



(Lima, Peru, from 17 to 20 June 2019)

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**Agenda Item 2: Review of Project H2 - Implementation of the monitoring of volcanoes in international airways (IAVW)**

**DETERMINATION OF AN AERONAUTICAL REQUIREMENT FOR TROPICAL CYCLONE ADVISORY INFORMATION IN THE WESTERN SOUTH ATLANTIC**

(Presented by the World Meteorological Organization (WMO))

**SUMMARY**

This working paper invites the GREPECAS MET Programme Projects group to determine whether there is an aeronautical requirement for tropical cyclone advisory information in the western South Atlantic in light of the development of Tropical Storm Iba off the east coast of Brazil in March 2019 and the known but infrequent development of tropical/subtropical storms or tropical cyclones in the same area over the past decade and more.

If it is determined that there *is* an aeronautical requirement, a new area of coverage would need to be defined and a tropical cyclone advisory centre with designated responsibility identified by ICAO, through GREPECAS and in coordination with WMO, together with all of the associated information exchange requirements.

Action by the GREPECAS MET Programme Projects group is in paragraph 4.

**1. Introduction**

1.1 ICAO and the World Meteorological Organization (WMO) coordinate, collaborate and cooperate on international standards for aeronautical meteorological service provision, as contained in ICAO Annex 3/WMO Technical Regulations (WMO-No. 49), Volume II, *Meteorological Service for International Air Navigation* and supporting ICAO and WMO guidance material.

1.2 Through its Secretariat, WMO has expert representation in global and regional ICAO groups including but not limited to the Meteorology Panel (METP) and its working groups [global] and the GREPECAS MET Programme Projects group [regional].

1.3 This working paper invites the GREPECAS MET Programme Projects to determine whether there is an aeronautical requirement for tropical cyclone advisory information in the western South Atlantic in light of the development of Tropical Storm Iba off the east coast of Brazil in March 2019 and the known but infrequent development of tropical/subtropical storms or tropical cyclones in the same area over the past decade and more. If it is determined that there *is* an aeronautical requirement, a new area of coverage would need to be defined and a tropical cyclone advisory centre with designated responsibility identified by ICAO, through GREPECAS and in coordination with WMO, together with all of the associated tropical cyclone advisory information exchange requirements.

**2. Discussion**

2.1 At the ninth meeting of the ICAO METP Working Group on Meteorological Operations Groups (WG-MOG/9) held in Toulouse, France from 2 to 4 April 2019 (final report [available here](#) in English only) the working group discussed matters that included the provision of tropical cyclone advisory information by designated tropical cyclone advisory centres and the inclusion of TC-related information on significant weather forecasts issued by the world area forecast centres (namely WAFC London and WAFC Washington).

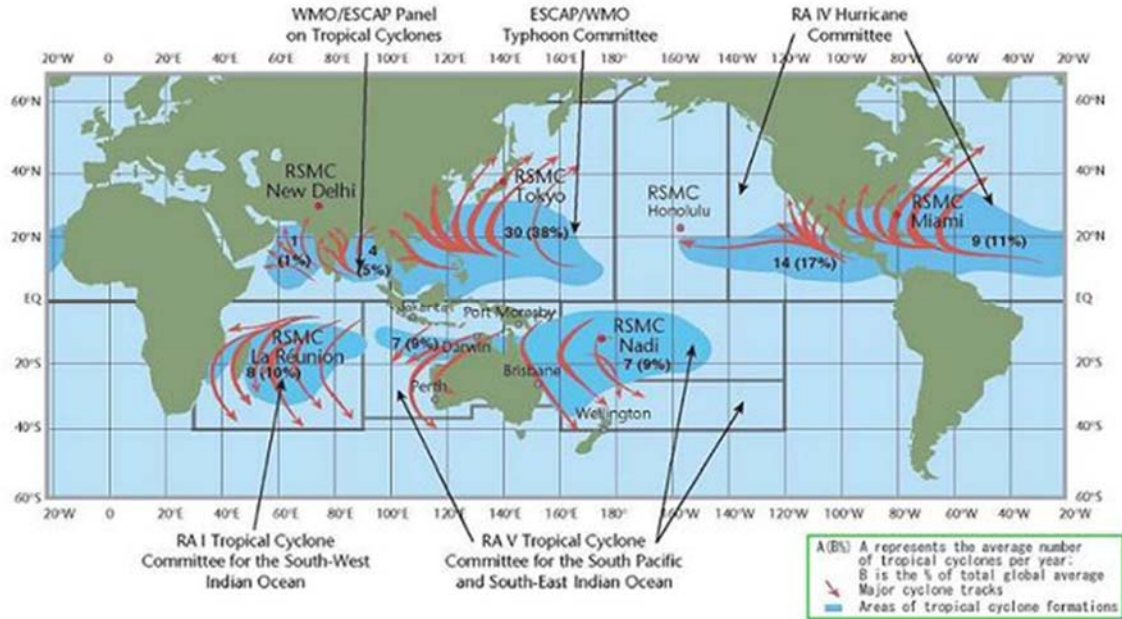
2.2 The ICAO METP WG-MOG/9 was informed of the development of Tropical Storm Iba ('TS Iba') that had developed a few weeks previously (in March 2019) off the east coast of Brazil. The working group was informed that since the South Atlantic was *not* currently under the area of responsibility of any TCAC there was uncertainty within the WAFCs as to whether to include TC-related information on the WAFC SIGWX forecasts if TS Iba had developed into 'TC Iba'.

2.3 Presently, through regional air navigation (RAN) agreement, ICAO has stated requirements for TCAC coverage in all oceanic basins of the world *except for* the South Atlantic Ocean, eastern South Pacific Ocean, Southern Ocean and Arctic Ocean. In total, seven TCACs are currently designated through ICAO RAN agreement as follows (the co-located WMO RSMC/TCWC<sup>1</sup> and approximate areas of responsibility are indicated for reference):

**Table 1.** ICAO-designated TCACs (as at May 2019)

<b>TCAC (ICAO)</b>	<b>RSMC/TCWC (WMO)</b>	<b>Area(s) of responsibility (approximate)</b>
<b>TCAC Miami</b>	RSMC Miami	North Atlantic, Caribbean Sea and Gulf of Mexico plus eastern North Pacific
<b>TCAC Honolulu</b>	RSMC Honolulu	Central North Pacific
<b>TCAC Tokyo</b>	RSMC Tokyo	Western North Pacific
<b>TCAC Nadi</b>	RSMC Nadi	Central and western South Pacific
<b>TCAC Darwin</b>	TCWC Darwin	Seas surrounding Australia, Indonesia and Papua New Guinea and the eastern Indian Ocean
<b>TCAC La Réunion</b>	RSMC La Réunion	South-West Indian Ocean
<b>TCAC New Delhi</b>	RSMC New Delhi	Arabian Sea and Bay of Bengal

<sup>1</sup> Regional specialized meteorological centre (RSMC)/Tropical cyclone warning centre (TCWC) of WMO.



**Figure 1.** WMO RSMC/TCWC areas of responsibility (as at May 2019)

2.4 As the foregoing illustrates, at the present time there is no TCAC (or RSMC) designated for the South Atlantic or for the eastern South Pacific.

2.5 Tropical cyclone formation in the South Atlantic is currently a rare occurrence due to a general prevalence of very strong vertical wind shear in the troposphere and absence of weather disturbances – for example, the inter-tropical convergence zone (ITCZ) seldom occurs over this part of the Atlantic Ocean yielding a general lack of vorticity (‘spin-up’) and convergence. Sea surface temperatures are also generally lower when compared with those of the western North Atlantic, Caribbean Sea and Gulf of Mexico where tropical cyclone formation is comparably more favourable. These factors have, historically, tended to suppress tropical storm and tropical cyclone development in the South Atlantic (and similarly in the eastern South Pacific). The impact of climate change on tropical cyclone formation is an active area of continuing scientific research.

2.6 While tropical cyclone (and precursor tropical storm) formation in the South Atlantic is rare it is not altogether absent. In 2004, for example, Tropical Cyclone Catarina (‘Hurricane Catarina’) developed off the east coast of Brazil. Hurricane Catarina was thought to be only the second South Atlantic hurricane in recorded history. A number of tropical storms, including TS Iba mentioned above, and subtropical storms are known to have developed in the western South Atlantic.

### 3. Conclusion

3.1 At present, due to the absence of an aeronautical requirement established through ICAO RAN agreement, there is currently no defined area of coverage and no designated TCAC for the western South Atlantic. Thus, whenever a subtropical or tropical storm develops into a tropical cyclone in the western South Atlantic, no tropical cyclone advisory information would be available for international air navigation (since there is no designated TCAC) and there is the possibility that no tropical cyclone SIGMET information would be available either (since SIGMET for TC should, in accordance with ICAO Annex 3, Chapter 7, paragraph 7.1.4, be based on TC advisory information).

3.2 Appreciating that tropical storm and tropical cyclone formation in the western South Atlantic is a rare occurrence, especially compared with some other oceanic basins, and appreciating also that staffing and infrastructure costs associated with hosting a TCAC are not insignificant, it may be necessary for ICAO to consider, in coordination with WMO, the need to designate a TCAC, perhaps an existing TCAC. It is worthwhile to note that the *only* WMO RSMC currently with specialism in tropical cyclone analysis and forecasting in the Americas and neighbouring oceanic basins is RSMC Miami (TCAC Miami). As illustrated by Figure 1 above, RSMC Miami's current area of responsibility only extends north of the Equator.

#### **4. Action by the meeting**

4.1 The GREPECAS MET Programme Project group is invited to:

- a) note the information contained in this working paper;
- b) determine whether there is an aeronautical requirement for tropical cyclone advisory information for the western South Atlantic; and
- c) on the basis of the positive identification of an aeronautical requirement at b) above, determine the steps required to be undertaken by ICAO, through GREPECAS and in coordination with WMO, to:
  - 1) define a new area of coverage; and
  - 2) identify a tropical cyclone advisory centre with designated responsibility together with all of the associated tropical cyclone advisory information exchange requirements.

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