

# 8th International Radio Occultation Working Group – IROWG-8

## Comparison among atmospheric profiles from COSMIC missions

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### INTRODUCTION

This work aims to present investigations regarding atmospheric profiles, such as pressure profiles, temperature, water vapor pressure and electron density, from COSMIC (Constellation Observing System for Meteorology, Ionosphere and Climate) missions, COSMIC and COSMIC-2, taking into account the Brazilian territory.

This region stands out for a wide variety of climates, for example the Amazon forest presence, contributing to a greater diversification in its atmospheric conditions, mainly regarding the parameters of temperature and pressure of water vapor. In addition, it is located in one of the most challenging regions regarding ionospheric effects, low latitudes.

We investigated the ionPrf, wetPrf and wetPf2 files, the content of these atmospheric profiles [1].

### METHODOLOGY

The investigated files are obtained from CDAAC (COSMIC Data Analysis and Archive Center) [2]. The processing is done in MATLAB.

Shades of blue and red were applied to the atmospheric profiles, representing the COSMIC and COSMIC-2 missions, respectively. The darker shades represent the first occultations of the day and the lighter shades represent the last occultations of the day.

For ionPrf files, negative values and large variations were excluded.

For the wetPrf and wetPf2 files, the values that represented absence of data were excluded.

### MATERIALS

To verify the seasonal variations recorded by these missions, the months of June and October were selected for the study on the ionosphere and the periods of February and August for the troposphere. The selection of the years, 2007 for COSMIC and 2020 for COSMIC-2 data, was based on the largest amount of data available from each mission. These periods present distinct characteristics in Brazilian atmosphere, allowing verifying the impact of seasonal effects in the atmospheric profiles.

The days were chosen based on the highest number of occultations, ensuring a large number of data.

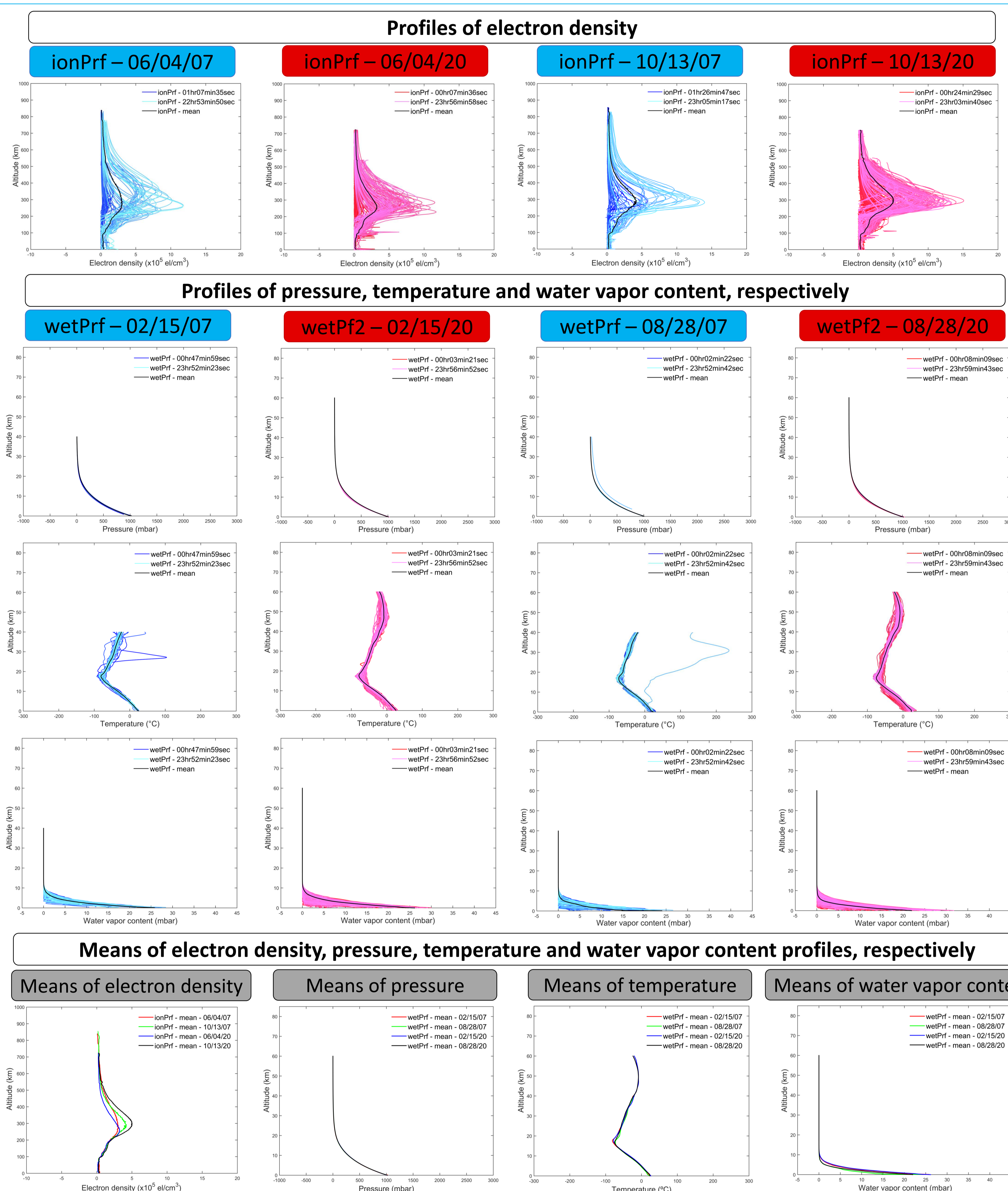
#### Number of occultations - ionPrf

Date	COSMIC - 2007		COSMIC-2 - 2020	
	In the world	In Brazil	In the world	In Brazil
June 04th	2947	82	2642	197
October 13th	2044	55	3606	241

#### Number of occultations - wetPrf and wetPf2

Date	COSMIC - 2007		COSMIC-2 - 2020	
	In the world	In Brazil	In the world	In Brazil
February 15th	2925	84	3781	223
August 28th	2889	79	5331	330

### RESULTS



### CONCLUSIONS

#### Increasing of occultations in Brazil with COSMIC-2 mission

ionPrf		wetPrf and wetPf2	
Date	Increase	Date	Increase
June 04th	140,2%	February 15th	165,5%
October 13th	338,2%	August 28th	317,7%

#### Evolution of the number of COSMIC-2 data in 2020 to the Brazilian region

ionPrf		wetPrf and wetPf2	
Period	Increase	Period	Increase
From June to October	22,3%	From February to August	48,0%

The filtering was efficient

The effects of seasonality were observed

### REFERENCES

- [1] CDAAC – file formats. Available in: <<https://cdaac-www.cosmic.ucar.edu/cdaac/doc/formats.html>>. Accessed on: March 23rd, 2021.  
 [2] CDAAC – COSMIC and COSMIC-2. Available in: <<https://cdaac-www.cosmic.ucar.edu/cdaac/products.html>>. Accessed on: March 23rd, 2021.