International Civil Aviation Organization 05/06/09
CAR/SAM REGIONAL PLANNING AND IMPLEMENTATION GROUP (GREPECAS)
Sixth Meeting of the CNS Committee of the GREPECAS ATM/CNS Subgroup (CNS/COMM/6)
Santo Domingo, Dominican Republic, 30 June to 4 July 2008

Agenda Item 2: Development of Navigation Systems

2.2. Follow up on the planning/implementation activities concerning SBAS and GBAS augmentation systems in the CAR/SAM Regions

REPORT OF THE THIRD MEETING OF THE GNSS TASK FORCE

(Presented by the Rapporteur of the GNSS-TF)

SUMMARY

This working paper contains the report of the third meeting of the GNSS Task Force.

References:

- Report of the GNSS-TF/3 meeting

1. Introduction

1.1 The third GNSS-TF meeting was held on 2-3 June 2008 in the ICAO Office in Lima, Peru and was attended by the delegates of Spain, the United States, Brazil, and Chile, together with an Observer from the Argentine Foreign Ministry.

2. Analysis

1.2 The meeting analysed nine working papers and seven information papers and formulated four draft conclusions for consideration by the CNS Committee of the ICAO ATM/CNS Subgroup.

1.3 The Task Force reviewed its Work Programme based on the criteria approved by the ACG/07 meeting and modified it to include new task assignments.

1.4 The **Appendix** to this working paper contains the report of the third meeting of the GNSS Task Force**.**

3. Suggested action

3.1 The Meeting is invited to:

a) take note of the information presented,

b) analyse the report to be found in the appendix to this working paper, including the draft conclusions developed for approval,

c) study the proposed new work programme of the GNSS Task Force, adjusting its contents to the tasks of the CNS Committee,

d) analyse any other considerations presented in this regard.

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APPENDIX

CNS/GNSS/TF/03

INTERNATIONAL CIVIL AVIATION ORGANIZATION

South American Regional Office

THIRD MEETING OF THE GNSS TASK FORCE OF THE GREPECAS ATM/CNS SUBGROUP CNS COMMITTEE (CNS/COMM)

(CNS/GNSS/TF/03)

REPORT

(Lima, Peru 2-3 June 2008)

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SUMMARY OF THE MEETING

1. SITE AND DURATION OF THE MEETING

The Third Meeting of the GNSS Task Force of the CNS Committee (CNS/COMM) of the GREPECAS ATM/CNS Subgroup (CNS/GNSS/TF/3) was held in the ICAO South American Regional Office in Lima, Peru on 2-3 June 2008.

2. OPENING

Mr. Onofrio Smarelli, Regional Communications, Navigation and Surveillance Officer of the ICAO South American Regional Office welcomed the participants, highlighting the importance of the agenda items to be addressed, and wished them success in their deliberations.

3. WORKING LANGUAGES

The working language of the Meeting was Spanish. Documents were prepared in English and Spanish, indistinctly.

4. PARTICIPANTS AND ORGANIZATION

Five States attended the Meeting (Argentina, Brazil, Chile, Spain and the United States). There were a total of 8 participants, including the participants from ICAO. The list of participants is shown on pages iii-1 to iii-2.

Mr. Gustavo Camargo Oliveira, Rapporteur of the GNSS Task Force of the CNS Committee of the GREPECAS ATM/CNS Subgroup acted as secretary and moderator of the Meeting, assisted by the CNS Officers of the Lima and Mexico ICAO Offices, Messrs. Onofrio Smarelli and. Julio C. Siu, respectively.

5. DOCUMENTS PRESENTED AT THE MEETING

WORKING/BACKGROUND PAPERS

Number	Agenda Item	Title	Date	Presented by
WP/01	--	REVIEW OF THE AGENDA AND SCHEDULE OF THE MEETING	28/05/08	Rapporteur
WP/02	1,2,3	RESULTS OF THE GNSS SEMINAR AND ITS EFFECTS ON GNSS SYSTEMS AS PART OF THE ACTIVITIES OF PROJECT RLA/00/009	25/05/08	Project RLA/00/009
WP/03	1	SUMMARY OF THE STUDIES ON THE IONOSPHERE CONDUCTED UNDER PROJECT RLA/03/902 SACCSA	21/06/08	Project RLA/03/902
WP/04	2	SUMMARY OF THE RESULTS OF REGIONAL PROJECT RLA/03/902 SACCSA, PHASE II	21/06/08	Project RLA/03/902

WORKING/BACKGROUND PAPERS

Number	Agenda Item	Title	Date	Presented by
WP/05	2	STATUS OF THE STUDIES AND WORK DONE BY PROJECT RLA/03/902	21/06/08	Project RLA/03/902
WP/06	2	DISTRIBUTION OF ACTIVITIES FOR SACCSA PHASE III	21/06/08	Project RLA/03/902
WP/07	2	CONSIDERATIONS OF SACCSA SUBSCRIBER COUNTRIES REGARDING THE IMPLEMENTATION OF PHASE III OF THE PROJECT	21/06/08	Project RLA/03/902
WP/08	3	BRAZILIAN GBAS PROGRAM UPDATE (ONLY IN ENGLISH)	28/05/08	Brazil
WP/10	5	REVIEW OF THE TERMS OF REFERENCE OF THE GNSS TASK FORCE	29/05/08	Rapporteur
IP/01	-	GENERAL INFORMATION	25/03/08	Secretariat
IP/02	-	LIST OF WORKING AND INFORMATION PAPERS	29/05/08	Secretariat
IP/03	1,2,3	RESULTS OF GNSS ACTIVITIES AT GREPECAS/14 AND AT THE SECOND MEETING OF THE GNSS TASK FORCE.	25/05/08	Secretariat
IP/04	1, 2, 3	SARPS REFERENCES AND CONSIDERATIONS ABOUT THE GNSS SYSTEMS AND THE WORK OF THE AIR NAVIGATION PANEL	29/05/08	Secretariat
IP/05	1,2	SECOND MEETING OF THE INTERNATIONAL COMMITTEE ON GLOBAL NAVIGATION SATELLITE SYSTEMS	21/06/08	Secretariat
IP/06	2	STATUS OF GNSS ELEMENTS AND SIGNALS (WAAS)		United States
IP/07	3	STATUS OF FAA GBAS ACTIVITIES		United States

6. LIST OF CONCLUSIONS OF THE CNS/GNSS/TF/03 MEETING

Agenda Item 1: **Review of the results of activities and studies concerning the ionosphere**

1.1 The following papers were presented and discussed under this agenda item: IP 03; WP 02, WP03 and IP 05. The Secretariat presented **IP 03 – NAVIGATION ASPECTS IN GREPECAS 14 AND THE SECOND MEETING OF THE GNSS TASK FORCE**, covering the highlights of the last meeting of the GNSS-TF and GREPECAS action in response to the recommendations of the Task Force.

1.2 **WP 02 – HIGHLIGHTS OF THE SEMINAR ON THE IONOSPHERE AND ITS EFFECTS ON GNSS SYSTEMS**, presented by the Secretariat, informed the Meeting that this seminar was the last activity carried out with funds from project RLA/00/009 and was aimed at enhancing knowledge about the behaviour of the earth atmosphere in the propagation of GNSS signals, describing the variety of phenomena that occur in the earth atmosphere and the way they affect GNSS signals propagation, describing methods for correcting ionospheric effects on GNSS signals, describing an algorithm for predicting ionospheric anomalies, describing techniques for modelling the effects of ionospheric delays on GNSS signals availability, and giving short and medium-term recommendations for GNSS implementation.

1.3 The Seminar described the progress made in the study of ionospheric effects on GNSS systems performance, emphasizing the increasing intensity of those effects and their behaviour within an 11-year solar cycle. It has not been possible to characterize this phenomenon fully, however, as has been done in the mid-latitudes. This characterization requires the collection of data for analysis.

1.4 In this regard, the Meeting agreed that project RLA/03/902 should make use, in its studies, of ionospheric data currently available and that States possessing GNSS receivers, as well as the members of project RLA/00/009, should inform about their operating condition. They should also provide information to the ICAO Regional Offices about other available GNSS receivers with L1 and L2 data collection capability per second, their geographic location and the type of equipment involved, so that project RLA/03/902 can analyze the feasibility of using such data for its studies.

1.5 The Meeting formulated the following draft conclusion for the CNS Committee:

DRAFT CONCLUSION
GNSS/TF/03/01 **AVAILABILITY OF GNSS DATA FOR PROJECT RLA/03/902 IONOSPHERIC ANALYSES AND STUDIES**

In order to support the ionospheric analyses and studies being conducted by project RLA/03/902, CAR/SAM States/Territories/International Organizations are urged to inform ICAO, through their respective Regional Offices, **no later than GREPECAS/15,** about the existence and availability of GNSS receivers with an L1 and L2 data collection capability per second**,** reporting their geographic location and the type of equipment.

1.6 **WP 03 - SUMMARY OF STUDIES ON THE IONOSPHERE CONDUCTED UNDER PROJECT RLA/03/902 SACCSA,** presented by members of the SACCSA Project, analyzed real, IGS-based data for a period of almost seven years (2000-2006) in order to fully characterize the ionosphere for at least half a solar cycle. Two types of processing or analyses were carried out for that purpose:

a) Those based on ionospheric information collected in IONEX-type files. This type of analysis consists of processing a large number of IONEX files to make a statistical analysis of the vertical ionosphere component (global analysis).

b) Those based on the processing and analysis of "raw" data (observation and navigation RINEX) that serve as an input for ionosphere algorithms, with an analysis of the output.

1.7 According to the report of the study for an SBAS ionospheric correction algorithm in the CAR/SAM Regions, "*The results* obtained *in the study are very encouraging. Both the correction prediction capability and the integrity shown by the results are very high…The integrity was satisfactory in 84% of the cases analyzed, ranging between a 99 and 100% prediction."* It should be stressed, however, that this analysis has not taken into account the effect of ionospheric scintillation or of other ionospheric irregularities on the lines-of-sight of geostationary satellites.

1.8 The Meeting took note of the information provided in IP/05 on the global activities and progress being made with regard to the GNSS systems addressed by the International Committee on Global Navigation Satellite Systems (ICG).

Agenda Item 2 Review of the results of trials and studies on the implementation of SBAS systems in the CAR/SAM Regions

2.1 The following papers were presented and discussed under this agenda item: IP 03, WP 04, WP 05, WP 06, WP 07 and IP 06.

2.2 The Meeting was told that, based on the reports of projects RLA/00/009 and RLA/03/902, the GREPECAS 14 meeting had considered that the implementation of GNSS, including SBAS and GBAS, would have to be based on the operational requirements, as well as on technical and cost-benefit analyses that would allow for decision-making regarding its implementation.

2.3 GREPECAS decided, on the basis of the preliminary results of project RLA/03/902, that the SBAS solutions proposed for the CAR/SAM Regions should be oriented towards reaching at least APV I capability and formulated Decision 14/55 accordingly.

2.4 The studies being conducted under project RLA/03/902 are following up on that decision, while information about the level of APV II service is also being included, in order to get an enlarged picture of SBAS service provision capabilities in the Regions.

2.5 Note was taken that during the GREPECAS 14 meeting, some members of project RLA/00/009 stated that, according to the final results of the studies and trials of this project, the SBAS solution is not feasible for the CAR/SAM Regions because it is not cost-effective and because of ionospheric effects on GNSS signals.

2.6 The Meeting noted that the IATA representative present at the GREPECAS 14 meeting had agreed to participate in the work of the GNSS Task Force, but had been unable to send a representative to this third meeting of the GNSS-TF.

2.7 IP07 informed the Meeting about the systematic and operational improvements made in the United States SBAS systems (WAAS) and that growing SBAS use makes global harmonization of the operational requirements and procedure design criteria essential.

2.8 **WP 04 - SUMMARY OF THE RESULTS OF REGIONAL PROJECT RLA/03/902 SACCSA, PHASE II** reported that the SACCSA project was organized into a total of twelve work packages, the results of which are described in Appendix A to WP 04:

1.- Collection of information from service providers and users.
2.- Definition of system requirements.
3.- Study of the solution of having its own SBAS.
4.- Analysis of the ionospheric model.
5.- Development of the specifications for its own SBAS.
6.- Development of the specifications of the MTSAT SBAS (not carried out because of budget limitations).
7.- Considerations about management / operation / exploitation.
8.- Human resources and training.
9.- Economic and financial feasibility.
10.- Planning of activities.
11.- Industrial positioning analysis.
12.- Seminars.

2.9 The Meeting agreed that the implementation of an SBAS system appeared to be technically feasible.

2.10 There were discussions over the financial feasibility and the conclusion was reached that financial feasibility would depend upon the support of agencies other than the provider itself that would cover some of the operating costs of system implementation (public fundingå).

2.11 The most sensitive elements of the economic model developed are, in the first place, the savings in operating costs, followed by savings in implementation costs.

2.12 There is a need for a more in-depth analysis of the benefits that can be achieved in the CAR/SAM Regions and to engage the stakeholders (providers, airlines and industry) in a review of the hypotheses and the creation of new hypotheses about aircraft equipment and the future status of ground infrastructure.

2.13 **WP 05- STATUS OF THE STUDIES AND WORK DONE BY PROJECT RLA/03/902** contained a summary of project activities planned thus far, including the action taken by and conclusions of the latest meetings of the Coordination Committee: RCC 5 and 6.

2.14 **WP 06- DISTRIBUTION OF ACTIVITIES FOR SACCSA PHASE III** summarized the activities of the third phase of the project, as agreed in RCC 6, over an implementation period of 36 months and distributed in the following way:

PHASE III A:

PT 1000: Monitoring and control network to study ionosphere behaviour and how the models defined for the CAR/SAM regions operate.
PT 2000: Completion of the studies for the current phase, bringing topics like communications, ionosphere, and ground network topology, etc. to a close.
PT 3000: Agreement upon the siting of critical facilities: Control centres (3), support infrastructure (1), and access stations to GEOs (4 – 6).
PT 4000: Institutional aspects that may permit States/Institutions to address the system and establish contacts with the relevant lending institutions.
PT 5000: Support activities for future GNSS implementation in the CAR/SAM Regions.
PT 6000: Workshops and seminars (including RCC 7, 8 and 9).

PHASE III B:

PT 7000: Definition of support activities for system validation/certification.
PT 8000: Analysis of other complementary options in areas with poor or limited services.
PT 9000: Cost/benefit study and financing.
PT 10000: Seminars (RCC 10 and 11 are included).

2.15 **WP 07- CONSIDERATIONS OF SACCSA SUBSCRIBER COUNTRIES ON THE IMPLEMENTATION OF PHASE III OF THE PROJECT** presented considerations brought up by SACCSA members with regard to the importance of incorporating the other States in Phase III of the project, suggesting the following lines of action:

a) recognizing that Phase III of SACCSA could provide definitive elements for decision-making by the CAR/SAM Regions with regard to the implementation of their own SBAS.

b) recognizing that the ionosphere studies proposed for SACCSA Phase III are of considerable importance for obtaining a knowledge of and characterizing actual

ionosphere behaviour in the CAR/SAM Regions and, consequently, for the implementation/planning of the GNSS solution.

c) recognizing the importance of having CAR/SAM States be willing to be incorporated into and participate in Phase III of RLA/03/902 SACCSA, for the effective and efficient completion of the project.

d) recommending to the CNS/ATM Subgroup that it take effective action within the GREPECAS mechanism to obtain a definitive response from CAR/SAM States/Organizations regarding their acceptance of the implementation of an SBAS of their own, and their commitment to participate in Phase III of project RLA/03/902, bearing in mind items a), b) and c) of the actions suggested above.

2.16 In light of the discussion under Agenda Items 1 and 2, the Meeting formulated the following draft conclusion:

DRAFT CONCLUSION GNSS/TF/03/0 ACCEPTANCE OF AN SBAS OF ITS OWN AND SUPPORT FOR PROJECT RLA/03/902-SACCSA

Bearing in mind

- that Phase III of SACCSA could provide definitive elements for decision-making by the CAR/SAM Regions with regard to the implementation of an SBAS of their own;

- that the proposed ionosphere studies are of considerable importance for gaining a knowledge of and characterizing its actual behaviour and, therefore, for the implementation/planning of the GNSS solution;

- the importance of having CAR/SAM States be willing to be incorporated into and participate in Phase III of RLA/03/902 SACCSA for the efficient completion of the project,

States/Territories/International Organizations are urged to:

a) present, within the GREPECAS mechanism, their acceptance of the implementation of an SBAS of their own.

b) express their support for PHASE III of project RLA/03/902 SACCSA and their willingness to participate in it.

Agenda Item 3 .... Review of the results of trials and studies on the implementation of GBAS systems in the CAR/SAM Regions

3.1 Under this agenda item, the Meeting discussed the following papers: BP 04, WP 08 and BP 07.

3.2 **IP 04- SARPS REFERENCES AND CONSIDERATIONS ABOUT THE GNSS SYSTEMS AND THE WORK OF THE AIR NAVIGATION PANEL** summarizes SARPS references and considerations regarding GNSS implementation, covering references and updates of air navigation standards, and presents current activities of the ICAO Panel and other aspects related to the planning and implementation of navigation systems.

3.3 **WP 08 BRAZILIAN GBAS PROGRAM UPDATE** reported that the aim of the DECEA (Brazil) was to acquire a certifiable GBAS station by 2010 and that it was accordingly involved in developing a risk model to represent ionosphere behaviour in Brazil.

3.4 **IP 07-STATUS OF FAA GBAS ACTIVITIES** informed the Meeting about current developments in the LAAS programme, including the status of international cooperation, the study of requirements for CAT III operations and work related to the technical validation of the CAT I systems.

3.5 The Task Force discussed the importance of collecting local data for the GBAS station implementation process, as a way of making sure that the risk model used can ensure safety.

Agenda Item 4 Review of GNSS requirements for PBN implementation

4.1 During the discussion of this agenda iem, the Meeting was told about the United States navigation system roadmap and asked the representative of the FAA to submit an Information Paper to the CNS Committee containing this document, which would serve as an initial model for the preparation by the GNSS TF of a regional strategy for the development of navigation systems to support the PBN roadmap in the CAR/SAM Regions, in order to provide a guide for States to develop their national plans and for air navigation services users.

Agenda Item 5 Other matters

5.1 Under this agenda item, there was a discussion of **WP 10- REVIEW OF THE WORK PROGRAMME OF THE GNSS TASK FORCE,** which sets out the current terms of reference and work programme of the GNSS Task Force, together with other considerations of higher GREPECAS bodies, in order for the Meeting to update them and reorganize its future tasks in accordance with the new guidelines.

5.2 The Meeting drew up a new work programme, based on the criteria approved by ACG 07, which will be presented to the CNS Committee for its consideration. This work programme is included as **Appendix A** to this report.

5.3 The rapporteur of the GNSS Task Force informed the Meeting that he would not be able to continue performing the duties of rapporteur because of the new and multiple responsibilities he had been assigned in his Administration. He thanked the Task Force members for their support and their efforts in carrying out the assigned tasks. The Meeting thanked the rapporteur for his successful work and agreed that a new rapporteur would be elected at the CNS Committee meeting (CNS/Comm/06) from among the Task Force members.

5.4 When discussing WP 02, the Meeting agreed that in order to improve GNSS planning and make its implementation more efficient, States/Territories/International Organizations should form national GNSS groups to plan GNSS implementation in the short, medium and long terms, such groups to be made up of service providers, users, regulatory bodies and other aeronautical organizations. The Meeting then went on to formulate the following draft conclusion:

DRAFT CONCLUSION
GNSS/TF/ 03/03 ESTABLISHMENT OF NATIONAL GNSS GROUPS

That States/Territories/International Organizations establish multidisciplinary national groups made up of service providers, users, regulatory bodies and other aeronautical organizations, to plan GNSS implementation in the short, medium and long terms.

5.5 Also while discussing WP 02, the Meeting considered the need to plan the short term implementation of basic GNSS systems in the CAR/SAM Regions and formulated the following draft conclusion to that effect:

DRAFT CONCLUSION
GNSS/TF/ 03/04 USE OF BASIC GNSS IN THE SHORT TERM

States/Territories/International Organizations are urged to complete the development and approval of NPA operations based on the basic GNSS, establishing regulations and procedures (NOTAM, AIC, etc.) for the use of GPS, GPS RAIM, and GPS with Baro-VNAV in the short term.

5.6 Regarding the next meeting of the GNSS Task Force, it was noted that a proposal for the venue was expected at the next CNS Committee Meeting (CNS/Comm/06), that if no State made a proposal, the Meeting could be held at the ICAO Regional Office in Mexico.

WORK PROGRAMME: CNS/GNSS/TF

No.	Strategic Objective	Global Plan/ Plan Mundial - GPI	Regional Plan - FASID	GREPECAS No. Con/Dec/Pa	Target activity	Follow-up action	Deliverable	Responsible	Target date	Remarks
1	2	3	4	5	6	7	8	9	10	11
1	A, D	GPI-21	CNS - 3	12/45 12/46 13/84 14/55	Develop draft regional guidelines for the evolution of air navigation systems		- List of avionics available in aircraft in the CAR/SAM Regions and projected future systems - List of navigation aids existing in the CAR/SAM States, together with their installation dates - Evolution strategy/ Roadmap of air navigation systems for the CAR/SAM Regions	To be defined at the CNS/Com/06 meeting	GNSS TF 04 (2009)	

No.	Strategic Objective	Global Plan/ Plan Mundial - GPI	Regional Plan - FASID	GREPECAS No. Con/Dec/Pa	Target activity	Follow-up action	Deliverable	Responsible	Target date	Remarks
1	2	3	4	5	6	7	8	9	10	11
2	A, D	GPI-21	CNS-3	12/129 b)	Propose technical training programmes in GNSS systems for the CAR/SAM States		- Technical training programme in basic GNSS systems - Technical training programme in SBAS systems - Technical training programme in GBAS systems	To be defined at the CNS/Com/06 meeting	GNSS TF 04	
3	D	GPI-21	CNS-3	12/46	Guide the States of the Region in the practical methodology for the implementation of GBAS systems		- Practical guide for the implementation of GBAS systems in the CAR/SAM Region	To be defined at the CNS/Com/06 meeting	GNSS TF 04	

- END -