

Postmidnight bubbles and scintillations in the quiet-time June solstice: possible forcing from lower atmosphere

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Abstract: This paper presents a case study of the strong postmidnight bubbles that often occur during magnetically quiet periods primarily in June solstice, along with a 4 year (2009–2012) statistical study that shows strong occurrence peak during June solstice predominantly in the African sector. While the mechanism for producing plasma irregularities in the dusk sector is believed to be fairly well understood, the cause for the formation of irregularities and bubbles during postmidnight sector is still unknown, especially for magnetically quiet periods. For the first time, the presence of Rayleigh-Taylor (RT) instability during postmidnight hours has been confirmed by using the physics-based model for plasma densities and RT growth rates. The question is what cause for the generation of eastward electric field, which is the prime driver of RTI, during postmidnight sector? Several possible sources of the eastward electric fields that permit the RT instability to develop and form bubbles in the postmidnight local time sector has been considered.