

On the characteristics of TIDs measured with the LISN network

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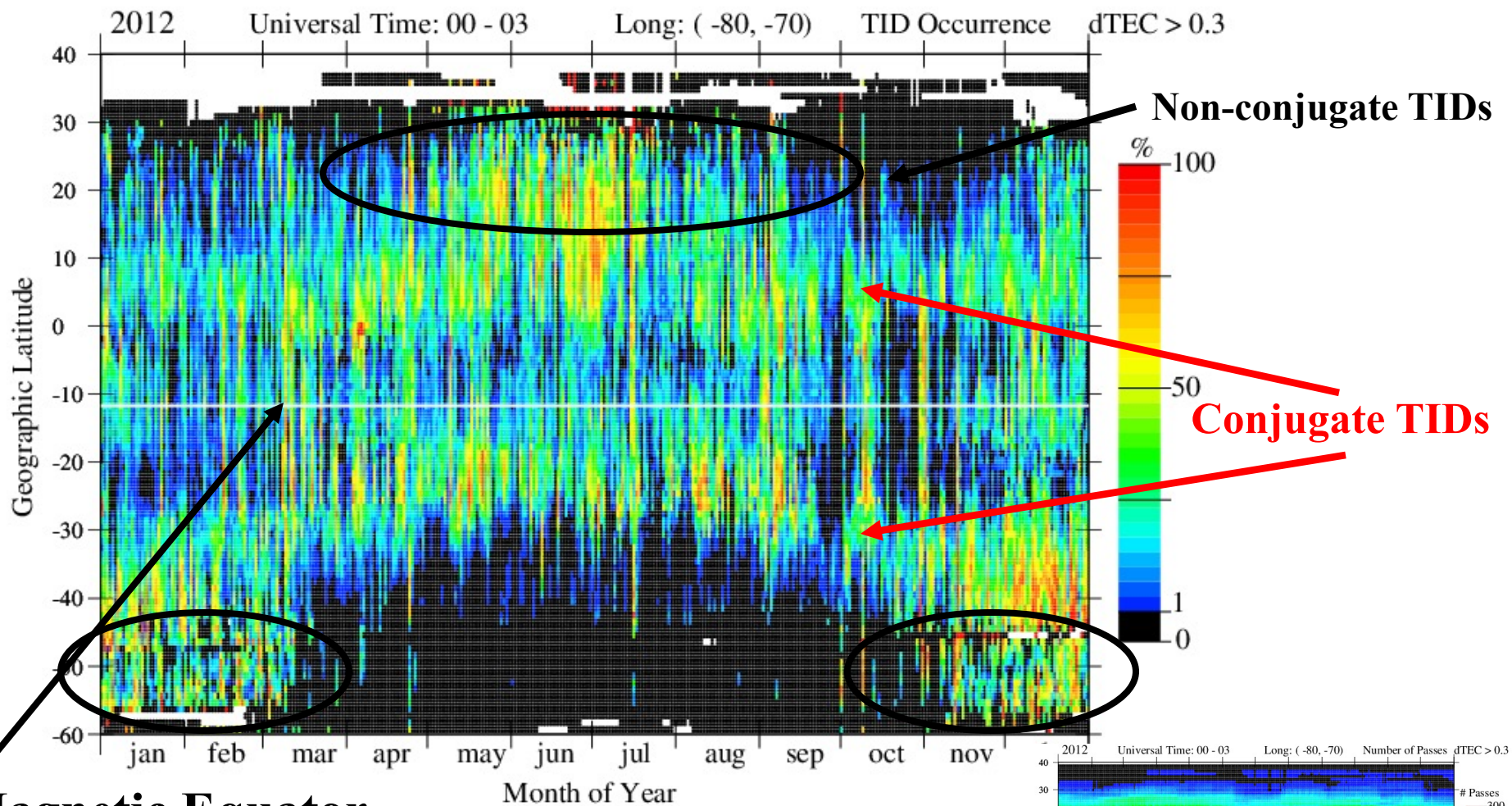
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One-year Occurrence of TIDs for 0-3 UT, between 70° and 80 ° W

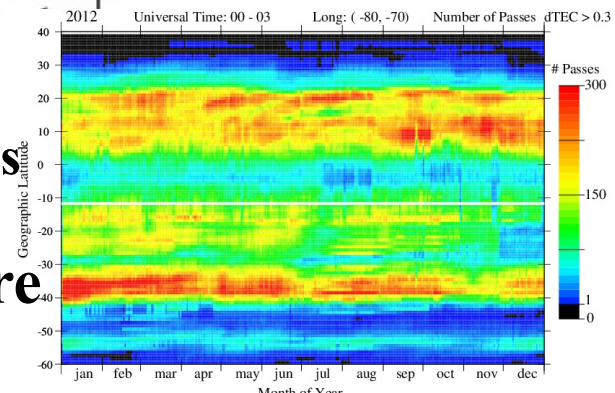


Magnetic Equator

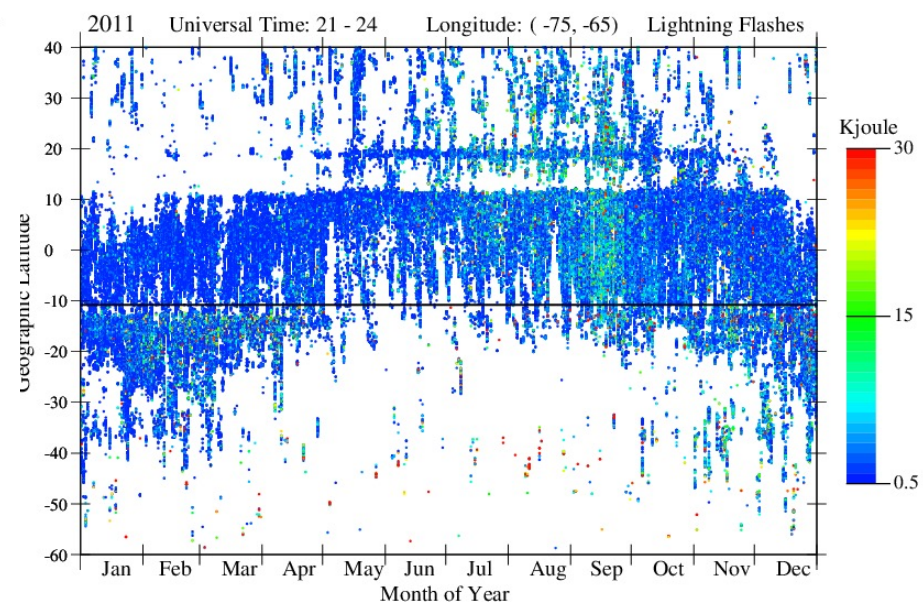
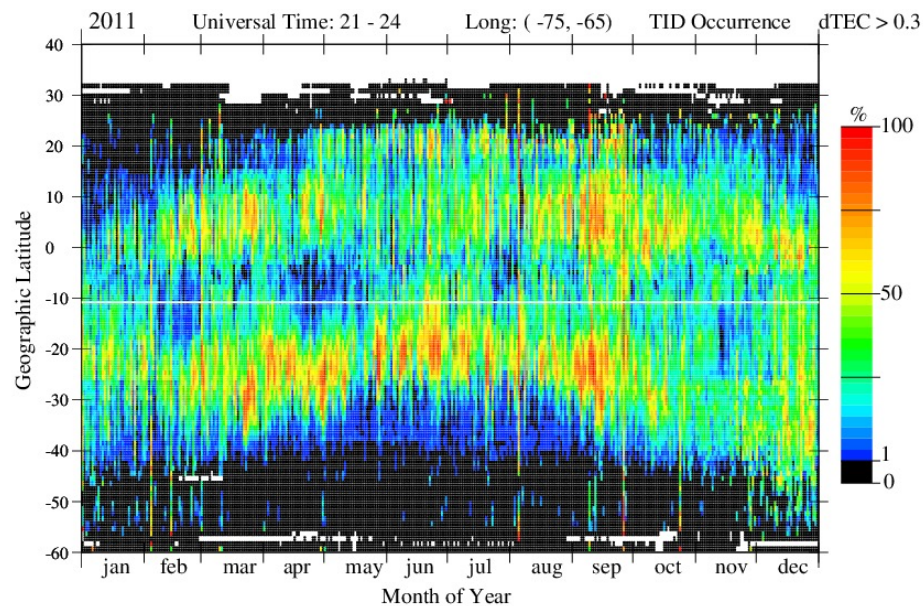
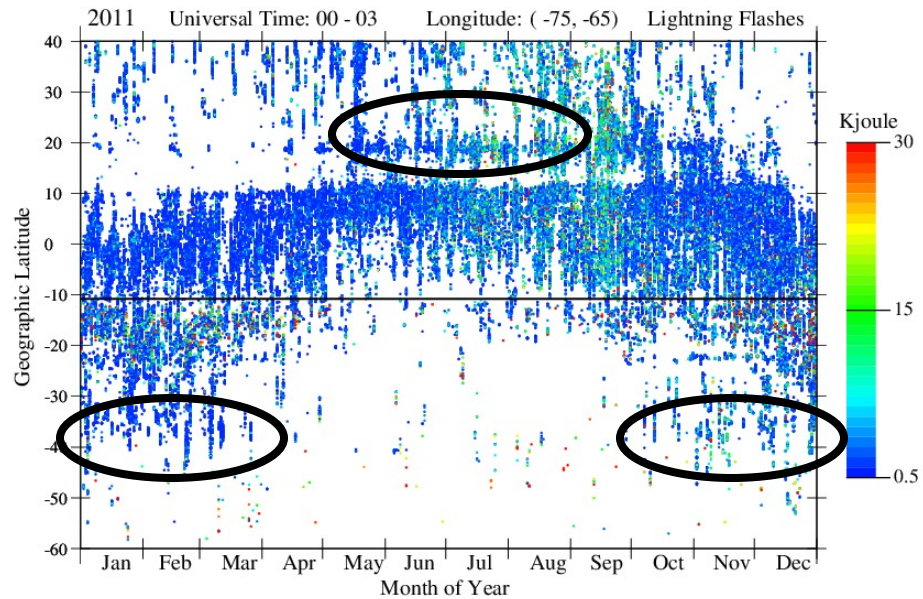
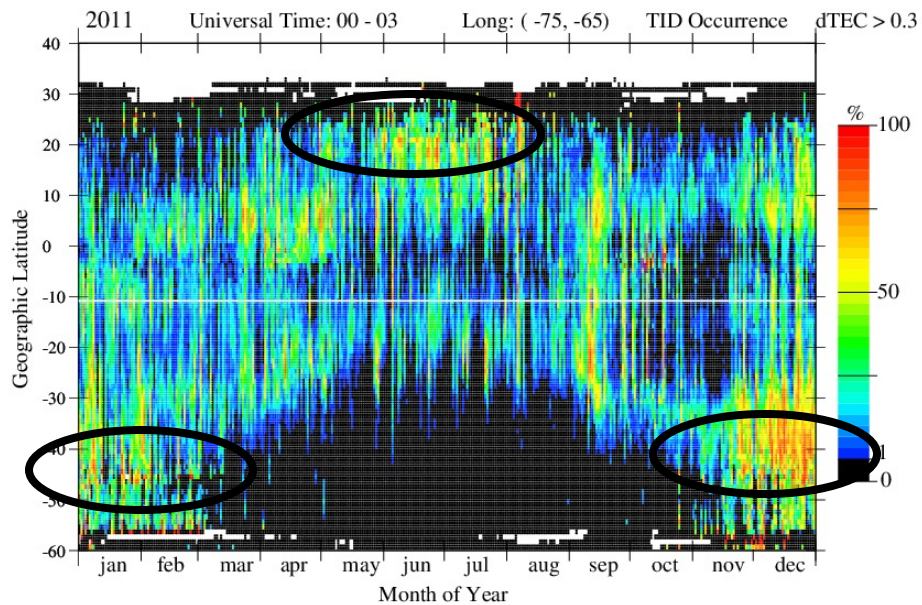
Number of passes × receivers



TIDs are conjugate, map to opposite hemisphere



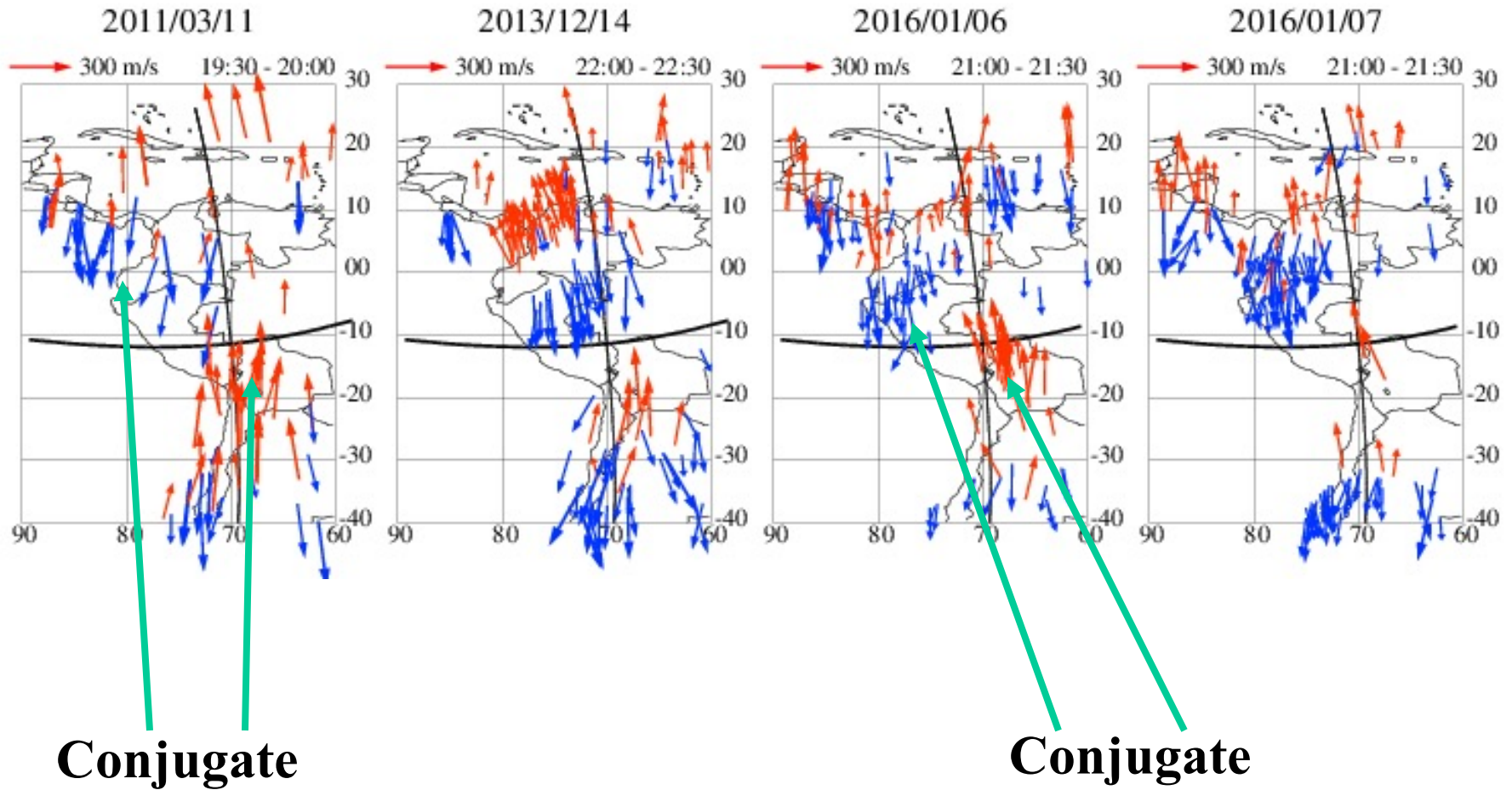
One-year Occurrence of TIDs compared to similar statistics of WWLLN



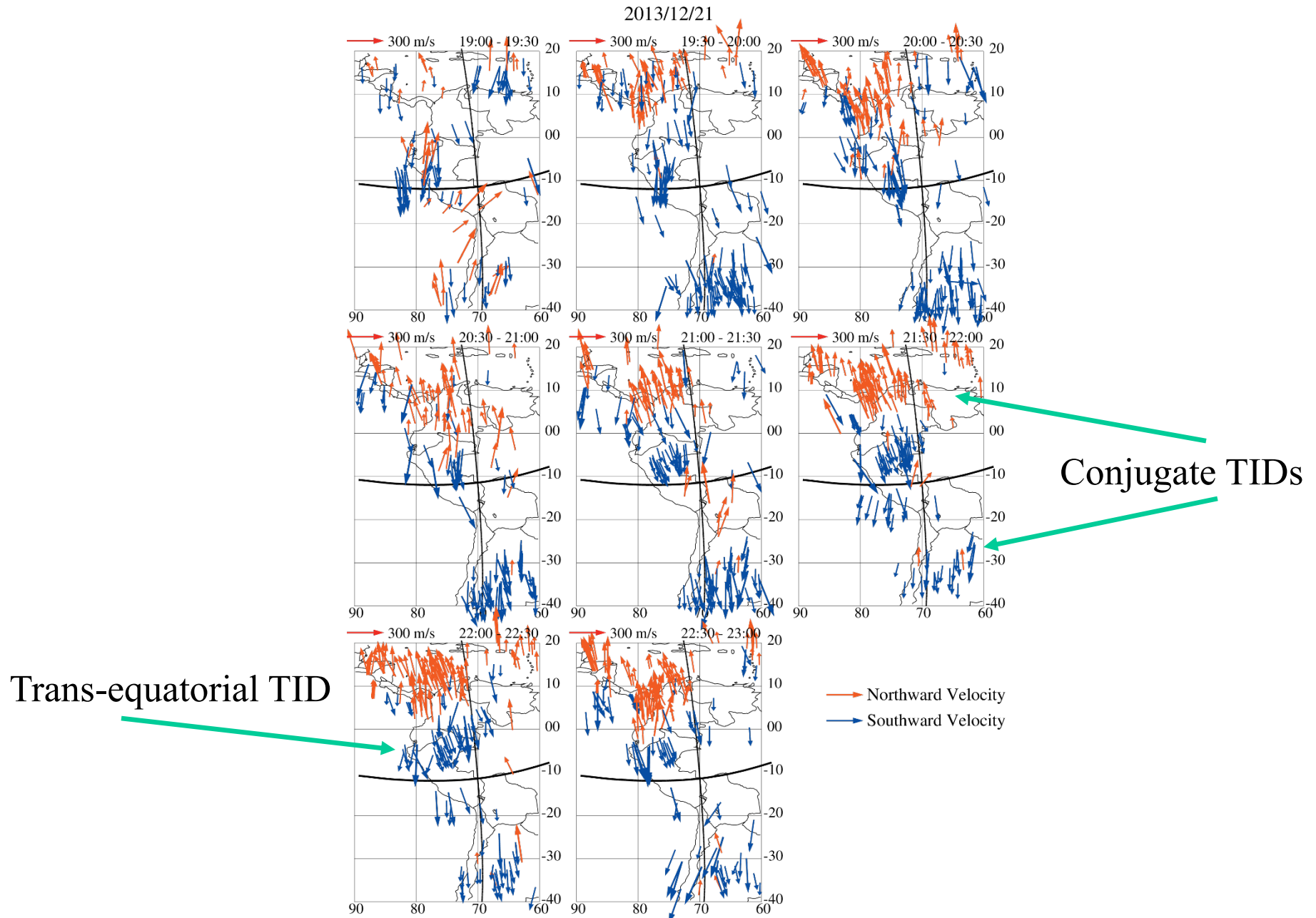
TID Occurrence

Lightning Activity

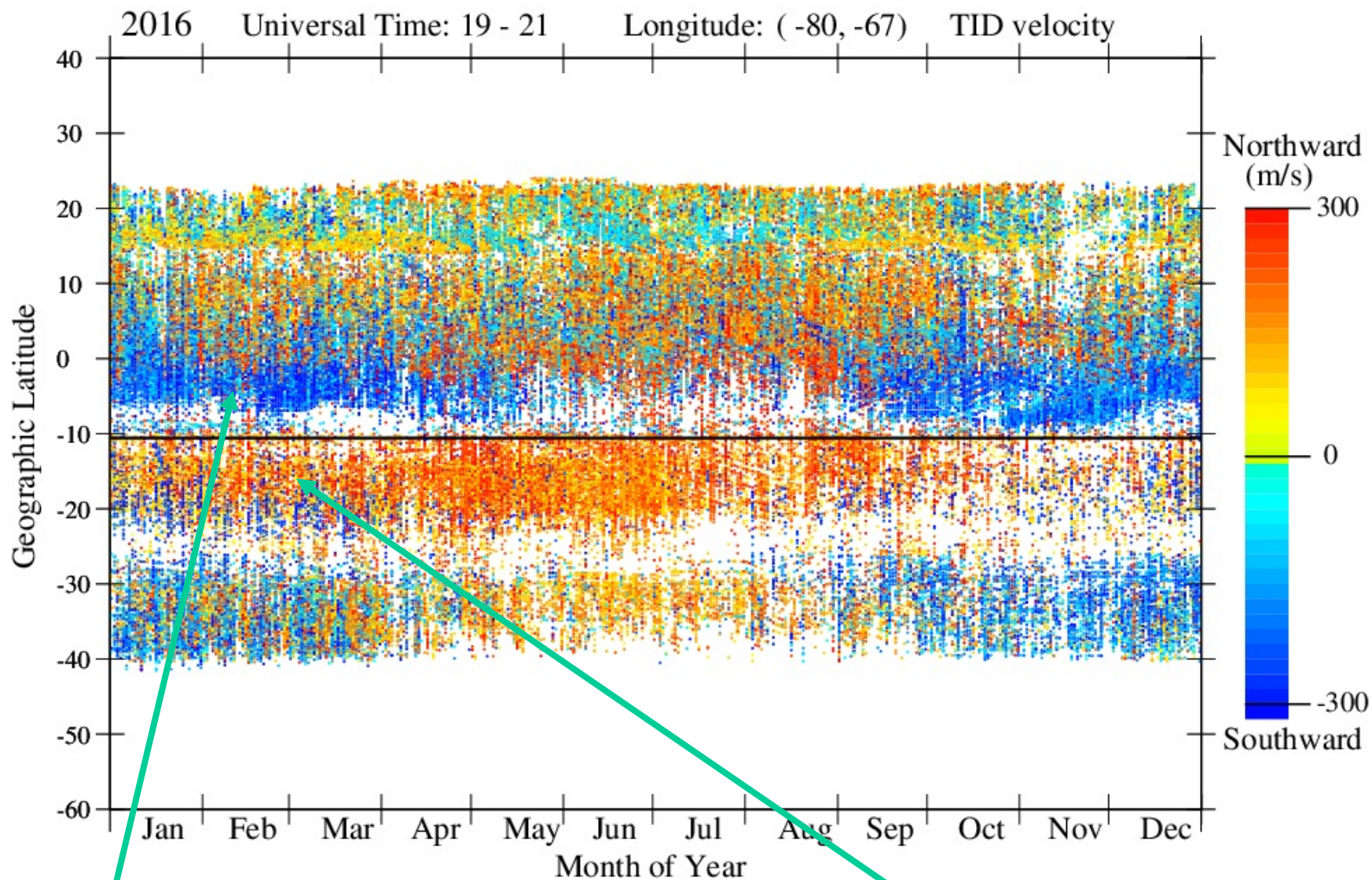
Four events of conjugate motion of TID phase velocity



TID velocity measured over South America for December 21, 2013 (19 -23 UT)



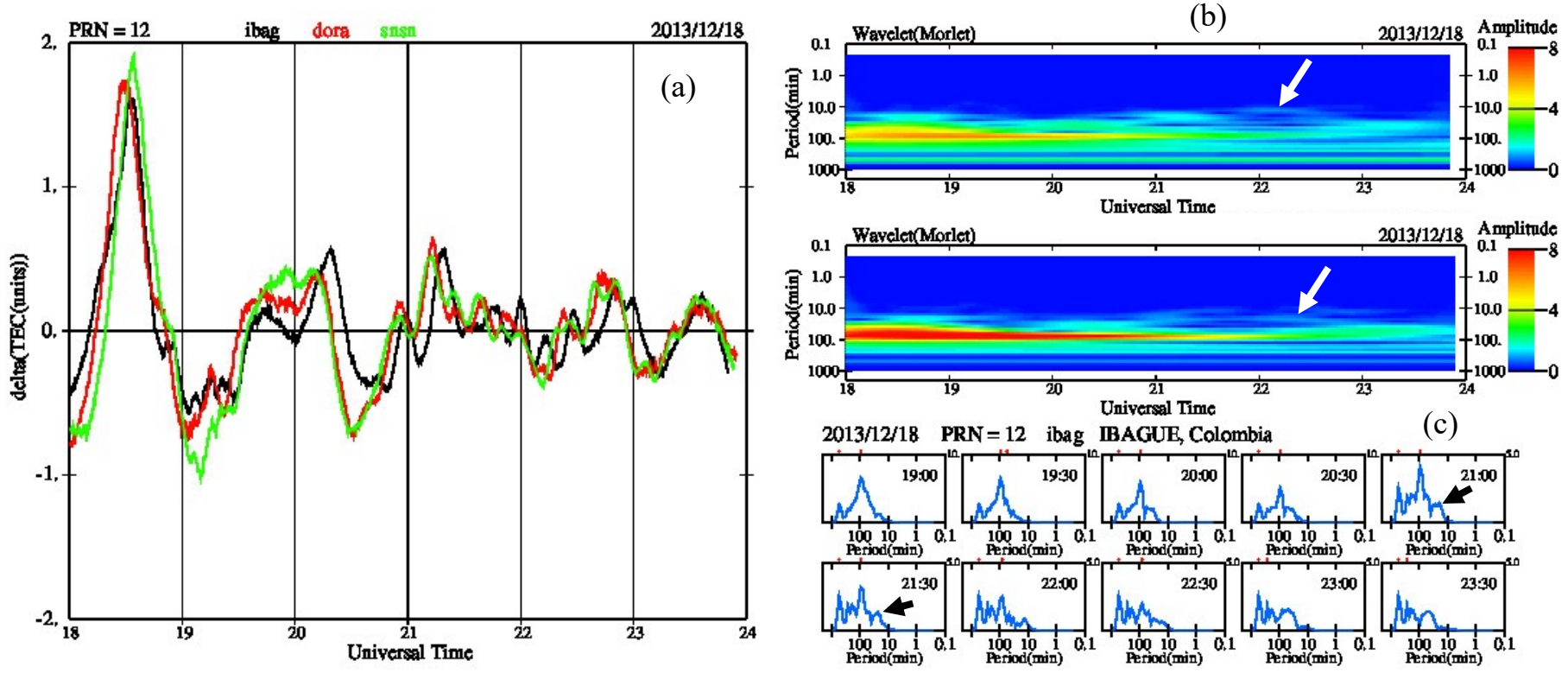
North-south TID Phase Velocity in 2016



Southward Velocities

Northward Velocities

TEC detrended values associated with TIDs with variable scale sizes



(a) TEC perturbations measured at 3 stations; Ibague, Dorado, and Sonson in Colombia, (b) wavelet analysis (Morlet) of 2 of the TECP traces. (c) Individual wavelet profiles for Ibague in Colombia showing multiple scale sizes.

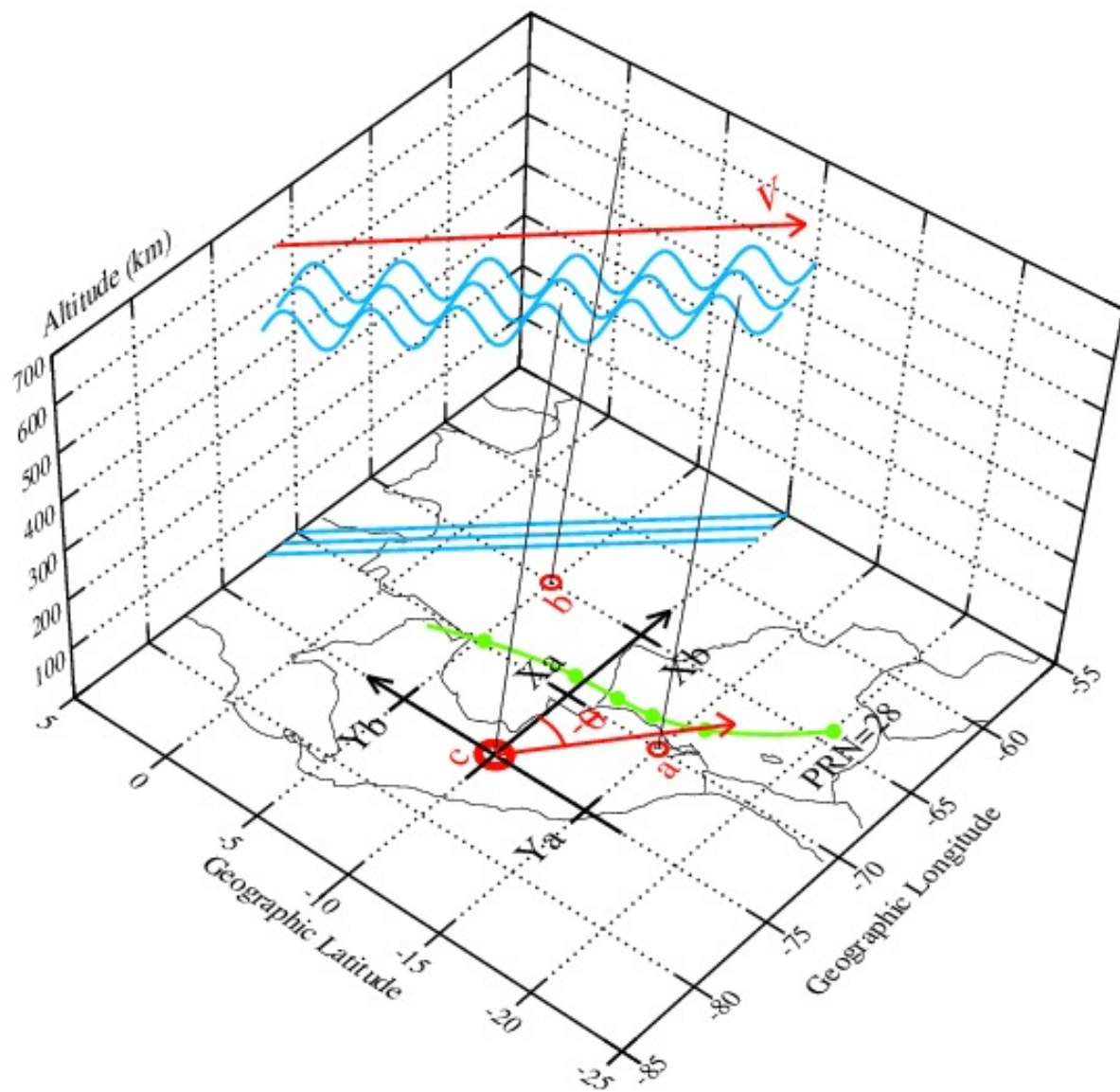
Conclusions

We found two different populations of TIDs. Near the magnetic equator TIDs are conjugate, map to the opposite hemisphere. The second type are not conjugate and develop during the solstices at poleward boundaries of the low-latitude ionosphere.

The GW that produce the TIDs are originated by thunderstorms in the troposphere. More than one TIDs with different scale sizes can coexist simultaneously.

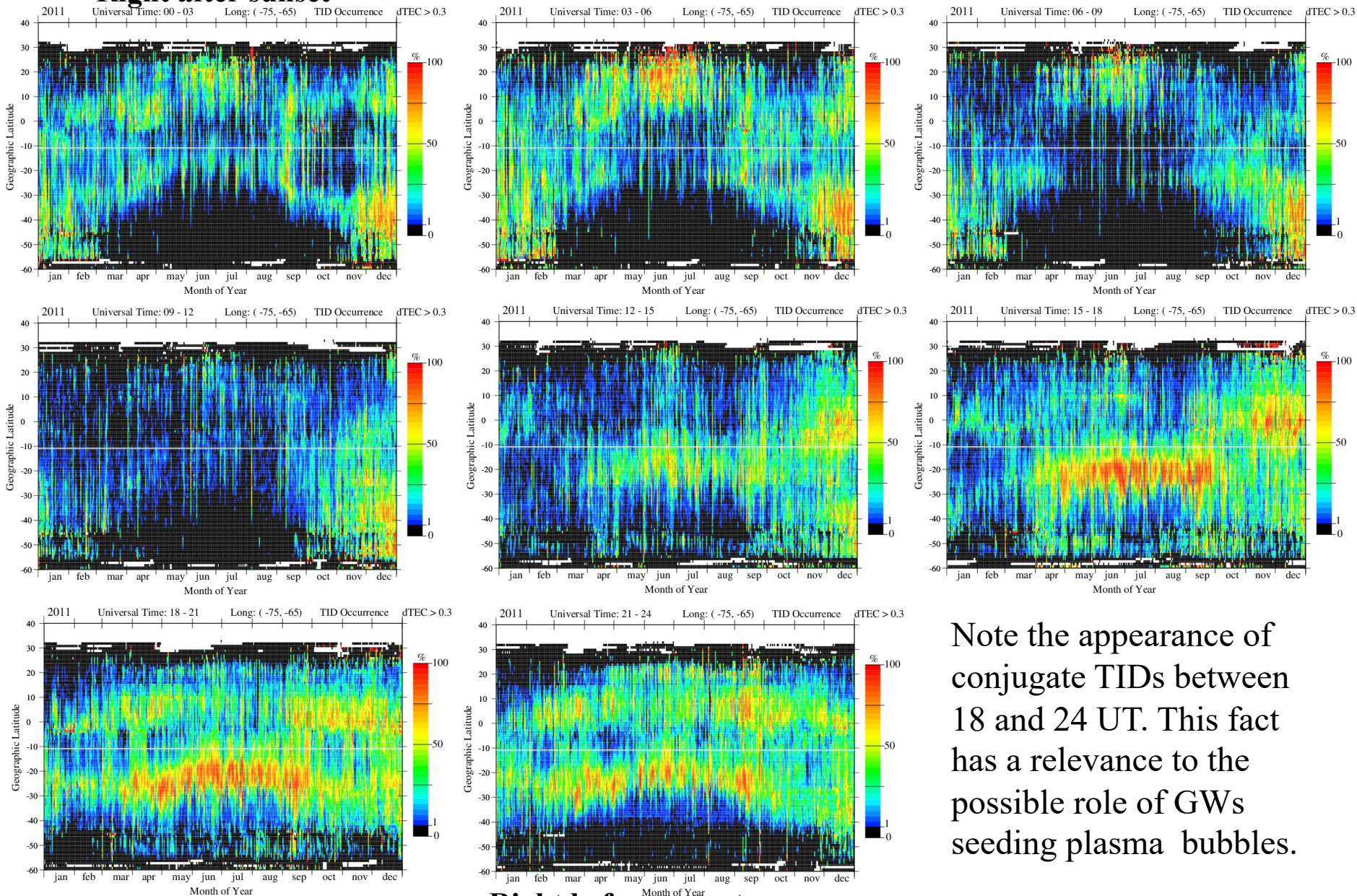
LISN is also providing inputs to the following programs:

- Bubble tracing
- TID-bubble Contact
- Ionospheric background conditions during Bottomside Sinusoidal Structures
- Meridional neutral Wind calculations
- Nighttime MSTIDs



One-year statistics of the Occurrence of TIDs for all eight 3-hr periods

Right after sunset

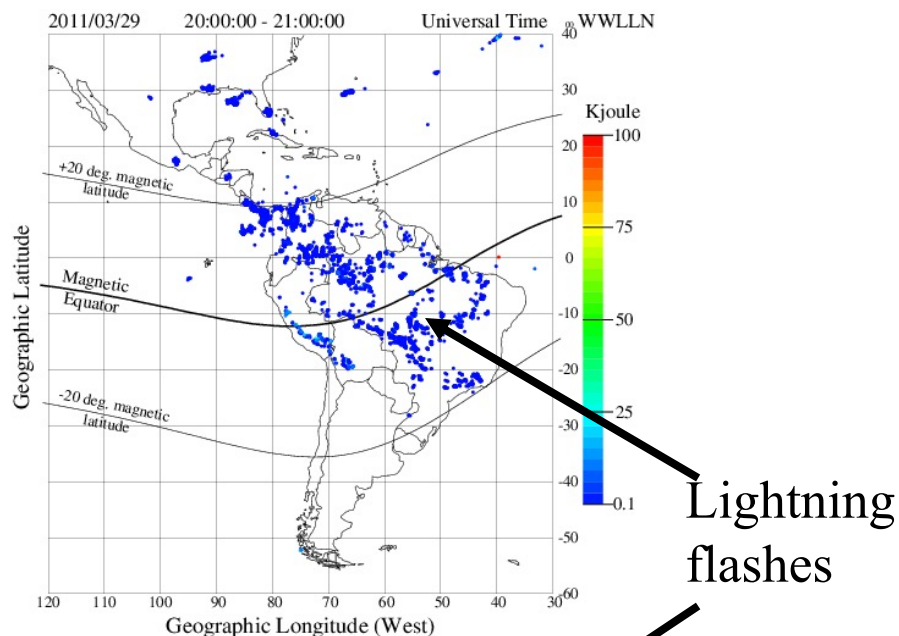
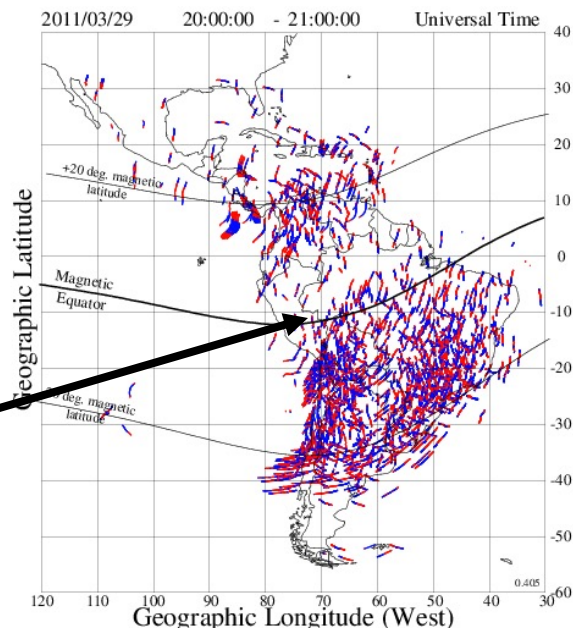


Note the appearance of conjugate TIDs between 18 and 24 UT. This fact has a relevance to the possible role of GWs seeding plasma bubbles.

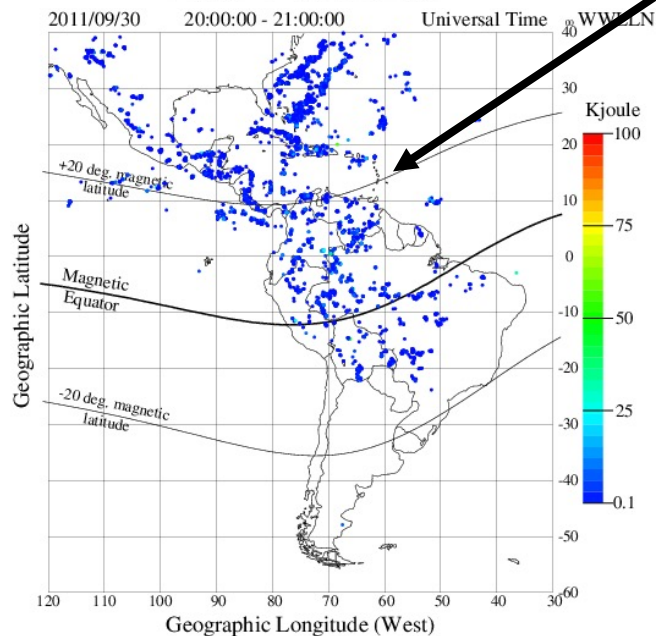
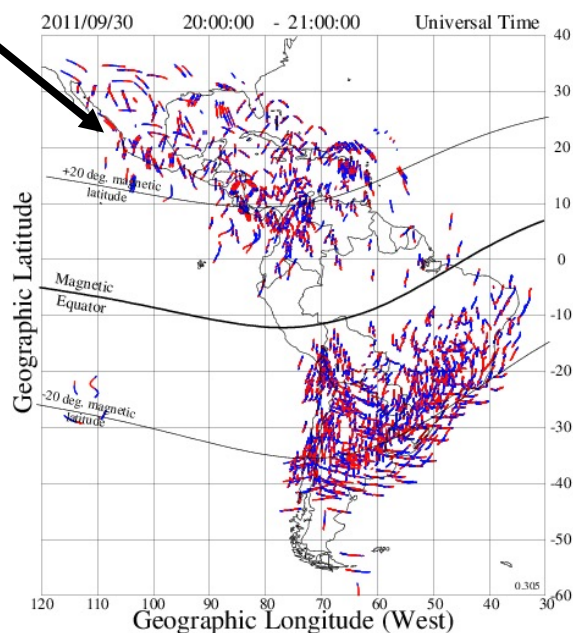
Right before sunset

TIDs observed over SA between 20 and 21 UT and WWLLN data

Red and blue traces indicate presence of TIDs



Lightning flashes



OUTLINE

- TIDs conjugacy and non-conjugacy depending on latitude. Comparison against WWLLN lightning flashes.
- Calculation of TID velocity reassuring that TIDs are conjugate.
- TIDs containing multiple scale sizes are typical in South America.