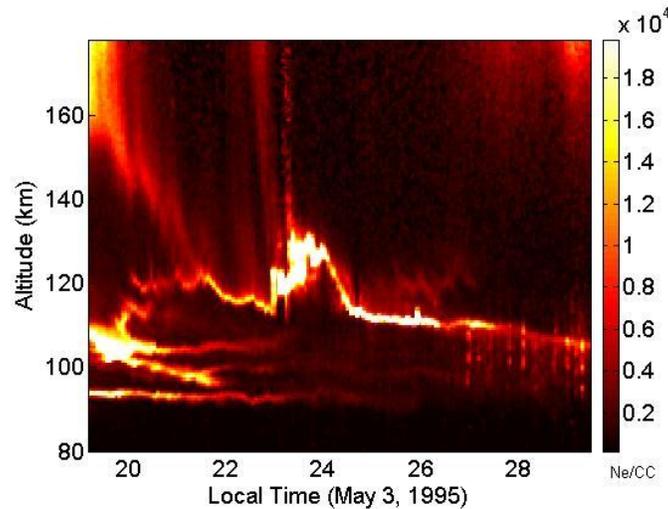


## Mid-Latitude Ionosphere Dynamics Studies

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The landscape of the mid-latitude E-region ionosphere is dominated by thin ionization layers less than several kilometers in thickness, as exemplified in Figure above. The layers below 120 km are typically referred to as sporadic E layers (Es). The Es layers are known to be formed mainly by east-west tidal winds driving ions across the geomagnetic field line (**B**). The layers above 120 km are commonly referred to as the intermediate or descending layers. The E-F valley region around 120-200 km is one of the least studied region of the atmosphere because it is in general not accessible to ground instruments other than incoherent scatter radars (ISRs) and had not been the main region of satellite studies until the launch of the TIMED satellite in 2001. The intermediate layer is a thread that weaves together the dynamic and chemical processes in the upper E-region and lower F-region. A better understanding of the intermediate layers will bring a better understanding to the underlying neutral wind system, electric fields, diffusion, and chemistry in this region, and to the meteoric deposition in the lower E-region as well. Understanding of these fundamental issues are critical to solving difficult problems often encountered in modern satellite communication and navigation such as signal fading, signal phase scintillation, Faraday rotation, signal bending, and ranging signal propagation errors.

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