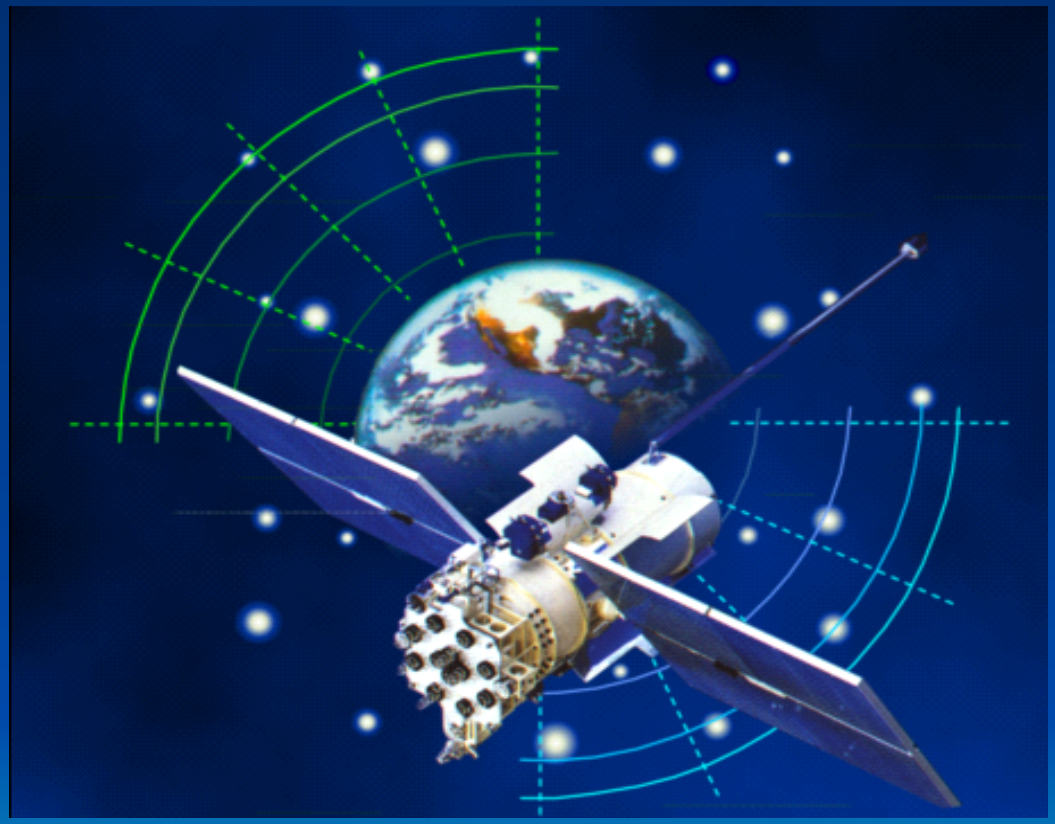
# USE AND APPLICATION OF GNSS IN AIR NAVIGATION IN ECUADOR



United Nations / ICTP Workshop on the Use of Global Navigation Satellite Systems (GNSS) for Scientific Applications

1 – 5 December 2014 (ICTP, Trieste, Italy)

ATCO. BOLIVAR DAVALOS C. CHIEF OF PANS-OPS

CIVIL AVIATION DIRECTION OF ECUADOR

# BACKGROUND

- 1980 ICAO RECOGNIZES THE LIMITATIONS OF CURRENT AIR NAVIGATION SYSTEMS AND THE NEED TO IMPROVE THE NEEDS OF AVIATION IN THE XXI CENTURY

- 1983 ICAO ESTABLISHES A SPECIAL COMMITTEE NAMED FANS (FUTURE AIR NAVIGATION SYSTEM) TO STUDY AND IDENTIFY NEW TECHNOLOGIES THAT WILL ALLOW A COORDINATED DEVELOPMENT OF AIR NAVIGATION SYSTEMS IN THE NEXT 25 YEARS.

- 1991 **WORLDWIDE APPROVAL OF THE CONCEPT CNS / ATM IN THE 10TH AIR NAVIGATION CONFERENCE OF ICAO (MONTREAL) WITH BACKUP OF INTERNACIONAL AIR TRANSPORTATION ASSOCIATION (IATA).**

**MAIN RECOMMENDATION: NEED FOR THE IMPLEMENTATION OF PROGRESSIVE WORLDWIDE NEW CONCEPT OF CNS / ATM SYSTEM BASED MAINLY IN SATELLITES.**

- 2003 ELEVENTH AIR NAVIGATION WORLD CONFERENCE (ANCONF / 11) GUIDELINES FOR THE TRANSITION OF SATELLITE BASED NAVIGATION SYSTEMS IN THE CAR / SAM REGIONS AND ADOPTED BY THE 12th MEETING OF GROUP OF PLANNING AND IMPLEMENTATION OF THE CAR / SAM (GREPECAS, IN ORDER TO INTRODUCE IN AN EVOLUTIONARY WAY GNSS CAPACITY IN ALL PHASES OF FLIGHT.

- 2006 RNAV / GNSS / RNP PROCEDURES IN OLD QUITO INTERNATIONAL AIRPORT IATA / AA / DGAC

# 2006

## RNAV / GNSS / RNP PROCEDURES IN OLD QUITO INTERNATIONAL AIRPORT

# 2008 NATION BIGGEST AVIATION CHALLENGE: NEW INTERNATIONAL AIRPORT IN QUITO, ECUADOR

## SCENARIO…

- IRREGULAR TOPOGRAPHY
- MOUNTAINOUS AREA
- WORK INFRASTRUCTURE (BUILDINGS, RWY, TWY)
- NAVAIDS INSTALLATION (VOR / DME, ILS, PAPI)
- SYSTEMS (CNS)
- SERVICES (AIS, COM, MET, ATC)

# GNSS SARPS SYSTEMS

Annex 2 - Rules of the Air

Annex 4 - Aeronautical Charts

Annex 6 - Operation of Aircraft

Annex 10 - Aeronautical Telecommunications

Annex 11 - Air Traffic Services

Annex 14 - Aerodromes

Annex 15 - Aeronautical Information Services



# GNSS DOCs SYSTEMS

9849 GNSS MANUAL

9750 Global Air Navigation Plan for CNS/ATM

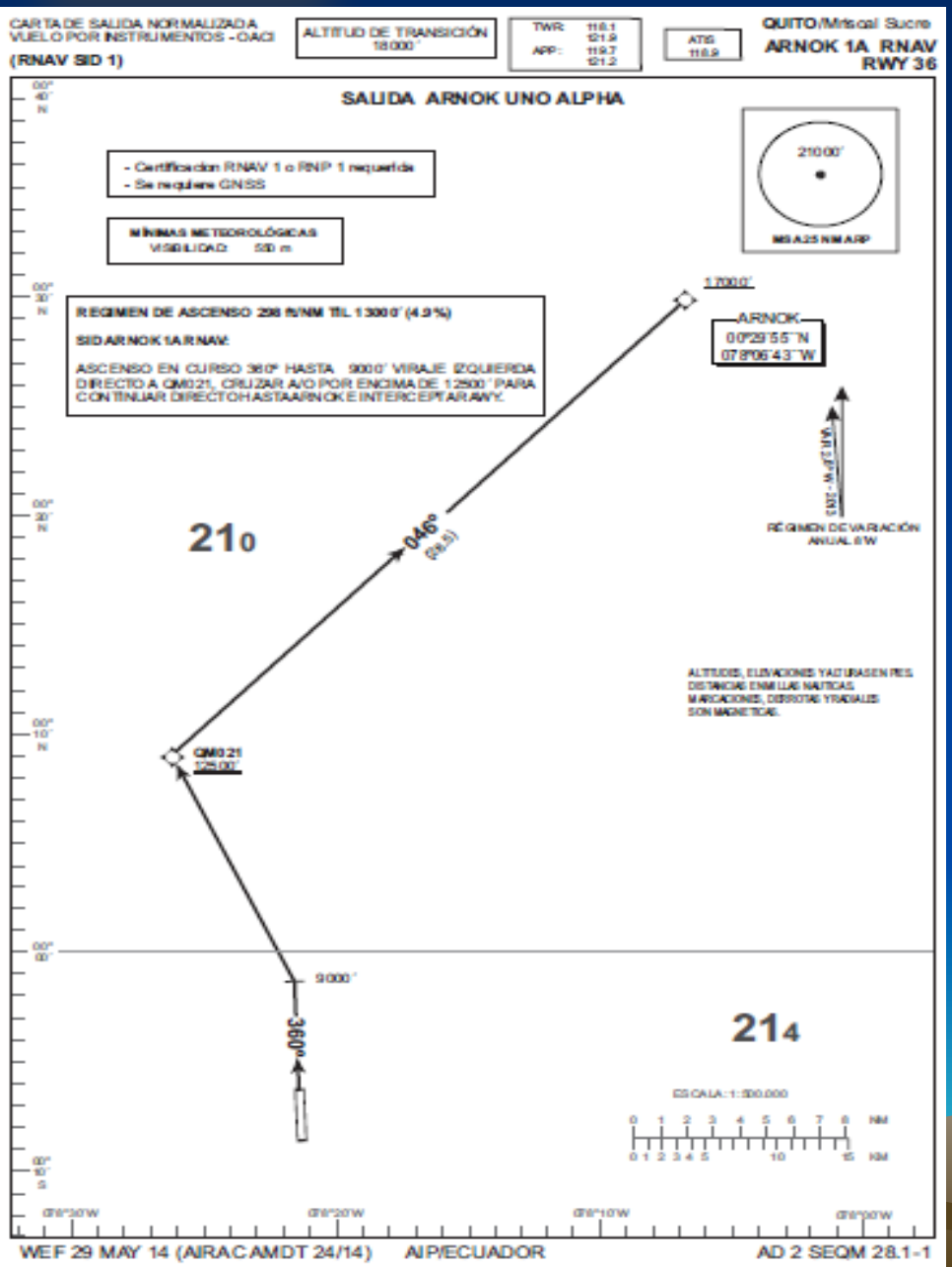
9674 WGS 84 MANUAL

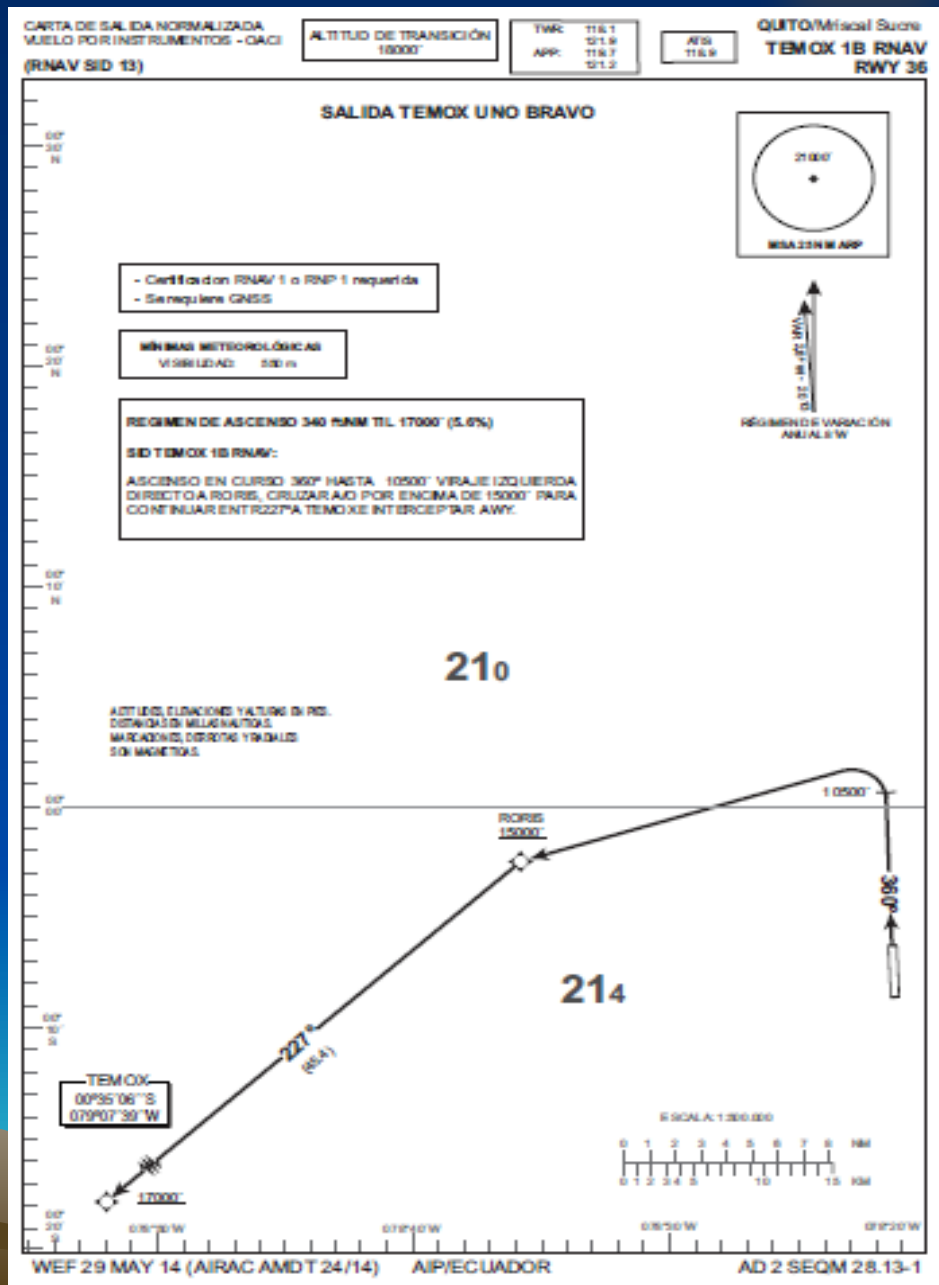
8071 Manual on testing of radio navigation aids (VOLUMEN II)

4444 Procedures for Air Navigation Services — Air Traffic Management

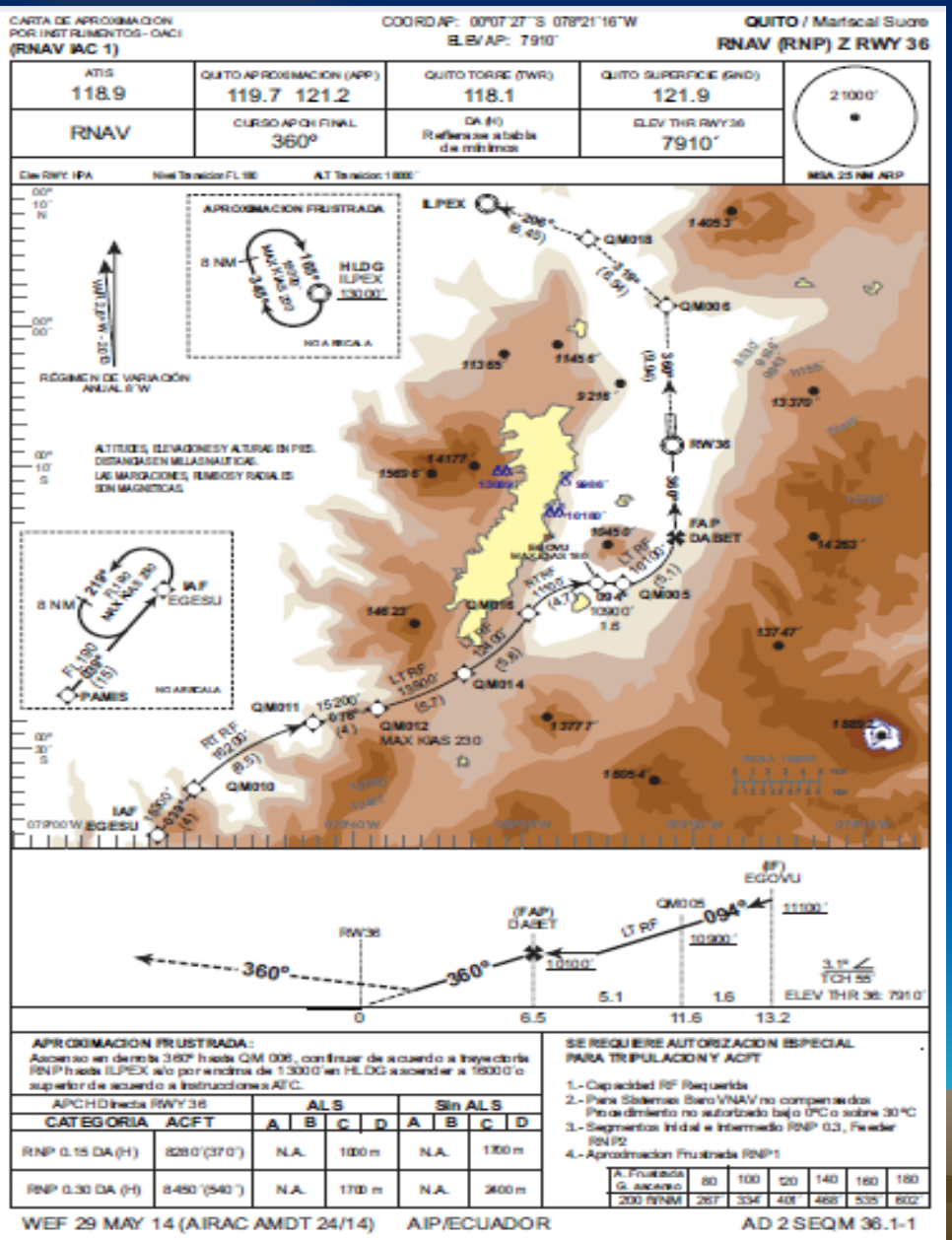
8126 Aeronautical Information Services Manual

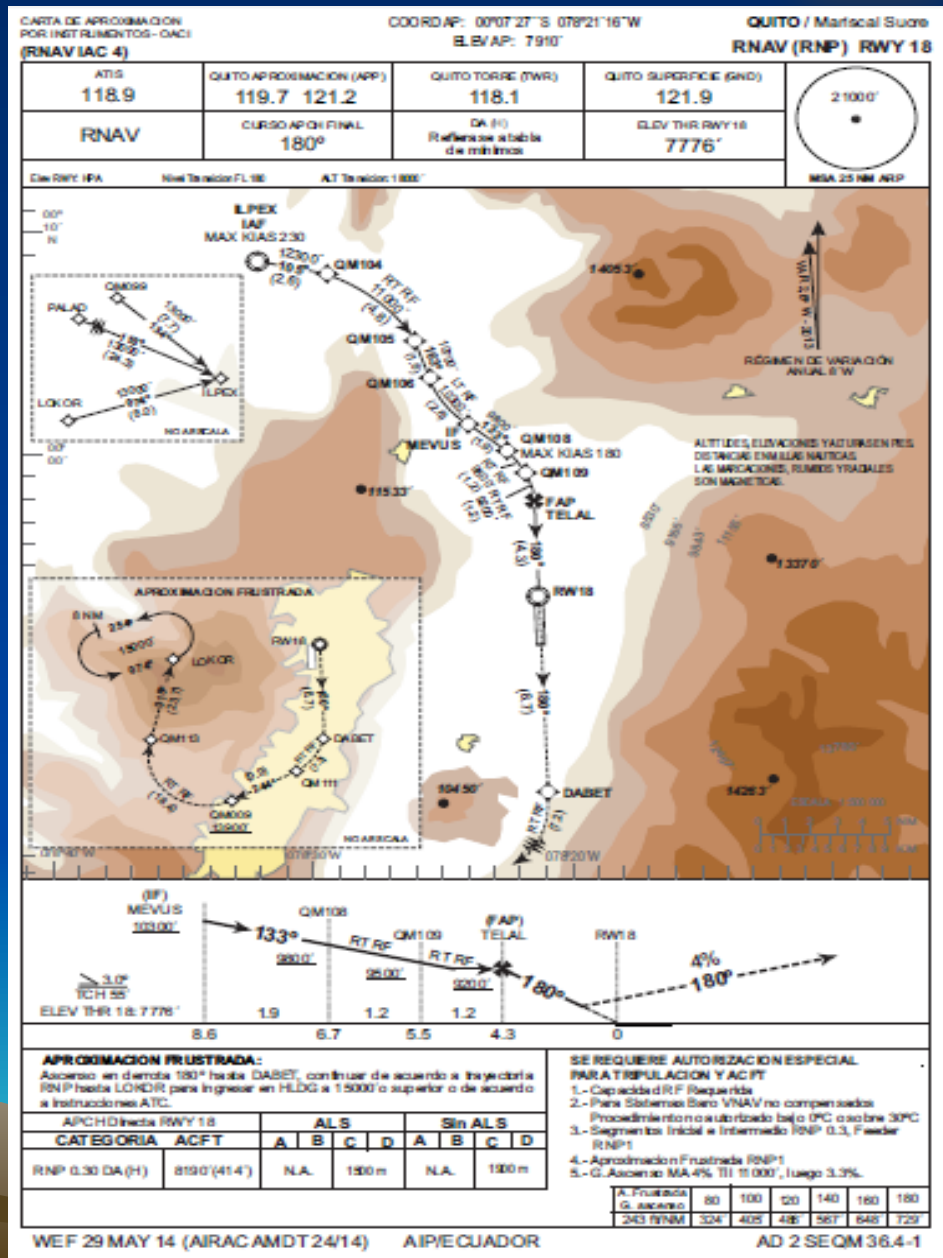
# RNAV/GNSS SID's Procedures



# RNAV/GNSS APP Procedures



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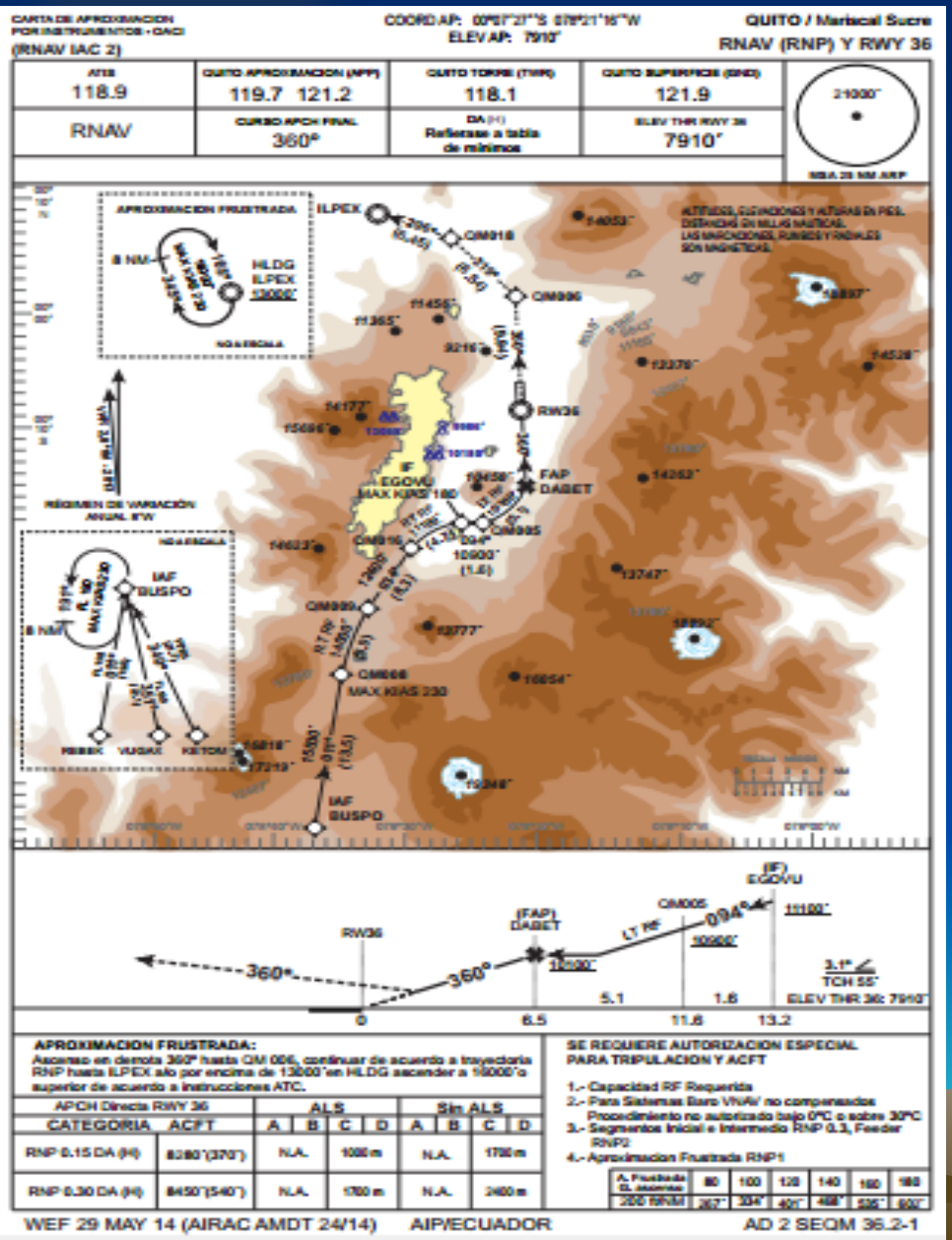


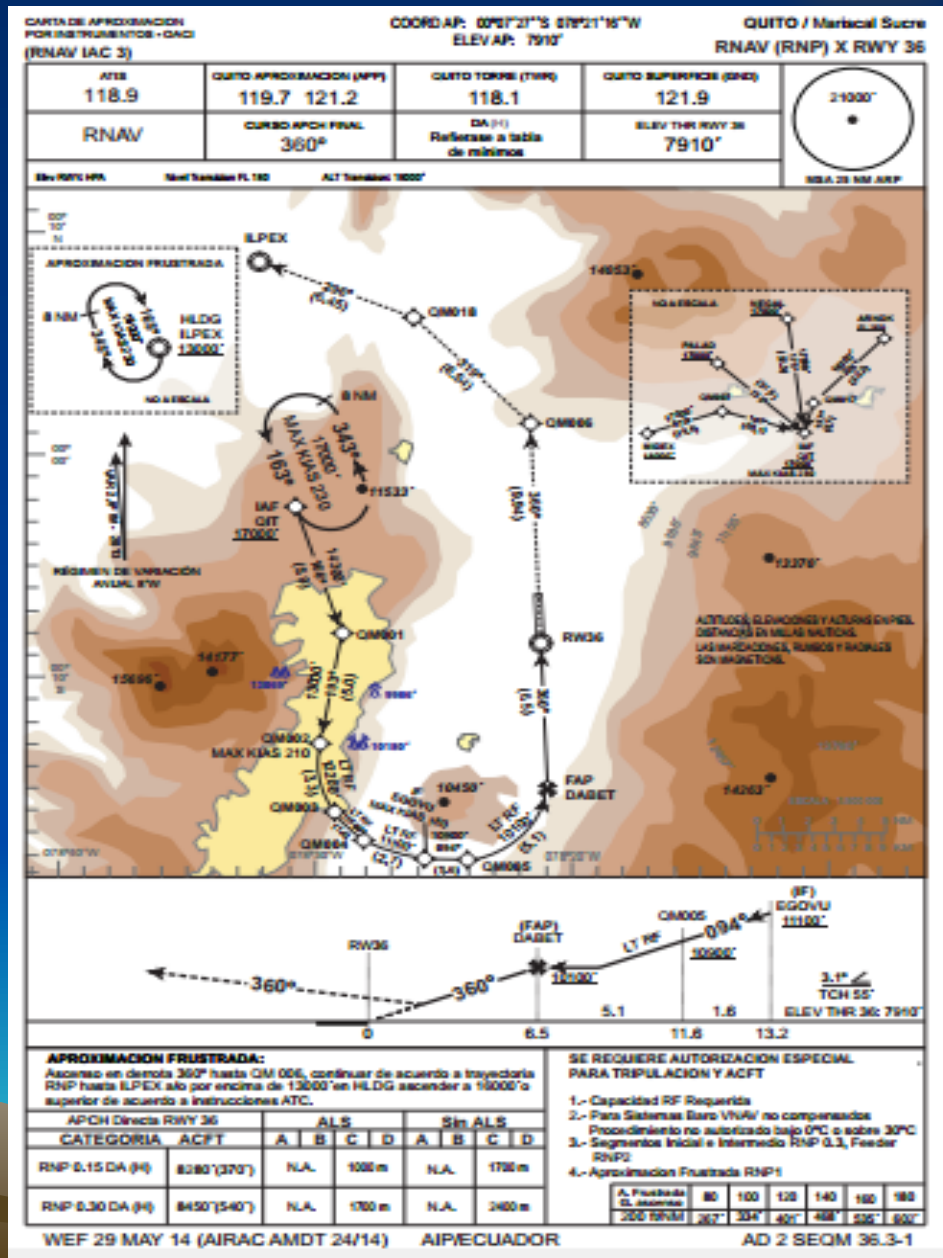

The goal is to have in the near future, procedures GNSS RNAV / RNP RNAV / RNP / AR

with a maximum degree of precision, and…….


DAC
without using ground equipment

# NOWADAYS QUITO´S AIRPORT HAS:

- 13 SIDs RNAV/GNSS

- 4 APPCH RNAV/GNSS

THE FIRST
AIRCRAFT
LANDED
IN NEW QUITO
INTERNATIONAL
AIRPORT
TEST FLIGHT

- THE MOST IMPORTANT AIRLINES IN THE WORLD OPERATE IN NEW QUITO´S INTL AIRPORT.


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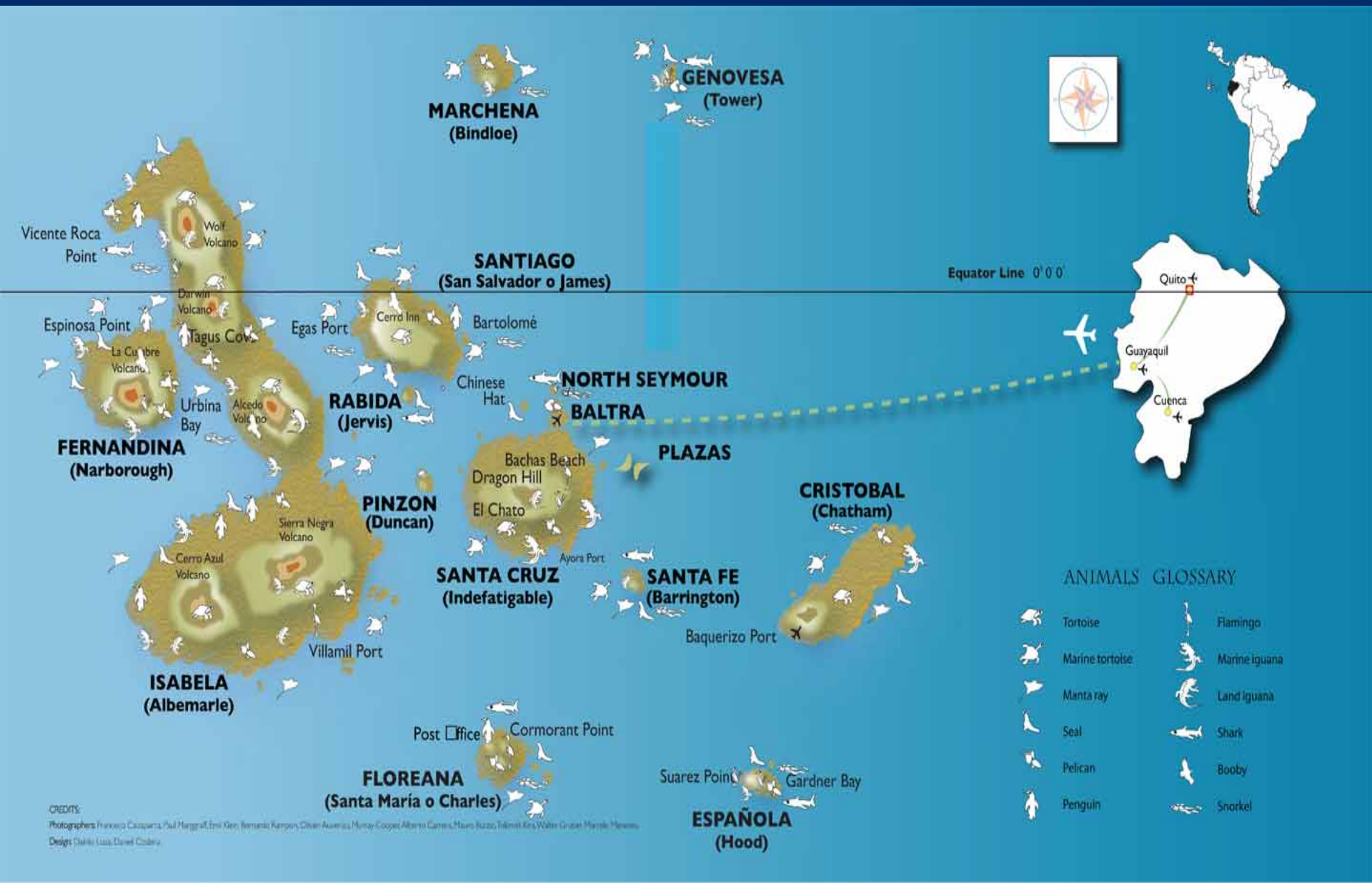
HC-CHA
LAN

# NEW QUITO´S INTL. AIRPORT

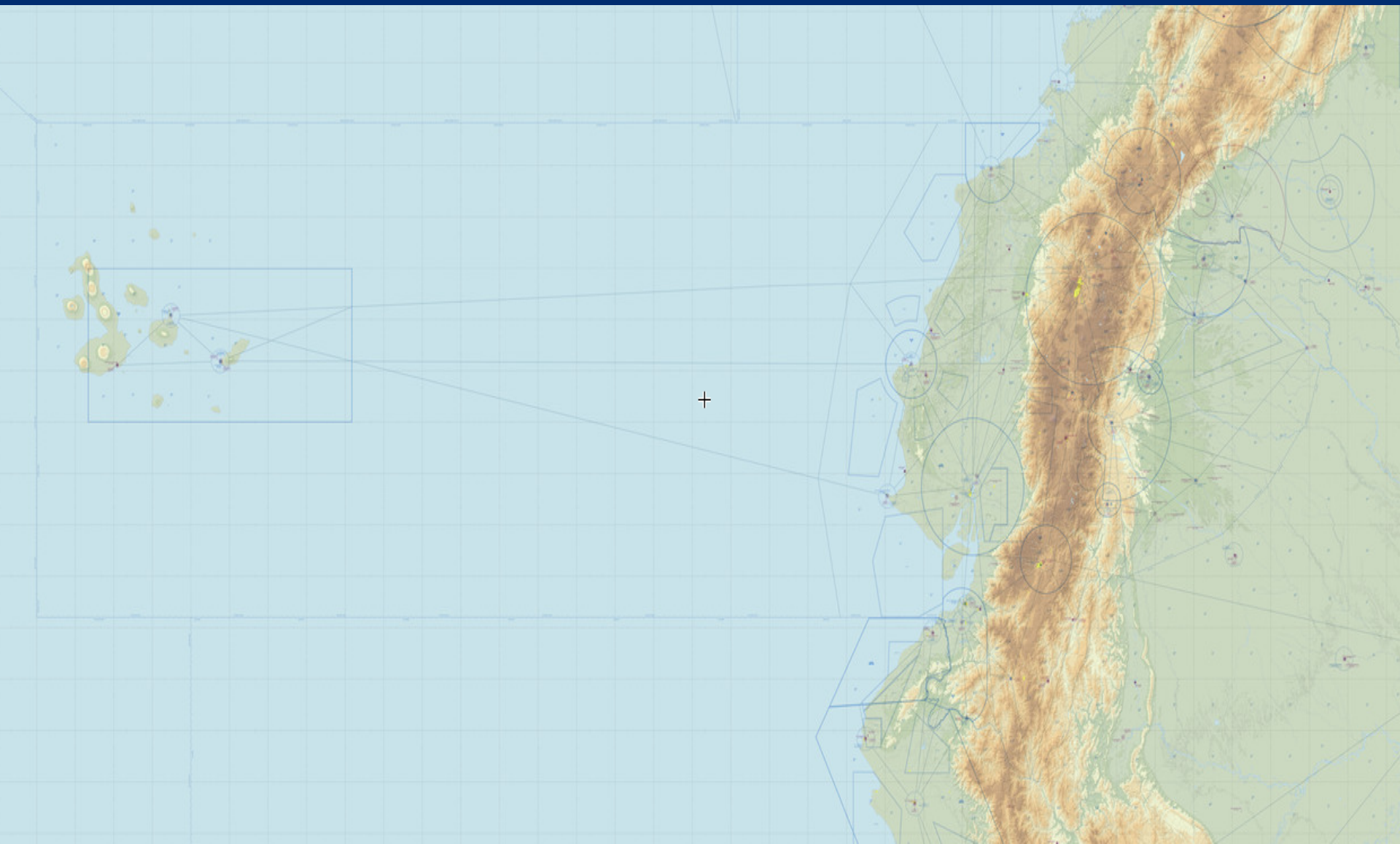

# USE OF GNSS IN ROUTE



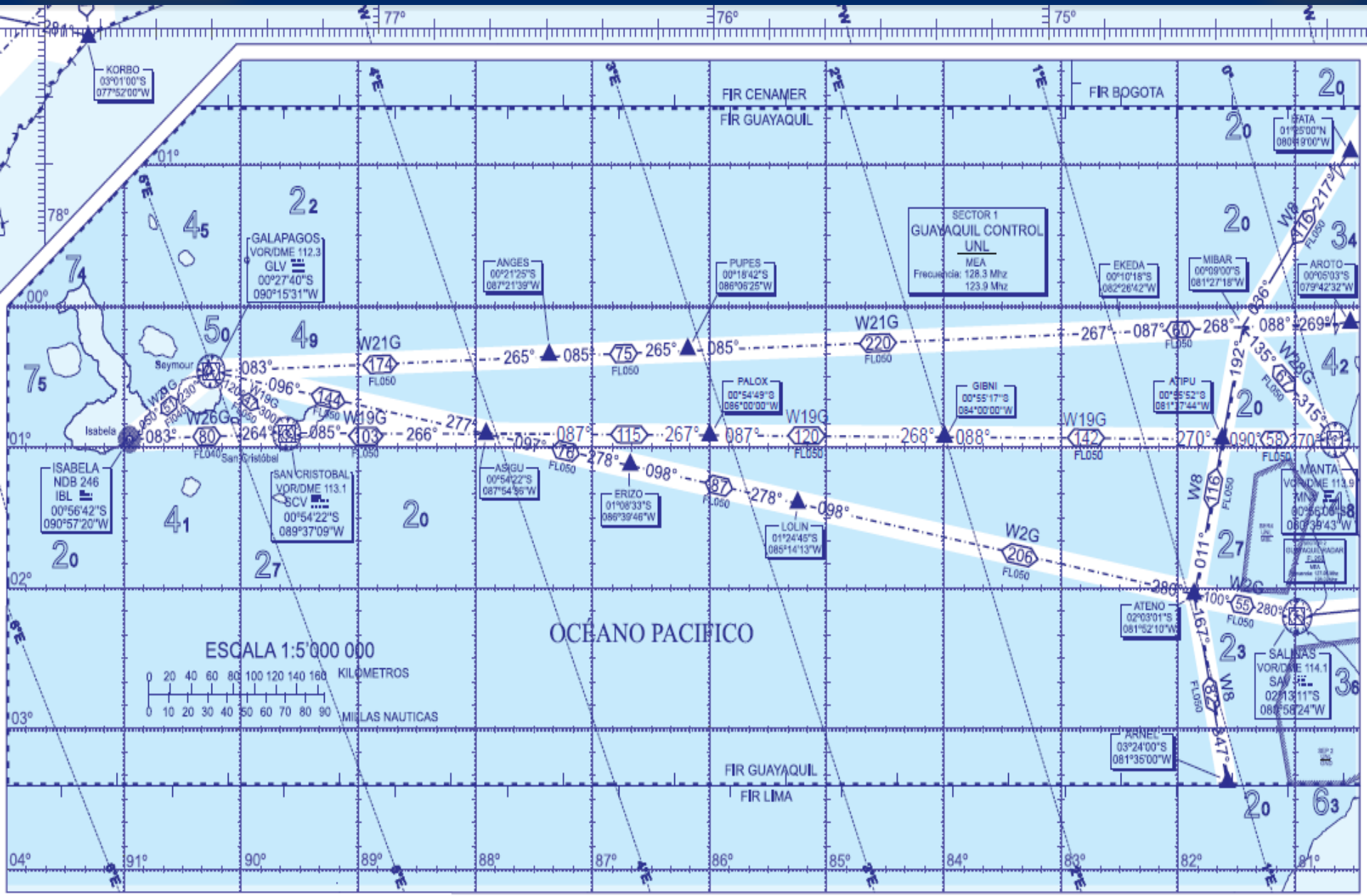
# NATURAL WORLD HERITAGE SITE

# GALAPAGOS

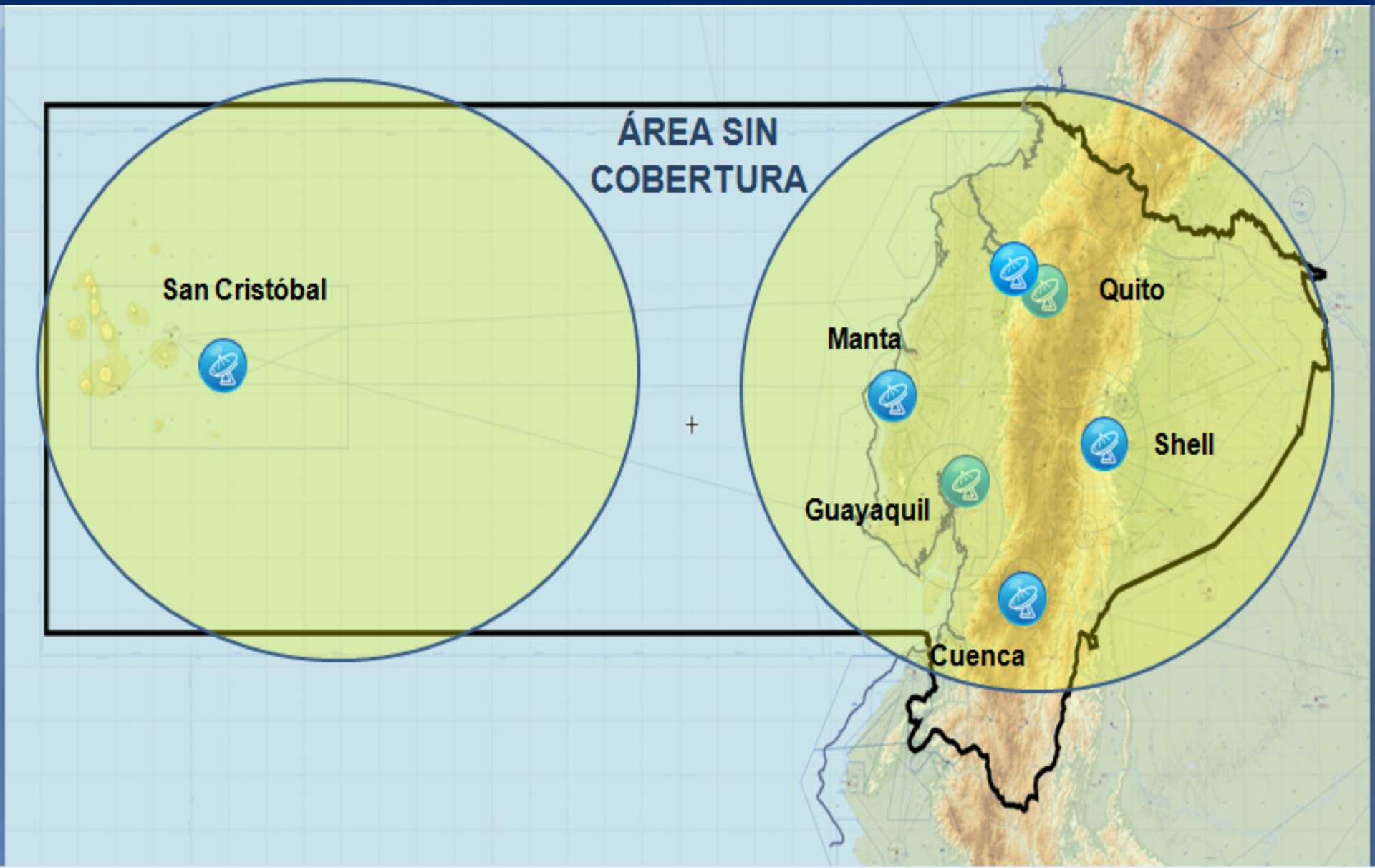
# MAP
# 600 NM



# CONVENTIONAL ROUTES



# RADAR COVERAGE



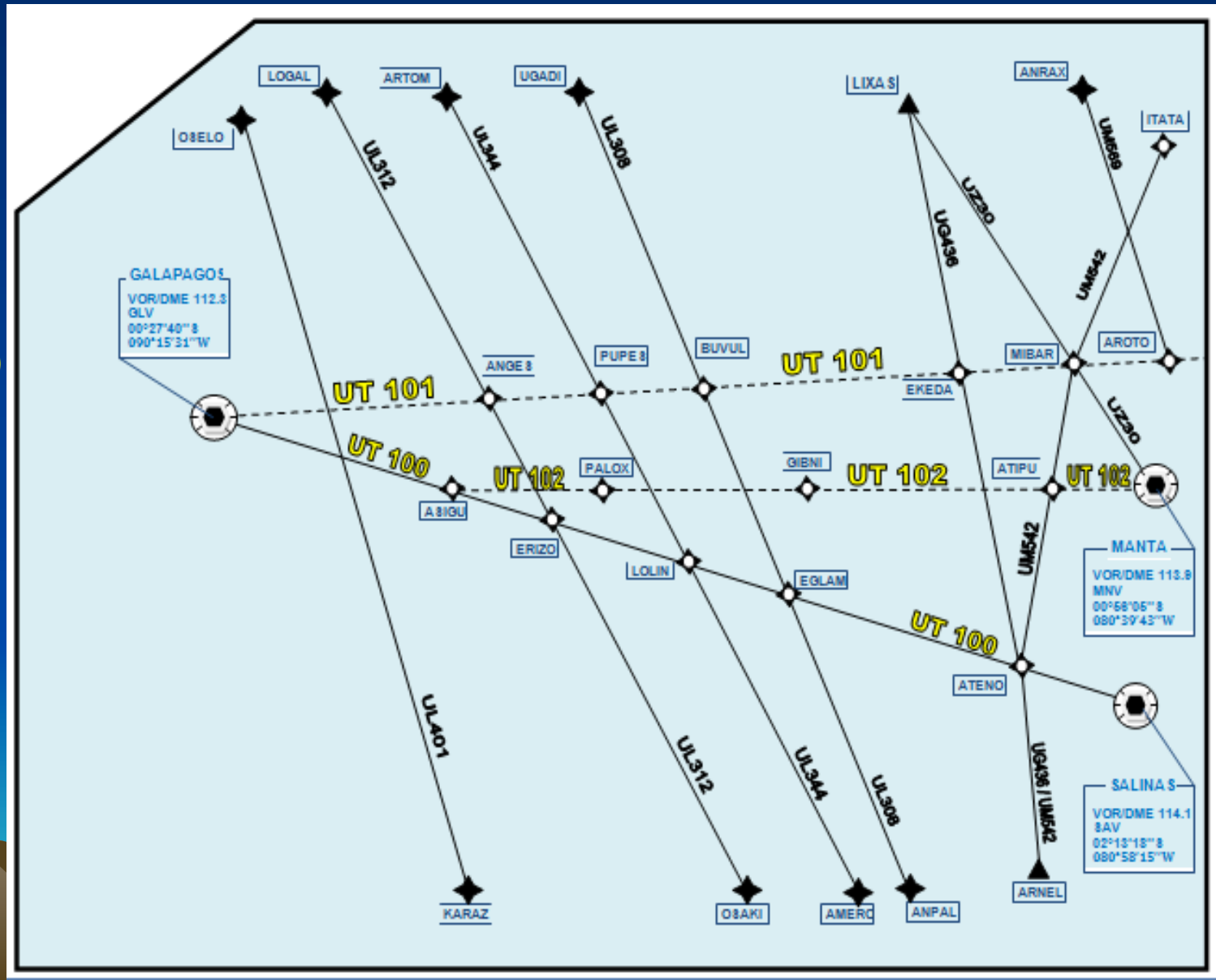
# RNAV ROUTES (GNSS) TO GALAPAGOS ISLANDS

**RNAV ROUTES (GNSS) PUBLISHED TO GALAPAGOS Y VV**

**UT-100**

**UT-101**

**UT-102**



# ADVANTAGES

- Increased safety
- Flight time reduction
- Operational costs reduction
- Best operational itineraries
- Standardization of procedures for pilots / ATC
- Instrument procedures without using ground equipment
- Airspace capacity

# BENEFICIARIES

- Operators / Airlines
- Airports
- Civil Aviation Authorities
- Users / passengers

# CONCLUSIONS

- GNSS IS THE MOST DEVELOPED MEANS FOR AIR NAVIGATION.

- ICAO HAS DEVELOPED STANDARDS AND RECOMMENDED PRACTICES (SARPS) FOR GNSS AND OTHER TECHNICAL DOCUMENTS FOR IMPLEMENTATION.

- THE EVOLUTION OF GPS, GALILEO, GLONASS, ETC. WILL CONTRIBUTE TO THE IMPLEMENTATION OF GNSS IN ALL PHASES OF FLIGHT WORLDWIDE.


...

- ECUADOR HAS NOW PROCEDURES RNAV GNSS / RNP/GNSS RELATIVELY EQUAL TO MOST IMPORTANT AIRPORTS IN THE WORLD

- HAS REGULATIONS REGARDING GNSS FOR ITS USAGE

- ITS IMPLEMENTATION (GNSS) WILL CONTRIBUTE TO ELIMINATE THE GAPS, IMPROVE SAFETY AND DEVELOPMENT OF AIR NAVIGATION IN CAR / SAM

- IT IS NECCESARY TO CONTINUE WITH THE EFFORTS, COORDINATION AND INTERNATIONAL COOPERATION TO ACHIEVE THE FULL IMPLEMENTATION OF GNSS IN THE CARIBBEAN AND SOUTH REGION (CAR / SAM).

# ECUADOR HAS LIFTED OFF WITH GNSS ON BOARD!!

THANK YOU

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