

## **GPS amplitude and phase scintillation associated with different polar cap ionization structures**

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The polar cap ionosphere consists of structures of various temporal and spatial scales. These structures will affect trans-ionospheric radio signals differently; therefore, a good understanding of the mechanisms that cause these structures is important in mitigating their effect on radio systems such as the Global Navigation Satellite Systems (GNSS). Scintillation, rapid random fluctuations of the amplitude and phase of a trans-ionospheric radio signal, is thought to be produced by Fresnel scale (<500m) irregularities that are generated through Gradient Drift Instability (GDI) and/or Kelvin-Helmholtz Instability (KHI) and/or modified RTI; however, these mechanisms are mainly operational in the F region ionosphere (E region conditions are slightly different). In the polar region, there other ionospheric structures as well (polar cap arcs produced by particle precipitation and Sporadic E layers produced by metallic ions) and these structures can produce scintillation as well. The question is; is scintillation produced by these structures characteristically different? We will be presenting a comprehensive study of the characteristics of scintillation produced by patches, polar cap arcs, and polar cap sporadic E layers. This will give us some clues regarding the underlying mechanism(s) that produce ionospheric scintillation.