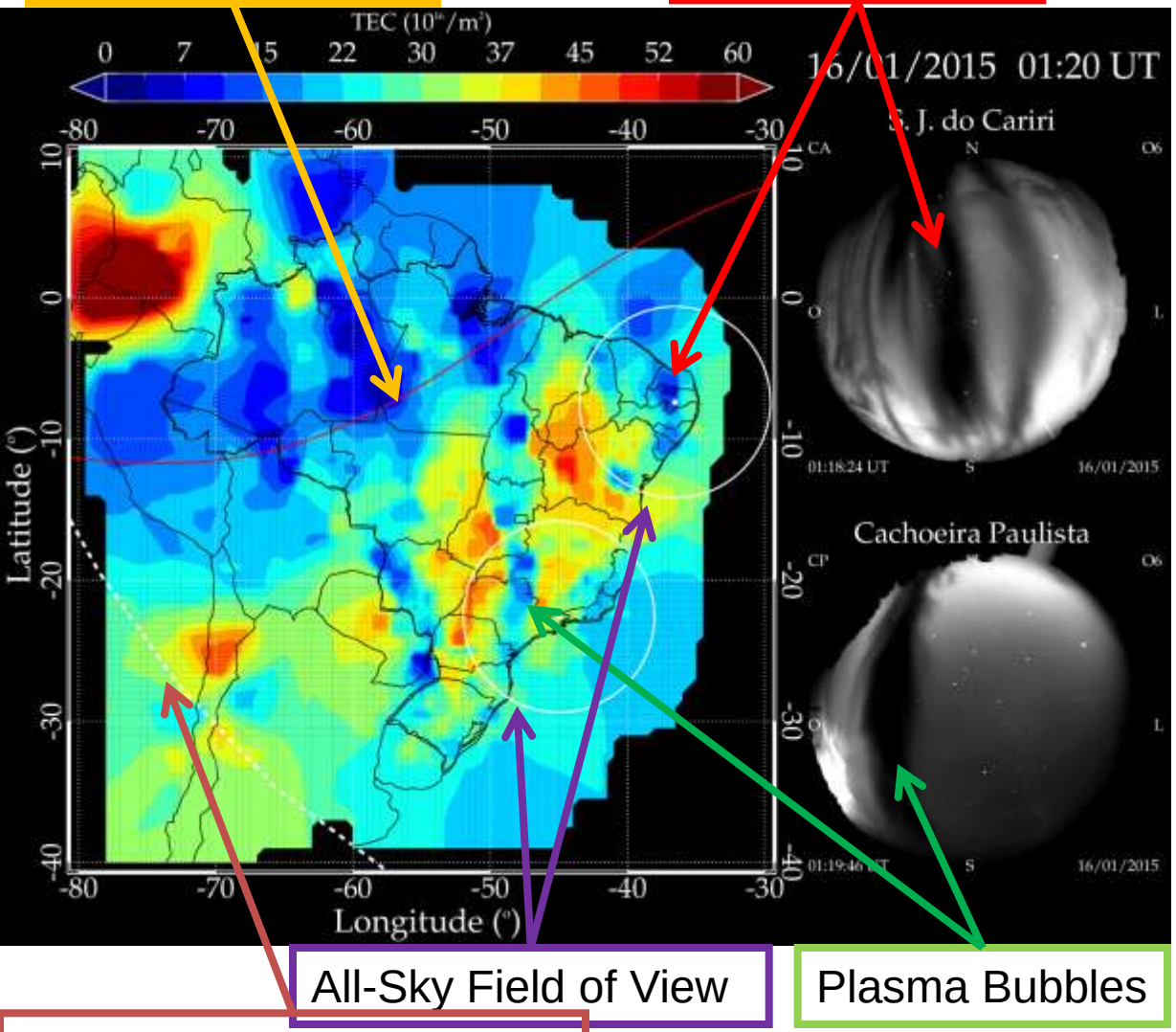
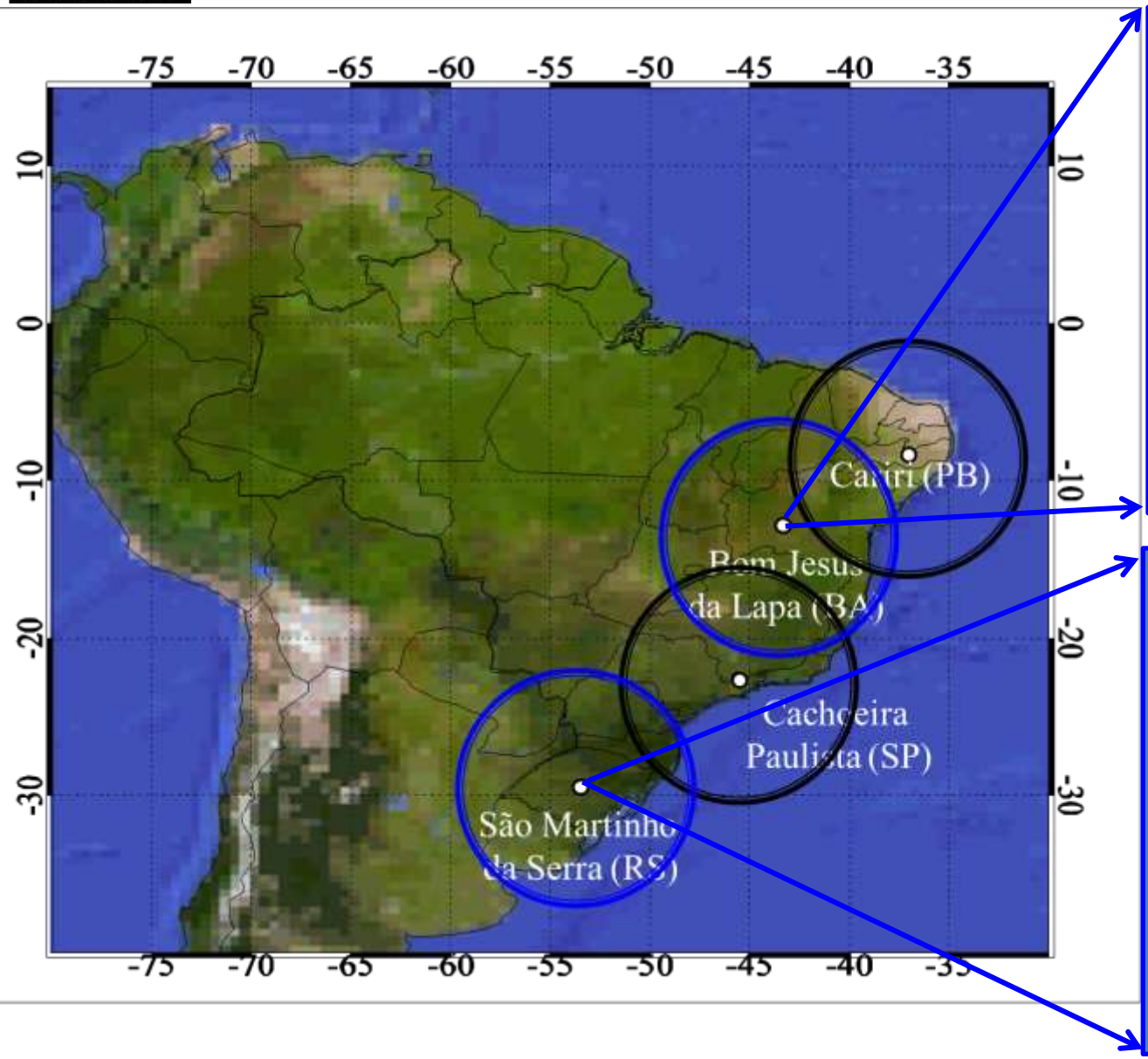
Equatorial Plasma Bubbles (EPB)

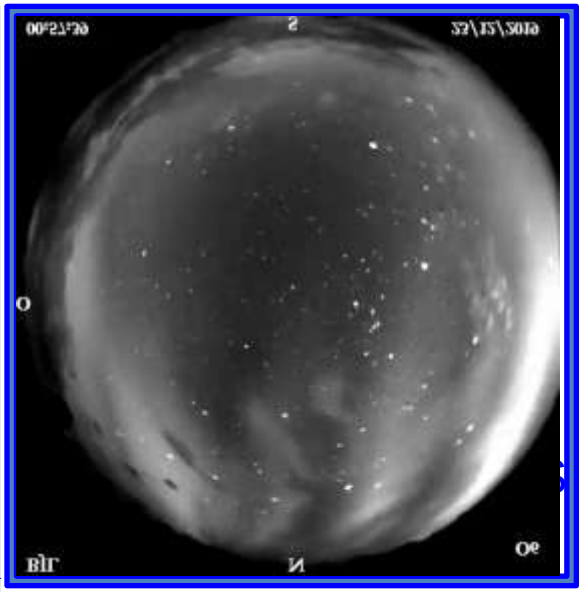
TEC GPS Maps Versus All-Sky images

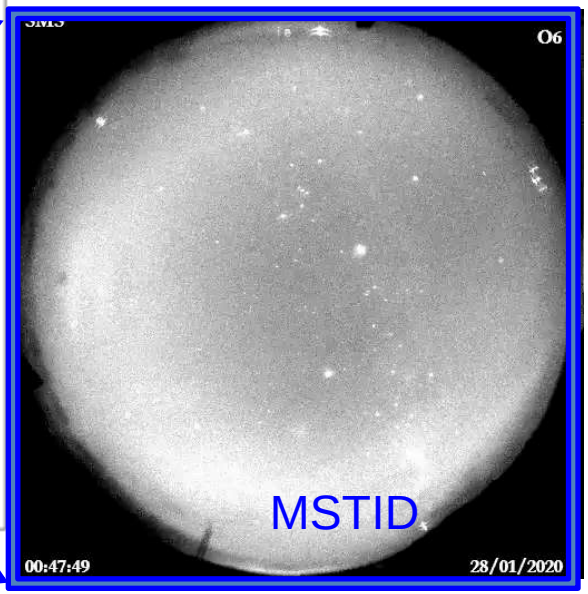


- EPB's are depletions of the plasma density along the magnetic field lines;
- EPB's Mechanism is Rayleigh-Taylor Instability.

EMBRACE NEW OBSERVATION SITES







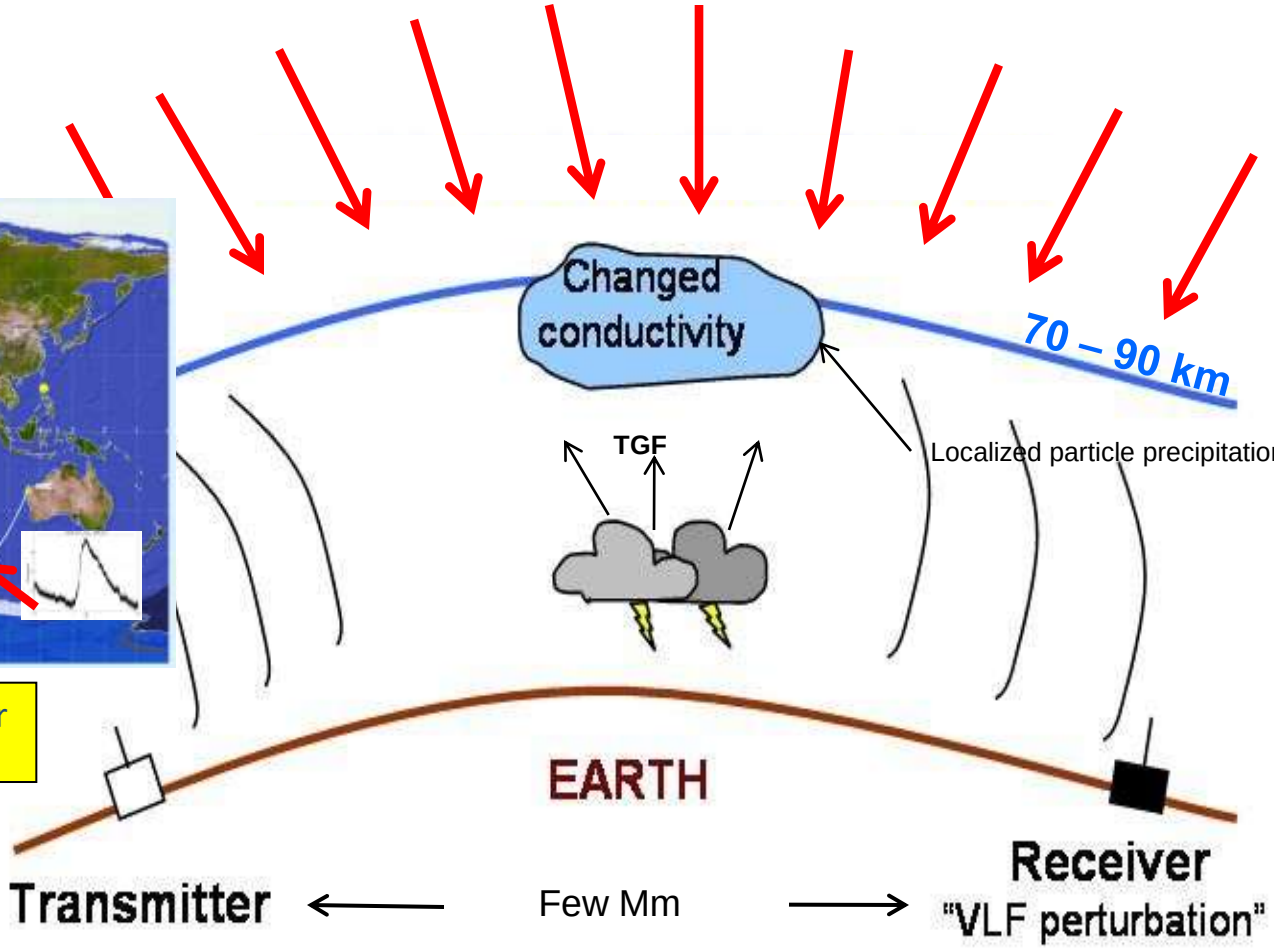
SAVNET: Ionospheric Disturbances

Photons and/or energetic particles → ionization excesses → changes of the electrical conductivity

→ VLF propagation anomalies → VLF phase and amplitude changes

Solar: quiescent, Ly-α, X-rays (flares), particles (SEPs); Non-Solar: X-rays, GRB, flares from SGR

Solar flares can be detected over a large longitudinal sector



The South Atlantic Anomaly – SAA: First evidence of the effects on the quiescent reference height

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Research Paper

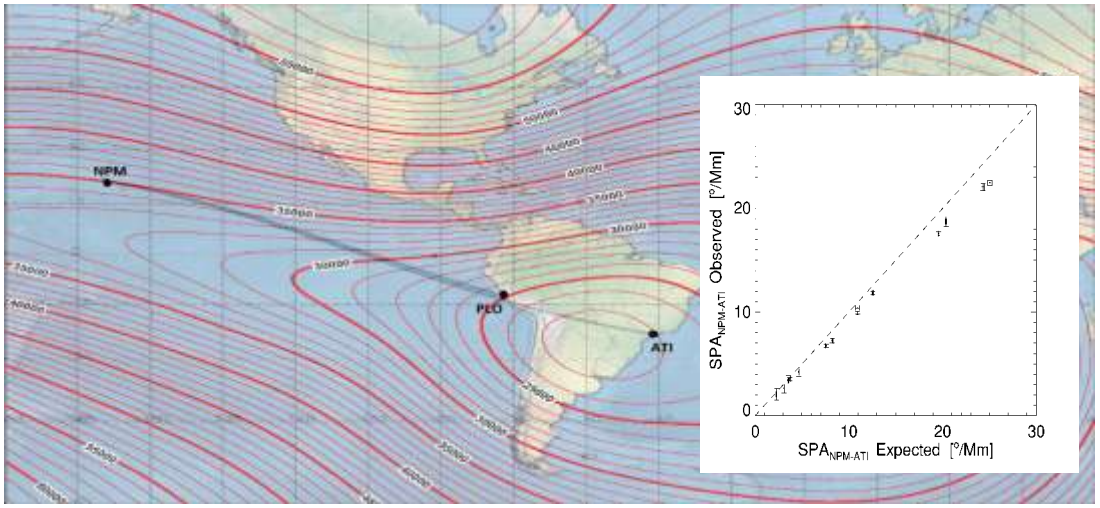
Ionosphere D-layer lowering in the region of the South Atlantic Magnetic Anomaly

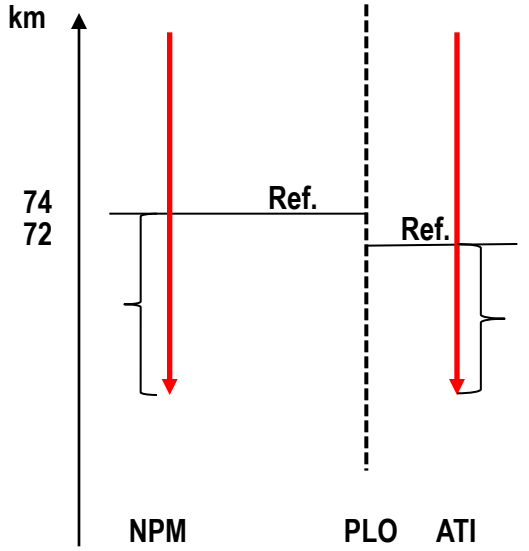
António A.S. Magalhães [a], Gabriel Guerche [b], Jean-Pierre Raulin [a,*]

[a] Centro de Rádio Astronomia e Astrofísica Mackenzie, Universidade Presbiteriana Mackenzie, São Paulo, Brasil
[b] Sorbonne Université, Faculté des Sciences et Ingénierie, Paris, France

ABSTRACT

In this paper we analyze the effects of 25 solar flare events over long VLF propagation paths, one of them with the very remarkable property of crossing nearly the centre with the lowest magnetic field intensity in the South Atlantic Magnetic Anomaly (SAMA). The phase of the VLF transmitter signal (NPM: 21.4 kHz) on Lualualei, Hawaii, was recorded at the stations Punta Lobos (PLO, Peru) and Atibaia (ATI, Brazil) between 2007 March and 2011 September. Both paths NPM-PLO and NPM-ATI are collinear, and the comparison of the recorded phases suggests a descent of the lower ionosphere quiescent reflection height, possibly associated with the weakening of the Earth magnetic field in the SAMA region.

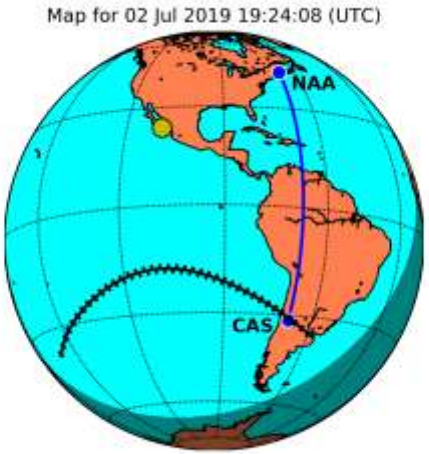


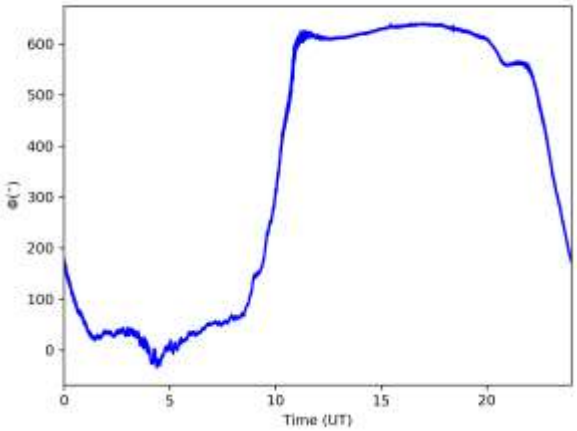


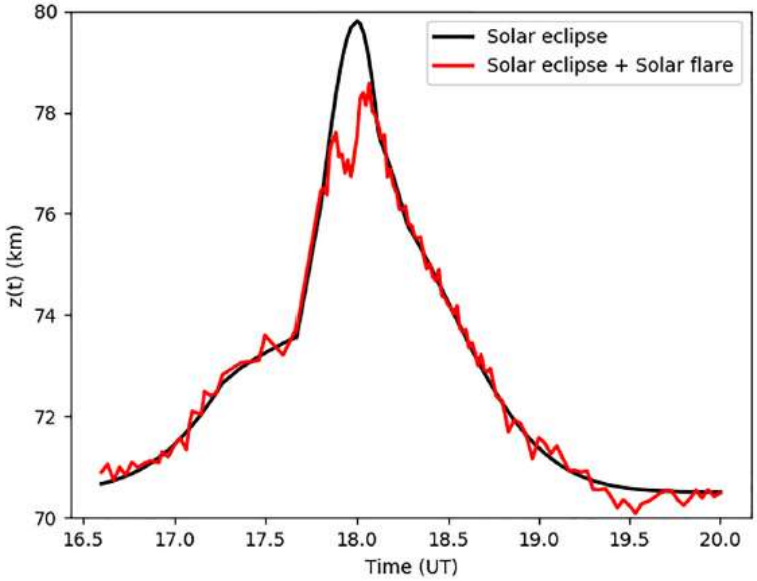
Observations indicate that the quiescent reference height is lower by 1 - 3 km within the PLO – ATI portion of the VLF propagation path

First evidence of the effect of the magnetic anomaly on the quiescent D-region reference height

Great American Solar Eclipse, 2019, July







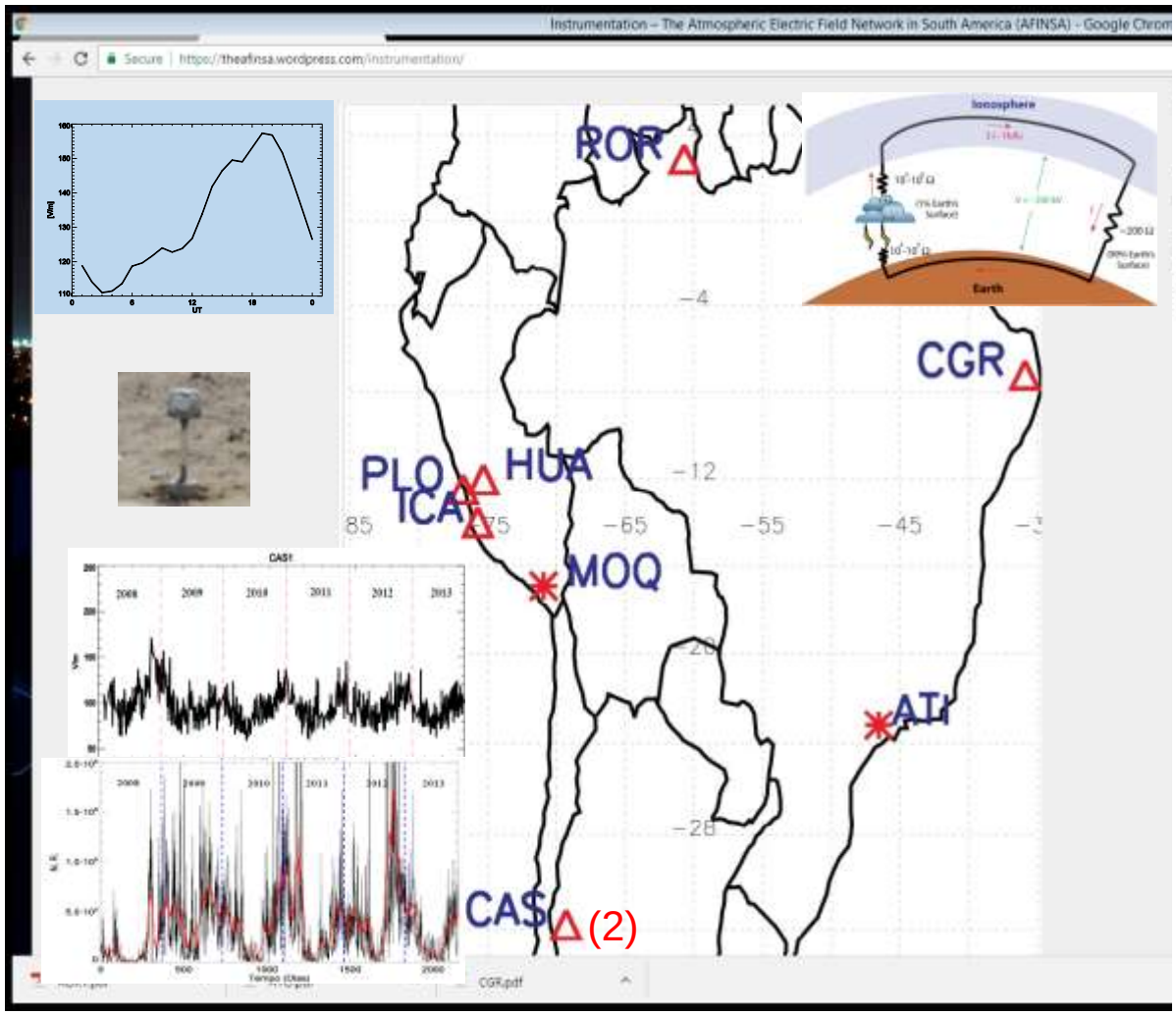
Great American Solar Eclipse, 2017, August 21

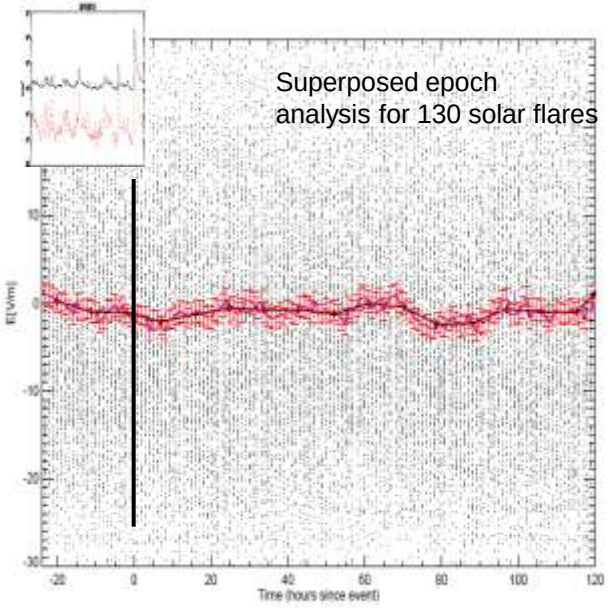
The AFINSA network

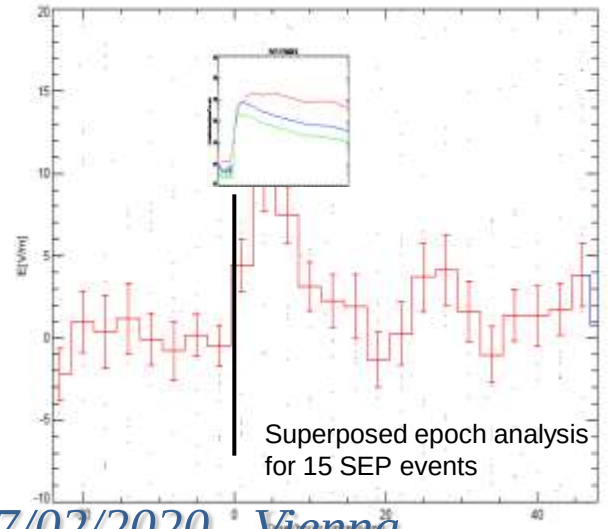
https://theafinsa.wordpress.com/

CRAAM

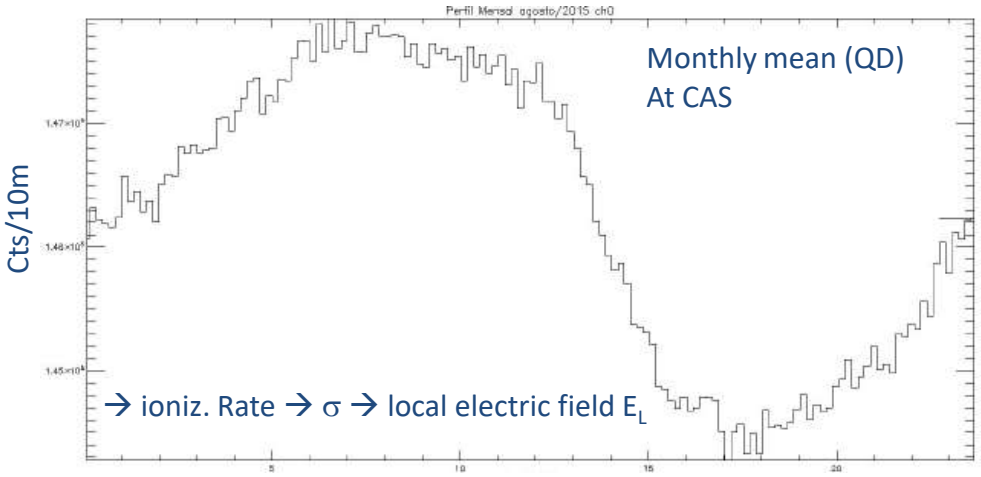
Atmospheric Electric Field - GAEC

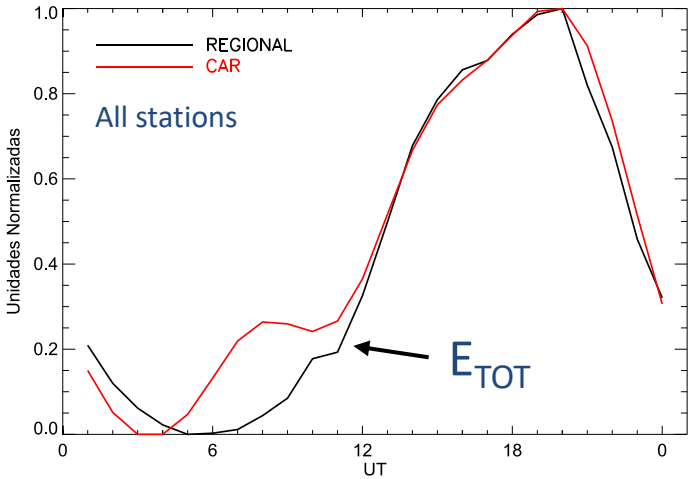






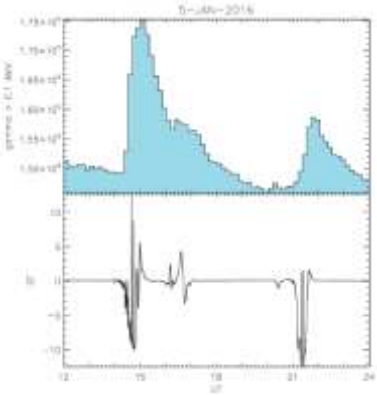
X/γ-rays observations at CASLEO





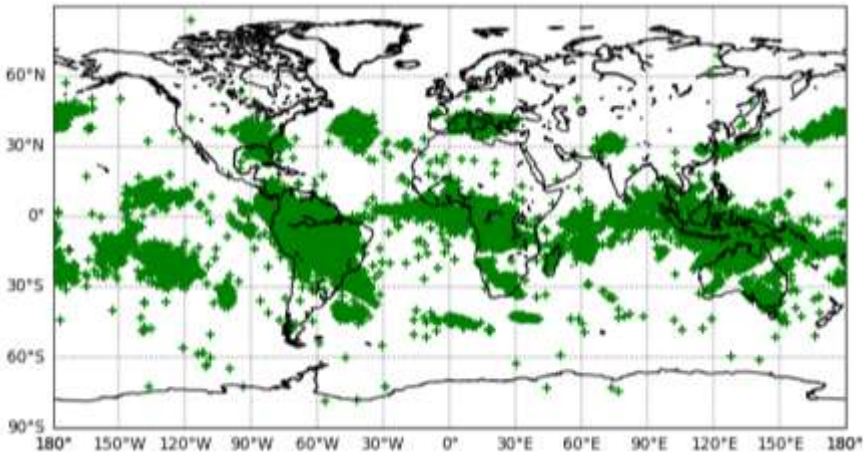
Total Electric Field $E_{TOT} = E_L + E_{GEC}$

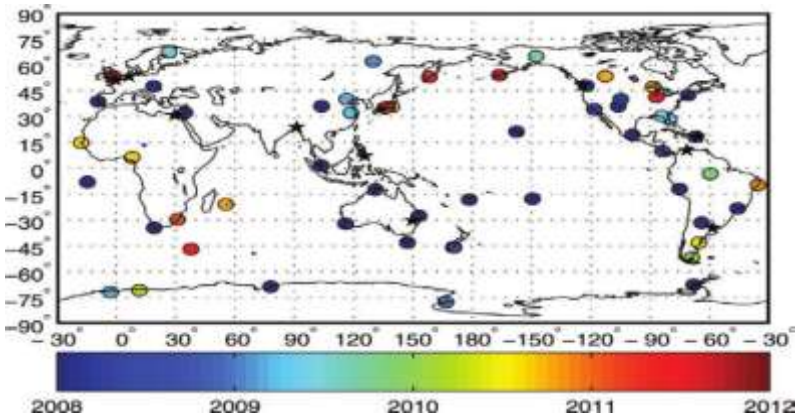
E_{GEC} Electric field from Global Electric Circuit

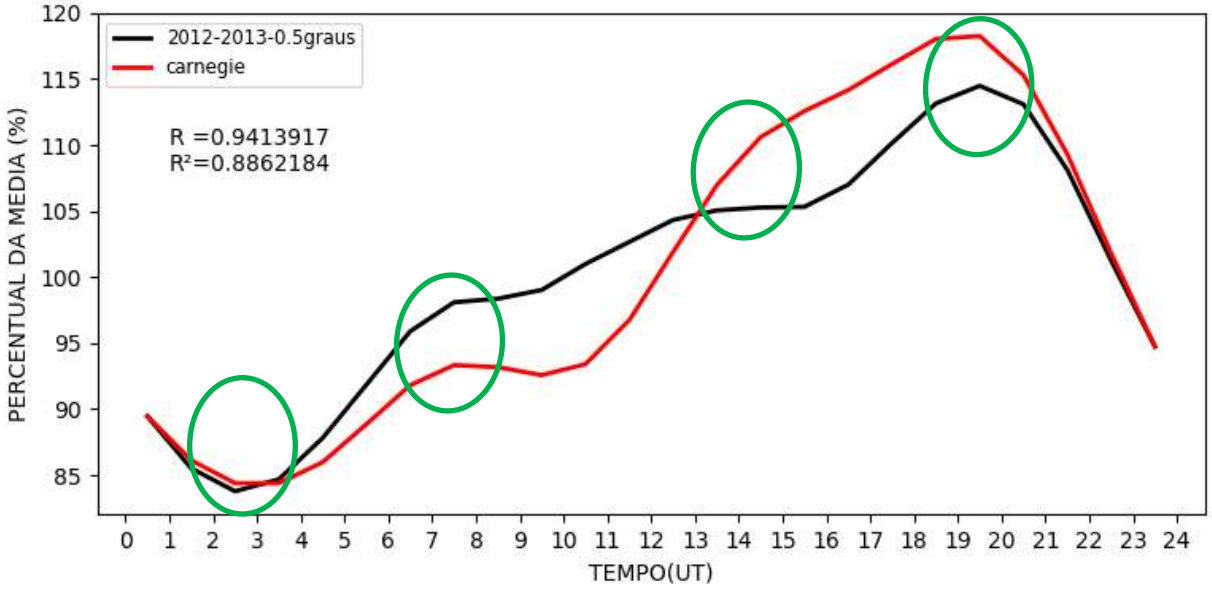


Detected > 3 MeV

WWLLN (World Wide Lightning Location Network)







ISWI – Steering Committee Annual Meeting – 07/02/2020 - Vienna