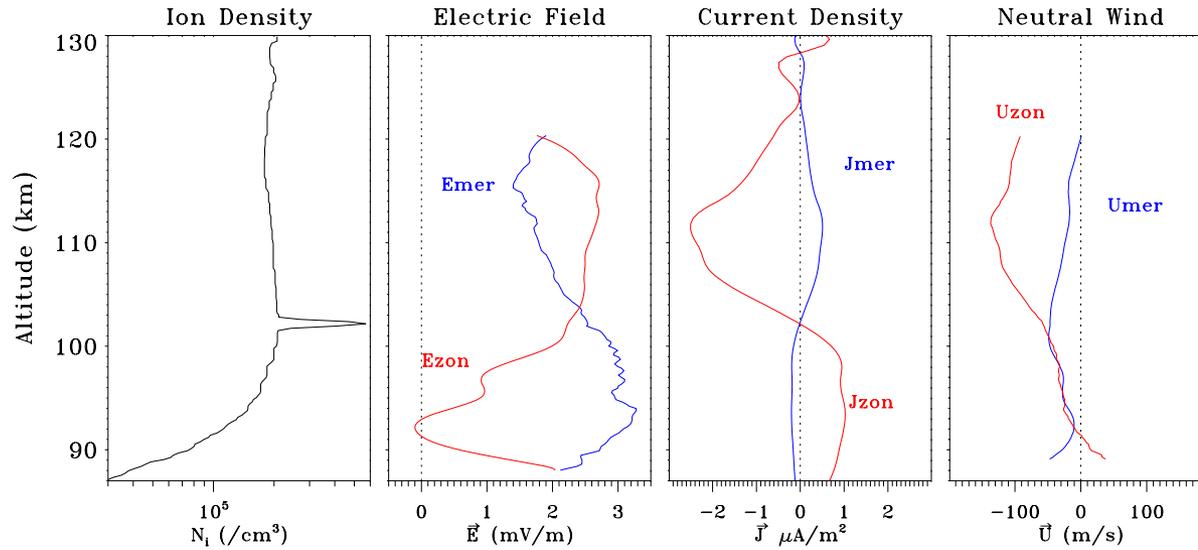
21.140, Downleg: Ion Density, Electric Field, Current Density, Neutral Wind



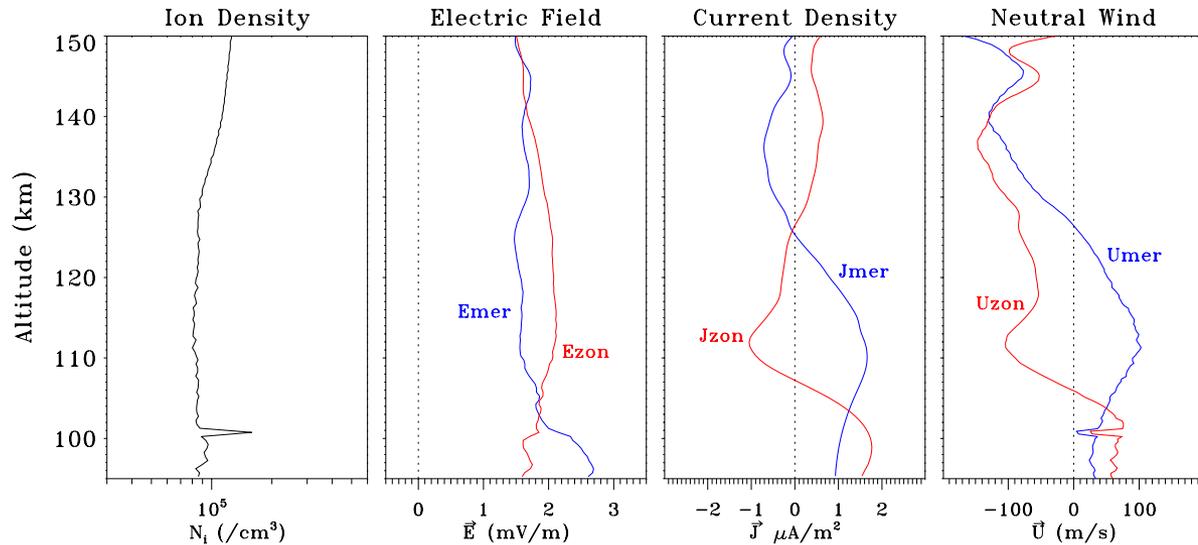
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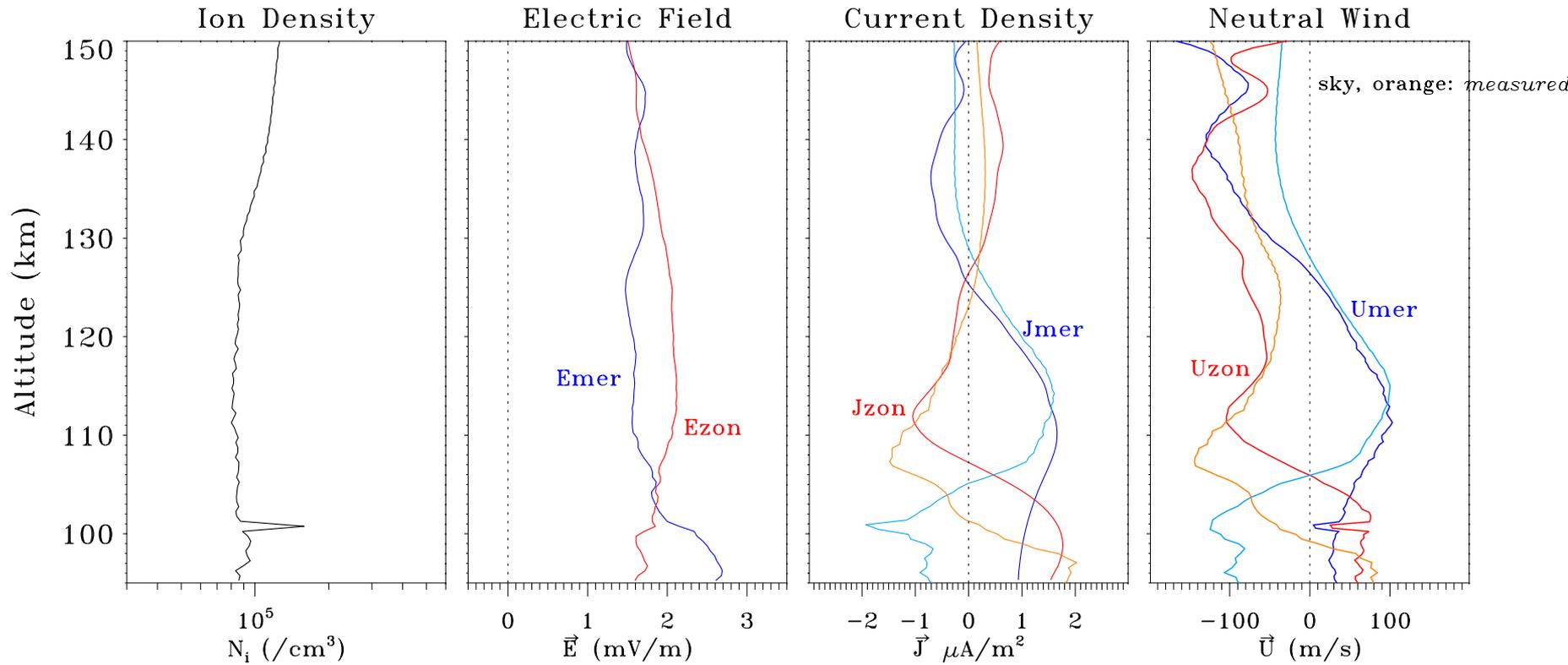
HF 2/24/14 16:15

Neutral Winds are Derived from E, J, and Ne

Zonal is Positive East, Meridional is Positive Up/North

Measured Winds are deduced from Aerospace Corp. Ionization Gauges (J. Clemmons)

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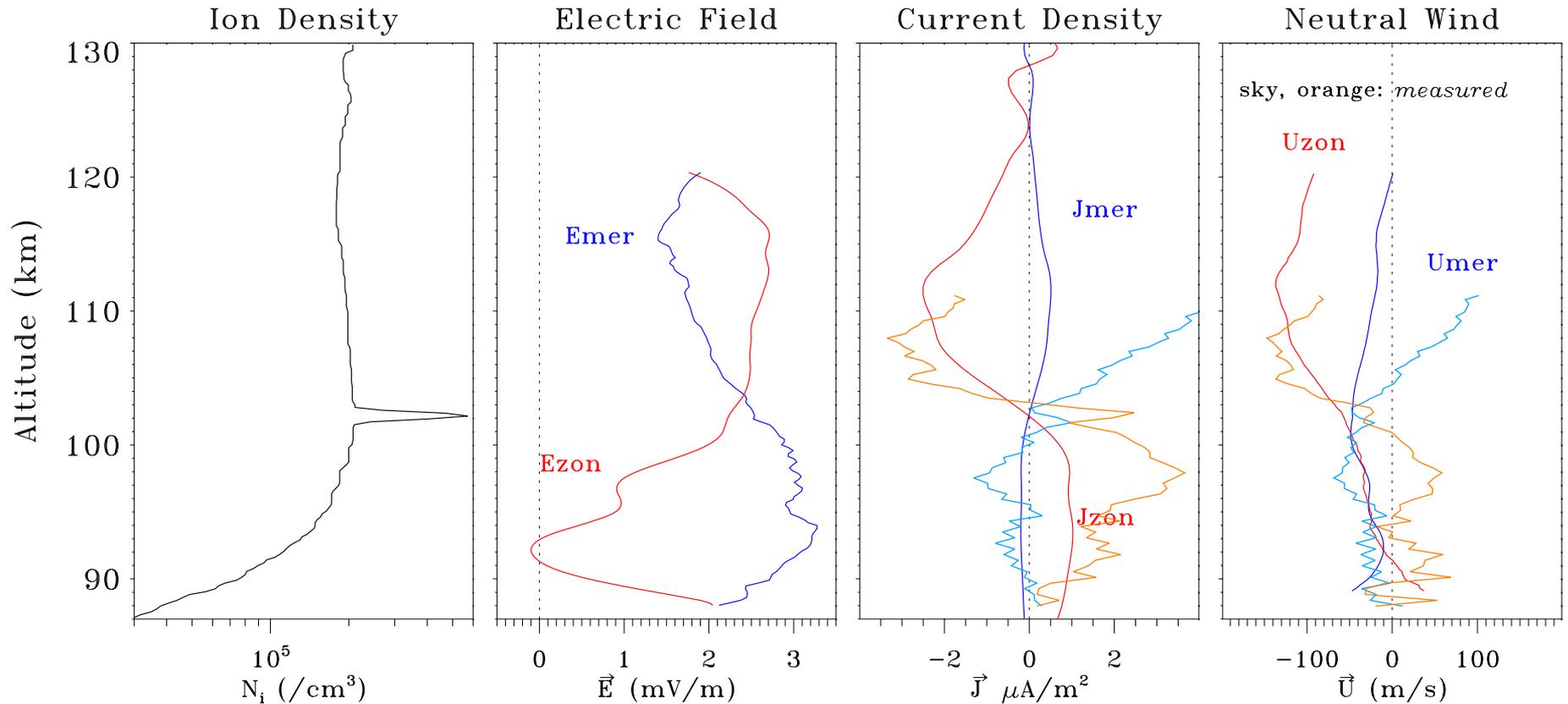


For comparison, neutral winds are also derived from measured E, J, and Ne

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21.140, Downleg: Ion Density, Electric Field, Current Density, Neutral Wind

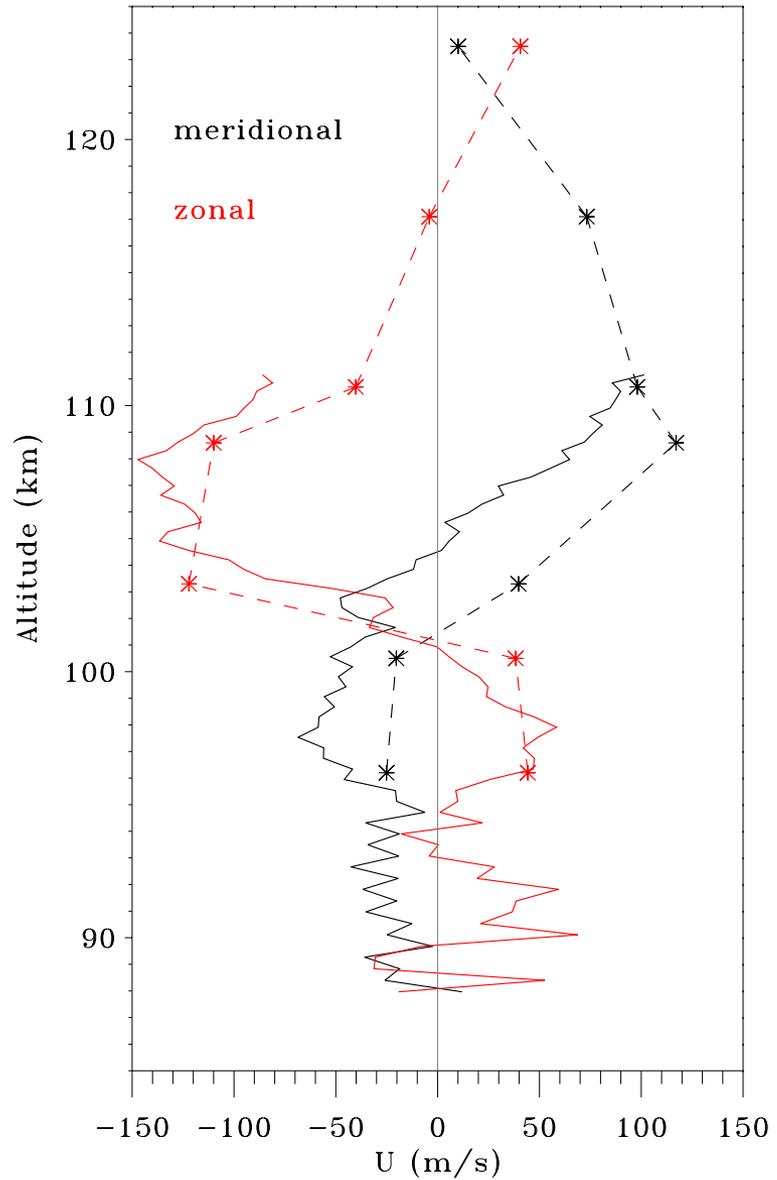


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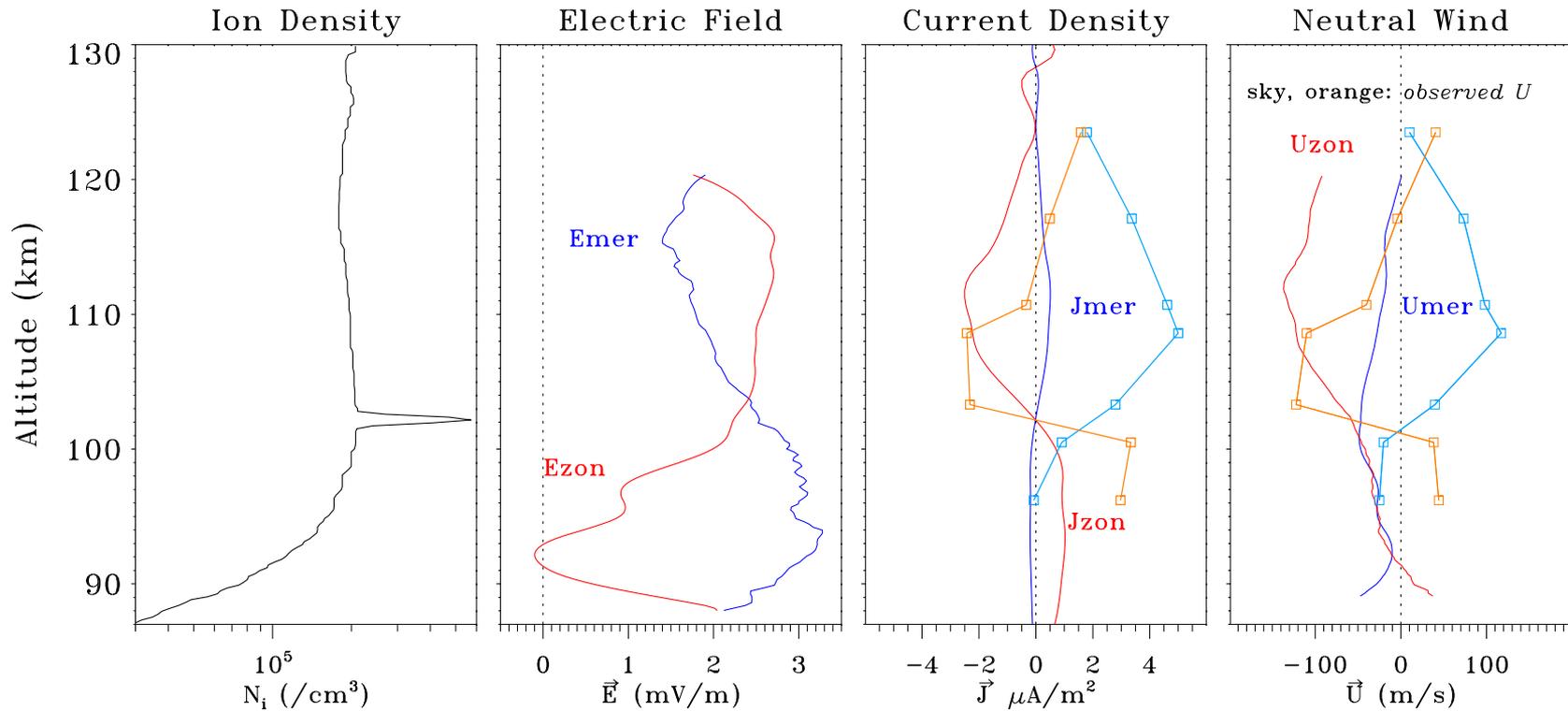
21.140: Observed Neutral Wind

solid: Aerospace; dashed: Clemson



Measured Winds are provided by Lithium Trail results (M. Larsen, Clemson Univ.)

21.140, Downleg: Ion Density, Electric Field, Current Density, Neutral Wind



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