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Seasonal and Disturbance Variability of the EEJ over the Brazilian Sector Based on Back-scatter Radar Echoes

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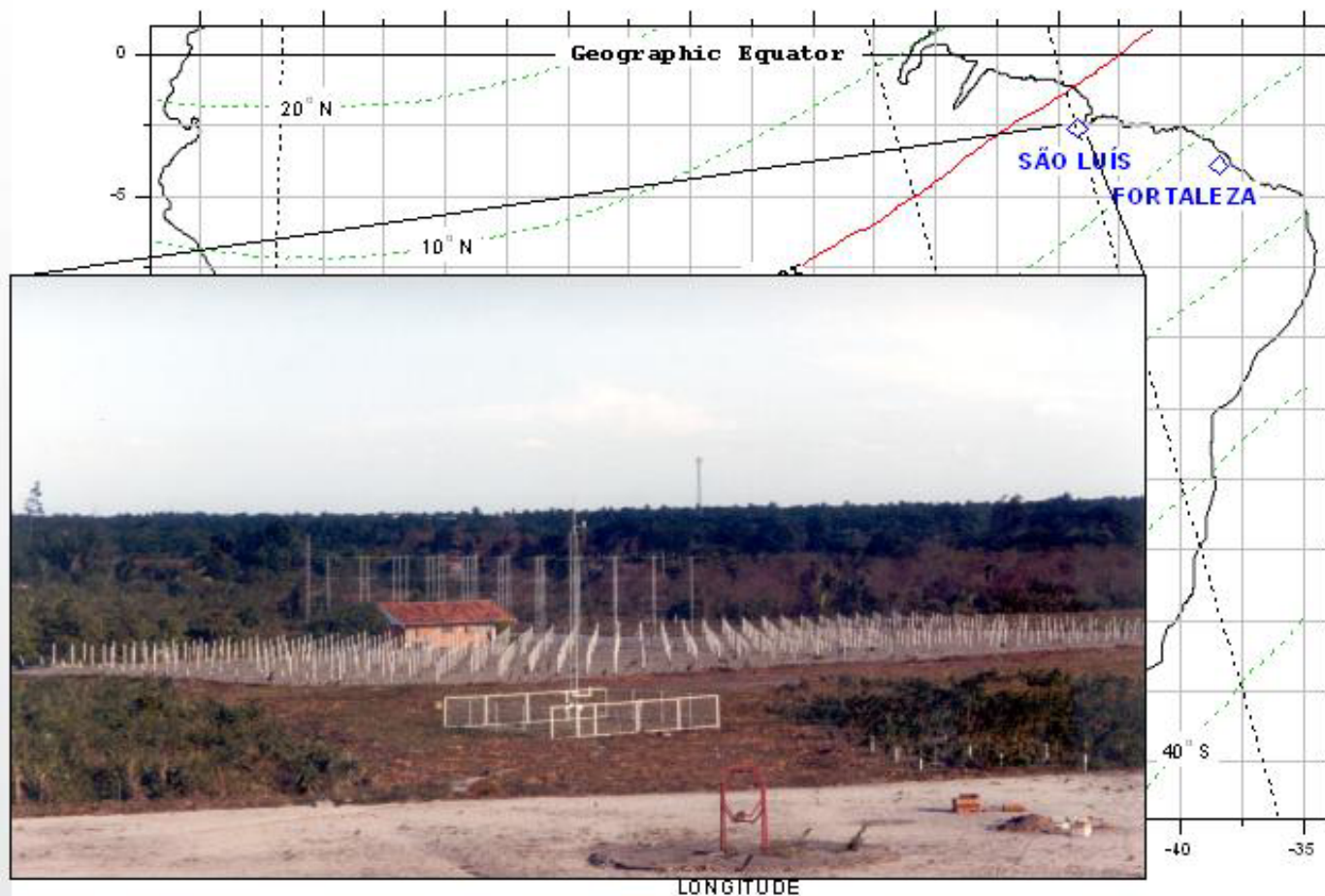
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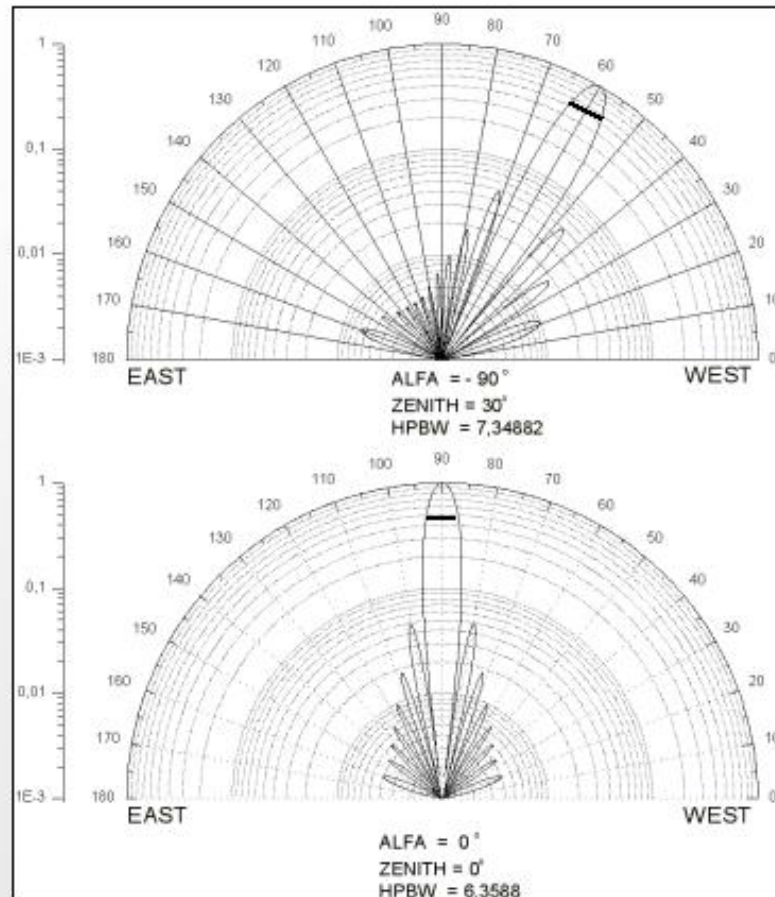
Outline

- ✓ The 50 MHz coherent back-scatter radar - RESCO, location and characteristics;
- ✓ Example of radar data;
- ✓ Parameterization of the scatter profile;
- ✓ Data Classification;
- ✓ Results from the analysis of 2002;
 - The rising of the EJC after 14 h;
 - The East-West power asymmetry;
 - The appearance of a later scattering E region;
- ✓ Remarks and Acknowledgments;

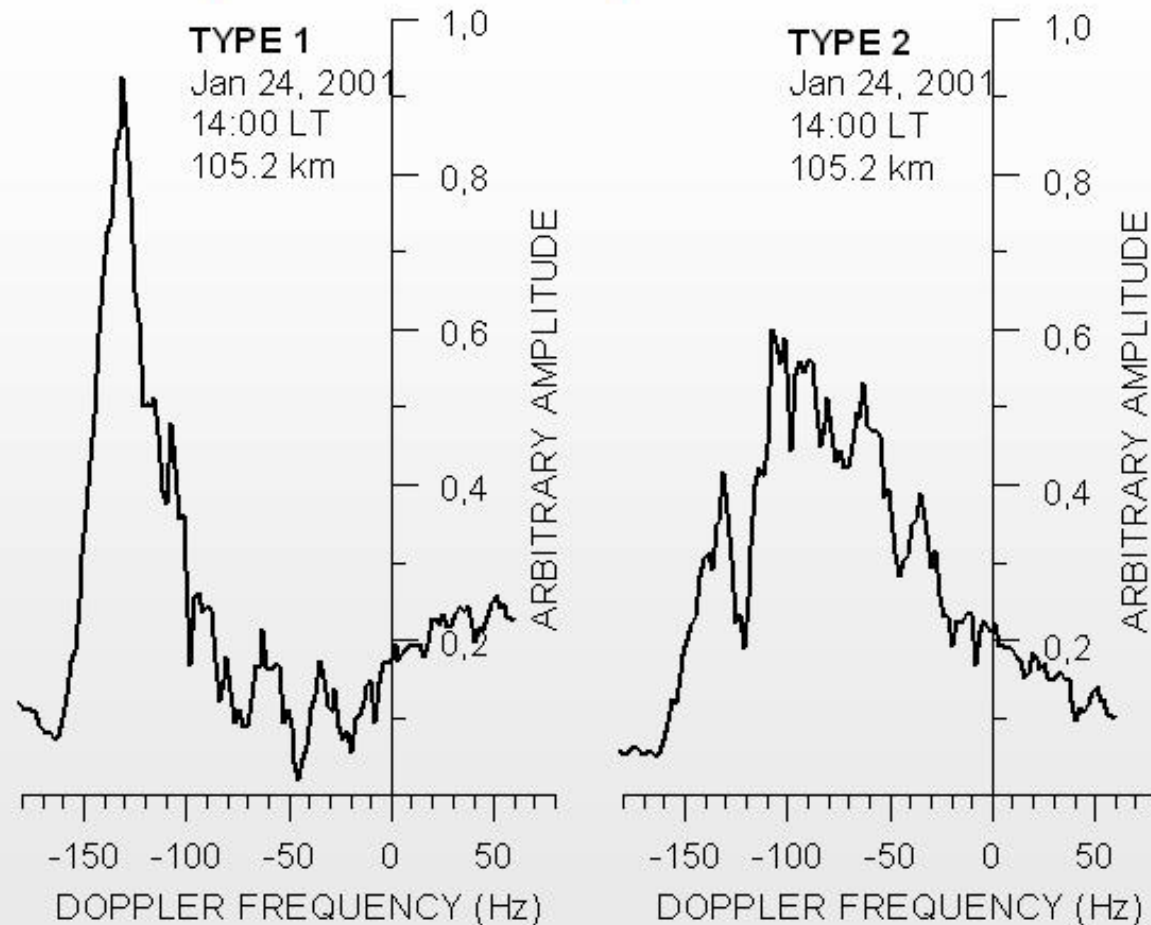
The 50 MHz Coherent Radar RESCO



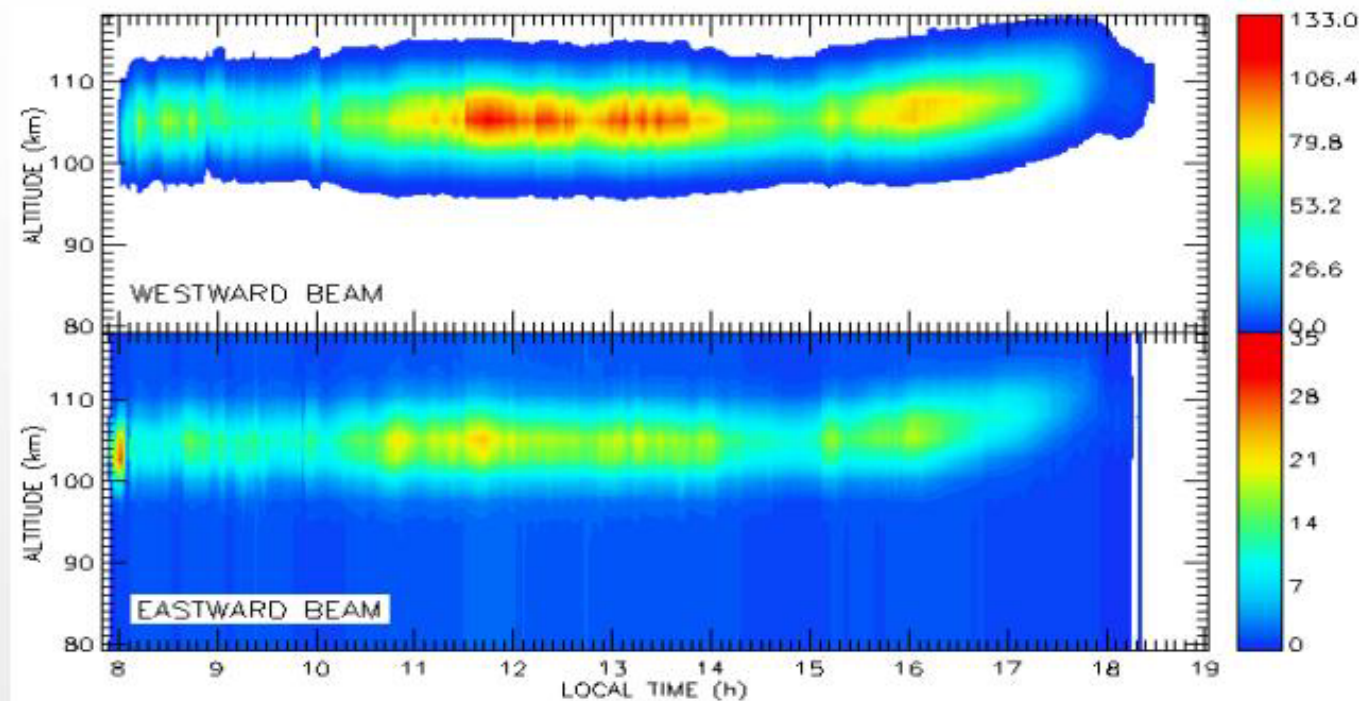
Radar Characteristics



Example of 3-m Spectra from EEJ



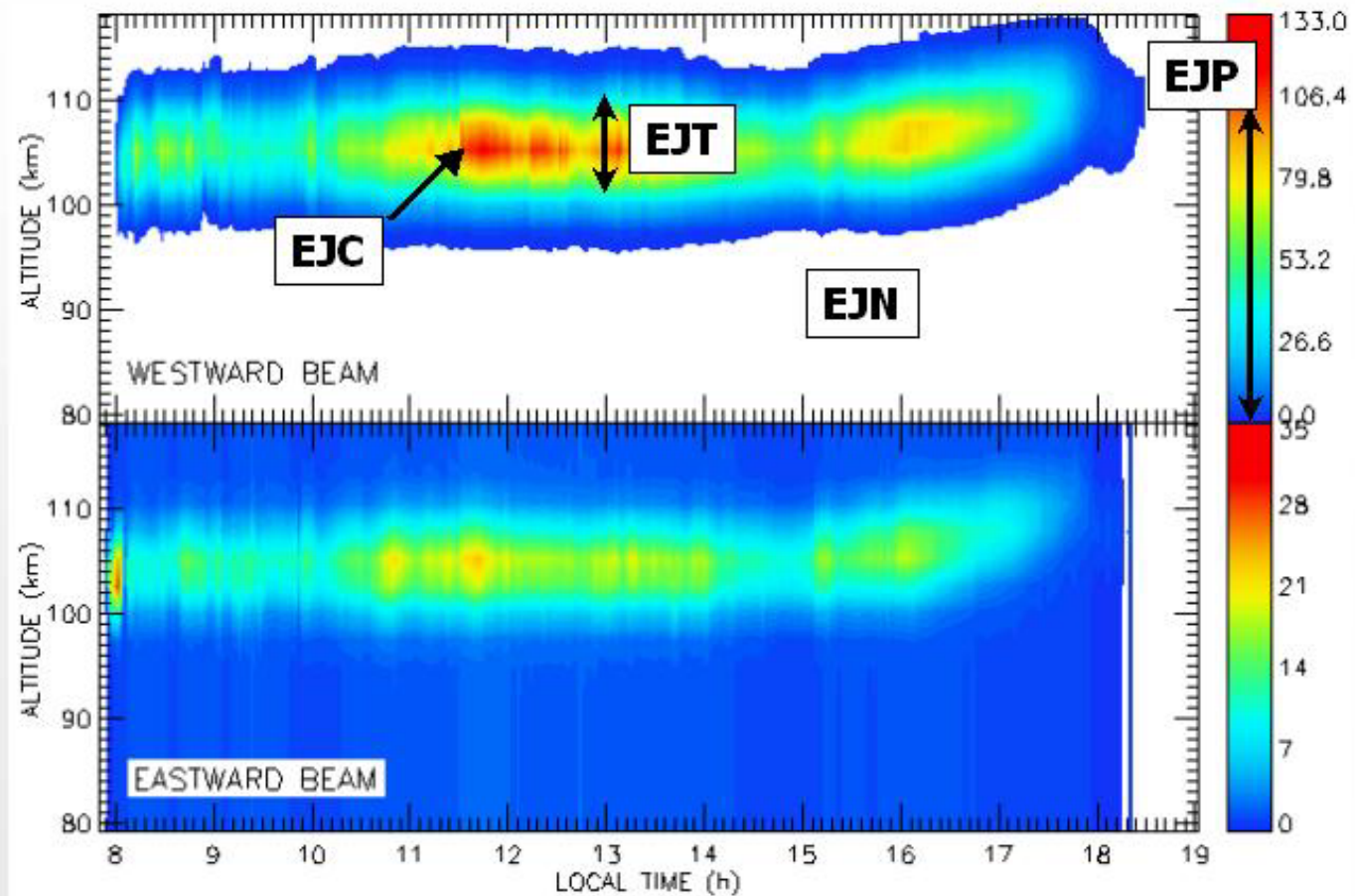
The Range Time Intensity Map



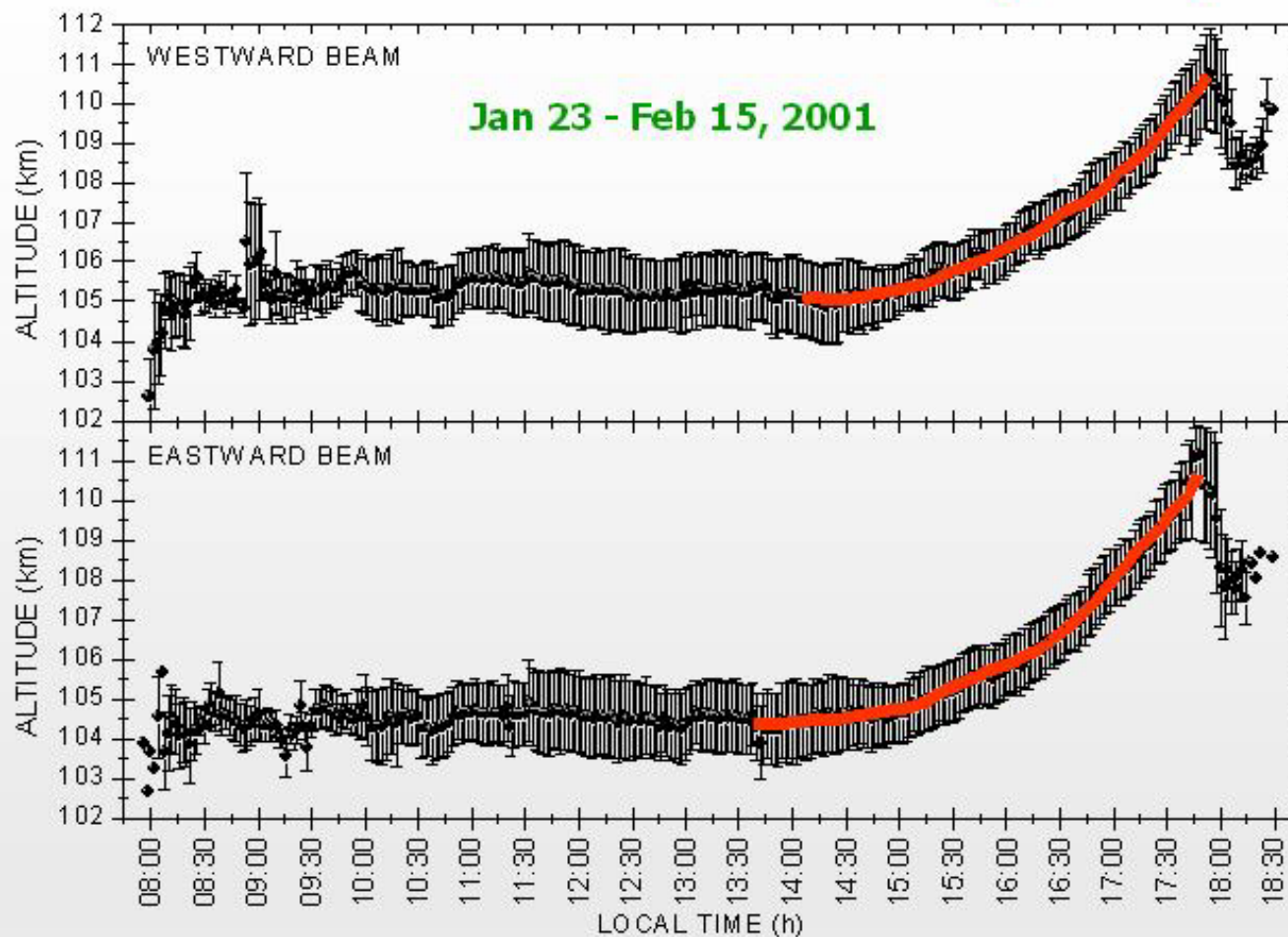
Parameter Used for the EEJ Sounding (Jan 23 - Feb 15, 2001)

Time Delay	600 μ s	Number of Pulses	1024
Pulse Width	20 μ s	Number of Gates	16
Sample Width	20 μ s	Zenith Angle	30 $^{\circ}$

Parameterization of the Scatter Profile



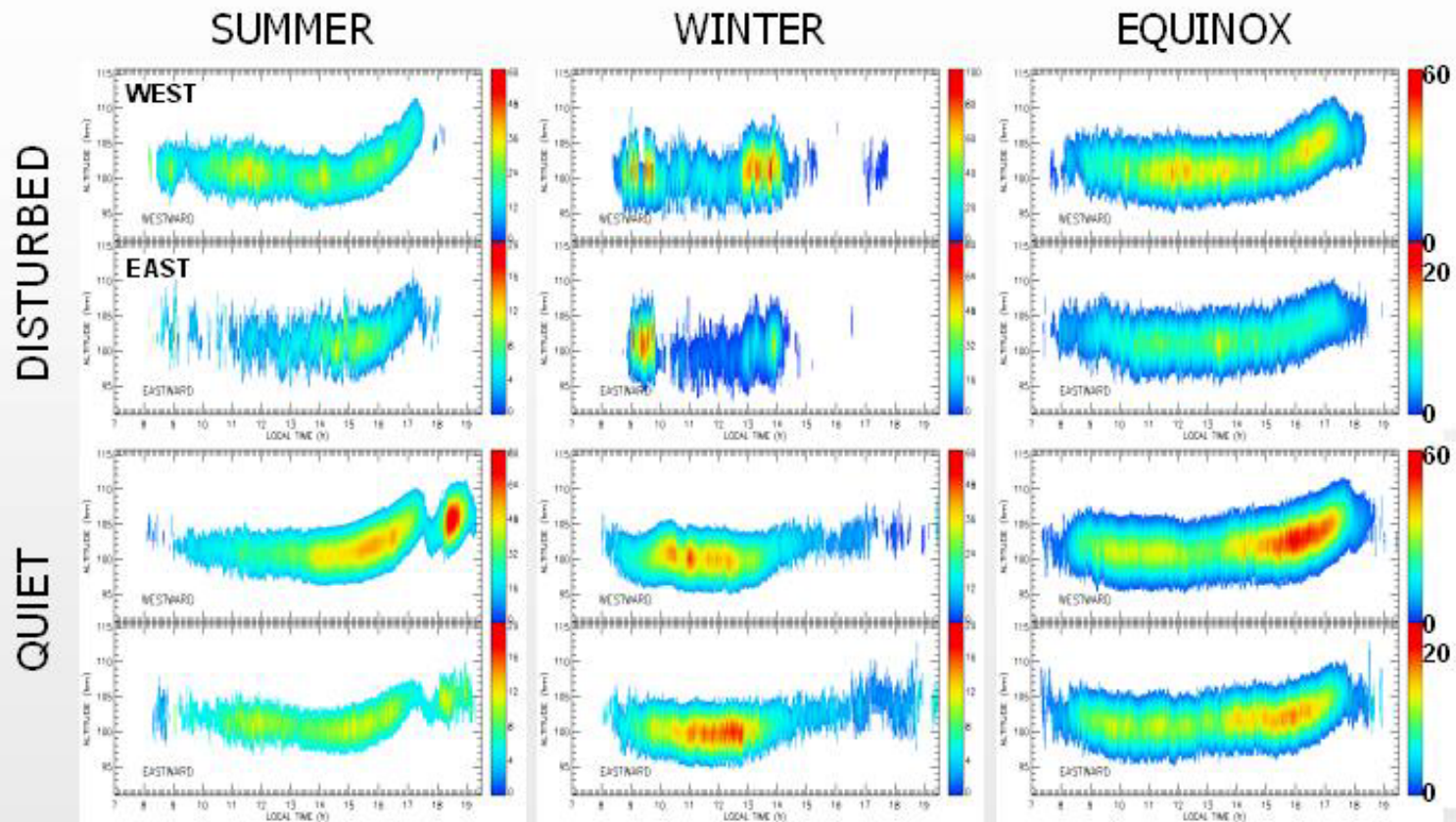
Variation of the mean EJC (2001)



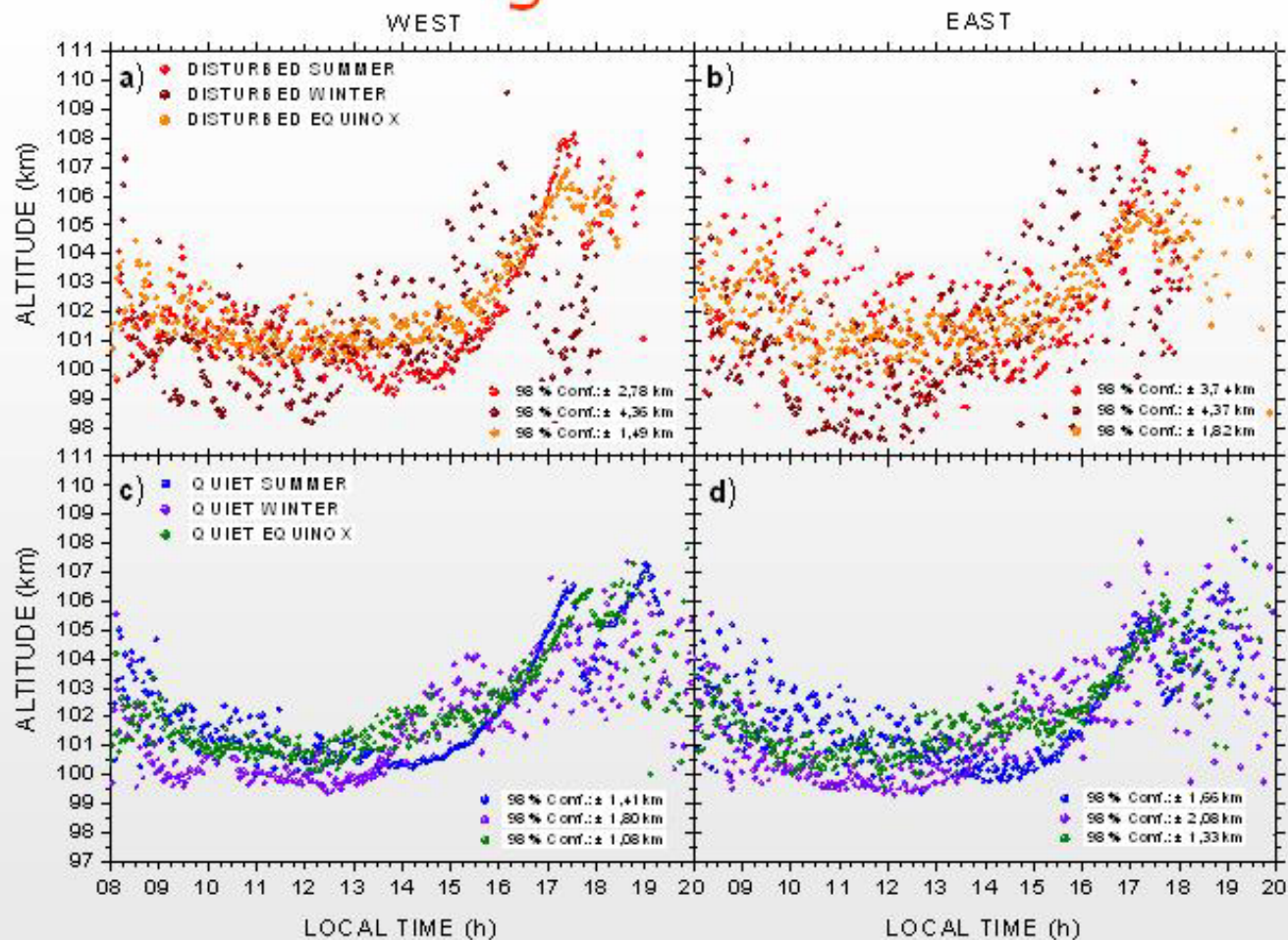
Data Classification - Southern Hemisphere

		Season	Months	Days
MAGNETIC CONDITION	Quiet ($Kp \leq 3^+$)	Summer Solstice	January	21, 22, 23, 28, 29 and 30
			November	14, 15, 16, 18, 19, 26, 28 and 29
			December	02, 03, 05, 06, 09, 10, 11 and 12
		Winter Solstice	May	24, 28 and 29
	June		20, 21, 24, 25, 26 and 27	
	Disturbed ($Kp > 3^+$)	Sprints Equinox	July	24 and 26
			September	12, 13, 17 and 20
		Autumn Equinox	November	08 and 09
February			14, 15, 16, 18, 20, 21, 22, 23, 24, 25 and 26	
Disturbed ($Kp > 3^+$)	Summer Solstice	March	19, 21, 22, 26, 27 and 28	
		April	23, 24, 25, 26, 29 and 30	
	Winter Solstice	May	02	
		December	01, 04, 07 and 08	
Sprints Equinox	November	13, 17, 20, 22, 23, 24, 25, 27 and 30		
	May	23 and 27		
Disturbed ($Kp > 3^+$)	Winter Solstice	July	23 and 25	
		August	14 and 26	
	Sprints Equinox	September	10 and 11	
		November	05, 06, 07, 10, 11 and 12	
Autumn Equinox	February	17, 19, 27 and 28		
	March	20 and 25		
	April	22		

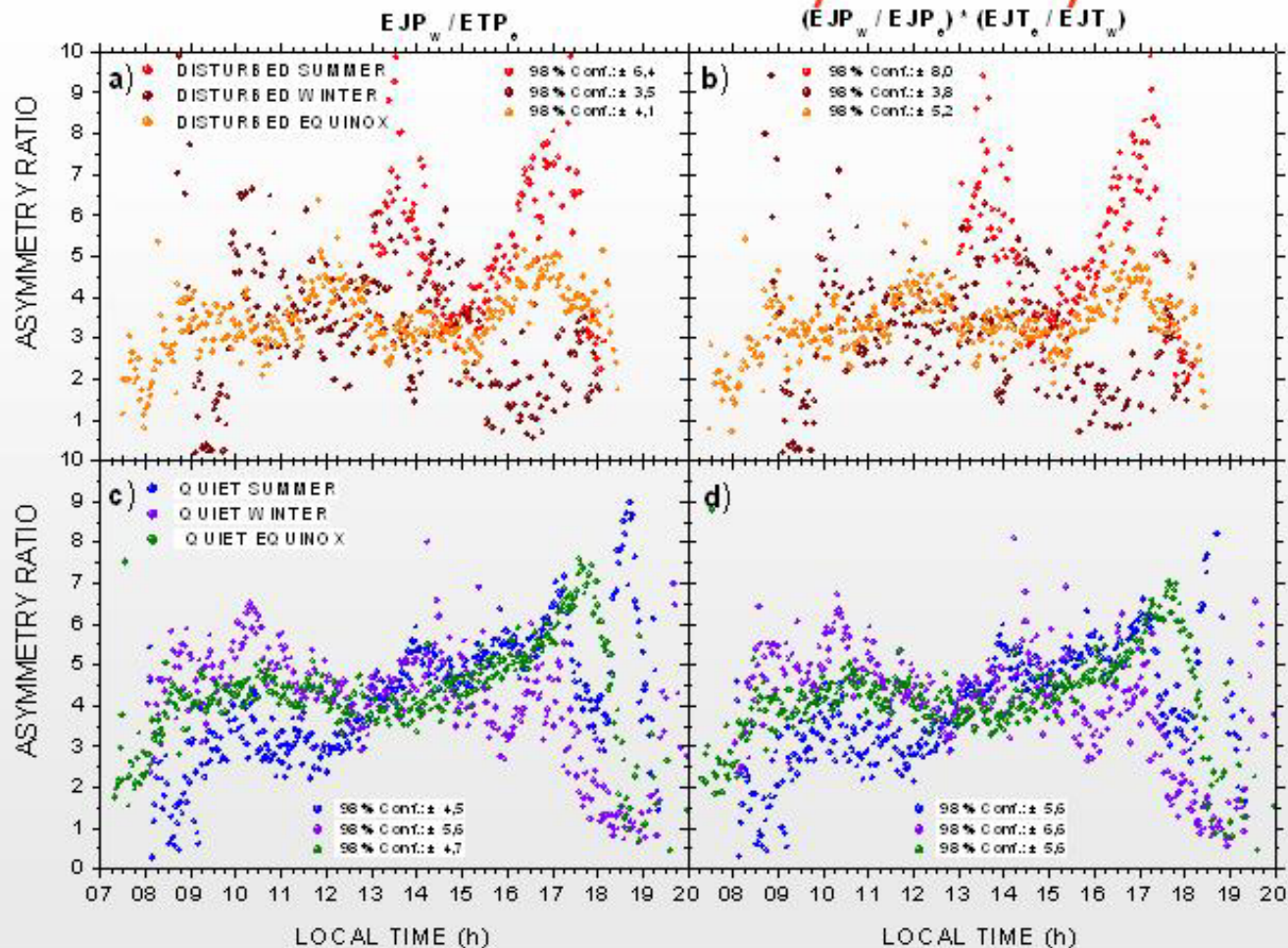
RTI Maps (2002)



EJC Rising After About 14 h



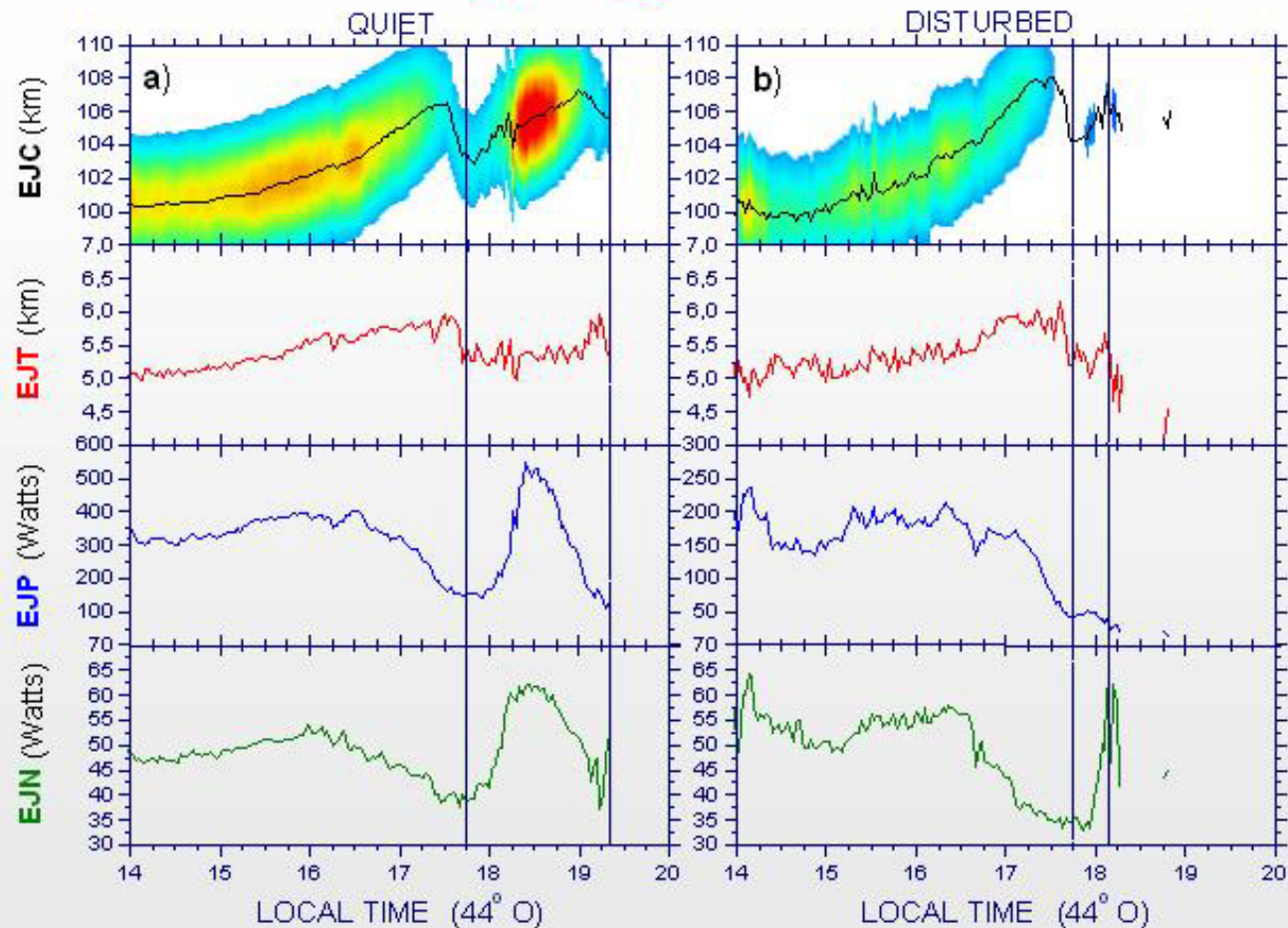
EJP East-West Asymmetry



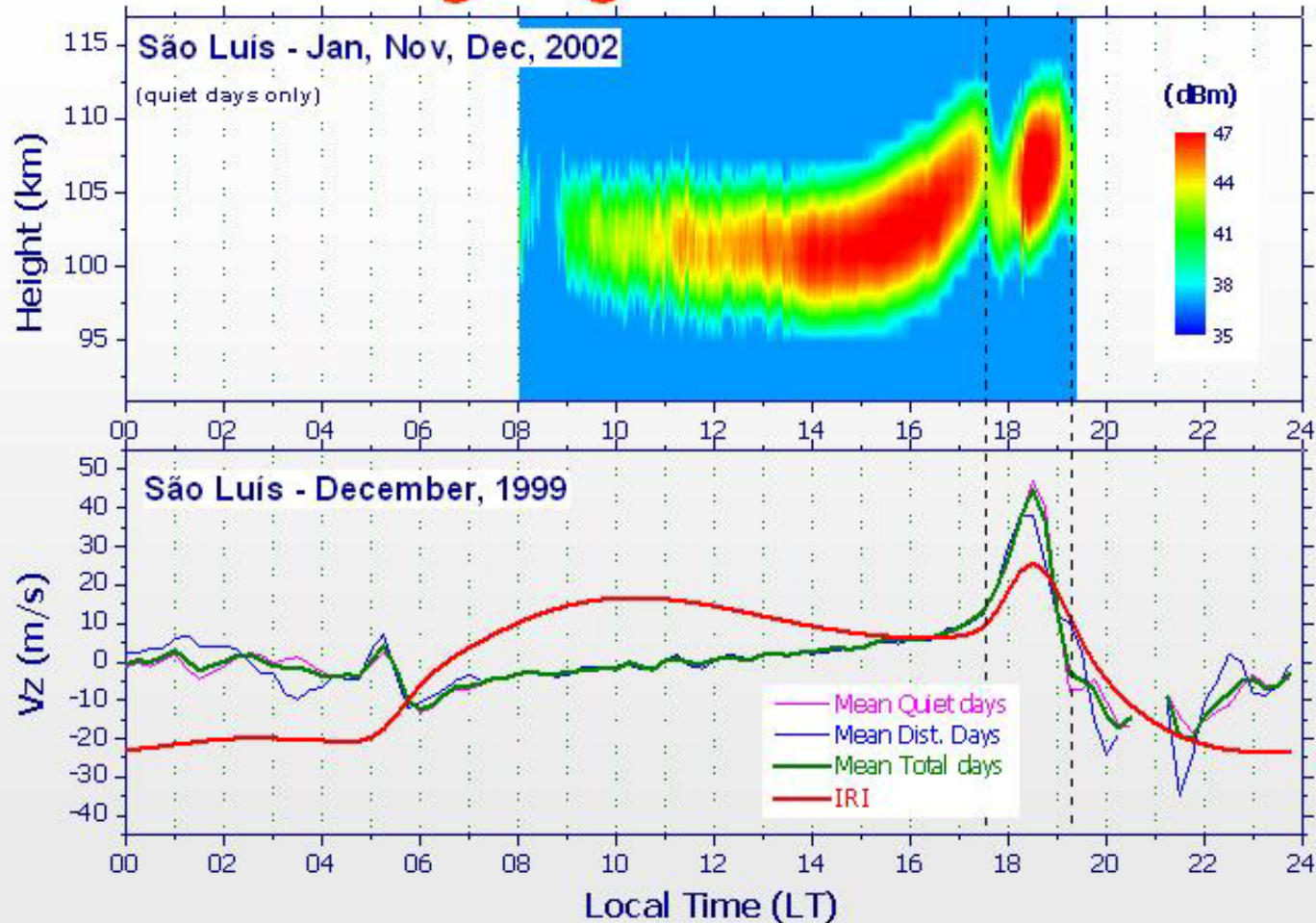
EJP East-West Asymmetry Ratio

		Season	Days	Asym EJP	Asym EJP/EJT	Diff. %
MAGNETIC CONDITION	Quiet ($Kp \leq 3^+$)	Summer Solstice	22	4,18576	3,95394	5,5
		Winter Solstice	11	4,10338	4,05169	1,3
		Equinox	30	4,16162	4,01768	3,5
		Springs Equinox	06	4,17140	4,13413	0,9
		Autumn Equinox	24	4,17799	4,02114	3,8
		All Calm Days	63	4,09653	3,97514	3,0
	Disturbed ($Kp > 3^+$)	Summer Solstice	13	5,34345	5,08604	4,8
		Winter Solstice	04	3,27041	3,32852	1,8
		Equinox	17	3,43635	3,35032	2,5
		Springs Equinox	10	3,74242	3,63928	2,8
		Autumn Equinox	07	3,24298	3,23078	0,4
		All Disturbed Days	34	3,63080	3,52086	3,0
	All Days			97	3,85531	3,74789

A Scattering Region After Sunset



Scattering Region x Vertical Drift



Remarks

- ❖ The study with data from 2001 had shown an East-West power asymmetry which was confirmed by the analysis with data from 2002. In 2001 the signal backscatter from the Westward region was about $\sim 3,7$ times stronger than that from Eastward. In 2002 this factor varied between 3 and 4. But it reduced by $1/8$ during disturbed periods.
- ❖ The mean behavior of EJC was characterized by a rising after about 14 h with an exponential shape.
- ❖ It was observed the appearance of a scattering region after sunset in the RTI maps during Summer time at quiet magnetic conditions.
- ❖ During the magnetic disturbed period, there is just a tendency of appearance (or generation) of such region.

Acknowledgments & Contact Address

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