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Observation of the cold ion stagnation in the ionospheric outflow

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The ionospheric outflow significantly contributes the cold ion (up to a few tens of eV) in the magnetosphere through the polar wind. It is widely accepted that the ions of the polar wind, associated with ambipolar electric field at low altitudes, are continuously accelerated at high altitudes. However, disruption of the ambipolar electric field results in an ion stagnation in a convecting magnetic flux tube, which is rarely mentioned in previous studies. With ten years Cluster observation, we report that this cold ion stagnation is found in high latitude of the dayside magnetosphere. By utilizing the particle tracing with parameter inputs from cold ion measurements in the magnetotail, we found that the cold ions in the magnetotail could be originated from the region where we observe the cold ion stagnation.