52ND CONFERENCE OF DIRECTORS GENERAL OF CIVIL AVIATION ASIA AND PACIFIC REGIONS

Manila, Philippines
26 – 30 October 2015

AGENDA ITEM 3.3: AIR NAVIGATION MATTERS

STUDY FOR THE ACQUISITION OF ELECTRONICTERRAIN & OBSTACLE DATA (ETOD) FROM SATELLITE IMAGERY

(Presented by Japan)

INFORMATION PAPER

SUMMARY

Electronic Terrain & Obstacle Data (eTOD) is intended to be used in the various air navigation applications, so it is required to provide for the area the vicinity of an aerodrome regularly used by international civil aviation (Area2) from 12 November 2015, based on specified numerical requirement. In view of the situation, JCAB has conduct the study about the possibility of using satellite imagery to acquire eTOD. This paper provides the tentative outcome from the study of JCAB to address eTOD.

STUDY FOR THE ACQUISITION OF ELECTRONIC TERRAIN & OBSTACLE DATA (ETOD) FROM SATELLITE IMAGERY

1. INTRODUCTION

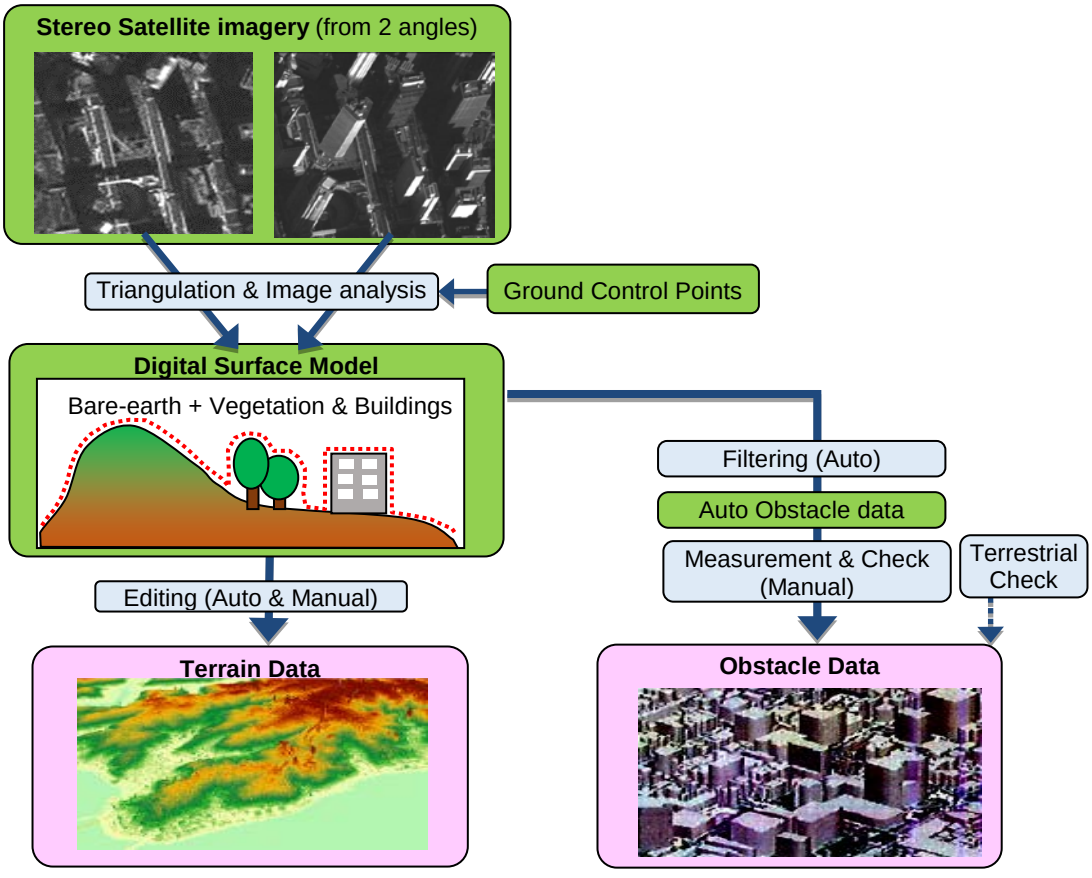
1.1 Electronic Terrain and Obstacle Data (eTOD) is intended to be used in the various air navigation applications, such as ground proximity warning system with forward looking terrain avoidance function and Minimum Safe Altitude Warning (MSAW) system; determination of contingency procedures for use in the event of an emergency during a missed approach or take-off; instrument procedure design (including circling procedure); etc. In order to provide eTOD, ICAO ANNEX15 –Aeronautical Information Services- was amended in two steps; for the entire territory of a State (Area1) and CAT II/III runway outward area (Area 4) from 2008, and for the area the vicinity of an aerodrome regularly used by international civil aviation (Area2) from 12 November 2015.

1.2 Japan has collected obstacle data by aerial survey and supplemental ground survey for Aerodrome Obstacle Chart and for flight procedure design, etc., however it takes huge cost for the surveying. As the high resolution satellite imagery is being available recently, JCAB has launched a study to consider the possibility of using satellite imagery as one of the means to produce obstacle data which meet the numerical requirement for the eTOD.

2. DISCUSSION

2.1 eTOD creation process from very-high resolution satellite imagery

Stereo satellite imagery is used for creating eTOD data. After triangulation and image analysis process on stereo satellite imagery, Digital Surface Model (DSM) is generated first. From DSM, terrain data is created through automatic and manual editing process. Also from DSM, obstacle data is created through automatic filtering and manual measurement and check. Terrestrial check will be performed where necessary.



eTOD Creation process from satellite image

The resolution of satellite imagery is improving, and 30cm resolution is commercially available now. With such very-high resolution, satellite image can be complement and alternative to typical aerial imagery, with supplemental ground survey for small and steeple objects.

50cm resolution 30cm resolution

2.2 Merits of using satellite image

Because of the following reasons, satellite imagery can be an effective method to produce eTOD in combination with traditional means.

Low intrusiveness	The data capturing is handled with the minimum impact on flight operations, so avoiding traffic disruptions or airspace closures at airports.
Availability	There is plenty of archived satellite imagery already commercially available, and will be added and updated continuously. Therefore it is also useful to update eTOD.
Regulatory Compliance	Satellite technologies are going to be fully compliant what is required in terms of resolution, accuracy and integrity of the data.

2.3 Validation test at Tokyo International Airport

Variation test at Tokyo International airport showed good accuracy for terrain and obstacle extraction, while it is necessary to combine with traditional terrestrial or other survey for pole and needle type objects. Satellite image is expected to contribute more effective eTOD provision in the future.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to note the information contained in this Paper.

—END—