



ISRO-IRNSS-PER-20-4

NavIC (IRNSS)
STANDARD POSITIONING SERVICE
PERFORMANCE REPORT

OCTOBER-DECEMBER 2020

SATELLITE NAVIGATION PROGRAM
U.R. RAO SATELLITE CENTRE
INDIAN SPACE RESEARCH ORGANIZATION

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ABBREVIATIONS

SPS	Standard Positioning Service
HPE	Horizontal Position Error
PE	Position Error
CEP	Circular Error Probability
DRMS	Distance Root Mean Square
SV	Space Vehicle
NSAT	Number of Satellites
DOP	Dilution Of Precision

1.1 INTRODUCTION

The performance of the Signals In Space (SIS), broadcasted by NavIC (IRNSS) system, is continuously being evaluated for both single and dual frequency users across various locations within the service area. The NavIC (IRNSS) SPS service performance in dual frequency mode for the months of October, November and December 2020 has been provided in this document.

1.2 PERFORMANCE INDICATORS

Table 1 describes the various parameters considered as the indicators of performance.

Table 1: Performance Indicators for NavIC (IRNSS)		
Position Accuracy	Horizontal Position Error (HPE) 3-D Position Error Circular Error Probability (CEP)	HPE is two dimensional and can be quantified in terms of error in latitude and longitude. It is calculated as twice the distance-root-mean-square (2drms) with the probability of 95% in this report. 3-D Position Error describes the overall accuracy by combining the effects of horizontal as well as vertical accuracy. The values taken are 2-sigma with 95% probability. CEP is the radius of a circular region, defined in such a way that, the probability of computed estimates falling inside this region is 50%. CEP can be computed from the scatter plot of latitudinal and longitudinal errors.
Availability	Percentage availability of SVs	The availability of service is computed at any user location as the percentage of time an SV can be used for position computation. This metric has been calculated by examining the status of Alert flag and URE index of each SV at every 30 s interval.
Carrier-to-Noise ratio	Received C/N_0 in L5 band Received C/N_0 in S band	
Satellite Geometry	Dilution of Precision	

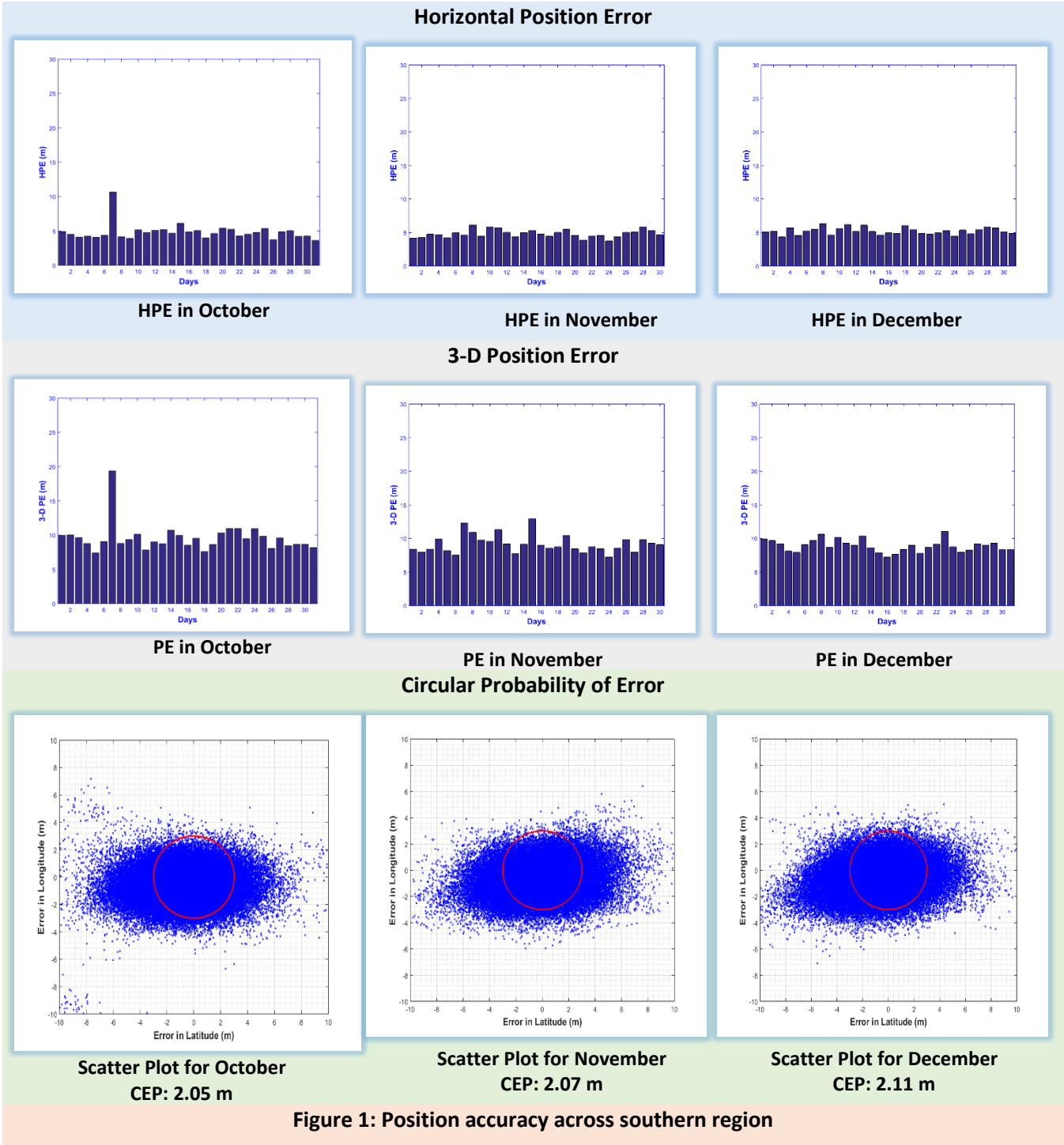
NOTE:

IRNSS 1G is not available for performance evaluation since October 05, 2019.

CHAPTER 2

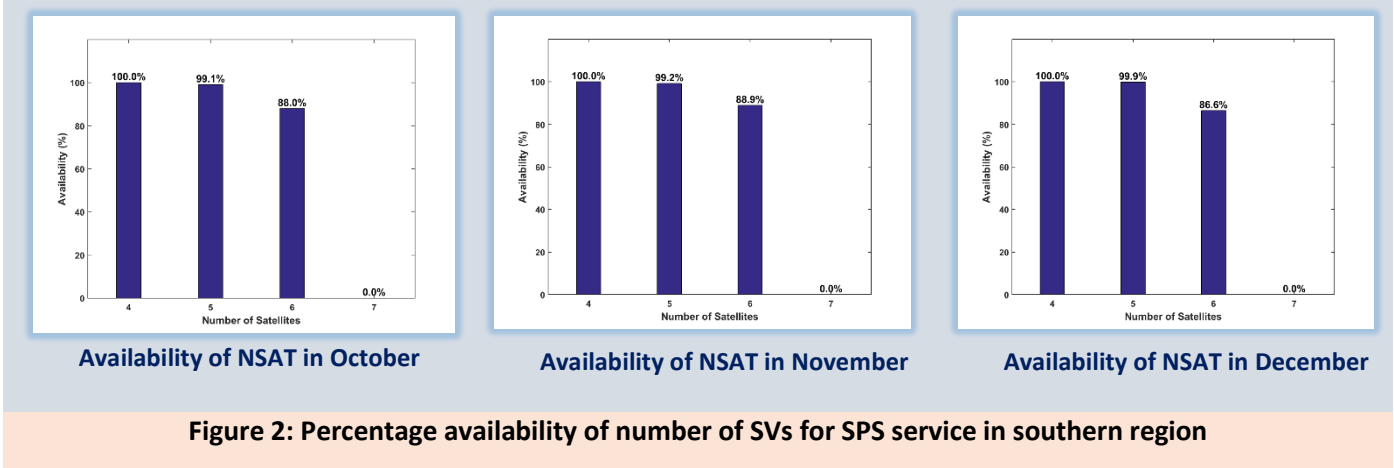
SOUTHERN REGION

2.1. SIGNAL IN SPACE ACCURACY

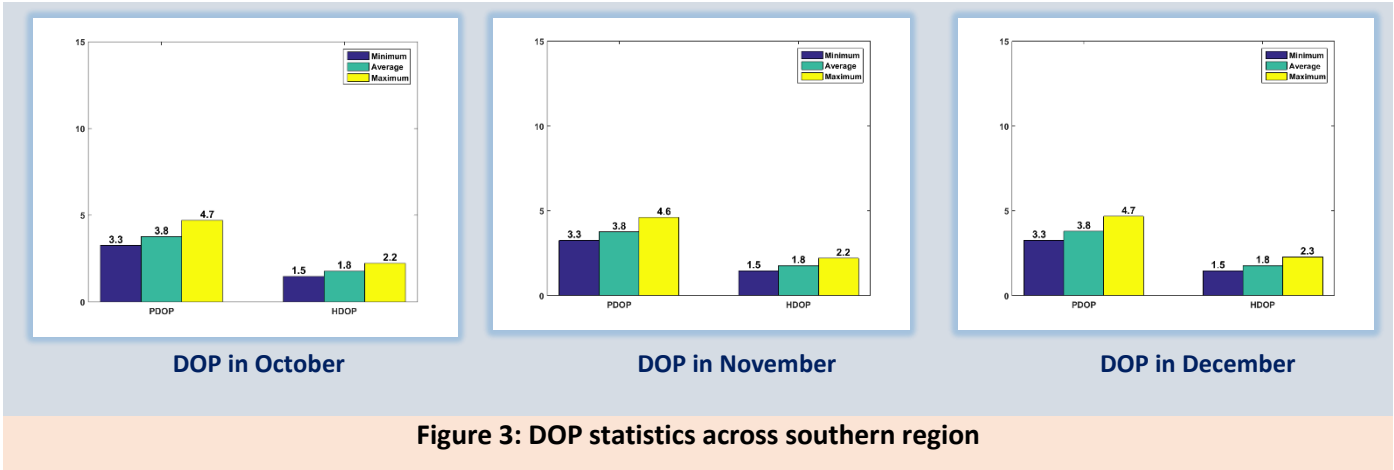


Due to SV error the 22 October 2020, PE and HPE plots are for 87% of time.

2.2. SATELLITE AVAILABILITY



2.3. DILUTION OF PRECISION STATISTICS



2.4. CARRIER TO NOISE RATIO

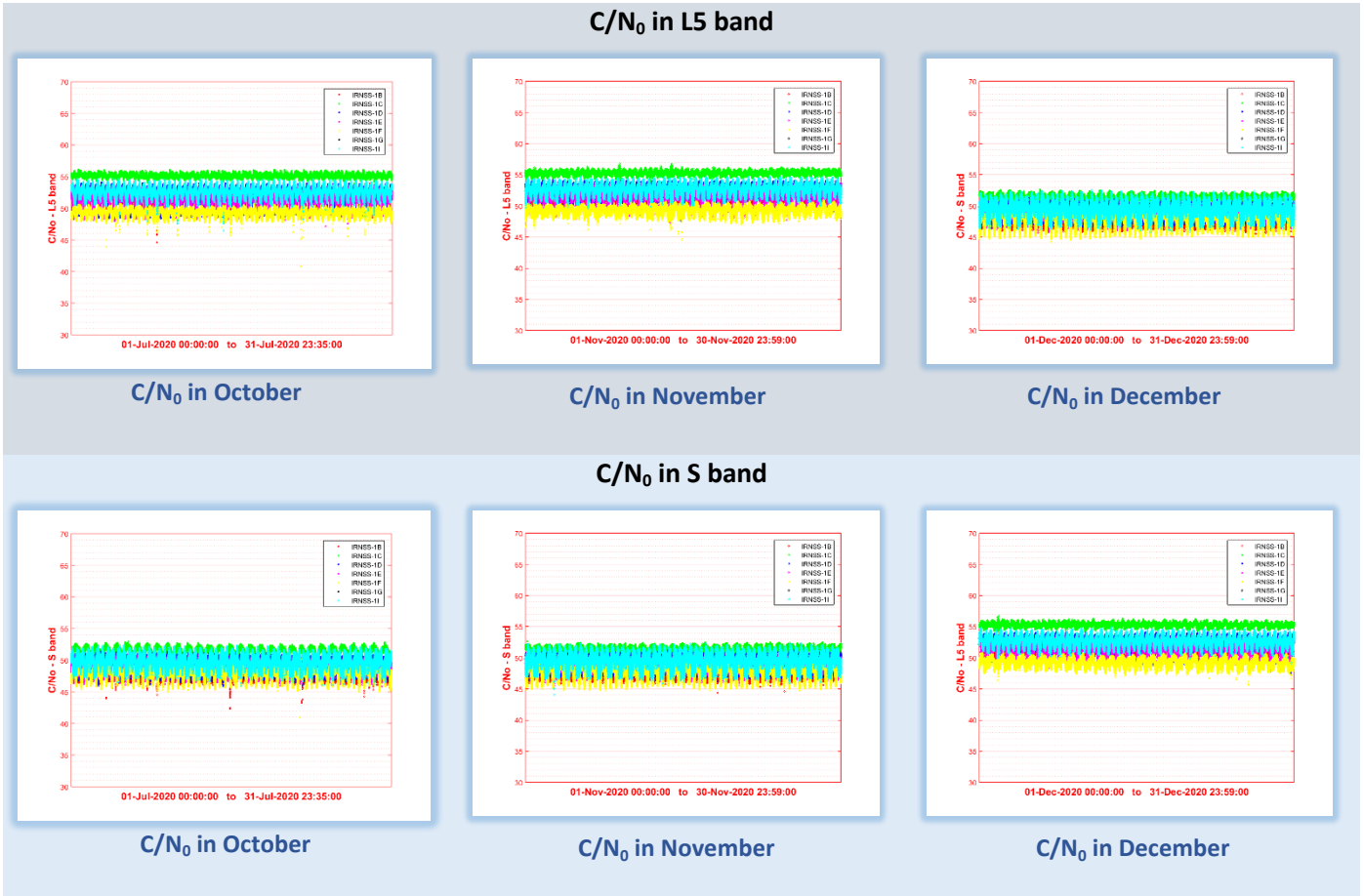
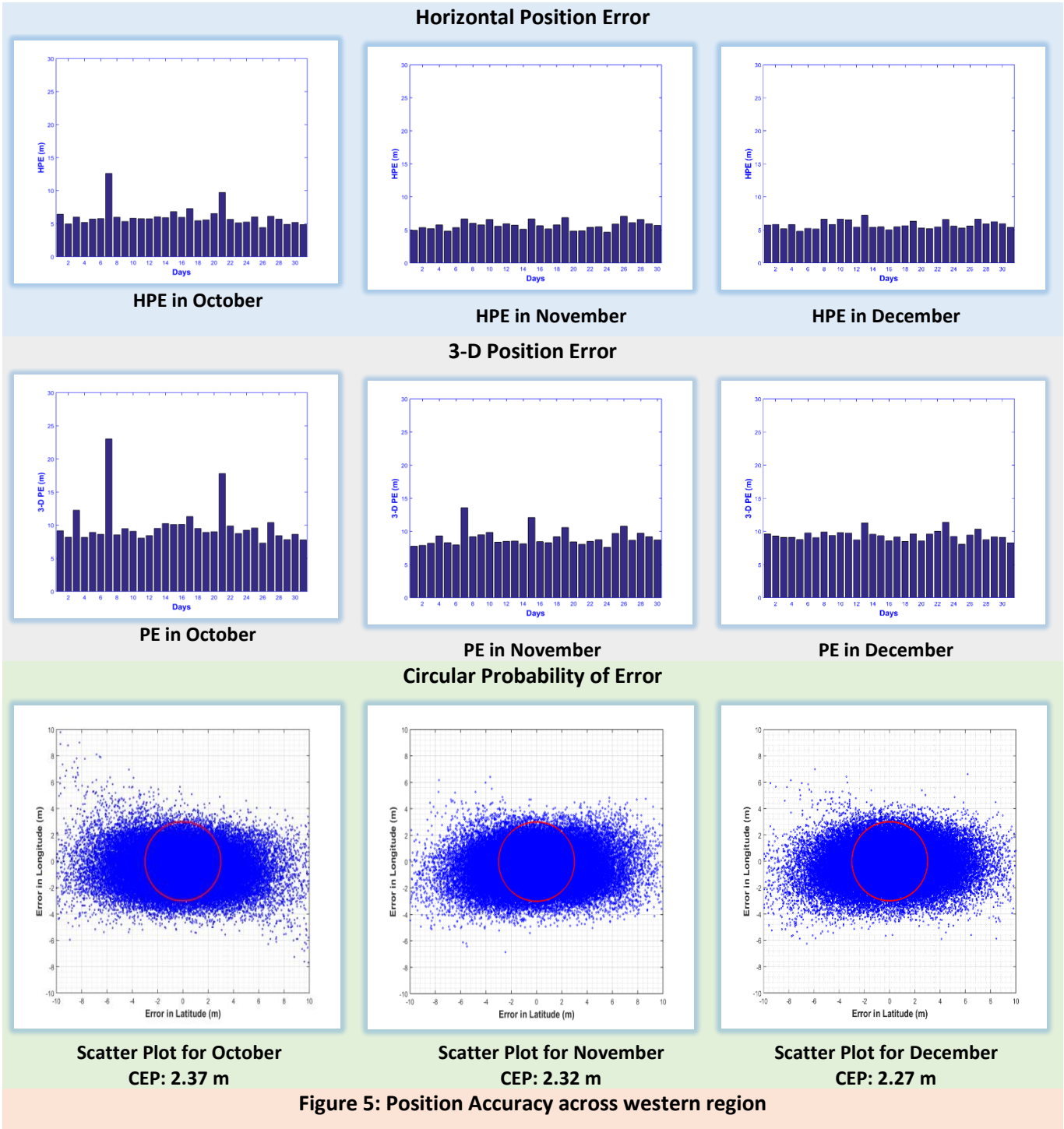


Figure 4: Received C/N₀ across southern region

3.1 SIGNAL IN SPACE ACCURACY



Due to SV error the 22 October 2020, PE and HPE plots are for 87% of time.

3.2 SATELLITE AVAILABILITY

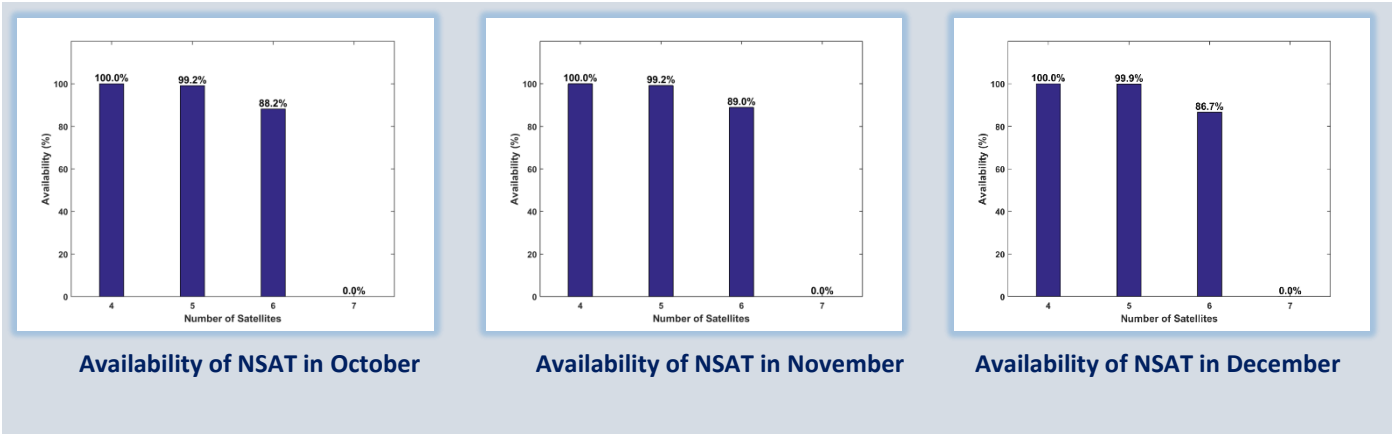


Figure 6: Percentage availability of number of SVs for SPS service in western region

3.3 DILUTION OF PRECISION STATISTICS

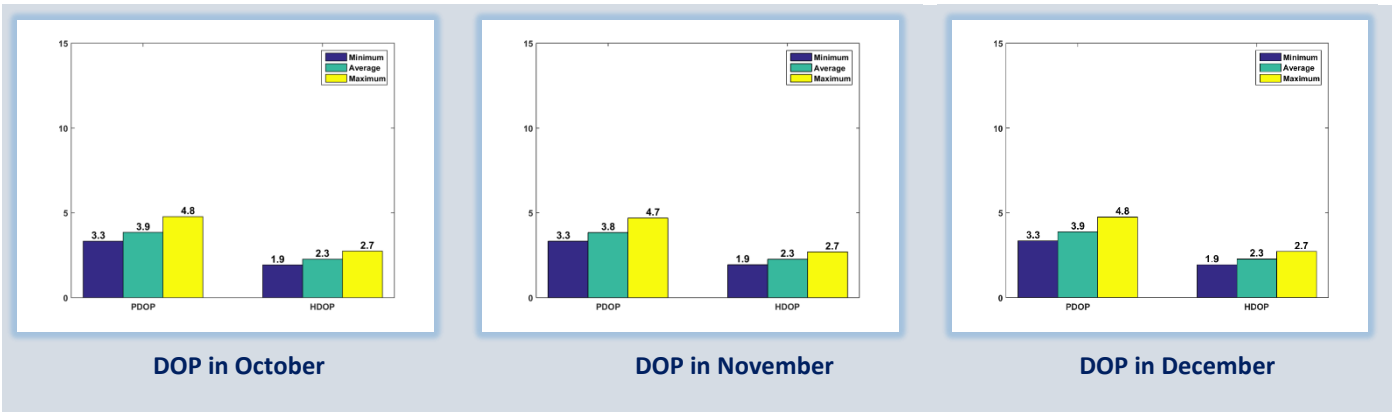


Figure 7: DOP statistics across western region

3.4 CARRIER TO NOISE RATIO

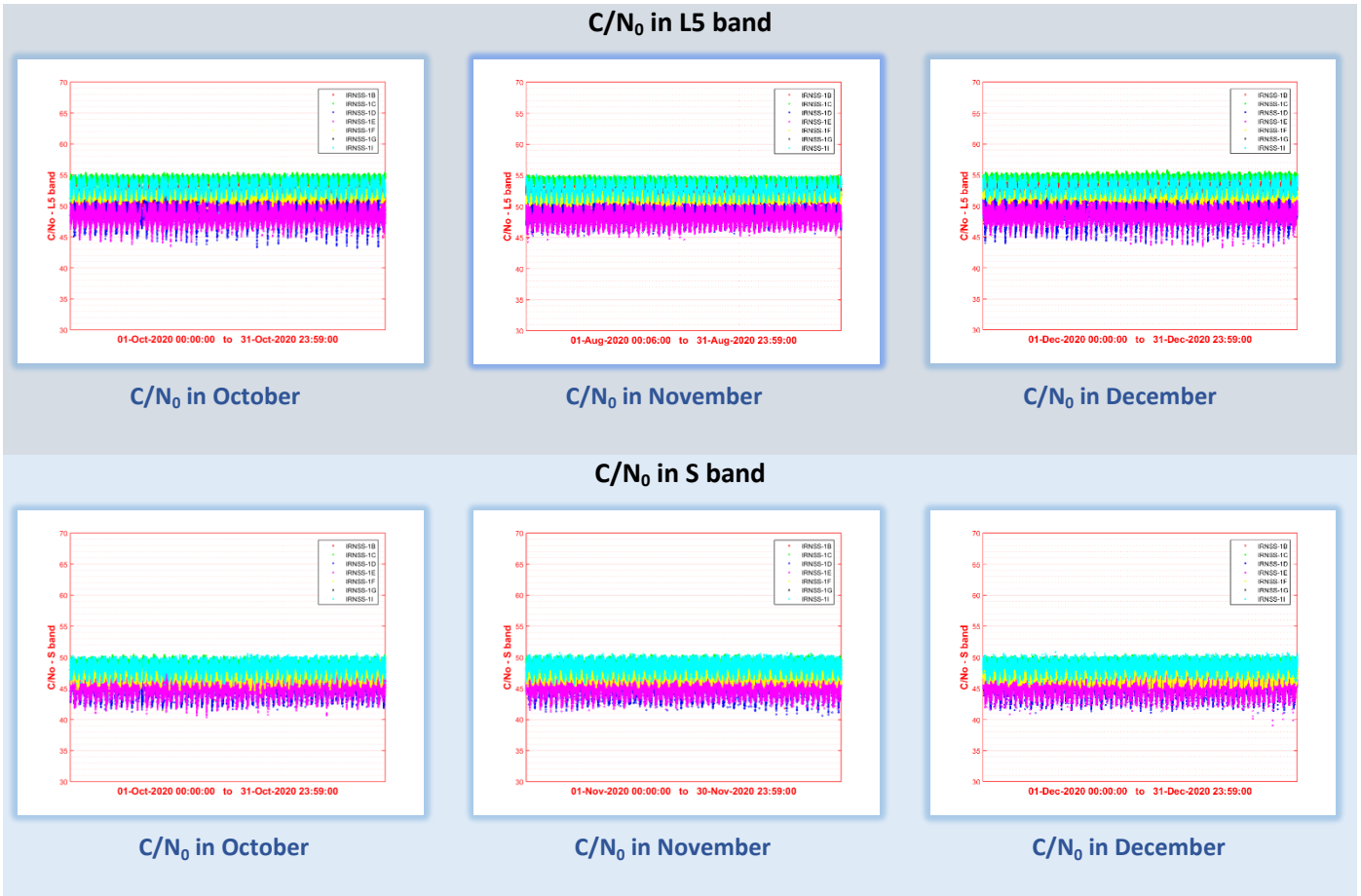
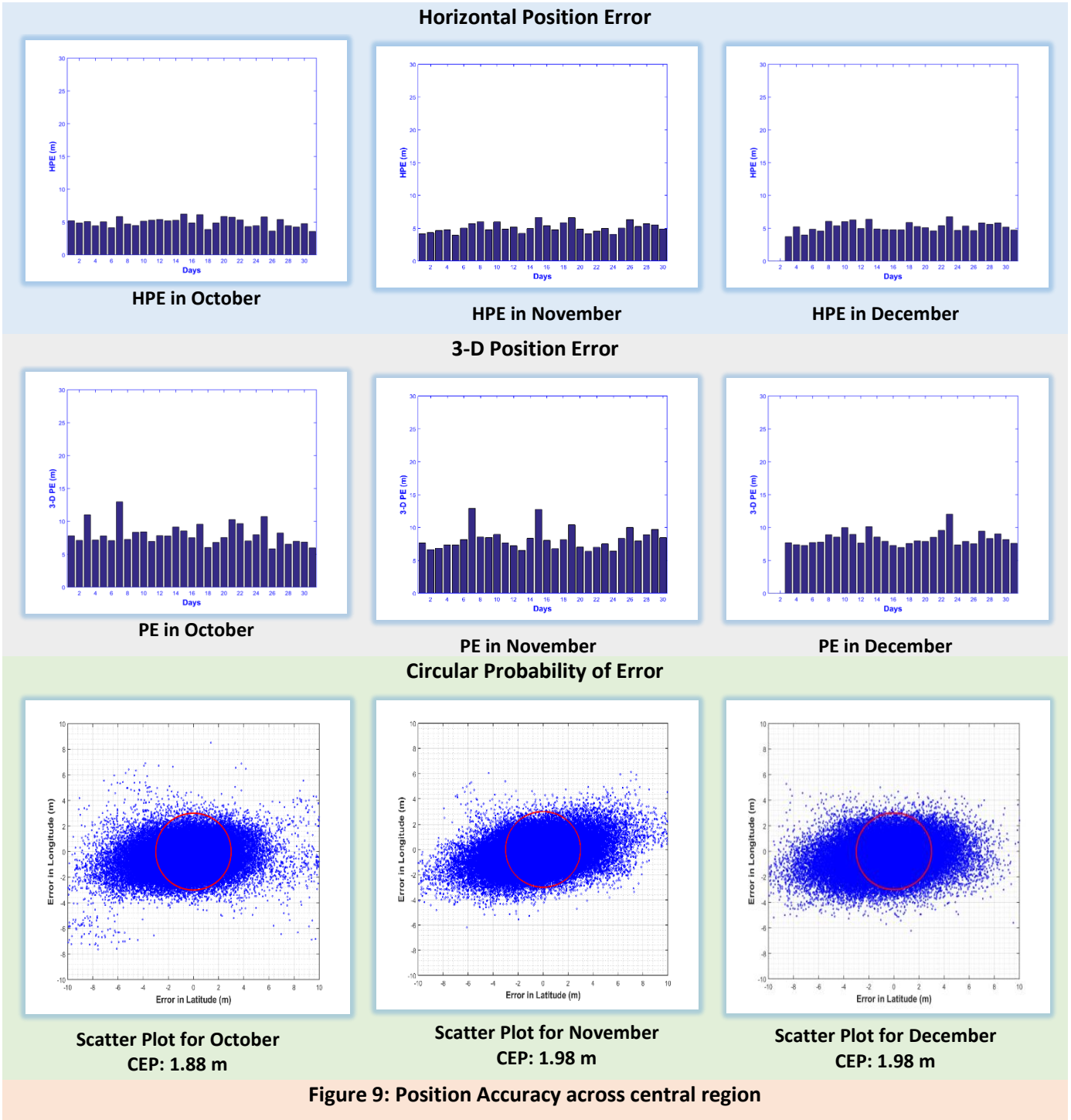


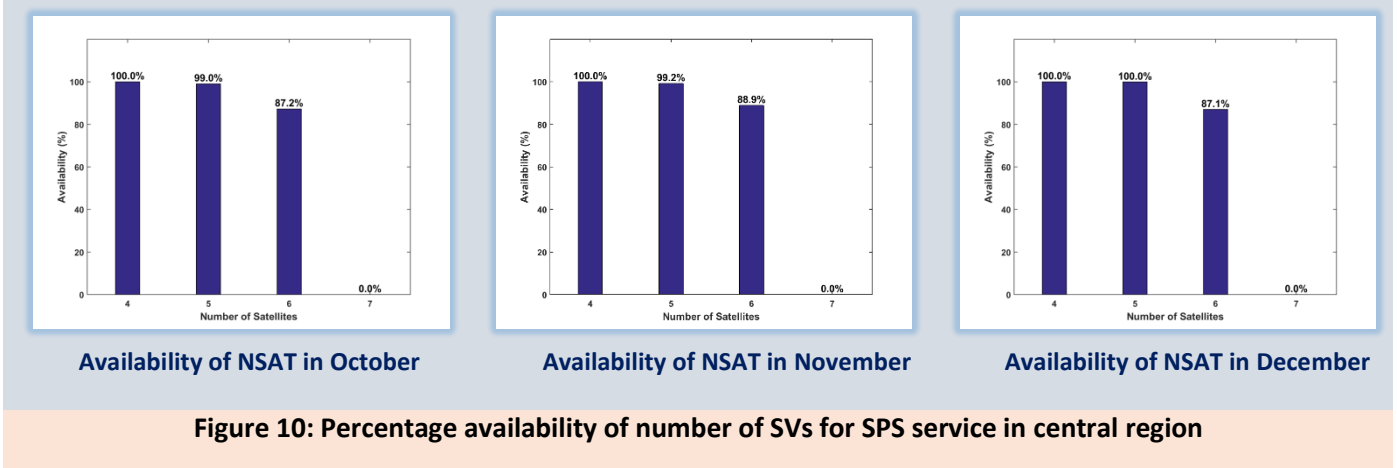
Figure 8: Received C/N₀ across western region

4.1 SIGNAL IN SPACE ACCURACY

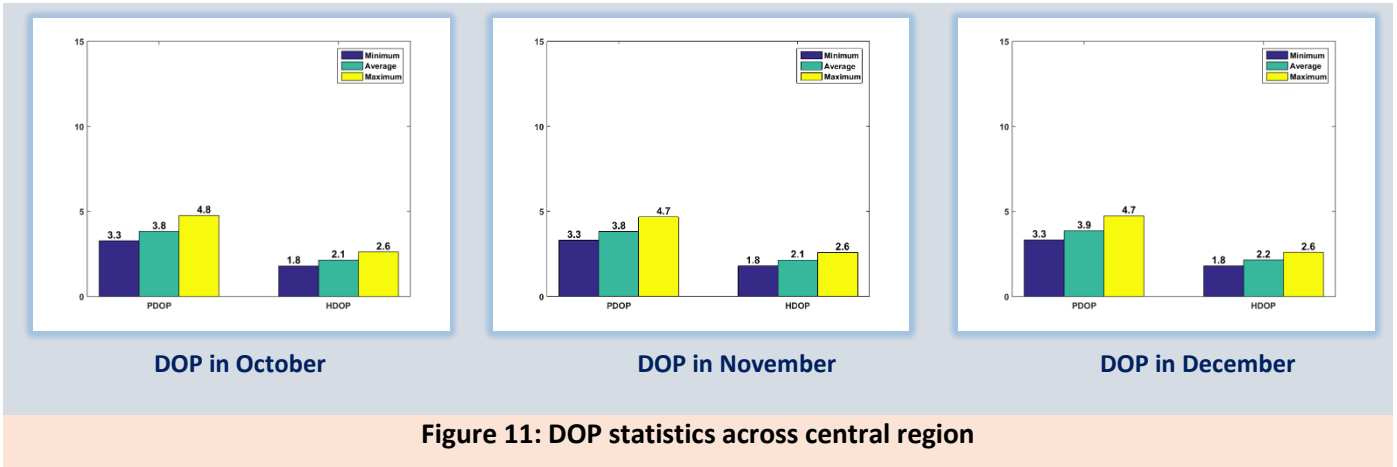


- Due to SV error the 22 October 2020, PE and HPE plots are for 87% of time.
- 1st & 2nd December 2020 data is not available due to station maintenance.

4.2 SATELLITE AVAILABILITY



4.3 DILUTION OF PRECISION STATISTICS



4.4 CARRIER TO NOISE RATIO

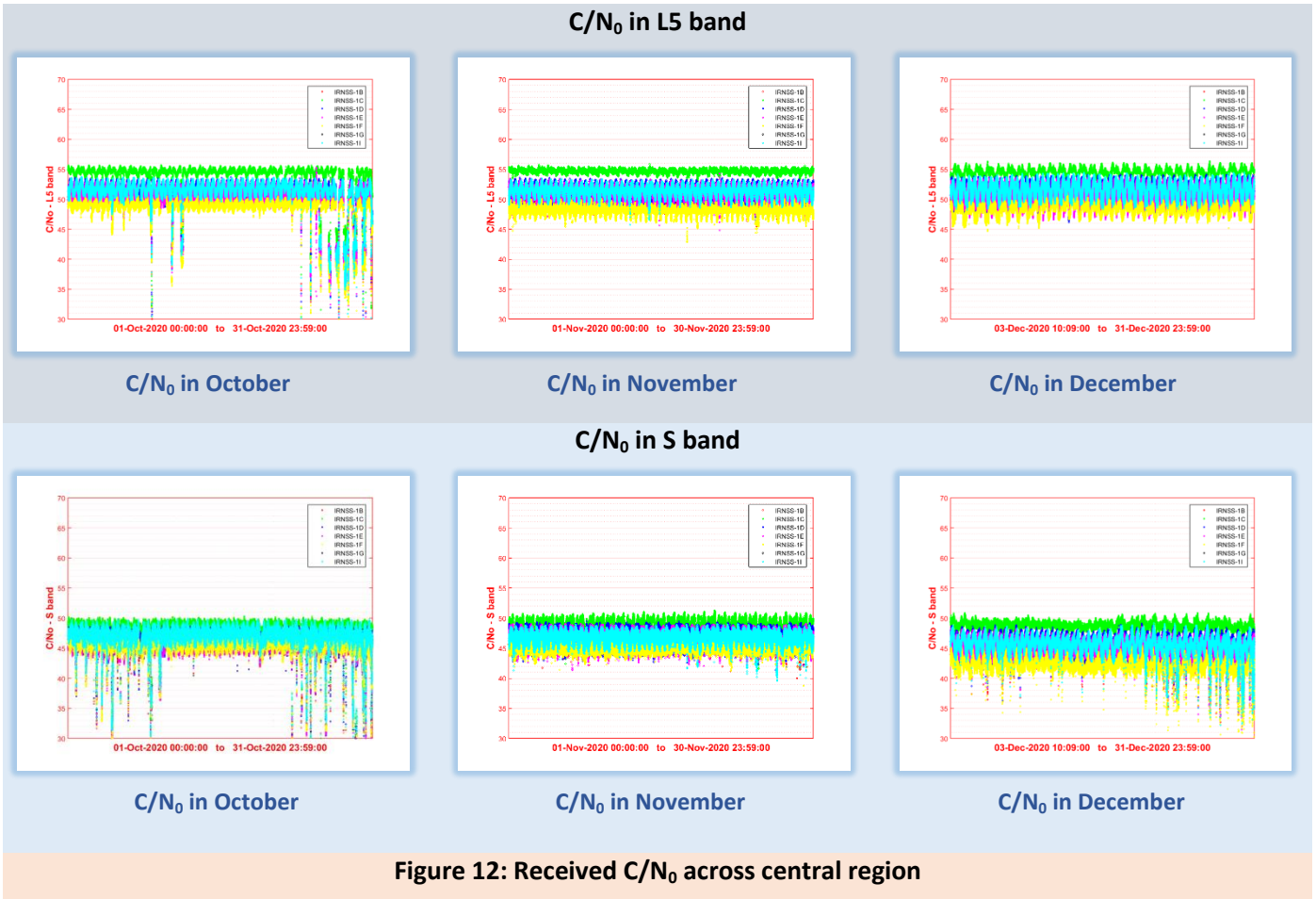


Figure 12: Received C/N₀ across central region

NOTE:

Occasional drop in C/N₀ is observed due to local interference.

5.1 SIGNAL IN SPACE ACCURACY

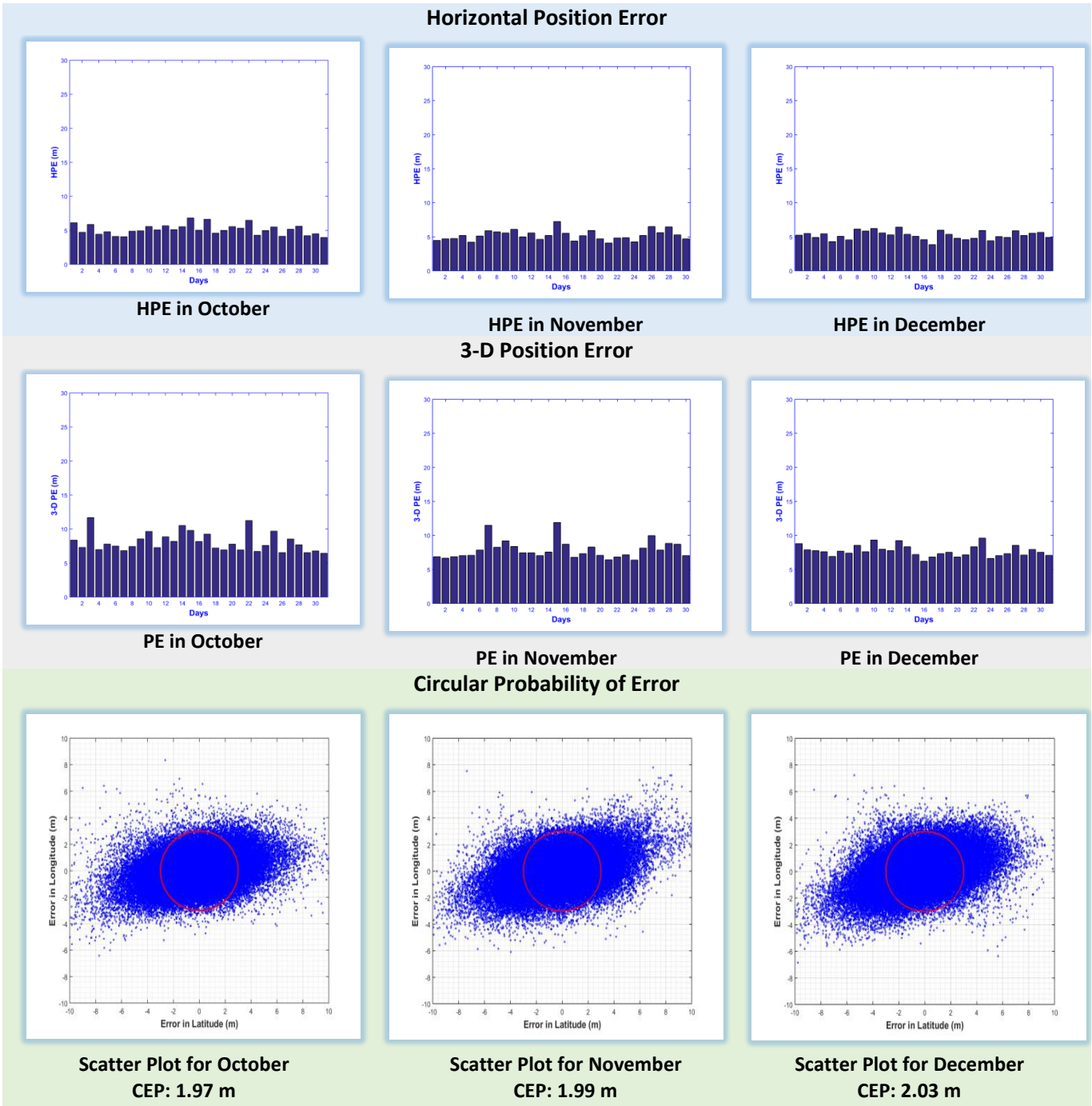
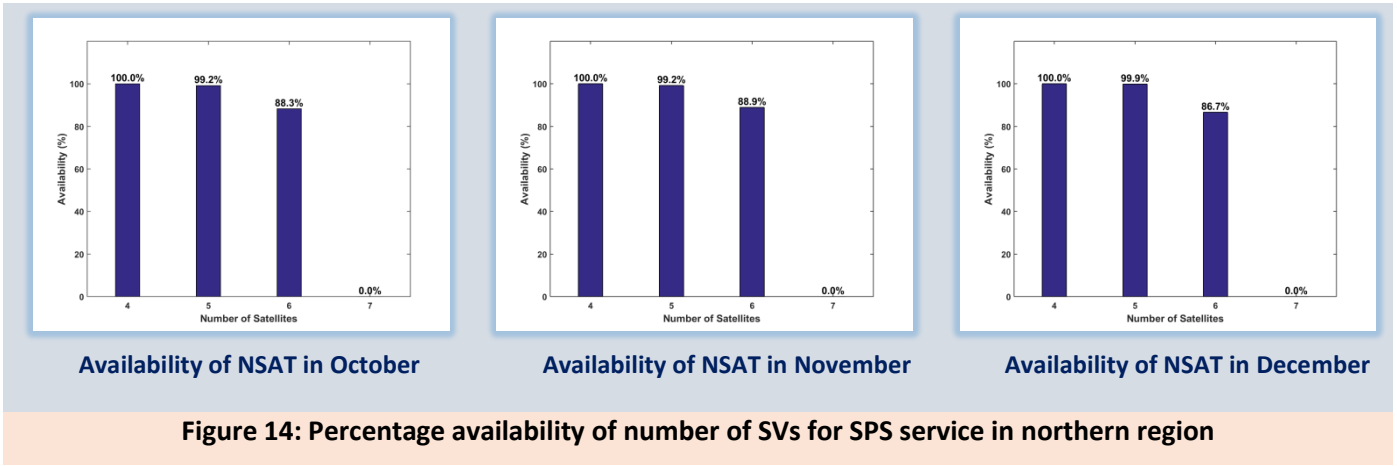
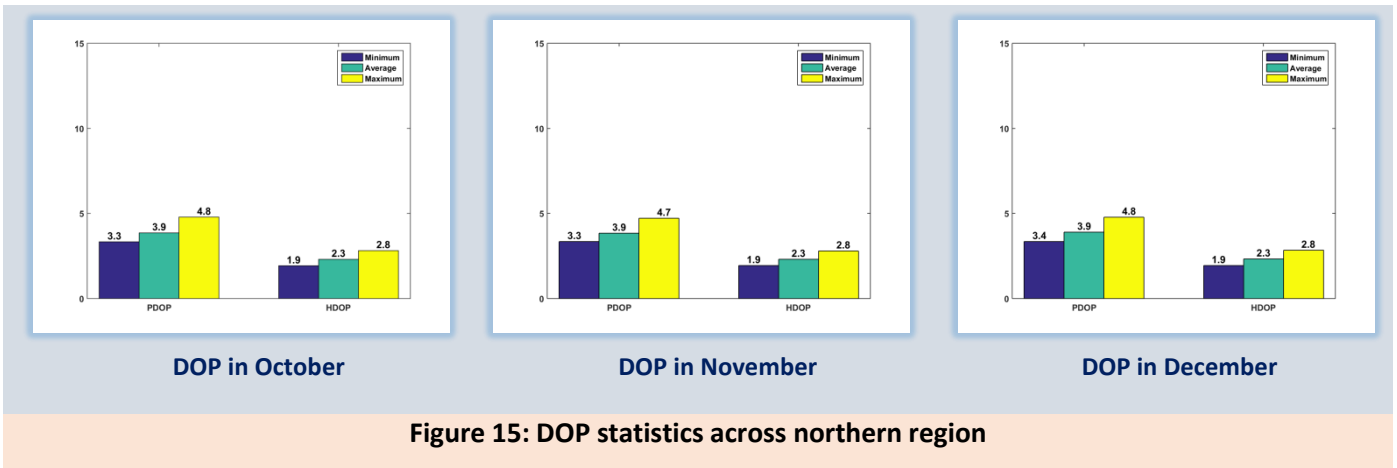


Figure 13: Position Accuracy across northern region

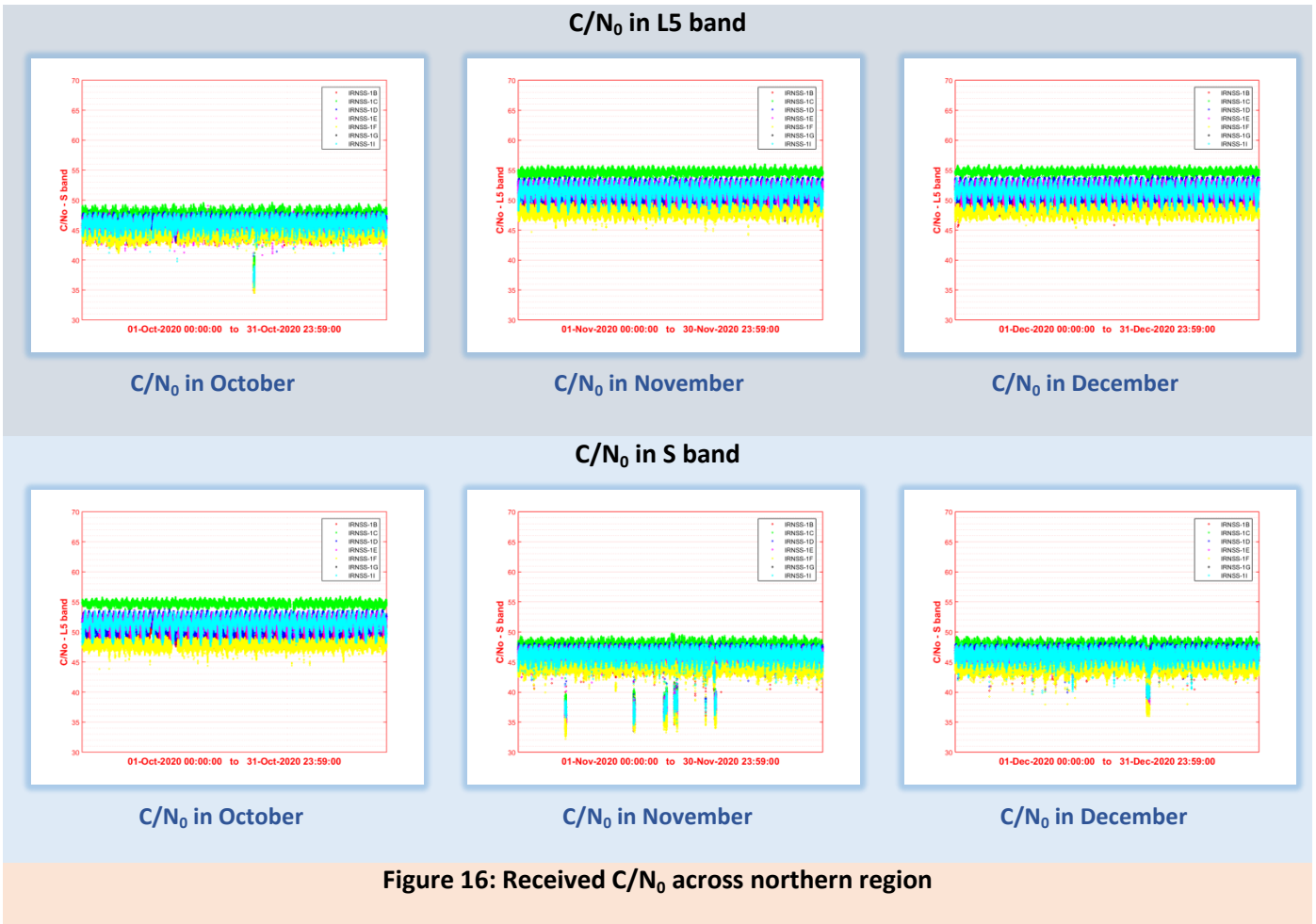
5.2 SATELLITE AVAILABILITY



5.3 DILUTION OF PRECISION STATISTICS

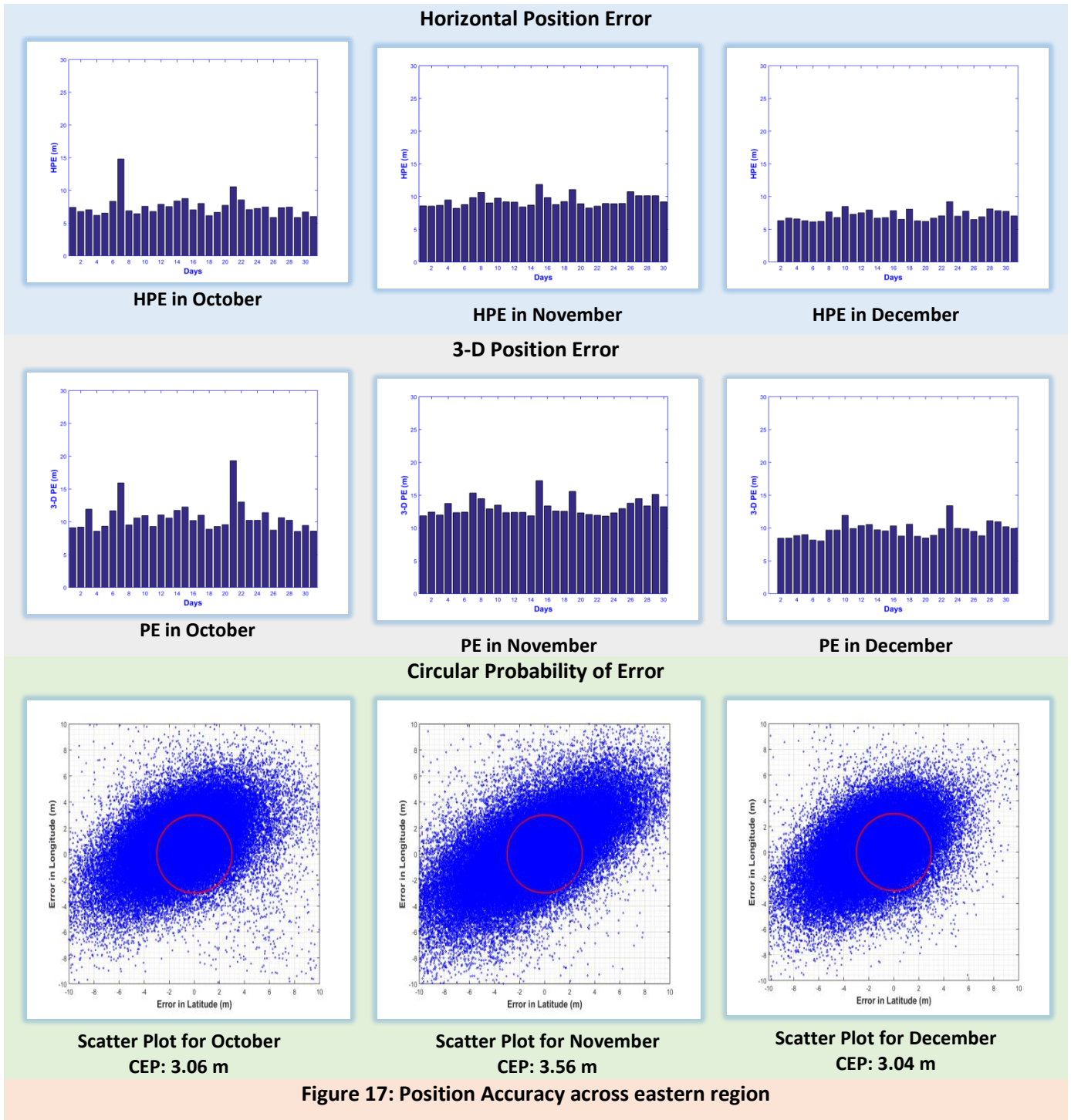


5.4 CARRIER TO NOISE RATIO



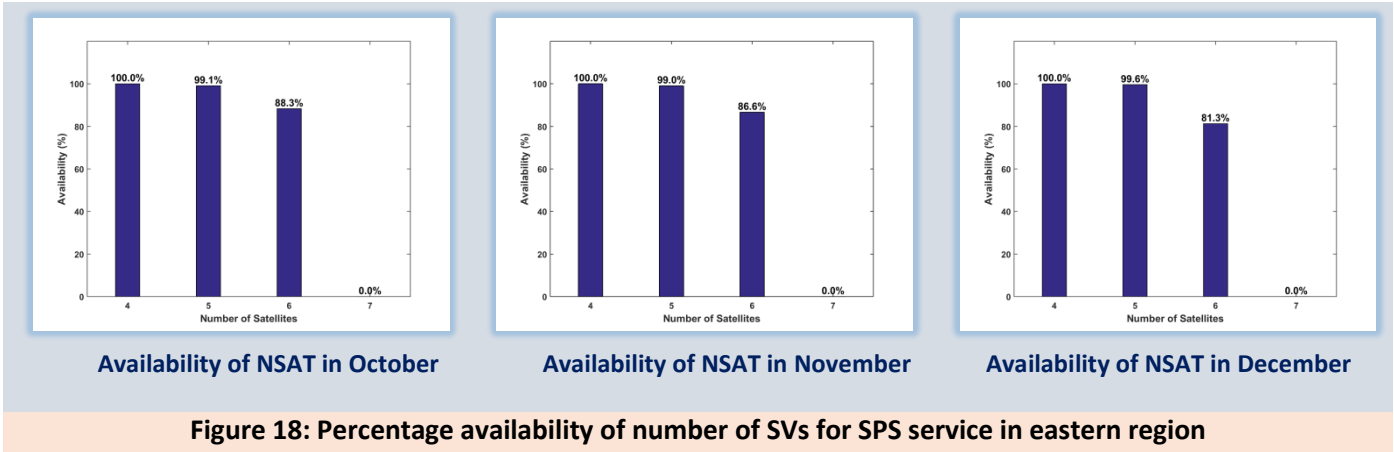
EASTERN REGION

6.1 SIGNAL IN SPACE ACCURACY

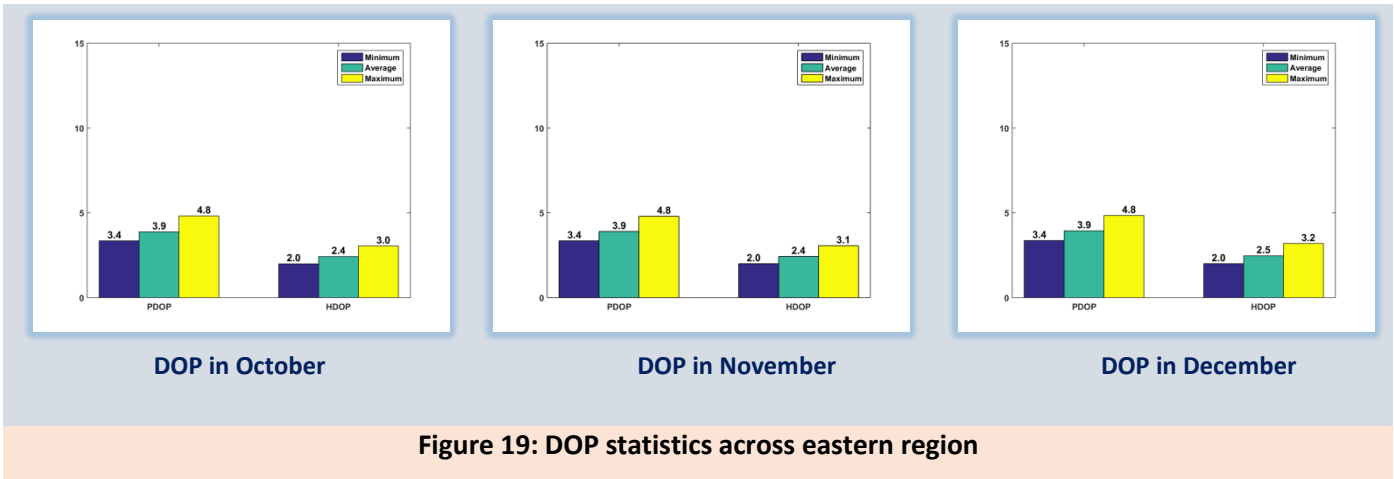


- Due to SV error the 22 October 2020, PE and HPE plots are for 87% of time.
- 1st December 2020 data is not available due to station maintenance.

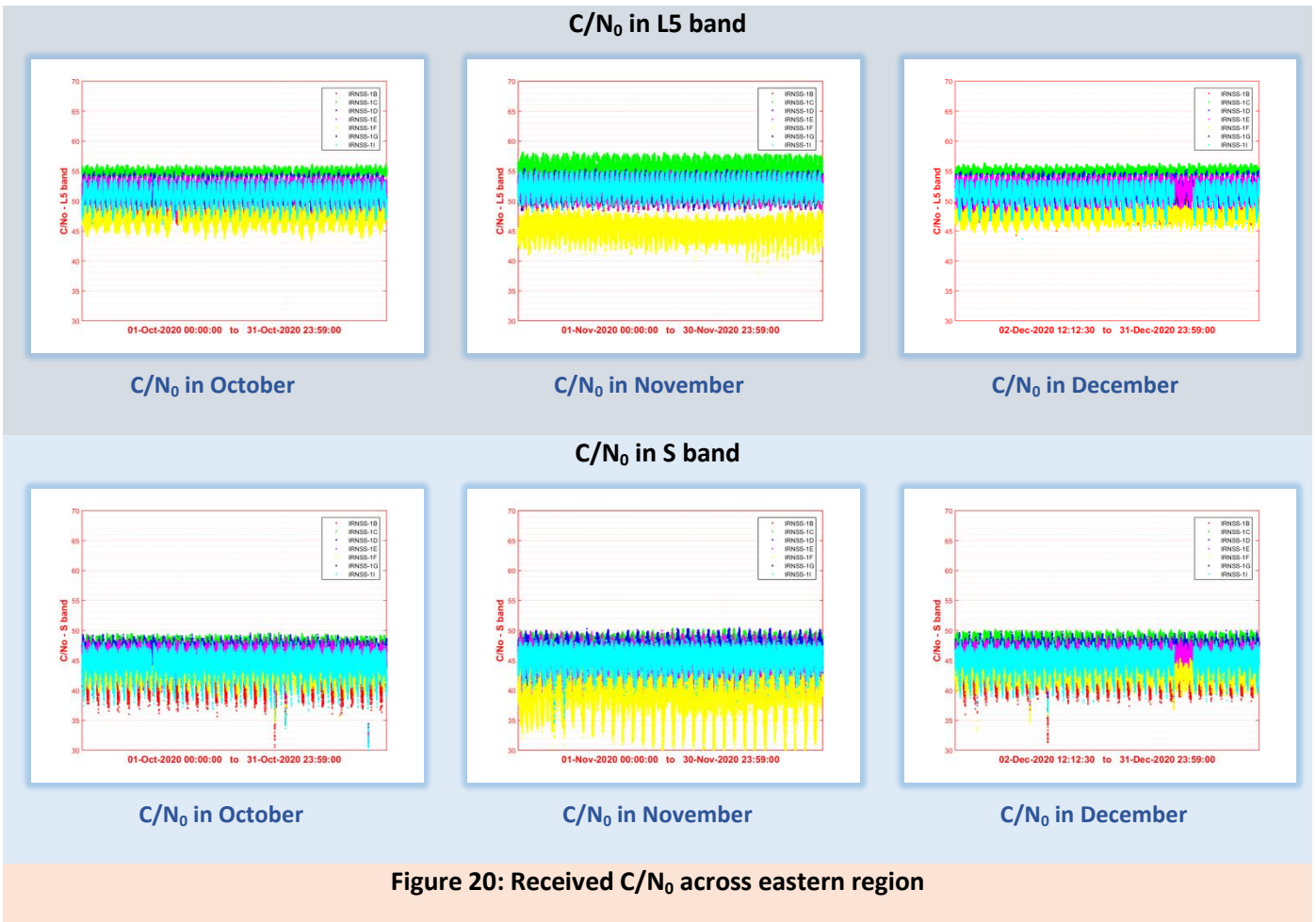
6.2 SATELLITE AVAILABILITY



6.3 DILUTION OF PRECISION STATISTICS



6.4 CARRIER TO NOISE RATIO



NOTE:

Occasional drop in C/N₀ is observed due to local issue.