

NOTE TO MEMBERS #30 09 AUG 2017

ISSUED BY FLIGHT SERVICE BUREAU

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SUBJECT: JAPAN MISSILE RISK ISSUED: 09 AUG 2017

CIRCULATION: OPSGROUP

Situation/Event

Since 2015, North Korea has been test-launching missiles with increasing regularity. In 2016, almost all operators stopped flying through the Pyongyang FIR due to the missile risk. In July 2017, North Korea for the first time successfully launched two Intercontinental Ballistic Missiles (ICBM's), both of which landed in Japanese airspace. The absolute lack of warning, coupled with an emerging picture of a focus area for re-entry, creates a **risk to flight operations in the western portion of the Fukuoka FIR** (Japanese airspace).

Unannounced launches

Until 2014, North Korea followed a predictable practice of notifying all missile launches to the international community. ICAO and state agencies had time to produce warnings and maps of the projected splashdown area. Now, **none of the launches are notified**.

Longer range

Previously, almost all North Korean missile launches landed again in their own waters and airspace. With the development of longer range Scud and ICBM varieties, the missiles are predominantly re-entering into Japanese airspace. This creates a new risk to civil aviation.



2017 missile landing areas in the Fukuoka FIR. Large version on next page.

Re-entry focus area

A clear picture emerges from the map on the next page. First, almost all launches are now in an easterly direction from North Korea. The launch sites are various, but **the trajectory is programmed with a landing in the Sea of Japan**. From North Korea's perspective, this provides a sufficiently large area to avoid a missile coming down on land in foreign territory.

Understanding the trajectories

The target in an actual real-world launch would be a site in North America. To test the missile without actually sending it to North America, the trajectory is **lofted** – as shown with the black line below. This is why the missiles are landing in the Sea of Japan.



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Landing sites in 2017 of missiles in the Fukuoka FIR. Hi-res version available at http://flightservicebureau.org/wp-content/uploads/2017/08/Japan-FIR-Risk-2017.png



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Fukuoka FIR landing sites

A closer look at the splashdown/re-entry sites shows a concentrated area, primarily on the airways south of positions **AVGOK** and **IGROD** – the boundary waypoints with the Khabarovsk FIR (Russia).

In 2017, there have been 6 distinct missile landings in this area. The primary airways affected are B451 and R211, as shown on the chart.

It is important to note that the landing positions vary in the degree of accuracy with which it is possible to estimate them. The highest accuracy is for the 28JUL17 landing of the Hwasong-14 ICBM, thanks to tracking by the Japanese Defence Force and US STRATCOM, as well as visual confirmation from land in Japan. The remaining positions are less precise, but in an overall view, the area affected is quite clear – south of **AVGOK** and north of **KADBO**.

Determining Risk

The critical question for any aircraft operator is whether there is a clear risk from these missiles returning to earth through the airspace in which we operate. This will be for each operator to determine, but the following considerations should be taken into account.

- The regularity and range of the launches are increasing. In 2015, there were 15 launches in total, of short-range ballistic and sub-launched missiles. In 2016, there were 24 launches, almost all being medium-range. In 2017, there have been 18 so far, with the first long-range missiles. - In 2016, international aviation solved the problem by avoiding the Pyongyang FIR. **This is no longer sufficient**. The landing sites of these missiles have moved east, and there is a higher likelihood of a splashdown through Japanese airspace than into North Korea.

- The most recent ICBM failed on re-entry, **breaking up into many fragmented pieces, creating a debris field**. At about 1515Z on the 28th July, there was a large area around the R211 airway that would have presented a real risk to an aircraft there. Thankfully, there was none – although an Air France B777-300 had passed through some minutes before.



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What are the chances?

Can a falling missile hit an aircraft? Following the Air France 293 report on July 28, the media has favoured the "billions to one" answer. We don't think it's quite as low.

First of all, that "one" is actually "six" – the number of North Korean missiles landing in the AVGOK/KADBO area in 2017. Considering that at least one of them, and maybe more, broke up on re-entry, that six becomes a much higher number. Any fragment of reasonable size hitting a tailplane, wing, or engine at 500 knots creates a signifcant risk of loss of control of the aircraft. How many fragments were there across the six launches? Maybe as high as a hundred pieces. The chances are not as low as it may initially appear.

ATC warnings

Not all launches are detected by surrounding countries or US STRATCOM. The missile flies for about 35 minutes before re-entry. Even with an immediate detection, it's unlikely that the information would reach the Japanese radar controller in time to provide any alert to enroute traffic. Further, even with the knowledge of a launch, traffic already in the area has no avoiding option, given the large area that the missile may fall in.

Guidance for operators

- **Review the map above** to see the risk area as determined by the landing sites in 2017.

- **Consider rerouting** to remain over the Japanese landmass or east of it. It is unlikely that North Korea would risk or target a landing of any test launch onto actual Japanese land.

- Check routings carefully for arrivals/departures to Europe from Japan, especially if planning airways R211 or B451. Consider the previous missile landing sites in your planning.

- Monitor nti.org for the most recent launches, as well as flightservicebureau.org.

- **OPSGROUP members** will be updated with any significant additions or updates to this Note through member mail and/or weekly newsletter. **opsgroup2017.com**



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Further References

 Nuclear Threat Initiative
 http://www.nti.org/analysis/articles/cns-north-korea-missile-testdatabase/
 International Ops 2017

http://flightservicebureau.org/

Feedback and Input

We greatly appreciate commentary and information to allow us to keep this information current. Write to: pubs@fsbureau.org

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