



THIRTEENTH AIR NAVIGATION CONFERENCE

Montréal, Canada, 9 to 19 October 2018

COMMITTEE B

Agenda Item 8: Emerging safety issues

8.2: Emerging safety issues

THE NEED FOR REGULATORY FRAMEWORK OF SUB-ORBITAL VEHICLES

(Presented by Japan)

EXECUTIVE SUMMARY

Recently, sub-orbital vehicles, aiming to provide commercial space flights, are being developed rapidly. These vehicles are potentially capable of providing international flight, which may foster the growth of the aviation system, if integrated successfully.

However, there are legal challenges for these vehicles to actually fly all around the world because of the ambiguity in international law/standards: whether this vehicle should be treated by space law or air law. In addition, there are operational challenges due to the differences in environment between airspace and outer space (e.g. differences in temperature, air pressure and radio waves, requirements of re-entry to the atmosphere and avoidance of space debris, etc.).

Japan supports the ICAO's establishment of the "Space Learning Group," collaborating with the United Nations Office for Outer Space Affairs (UNOOSA), to further study these issues. Moreover, Japan recognizes that stakeholders of air and space deepened their understanding by participating in "ICAO/UNOOSA Aerospace Symposium" of which ICAO/UNOOSA took leadership to accommodate stakeholders in one location.

This paper restates the need for clarification of international law/standards and claims that a regulatory framework of sub-orbital operation is needed in the near future.

Action: The Conference is invited to agree to the recommendation in paragraph 3.1.

1. INTRODUCTION

1.1 Recently, sub-orbital vehicles, aiming to provide commercial space flights, are being developed rapidly. These vehicles are potentially capable of providing international flight, which may foster the growth of the aviation system, if integrated successfully.

1.2 In Japan, some projects are being launched to realize commercial human space flight in the 2020s. There are a variety of vehicles that are being developed in Japan. One type of vehicle uses a jet engine to take-off from an airport and switches to a rocket engine during its flight to complete its sub-orbital flight. Another type of vehicle uses a rocket engine from a spaceport and dives into its sub-orbital flight soon after take-off. After its sub-orbital flight, these vehicles intend to glide down to the airport/spaceport.

1.3 However, there are legal challenges for these vehicles to actually fly all around the world because of the ambiguity in international law/standards: whether this vehicle should be treated by space law or air law. In addition, there are operational challenges due to the differences in environment between airspace and outer space (e.g. differences in temperature, air pressure and radio waves, requirements of re-entry to the atmosphere and avoidance of space debris, etc.).

1.4 Japan supports the ICAO's establishment of the "Space Learning Group," collaborating with UNOOSA, to further study these issues. Moreover, Japan recognizes that stakeholders of air and space deepened their understanding by participating in "ICAO/UNOOSA Aerospace Symposium" of which ICAO/UNOOSA took leadership to accommodate stakeholders in one location.

1.5 This paper restates the needs for clarification of international law/standards and claims that a regulatory framework of sub-orbital operation is needed in the near future.

2. NEEDS OF CLARIFICATION FOR INTERNATIONAL LAW/STANDARDS

2.1 Needs of clarification for international law/standards are presented from the following point of view:

- a) liability for damage caused by the vehicle;
- b) regulate sub-orbitals as an "aircraft" or "space object"; and
- c) international harmonization of technical standards related to the vehicle.

2.2 First, it is ambiguous who is responsible for damage caused by a sub-orbital vehicle. According to the "Convention on International Liability for Damage Caused by Space Objects," "a launching State" is "absolutely liable to pay compensation for damage caused by its space object on the surface of the Earth or to aircraft in flight."¹ On the other hand, the Montreal Convention states that "the carrier" has limited liability for damage to "passengers, baggage and cargo," unless there is a "negligence or other wrongful act or omission of the carrier."² Therefore, according to the current convention, if a

¹ Article II, Convention on International Liability for Damage Caused by Space Objects:

"A launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the Earth or to aircraft in flight."

² Article 17, Montreal Convention

"1. The carrier is liable for damage sustained in case of death or bodily injury of a passenger upon condition only that the accident which caused the death or injury took place on board the aircraft or in the course of any of the operations of embarking or disembarking."

Article 18, Montreal Convention

"1. The carrier is liable for damage sustained in the event of the destruction or loss of, or damage to, cargo upon condition only that the event which caused the damage so sustained took place during the carriage by air."

Article 21, Montreal Convention

sub-orbital vehicle is treated as a “space object,” the launching State has total responsibility for damage caused in airspace, whereas if a sub-orbital vehicle is treated as an “aircraft,” the carrier basically has a limited liability for damage caused in airspace. It could also be said that it is ambiguous whether a sub-orbital enters “outer space” because there is no clear definition of where “outer space” begins. It seems that these ambiguities make it difficult for each State to realize their responsibility for their country’s sub-orbital operation.

2.3 Secondly, as it is stated above, it is ambiguous whether sub-orbitals should be regulated as an “aircraft” or “space object.” Since sub-orbital vehicles fly from and back to the airspace, it could be said that air regulators should take lead to regulate these vehicles. On the other hand, current “aircraft” fly at a height of only around 10 km above the ground whereas sub-orbital vehicles aim to fly at a height of more than 100 km above the ground. Therefore, it could also be said that space regulators should take initiatives to regulate these vehicles. Since the vehicles are being developed, it seems that acceleration of this discussion, with expertise in both space and air, is necessary.

2.4 In addition, there is a need of unified technical standards related to the sub-orbital operation. This is because sub-orbital vehicles are intended to fly internationally, hopefully being integrated in a non-segregated airspace in the future. Moreover, one type of sub-orbital vehicle using a jet engine that is being developed in Japan intends to take-off from an airport. It seems that these operations hold an inherent safety concern to global civil aviation, which should be regulated by a unified rule. Thus, we believe that a globally unified rule which takes into account the differences in environment between airspace and outer space, is necessary to realize safe and smooth international flight.

2.5 If these legal/operational issues are not solved, the risk of business investment will be extremely high, possibly hampering innovation.

3. CONCLUSION

3.1 The conference is invited to agree to the following recommendation:

Recommendation

That the Conference:

- a) recognize the rapid development of sub-orbital vehicles by the private sector; and
- b) recognize the need for a regulatory framework of sub-orbital operation; and
- c) request ICAO to develop, in cooperation with UNOOSA, a roadmap to consider a regulatory framework of sub-orbital operation to inclusion in the Global Air Navigation Plan.

— END —

“2. The carrier shall not be liable for damages arising under paragraph 1 of Article 17 to the extent that they exceed for each passenger 100 000 Special Drawing Rights if the carrier proves that: a) such damage was not due to the negligence or other wrongful act or omission of the carrier or its servants or agents; or b) such damage was solely due to the negligence or other wrongful act or omission of a third party.”