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Data-Based and Theory-Based Ion Outflow Scaling Laws

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Purely empirical scaling laws for ionospheric outflows have previously been derived using data from the Fast Auroral Snapshot Small Explorer (FAST) spacecraft. These outflow scaling laws showed that the ion flux is correlated with precipitating electron density and quasi-DC Poynting flux. On the other hand, theoretical models such as the Dynamic Fluid Kinetic (DyFK) model have been used to explore the dependence of outflows on parameters such as the wave power in the heating region. Here we compare the two approaches, with the objective of placing the empirical scaling laws on a stronger, more physical footing.