



A climatology of fronts and their boundary layer structure in Helsinki, Finland

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In the mid-latitudes fronts are a dominant factor in determining the weather, and consequently, the structure and dynamics of fronts have undergone significant investigation. However, frontal structure at the end of the climatological storm tracks has received limited attention and despite previous work demonstrating the importance of boundary layer turbulent mixing on fronts, few observations have been published which reveal the structure of fronts in the boundary layer.

Significant weather charts produced every 6 hours by the Finnish Meteorological Institute are used as a basis to create a six year climatology of fronts in Helsinki, Finland. Helsinki (25°E 60°N) is at the end of the North Atlantic storm track, at a high latitude, and in a region where frontal climatology studies are extremely sparse. The basic climatology, constructed from the significant weather charts, includes the type of front, time of occurrence, and the direction that the front approached Helsinki from. Statistics based on this dataset, which includes 855 fronts (332 cold fronts, 236 warm fronts and 287 occluded fronts), will be presented.

The climatology has been significantly enhanced by the inclusion of multi-level observations from a 327m mast which has resulted in an unprecedented climatological view of the structure of fronts within the boundary layer. Frontal characteristics, such as temperature and wind change, precipitation, stability, and vertical tilt are calculated for all fronts and are related to pre-frontal boundary layer structure, large-scale synoptic patterns, and seasonal and diurnal cycles.