International Civil Aviation Organization

Thirty-First Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/31)

Bangkok, Thailand, 29 June – 03 July 2026

Agenda Item 5: Airspace Safety Monitoring Activities/Requirements in the Asia/Pacific Region

ASE COMPARISON BEFORE AND AFTER THE UPDATE OF SETOUCHI HMU

(Presented by JASMA)

SUMMARY

This paper provides an overview of a verification study comparing Altimetry System Error (ASE) values obtained using the conventional HMU with those obtained using ADS-B Height Monitoring System (AHMS), following the update of the Setouchi HMU conducted by JCAB. It also compares ASE values obtained using AHMS with those obtained using en-route Wide Area Multilateration (WAM).

1. INTRODUCTION

1.1 In December 2025, JCAB updated the Setouchi HMU. After RMACG/20, the implementation timeline was revised, and the update was completed three months later than originally planned. As a result, Setouchi HMU transitioned to a hybrid height monitoring system that combines AHMS using ADS-B with multilateration based on en-route WAM.

1.2 Initially, AHMS was intended to serve as a supplementary function to height monitoring using en-route WAM, but the policy was subsequently changed to use AHMS as the primary height monitoring system, with en-route WAM used to monitor flights that cannot be monitored by AHMS.

2. DISCUSSION

2.1 From the outset, JASMA planned to compare the ASE values from the updated Setouchi HMU with those of the legacy system to verify whether the new system could maintain the same level of surveillance performance as the legacy system, or to what extent its performance had improved.

2.2 The data used by JASMA for the ASE comparison was collected starting on 14 February 2026. The reason data immediately following the Setouchi HMU update could not be used was that it was difficult to separate the data streams. Ultimately, separating the data from AHMS and WAM required extracting raw data from the monitoring devices, but by the time this issue was resolved, the data retention period had expired.

2.3 AHMS data following the HMU update covers the period from 14 February to 29 May 2026. The verified data set spans less than three months and comprises a total of 34,080 flight tracks. Although the data sample is limited, requiring caution in determining whether the updated Setouchi HMU data fully reflects aircraft height keeping performance, the mean ASE for AHMS during this period is observed to be converging toward a narrower band compared to pre-update values.

2.4 The volume of WAM data for this period is even smaller than that of AHMS data. The number of WAM data is 2,434 flights, accounting for 5.19% of the total data. Therefore, a comparison of AHMS and WAM data may not be meaningful at this stage. For reference, **Table 1** shows the number of data and mean ASE for each aircraft group. Additionally, **Figure 1** shows an example of A320, comparing AHMS and WAM.

Table 1. Mean ASE of AHMS and WAM by Monitoring Group

Monitoring Group	AHMS		WAM	
	count	Mean ASE	count	Mean ASE
A20N	5342	39.4	7	42.7
A320	6404	52.5	21	93.0
A330	579	46.4	3	21.9
A350	2932	-43.1	5	-16.2
B737NX	11591	5.9	14	8.6
B767	3989	-56.7	11	-55.0
B772	2446	20.0	17	1.9
B773	1544	17.0	7	-33.4
B787	5577	28.0	4	17.2
B78X	1047	42.7	2	43.7
CRJ7	135	2.0	120	30.6
E170-190	791	-21.1	2048	16.6

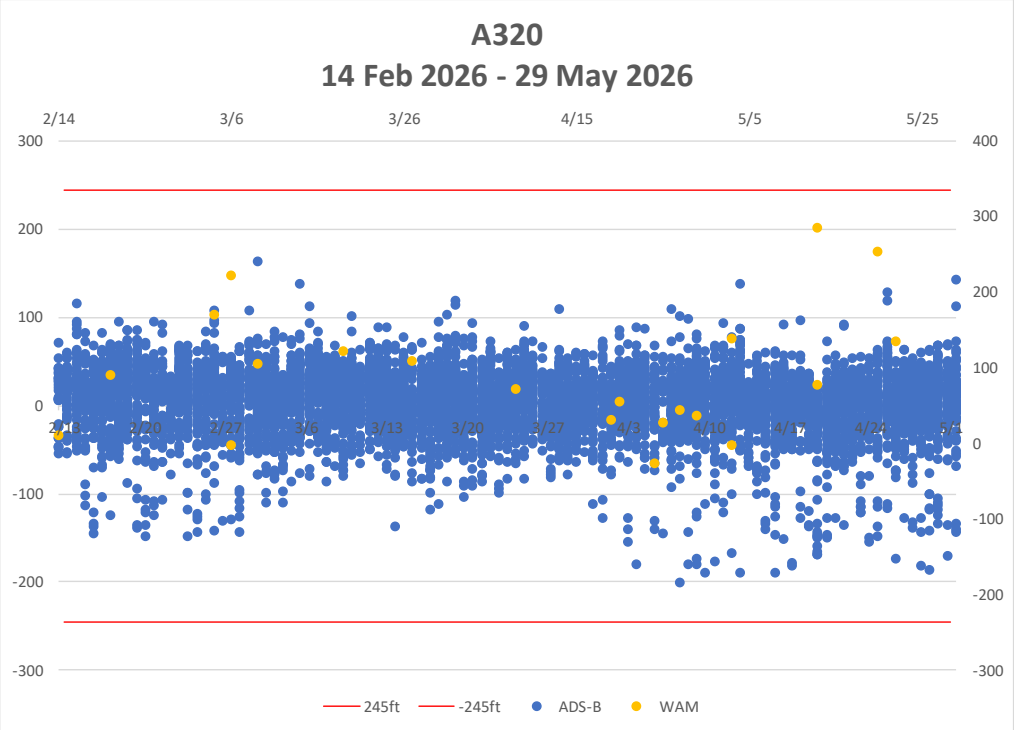

Figure 1. Distribution of Mean ASE for A320

2.5 As indicated above, because the number of WAM samples is too limited, it is not possible to draw any conclusions regarding the comparison of AHMS and WAM at this time. Therefore, we conducted a comparison of the pre-update HMU data and the post-update AHMS data.

2.6 The data comparison was conducted using previous HMU data from 14 February 2025 to 1 May 2025, and AHMS data from 14 February 2026 to 1 May 2026. Since some aircraft groups had a small number of AHMS data samples, the comparison was based on data from the A320 and B737NX groups, which had relatively large sample sizes. The results of this comparison are shown in **Figure 2** for the A320 and in **Figure 3** for the B737NX.

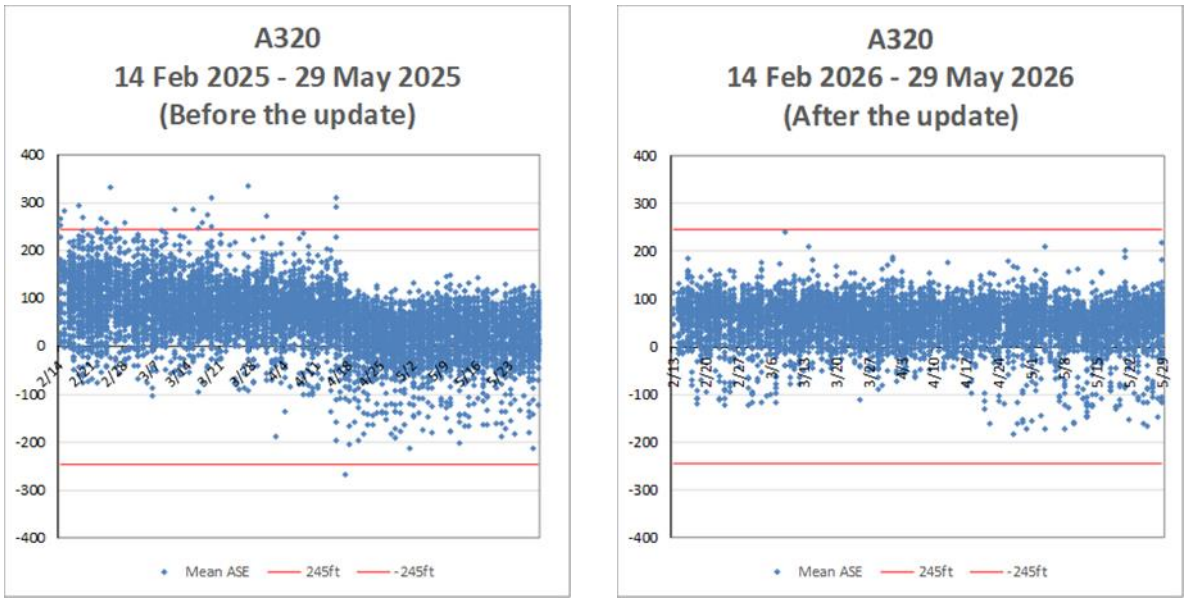

Figure 2. Comparison of Mean ASE for A320

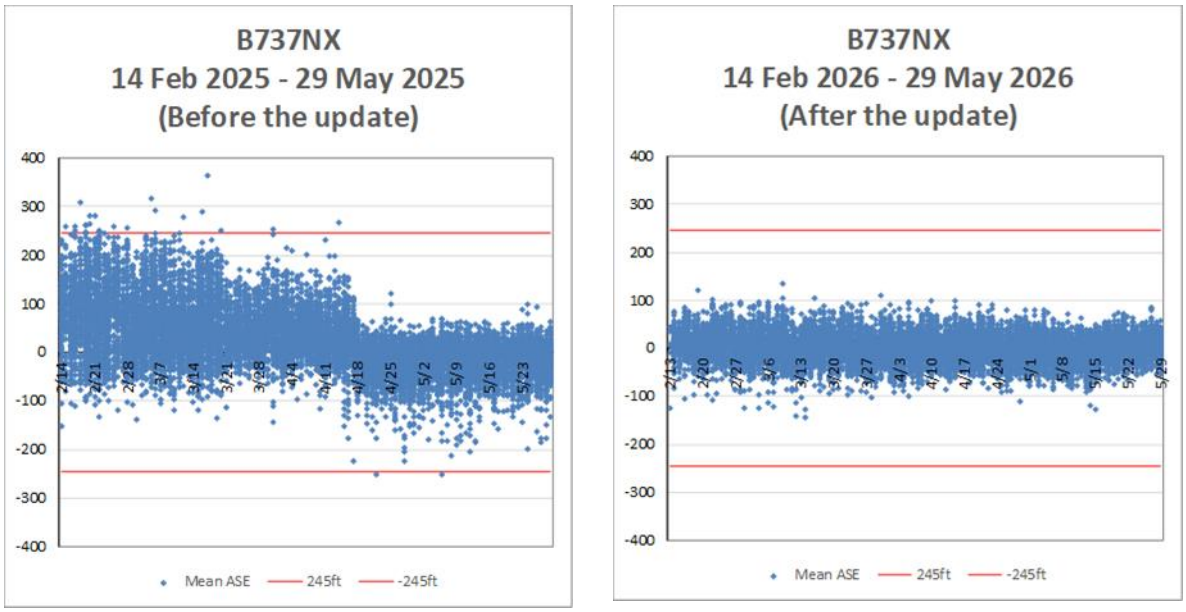

Figure 3. Comparison of Mean ASE for B737NX

2.7 **Figures 2** and **3** indicate that the ASE from AHMS has a significantly smaller range of variation than that of the pre-updated HMU. Furthermore, the extremely large ASE values previously observed with the pre-update HMU are no longer present. The trend has been proved for other aircraft groups as well. On the other hand, although the data set is limited, ASE of WAM suggests that results may be equivalent to or worse than those of the pre-update HMU. However, since the sample size remains limited, JASMA will continue to conduct comparative analyses until sufficient data is obtained.

3. ACTION BY THE MEETING

3.1 The meeting is invited to note the information contained in this paper.

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