

Agenda Item 4: Review on the status of implementation of the WGS-84 System in the ICAO SAM Region

4.1 Under this agenda item, the Meeting took due note on the fact that efforts are being carried out by ICAO in order to assist the States involved with the effective implementation of the WGS-84 System. In this sense, a series of specific actions have been initiated, such as the holding of technical meetings, seminars and workshops on the WGS-84 System. Likewise, the States, in order to meet the various requirements of the aforementioned system, have received the support required in terms of documentation on the reference technique. Furthermore, through the implementation of Special Implementation and Technical Cooperation Projects, direct support has been also provided to the States for the completion of field geodetic surveys at international airports.

4.2 With respect to WGS-84 implementation in the SAM Region (See **Appendix A and Attachment 1 to Appendix A** to this part of the Report), significant progress has been made with respect to field works at the main international airports. As result of this, primary (PACs) and secondary (SACs) control points have been established in that type of aerodromes. However, it was also observed that additional efforts still need to be made by civil aviation administrations to meet other WGS-84 requirements (see **Appendix B**), such as: completing field work at airports, mainly those involving the survey of all obstacles in the surroundings of aerodromes, the conversion of all airspace geographic coordinates, as well as the preparation of all the required aeronautical charts in reference to the WGS-84 System.

4.3 Likewise, it was observed that other elements that should be considered by the concerned States for full and effective WGS-84 implementation are, *inter alia*: the need to publish geoid undulations at runway thresholds of international airports, the establishment of quality assurance systems capable of safeguarding the precision and integrity of the geographical data used by civil aviation, and the use of appropriate and effective procedures for validating WGS-84 data. It was also recognized that, for a full and effective WGS-84 implementation, States will be required to adopt special measures on this matter in order to incorporate said requirement into their national implementation plans.

4.4 With respect to that stated in above paragraphs, the Meeting considered the need that relevant measures should be taken for the prompt implementation of these technical requirements, as well as the need for a closer level of coordination between civil aviation administrations and national and military geographic institutes, in order to effectively and properly meet the vertical requirements of the WGS-84 system. The need for the establishment of quality assurance systems capable of safeguarding the precision and integrity of geographic data used in civil aviation, and the need to pay special attention to the procedures used for validating WGS-84 data, were object of consideration by the Meeting. The Meeting also took note of the requirement that SAM Regional Office should have detailed and reliable information on WGS-84 data published and/or to be published by the States concerned. In this sense, the Meeting considered as convenient the adoption of the following Conclusion:

CONCLUSION 4/1: WGS-84 DATA QUALITY ASSURANCE

That SAM States take the necessary steps to:

- a) establish quality systems in their AIS/MAP services, so as to guarantee, at all times, the precision and integrity of WGS-84 geographic data used in civil aviation;
- b) adopt effective procedures to validate the WGS-84 data used in civil aviation; and
- c) that States should establish and maintain an electronic file for the WGS-84 data.

APPENDIX A / APÉNDICE A**TABLE AIS 5 / TABLA AIS 5**

**STATUS OF IMPLEMENTATION OF THE 1984 WORLD GEODESIC SYSTEM (WGS-84)
IN THE SOUTH AMERICAN REGION
(February 2002)**

**NIVEL DE IMPLANTACIÓN DEL SISTEMA GEODÉSICO MUNDIAL 1984 (WGS-84)
EN LA REGIÓN SUR AMÉRICA
(Febrero 2002)**

Explanation of the Table

Explicación de la Tabla

Column/
Columna

- 1 Name of the State, territory or aerodrome for which WGS-84 coordinates are required with the designation of the aerodrome use: // *Nombre del Estado, territorio o aeródromo para el que se requieren las coordenadas WGS-84, con la designación relativa a la utilización del aeródromo:*

RS	C	international scheduled air transport, regular use // <i>utilizado como aeródromo regular por el transporte aéreo internacional regular</i>
RNS	C	international non-scheduled air transport, regular use // <i>utilizado como aeródromo regular por el transporte aéreo internacional no regular</i>
RG	C	international general aviation, regular use // <i>utilizado como aeródromo regular por la aviación general internacional</i>
AS	C	international scheduled air transport, alternate use // <i>utilizado como aeródromo de alternativa por el transporte aéreo internacional regular.</i>

- 2 Runway designation numbers // *Números de designación de pista*

- 3 Type of each of the runways to be provided. The types of runways, as defined in Annex 14, Volume 1, Chapter I, are: // *Tipo de cada una de las pistas que han de suministrarse. Los tipos de pista, según se definen en el Anexo 14, Volumen I, Capítulo I, son:*

NINST	C	non-instrument runway // <i>pista de vuelo visual</i>
NPA	C	non-precision approach runway // <i>pista para aproximaciones que no sean de precisión</i>
PA1	C	precision approach runway, Category I // <i>pista para aproximaciones de precisión, Categoría I</i>
PA2	C	precision approach runway, Category II // <i>pista para aproximaciones de precisión, Categoría II</i>
PA3	C	precision approach runway, Category III // <i>pista para aproximaciones de precisión, Categoría III</i>

- 4 Requirement for the WGS-84 coordinates for FIR, indicated by the expected date of implementation or an AX@ if already implemented. // *Requisito de proporcionar las coordenadas WGS-84 de las FIR, indicado con una "X" frente al Estado o territorio que corresponda.*

- 5 Requirement for the WGS-84 coordinates for En-route points, indicated by the expected date of implementation or an AX@ if already implemented. // *Requisito de proporcionar las coordenadas WGS-84 de los puntos en ruta, indicado con una "X" frente al aeródromo que corresponda.*

- 6 Requirement for the WGS-84 coordinates for the Terminal Area, indicated by the expected date of implementation or an **AX@** if already implemented. // *Requisito de proporcionar las coordenadas WGS-84 del área terminal, indicado con una "X" frente al aeródromo que corresponda*
- 7 Requirement for the WGS-84 coordinates for the Approach points, indicated by the expected date of implementation or an **AX@** if already implemented.// *Requisitos de proporcionar las coordenadas WGS-84 de los puntos de aproximación, indicado con una "X" frente a la designación de pista que corresponda.*
- 8 Requirement for the WGS-84 coordinates for runways, indicated by the expected date of implementation or an **AX@** if already implemented.// *Requisito de proporcionar las coordenadas WGS-84 de las pistas, indicado con una "X" frente a la designación de pista que corresponda*
- 9 Requirement for the WGS-84 coordinates for Aerodrome/Heliport points (e.g. aerodrome/heliport reference point, taxiway, parking position, etc.), indicated by the expected date of implementation or an **AX@** if already implemented.// *Requisito de proporcionar las coordenadas WGS-84 de los puntos del aeródromo/ helipuerto (p. ej., puntos de referencia del aeródromo/ helipuerto, calle de rodaje, puestos de estacionamiento, etc.), indicado con una "X" frente al aeródromo que corresponda*
- 10 Requirement for geoid undulation indicated by the expected date of implementation or an **AX@** if already implemented.// *Requisito para una ondulación geoidal indicado con una "X" frente al umbral de la pista que corresponda.*
- 11 Requirement for the WGS-84 Quality System, indicated by the expected date of implementation or an **AX@** if already implemented.// *Requisito de proporcionar el sistema de calidad WGS-84, indicado con una "X" frente al Estado o territorio que corresponda*
- 12 Requirements for publication of WGS-84 coordinates in the AIP indicated by the expected date of publication or an **AX@** if already published.// *Requisito de publicar las coordenadas WGS-84 en la AIP, indicado con una "X" frente al Estado o territorio que corresponda.*

FASID TABLE AIS-5 / TABLA FASID AIS-5

STATE, TERRITORY OR AERODROME FOR WHICH WGS-84 IS REQUIRED ESTADO, TERRITORIO O AERÓDROMO PARA EL QUE SE REQUIERE EL WGS-84			WGS-84 REQUIRED WGS-84 REQUERIDO										REMARKS OBSERVACIONES
CITY/AERODROME/USE CIUDAD/AERODROMO/USO	RWY NO PISTA NO	RWY TYPE TIPO DE PISTA	FIR	ENR	TMA CTA CTZ	APP	RWY	AD/ HEL	GUND	QUALITY SYSTEM SISTEMA DE CALIDAD	AIP		
1	2	3	4	5	6	7	8	9	10	11	12	13	
ARGENTINA													
BUENOS AIRES/Aeroparque Jorge Newberry RS	1331	PAI NINST	X	X	X	X X	X X	X				X	
BUENOS AIRES/Ezeiza Ministro Pistarini RS	11291735	PA3 NPA NINST PAI			X	X X X X	X X X X	X					
COMODORO RIVADAVIA/ General Mosconi RS	725	NINST PAI			X	X X	X X	X					
CORDOBA/Ing. Aer. A.L. Taravela RS	1836	PAI NINST			X	X X	X X	X					
CORRIENTES/Corrientes RG	220	NINST PAI			X	X X	X	X					
FORMOSA/Formosa RG	321	NPA PAI			X	X X	X	X					
IGUAZU/Cataratas del Iguazú RS	1331	NPA PAI			X	X X	X X	X					
JUJUY/Gobernador Guzmán RS	1533	NINST PAI			X	X X	X X	X					
MAR DEL PLATA/Bgdier. Gral. B. de al Colina RG & AS	1331	PAI NINST			X	X X	X X	X					
MENDOZA/El Plumerillo RS	1836	NPA PAI			X	X X	X X	X					
NEUQUEN/Presidente Perón RS	826	PAI NINST			X	X X	X X	X					
POSADAS/Posadas RG	119	NPA			X	X		X					

STATE, TERRITORY OR AERODROME FOR WHICH WGS-84 IS REQUIRED										WGS-84 REQUIRED		REMARKS OBSERVACIONES
ESTADO, TERRITORIO O AERÓDROMO PARA EL QUE SE REQUIERE EL WGS-84										WGS-84 REQUERIDO		
CITY/AERODROME/USE CIUDAD/AERODROMO/USO	RWY NO PISTA NO	RWY TYPE TIPO DE PISTA	FIR	ENR	TMA CTA CTZ	APP	RWY	AD/ HEL	GUND	QUALITY SYSTEM SISTEMA DE CALIDAD	AIP	
1	2	3	4	5	6	7	8	9	10	11	12	13
		PA1				X						
RESISTENCIA/Resistencia RG & AS	321	NINST PA1			X	X X		X				
RIO GALLEGOS/Piloto Civil N. Fernández RS	725	NPA PA1			X	X X		X				
RIO GRANDE/Rio Grande RG & AS	725	NINST PA1			X	X X		X				
ROSARIO/Rosario RS	119	NINST PA1			X	X X		X				
SALTA/Salta RS	119	PA1 NINST			X	X X		X				
SAN CARLOS DE BARILOCHE/San Carlos de Bariloche RS	1129	NPA PA1			X	X X		X				
SAN FERNANDO/San Fernando RNS	523	NINST NPA			X	X X		X				
TUCUMAN/Tte. Benjamin Matienzo RS	119	PA1 NINST			X	X X		X				
USHUAIA/Malvinas Argentinas RS	725	NPA PA1			X	X X	X X	X				
BOLIVIA												<p>WGS-84 data on the La Paz, Cochabamba and Santa Cruz airports were partially issued through an AIC.</p> <p>Transformation of geographical coordinates toward the WGS-84 system, are in progress for the ATS airspaces.</p> <p>Technical support is being provided to this State under CAR/SAM - RLA/98/003 Regional Project //</p> <p><i>Datos WGS-84 de los aeropuertos de La Paz, Cochabamba y Santa Cruz fueron publicados parcialmente mediante un AIC.</i></p> <p><i>Conversión de coordenadas geográficas al sistema WGS-84 en proceso para los espacios aéreos ATS</i></p> <p><i>Se está dando ayuda técnica a este Estado a</i></p>

STATE, TERRITORY OR AERODROME FOR WHICH WGS-84 IS REQUIRED										WGS-84 REQUIRED		REMARKS OBSERVACIONES
ESTADO, TERRITORIO O AERÓDROMO PARA EL QUE SE REQUIERE EL WGS-84										WGS-84 REQUERIDO		
CITY/AERODROME/USE CIUDAD/AERODROMO/USO	RWY NO PISTA NO	RWY TYPE TIPO DE PISTA	FIR	ENR	TMA CTA CTZ	APP	RWY	AD/ HEL	GUND	QUALITY SYSTEM SISTEMA DE CALIDAD	AIP	
1	2	3	4	5	6	7	8	9	10	11	12	13
FLORIANOPOLIS/Hercilio Luz Intl RS	1432	PA1 NPA			X	X X	X X	X				
FORTALEZA/Pinto Martins RS	1331	PA1 NINST			X	X X	X X	X				
FOZ DO IGUAÇU/Cataratas AS	1432	PA1 NINST			X	X X	X X	X				
MACAPA/Macapá Intl RS	826	PA1 NPA			X	X X	X X	X				
MANAUS/Eduardo Gomes RS	1028	PA1 NPA			X	X X	X X	X				
NATAL/Augusto Severo AS	16L 34R	PA1 NINST			X	X X	X X	X				
PORTO ALEGRE/Salgado Filho RS	1129	PA2 NPA			X	X X	X X	X				
RECIFE/Guararapes RS	1836	PA1 NPA			X	X X	X X	X				
RIO DE JANEIRO/Antonio Carlos Jobim Intl RS	10281533	PA2 PA1 PA1 NINST			X	X X X X	X X X X	X				
SALVADOR/Dois de Julho RS	1028	PA1 NPA			X	X X	X X	X				
SANTAREM/Santarém Intl AS	1028	PA1 NPA			X	X X	X X	X				
SAO JOSE DOS CAMPOS/ Sao José dos Campos AS	1533	PA1 NINST			X	X X	X X	X				
SAO LUIS/Marechal Cunha Machado AS	624	PA1 NPA			X	X X	X X	X				

STATE, TERRITORY OR AERODROME FOR WHICH WGS-84 IS REQUIRED ESTADO, TERRITORIO O AERÓDROMO PARA EL QUE SE REQUIERE EL WGS-84			WGS-84 REQUIRED WGS-84 REQUERIDO									REMARKS OBSERVACIONES
CITY/AERODROME/USE CIUDAD/AERODROMO/USO	RWY NO PISTA NO	RWY TYPE TIPO DE PISTA	FIR	ENR	TMA CTA CTZ	APP	RWY	AD/ HEL	GUND	QUALITY SYSTEM SISTEMA DE CALIDAD	AIP	
1	2	3	4	5	6	7	8	9	10	11	12	13
SAO PAULO/Guarulhos Intl RS	09R 27L 09L 27R	PA3 NPA PA1 NPA			X	X X X X	X X X X	X				
CHILE			X	X							X	
ANTOFAGASTA/Cerro Moreno AS	1901	NPA NPA			X		X X	X				
ARICA/Chacalluta RS	220	NPA NINST			X	X X	X X	X				
CONCEPCION/Carriel Sur RS	220	PA1 NPA			X	X X	X X	X				
IQUIQUE/Gral. Diego Aracena Intl AS	1836	NPA NINST			X	X X	X X	X				
PUERTO MONTT/El Tepual AS	1735	NPA PA1			X	X X	X X	X				
PUNTA ARENAS/Pdte. C. Ibañez del Campo AS	725	NPA PA1			X	X X	X X	X				
SANTIAGO/Arturo Merino Benítez RS	1735	PA3 NPA			X	X X	X X	X				
TEMUCO/Manquehue RS	624	NPA NPA			X	X X	X X	X				
COLOMBIA			X	X							X	
BARRANQUILLA/Ernesto Cortissoz RS	422	PA1 NPA			X	X X	X X	X				
CAL/Alfonso Bonilla Aragón RS	119	PA1 NPA			X	X X	X X	X				

STATE, TERRITORY OR AERODROME FOR WHICH WGS-84 IS REQUIRED										WGS-84 REQUIRED		REMARKS OBSERVACIONES
ESTADO, TERRITORIO O AERÓDROMO PARA EL QUE SE REQUIERE EL WGS-84										WGS-84 REQUERIDO		
CITY/AERODROME/USE CIUDAD/AERODROMO/USO	RWY NO PISTA NO	RWY TYPE TIPO DE PISTA	FIR	ENR	TMA CTA CTZ	APP	RWY	AD/ HEL	GUND	QUALITY SYSTEM SISTEMA DE CALIDAD	AIP	
1	2	3	4	5	6	7	8	9	10	11	12	13
CARTAGENA/Rafael Nuñez RNS & AS	1836	NINST PA1				X X	X X	X				
CARTAGO/Santana RNS	1836	NINST NINST			X	X X	X X	X				
CUCUTA/Camilo Daza RNS	1533	PA1 NINST			X	X X	X X	X				
LETICIA/Alfredo Vásquez Cobo AS	220	NPA NINST			X	X X	X X	X				
RIONEGRO/José Mariá Córdoba RS	1836	NPA PA1			X	X X	X X	X				
SAN ANDRES I/ Sesquicentenario RS	624	NPA NINST			X	X X	X X	X				
SANTAFE DE BOGOTA/ Eldorado RS	13L 31R 13R 31L	PA2 NINST PA2 NPA			X	X X	X X	X				
ECUADOR			X	X							X	
GUAYAQUIL/Simón Bolívar RS	321	NINST PA1			X	X X	X X	X				
LATACUNGA/Cotopaxi RNS	1836	PA1 NPA			X	X X	X X	X				
MANTA/Eloy Alfaro RS	523	NINST PA1			X	X X	X X	X				
QUITO/Mariscal Sucre RS	1735	NPA PA1			X	X X	X X	X				
TACHINA/Gral. Rivadeneira RNS	1836	PA1 NPA			X	X X	X X	X				

STATE, TERRITORY OR AERODROME FOR WHICH WGS-84 IS REQUIRED ESTADO, TERRITORIO O AERÓDROMO PARA EL QUE SE REQUIERE EL WGS-84			WGS-84 REQUIRED WGS-84 REQUERIDO									REMARKS OBSERVACIONES
CITY/AERODROME/USE CIUDAD/AERODROMO/USO	RWY NO PISTA NO	RWY TYPE TIPO DE PISTA	FIR	ENR	TMA CTA CTZ	APP	RWY	AD/ HEL	GUND	QUALITY SYSTEM SISTEMA DE CALIDAD	AIP	
1	2	3	4	5	6	7	8	9	10	11	12	13
FRENCH GUYANA (France)												
CAYENNE/Rochambeau RS	826	PAI NPA	X	X	X	X X	X X	X	X			
GUYANA												
TIMEHRI/Cheddi Jagan Intl RS	624	NPA NPA										(#) WGS-84 data are available, but no information has been yet issued // Datos WGS84 disponibles, pero la información aún no ha sido publicada.
PANAMA												
BOCAS DEL TORO/Bocas del Toro RG & AS	826	NPA NPA	X (%)	X (%)			X	X			X	(%) Geographical coordinates of ATS routes in upper and lower airspaces; FIR/CTA; CTR/ATZ; R, P and W airspaces; Obstacles; and Aerodromes have issued in AIP and AIP supplements under WGS-84 // Coordenadas geográficas en los espacios aéreos superior e inferior; espacios aéreos FIR/CTA; CTR/ATZ; R, P y W. Obstáculos y aeródromos publicados en AIP y Suplementos AIP bajo WGS-84
CHANGUINOLA/Cap. Manuel Niño RG & AS	321	NINST NINST					X	X				(%)
DAVID/Enrique Malek RS	422	NPA NINST			X		X	X				(%)
PANAMA/Marco A. Gelabert RG & AS	1836	NINST NINST			X		X	X				(%)
PANAMA/Tocumen Intl RS	03R 21L 03L 21R	PAI NPA NPA NINST			X	X	X	X				(%)
PARAGUAY												
ASUNCION/Silvio Pettrossi			X	X			X				X	(&) WGS-84 data concerning the radio

STATE, TERRITORY OR AERODROME FOR WHICH WGS-84 IS REQUIRED ESTADO, TERRITORIO O AERÓDROMO PARA EL QUE SE REQUIERE EL WGS-84			WGS-84 REQUIRED WGS-84 REQUERIDO									REMARKS OBSERVACIONES
CITY/AERODROME/USE CIUDAD/AERODROMO/USO	RWY NO PISTA NO	RWY TYPE TIPO DE PISTA	FIR	ENR	TMA CTA CTZ	APP	RWY	AD/ HEL	GUND	QUALITY SYSTEM SISTEMA DE CALIDAD	AIP	
1	2	3	4	5	6	7	8	9	10	11	12	13
URUGUAY												
COLONIA/Departamental de Colonia RG	1230	NPA NPA	X	X	X	X X	X X	X				X
MALDONADO/Carlos A. Curberto Intl Laguna del Sauce RS	826	PAI NPA			X	X X	X X	X				
MONTEVIDEO/Aeropuerto Angel S. Adami Intl RG	1836	NPA NINST			X	X X	X X	X				
MONTEVIDEO/Carrasco Intl RS	624	NPA PAI			X	X X	X X	X				
PUNTA DEL ESTE/El Jaguel Intl RG	119	NINST NPA			X	X X	X X	X				
RIVERA/Cesco Chapau Intl RS	523	NPA NPA			X	X X	X X	X				
SALTO/Nueva Hesperides Intl RG	523	NPA NPA			X	X X	X X	X				
VENEZUELA												
BARCELONA/Gral. José Antonio Anzoátegui Intl RNS	1533	PAI NINST										Technical support is being provided to this State under CAR/SAM-RLA/98/003 Regional Project // Se está proporcionando ayuda técnica a este Estado bajo el Proyecto Regional CAR/SAM RLA/98/003
CARACAS/Simón Bolívar Intl, Maiquetía RS	09L 27R	PAI NINST										(#) WGS-84 data are available, but no information has been yet issued // Datos WGS-84 disponibles, pero la información aún no ha sido publicada.
MARACAIBO/La Chinita Intl RS	02L 20R	PAI NINST										(#)
MARGARITA/Intl Del Caribe Gral. Santiago Marino RS	927	PAI NINST										(#)
PARAGUANA/Josefa Camejo Intl RS	927	NPA										(*) Lack of geodetic survey // Falta de estudios geodésicos

STATE, TERRITORY OR AERODROME FOR WHICH WGS-84 IS REQUIRED										WGS-84 REQUIRED		REMARKS OBSERVACIONES
ESTADO, TERRITORIO O AERÓDROMO PARA EL QUE SE REQUIERE EL WGS-84										WGS-84 REQUERIDO		
CITY/AERODROME/USE CIUDAD/AERODROMO/USO	RWY NO PISTA NO	RWY TYPE TIPO DE PISTA	FIR	ENR	TMA CTA CTZ	APP	RWY	AD/ HEL	GUND	QUALITY SYSTEM SISTEMA DE CALIDAD	AIP	13
1	2	3	4	5	6	7	8	9	10	11	12	13
		NINST										
SAN ANTONIO DEL TACHIRA/San Antonio del Táchira Intl RS	1634	NPA NINST										(*) Lack of geodetic survey // Falta de estudios geodésicos.
VALENCIA/Zim Valencia Intl RS	1028	NINST NPA										(*) Lack of geodetic survey // Falta de estudios geodésicos.

B END B
B FIN B

ATTACHMENT 1 TO APPENDIX A / ADJUNTO 1 AL APÉNDICE A

STATUS OF IMPLEMENTATION OF WGS-84/ NIVEL DE IMPLANTACIÓN DEL WGS-84

States/ <i>Estados</i>	Full Implemented/ <i>Implantación total</i>	Partially Implemented/ <i>Implantación parcial</i>	Completion expected in 2003/2004 <i>Implantación para 2003/2004</i>	No precise Information/ <i>Información No precisa</i>	Remarks/ <i>Observaciones</i>
1	2	3	4	5	6
Argentina	*Ž				*Lack of geoid undulation publication/ <i>Falta publicación ondulaciones geoidales.</i>
Bolivia		Ž	Ž		
Brazil	*Ž				*Lack of geoid undulation publication/ <i>Falta publicación de ondulaciones geoidales.</i>
Chile	*Ž				*Lack of geoid undulation publication/ <i>Falta publicación de ondulaciones geoidales.</i>
Colombia		Ž	Ž		
Ecuador	*Ž				*Lack of geoid undulation publication/ <i>Falta publicación de ondulaciones geoidales.</i>
French Guiana*	Ž				
Guyana				Ž	
Panama			Ž		
Paraguay		Ž	Ž		
Peru					
Suriname				Ž	
Uruguay	*Ž				*Lack of geoid undulation publication/ <i>Falta publicación de ondulaciones geoidales.</i>
Venezuela				Ž	

APPENDIX B

DIFFICULTIES ENCOUNTERED IN THE EFFECTIVE IMPLEMENTATION OF THE WGS-84 SYSTEM

Based on paragraph 3.3 of this working paper, some significant difficulties encountered in the implementation of the system in the area of concern are listed below for consideration by the meeting:

- need for a proper level of understanding of the direct benefits that air navigation will obtain from the transition from local and/or regional geodetic reference systems to the World Geodetic System 1984 (WGS-84);
- lack of capacity of some civil aviation administrations to carry out geodetic work and need to coordinate such type of activity with other state institutions that have the necessary resources and experience to carry out these activities as part of their normal functions;
- need for some civil aviation administrations to develop implementation plans, as well as lack of specific timetables for an effective WGS-84 implementation;
- need to assign priorities for the economic resources to finance WGS-84 implementation directly;
- need to acquire appropriate, reliable and specialized equipment to carry out field work, data post-processing and the conversion of geographic coordinate data using the required precision parameters to meet the various precision requirements of WGS-84 data;
- lack of a high level of coordination among the different government bodies (DCA, national and/or military geographic institutes) responsible for geodetics and national and aeronautical mapping;
- need to pay more attention to the training of aeronautical/geodetic personnel in charge of the direct implementation of the WGS-84 system, mainly with respect to the interpretation of field work documentation and data and post-process calculations and conversions;

- lack of specialized technical units within civil aviation administrations, capable of directly carrying out the activities of mapping and/or production of all the required aeronautical charts;
- need to produce all of the required aeronautical charts under the WGS-84 system in an effective manner;
- need for proper publication in the respective AIPs of the geoid undulation data required for each runway threshold at international airports;
- need for regional and/or sub-regional coordination to identify the gravimetric studies required to define with precision the geoid (MSL/gravimetric) models and their direct relationship with the WGS-84 system, and thus have certain, reliable and precise elevation, height and geoid undulation data; and
- need for adequate links among SAM States for the effective determination and publication of WGS-84 geographic coordinate data for ATS reporting points at common FIR boundaries and for geographic coordinates that constitute common boundaries of flight information regions (FIRs).
