

Quasi-Zenith Satellite System

The satellite orbits and service performance during the six-satellite operation

QZSS Strategy Office, Cabinet Office
July 27 and 28, 2026

Introduction

- ◆ Due to the loss of QZS5, operations will be limited to six satellites for the time being. This document describes the satellite orbits and service performance during the six-satellite operation period. The six satellites covered in this document are QZS2, QZS3, QZS4, QZS1R, QZS6, and QZS7.
- To optimize service performance during the six-satellite operation period, orbital repositioning of QZS2 and QZS1R will be carried out. Regarding the satellite orbits during the six-satellite operation period after orbital repositioning of QZS2/QZS1R, differences from PS-QZSS-005 Section 3.2.3 are shown on p.3.
- For service performance during the six-satellite operation period, a list of items that differ from the values in PS-QZSS-005 is shown in the table below, and the details are provided on pages 4 to 10.

PS-QZSS-005 Chapter	List of items that differ from the PS-QZSS-005 values during the six-satellite operation period	PS-QZSS-005 Chapter	List of items that differ from the PS-QZSS-005 values during the six-satellite operation period
Chapter 4 PNT	• 4.2 Visible Area • 4.4.1 Constellation Service Availability • 4.7 Position Accuracy	Chapter 9 PTV	• 9.2 Service Area
Chapter 6 CLAS	• 6.4.3 Constellation Service Availability at High Elevation Angles	Chapter 11 SAS	• 11.1.2 Service Area (11.1.2.1 QZSS NMA)
Chapter 7 DC Report	• 7.2 Service Area		

From the following pages, the item numbers/figure numbers of PS-QZSS-005 will be shown.

「3.2.3 Satellite Orbits」

- ◆ During the six-satellite operation period, the satellite orbit information that differs from PS-QZSS-005 section 3.2.3 is the central longitude of QZS2/1R. Also, QZS5 is not applicable as it has been lost.

「Table 3.2-4 QZO Parameters and Operational Ranges (1/4)」

Orbit parameter	QZS2	
	Nominal value	Operational range
Center of longitude (λ)	147 degrees east (Average of orbit control interval (approx. 6 months))	from 141.5 to 151.5 degrees east

「Table 3.2-4 QZO Parameters and Operational Ranges (3/4)」

Orbit parameter	QZS1R	
	Nominal value	Operational range
Center of longitude (λ)	127 degrees east (Average of orbit control interval (approx. 6 months))	from 120.5 to 133.0 degrees east

「Table 3.2-4 Parameters and Operational Ranges(4/4)」

QZS5 : N/A

「4.2 Visible Area」 (PNT)

- ◆ Figure 4.2-1 shows the area where at least one QZS is visible. PNT signals can be received in the inside area of the line which corresponds to the elevation angle of 10 degrees.

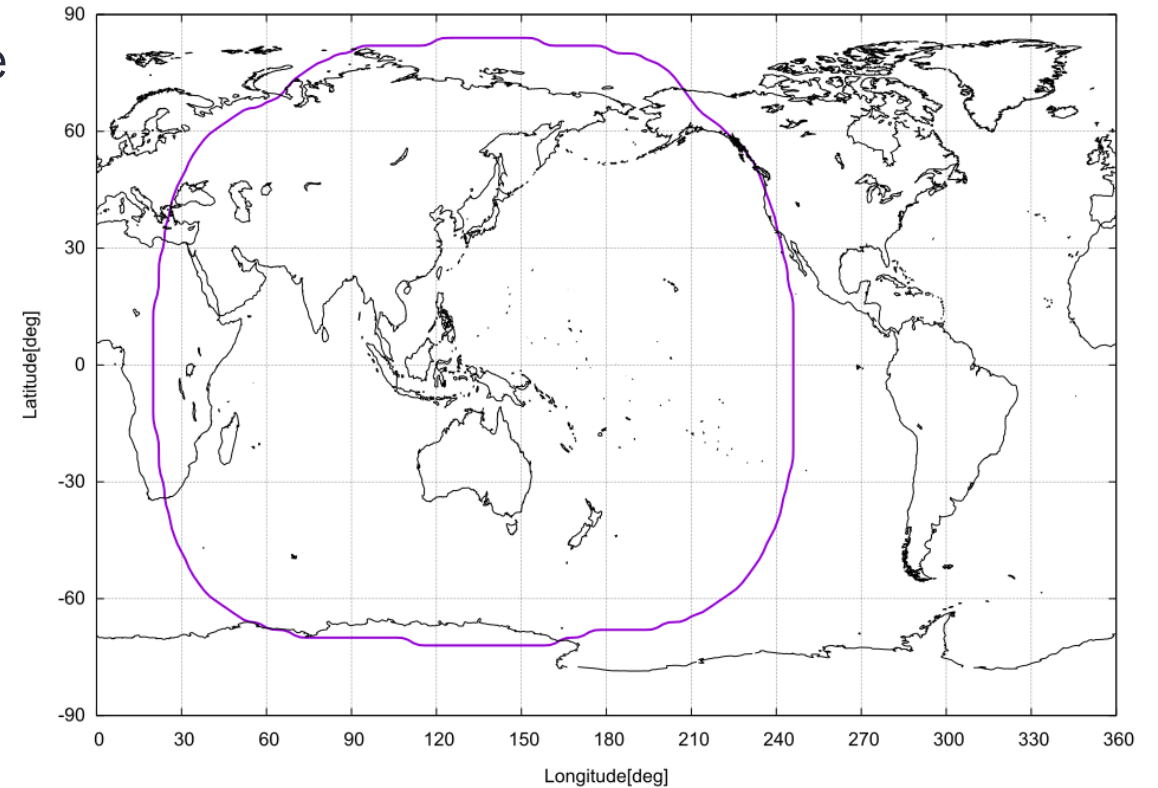


Figure 4.2-1 Visible Area (at least one of six QZSs at an elevation angle of 10 degrees or more is visible)(PNT)

「7.2 Service Area」 (DC Report)

◆DC report is available in the area depicted in Figure 7.2-1 where at least one QZS is visible at an elevation angle of 10 degrees or more.

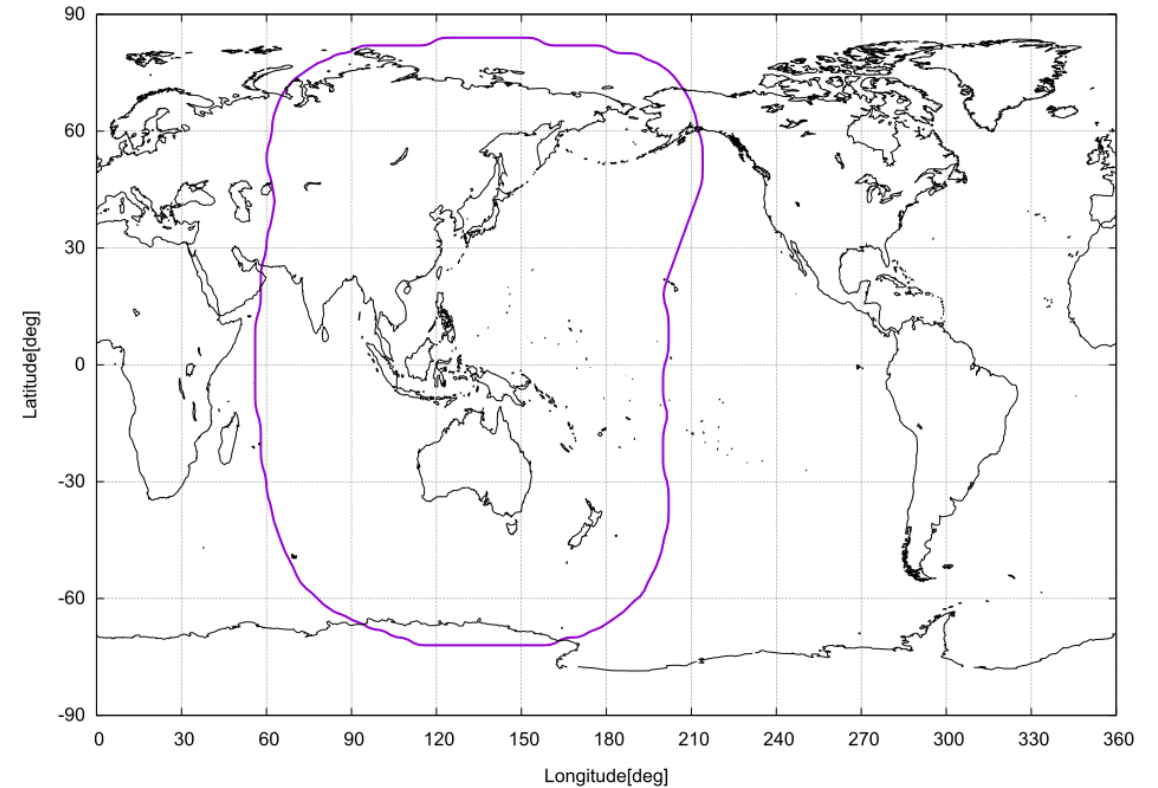


Figure 7.2-1 Service Area of the DC Report

「9.2 Service Area」 (PTV)

- ◆PTV is available in the area depicted in Figure 9.2-1 where at least one of the QZSs transmitting L5S signal is visible at an elevation angle of 10 degrees or more.

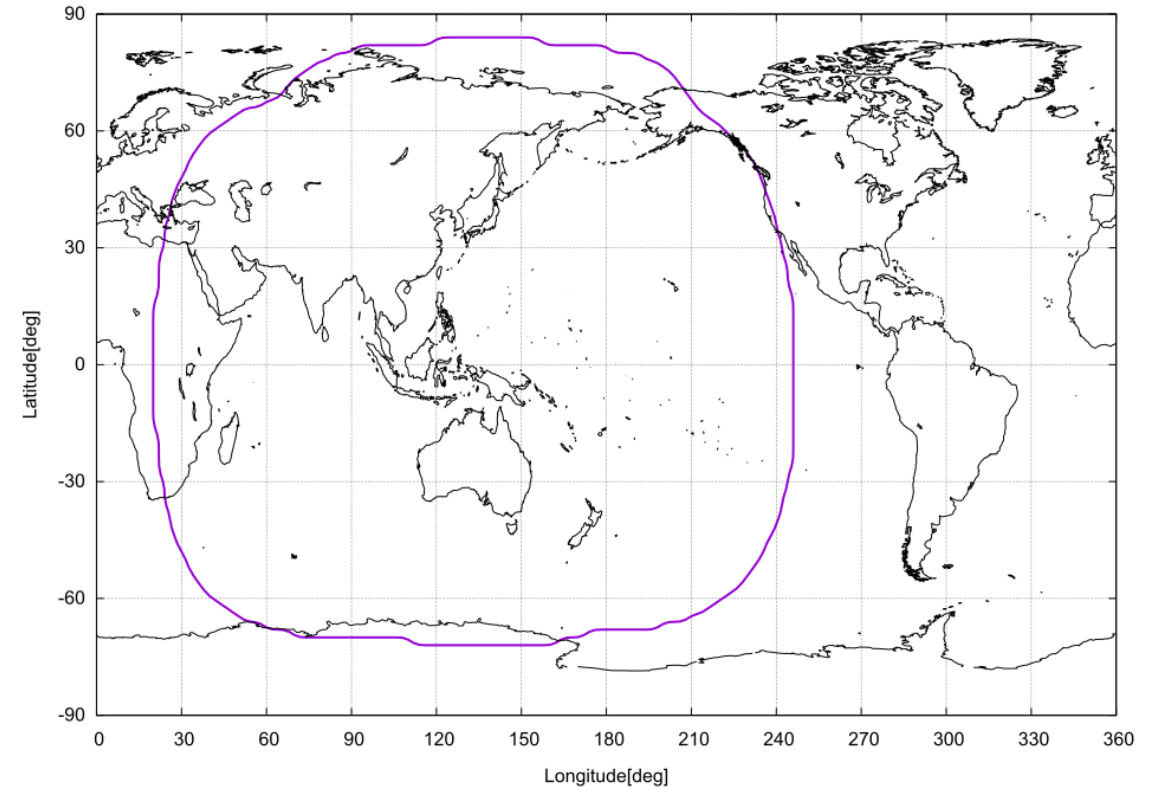


Figure 9.2-1 Service Area of the PTV

「11.1.2.1 Service Area」 (SAS:QZSS NMA)

◆Service area for QZSS NMA is same as PNT Service. Refer to section 4.2.

「4.4.1 Constellation Service Availability」 (PNT)

◆ The constellation availability is the time ratio that the healthy PNT signals (L1C/A, L1C/B, L1C, L2C and L5) from at least four of six QZSs at an elevation angle of 10 degrees or more are available. It shall be the following performance during the six-satellite operation period:

- ≥ 0.985

「6.4.3. Constellation Service Availability at High Elevation Angles(CLAS)

◆The constellation service availability at high elevation angles is the time ratio that the healthy L6(CLAS) signal from any QZS at an elevation angle of 60 degrees or more is available. It shall be the following performance during the six-satellite operation period:

- ≥ 0.84

「4.7. Position Accuracy」 (PNT)

The Position accuracy is an indicator that evaluates Signal-In-Space User Range Error (SIS-URE), Horizontal Dilution of Precision (HDOP) and User Equipment Error (UEE). It shall satisfy the following conditions for Japan area shown in Figure 4.7-1:

- Area Average:
 $\leq 8.0 \text{ m (95\%) (Error(RMS) = 4.0 m)}$
- Worst Site
 $\leq 16.0 \text{ m (95\%) (Error(RMS) = 8.0 m)}$

Usage assumptions to achieve the accuracy are as follows:

- The assumed URE is 2.6 m (95%) or less, referring to 4.3.1.
- The assumed UEE is 0.7 m (95%) or less. The use of a representative dual-frequency receiver that is designed in accordance with IS-QZSS-PNT (reference document (2)). The actual UEE in the receiver depends on the intended user.
- The assumed HDOP is 8.0 (95%) or less in area average, 20.0 (95%) or less in worst site. The HDOP for QZSS six-satellite constellation (full constellation and 1-satellite failure are considered) and 10 degrees mask angle are assumed.

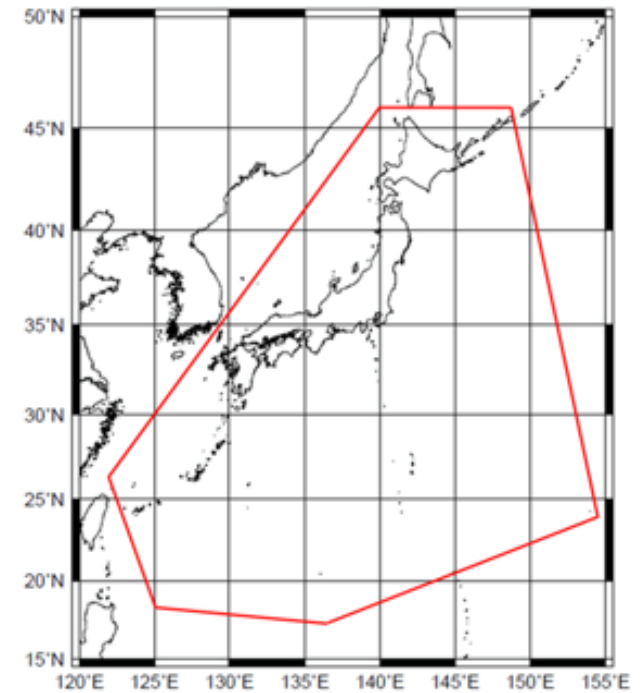


Figure 4.7-1 Target Area of Position Accuracy

【 Reference 】

「5.4.3. Constellation Service Availability at High Elevation Angles」 (SLAS)

◆ The constellation service availability at high elevation angles is the time ratio that the healthy L1S(SLAS) signal from any QZS at an elevation angle of 60 degrees or more is available. This availability remains the same as that of PS-QZSS-005 as shown below even during the six-satellite operation period:

- ≥ 0.84

【 Reference 】

「7.3.3. Constellation Service Availability at High Elevation Angles 」 (DC Report)

◆ The constellation service availability at high elevation angles is the time ratio that the healthy L1S(DC report) signal from any QZS at an elevation angle of 60 degrees or more is available. This availability remains the same as that of PS-QZSS-005 as shown below even during the six-satellite operation period:

- ≥ 0.84

【Reference】 Schedule and Related Information

The following orbit transfers are planned for performance optimization in six-satellite operation.

◆QZS-1R: Starts in late January 2027, Ends in late July 2027

◆QZS-2: Starts in late October 2026, Ends in late April 2027

Please refer to NAQU for the actual timing of orbit control operations.

Six-satellite operation is planned to transition in phases to 7SV constellation, and subsequently to 11SV constellation.

Further details of this plan will be announced once finalized.