

CARTOGRAFIA AERONAUTICA

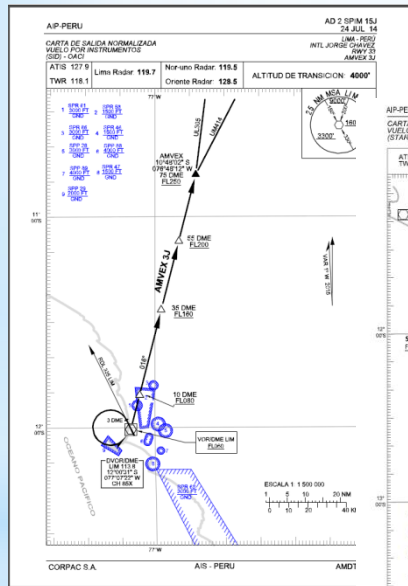
GIS / AIXM / AIMDB

Ing. Sergio E. Rojas Hidalgo

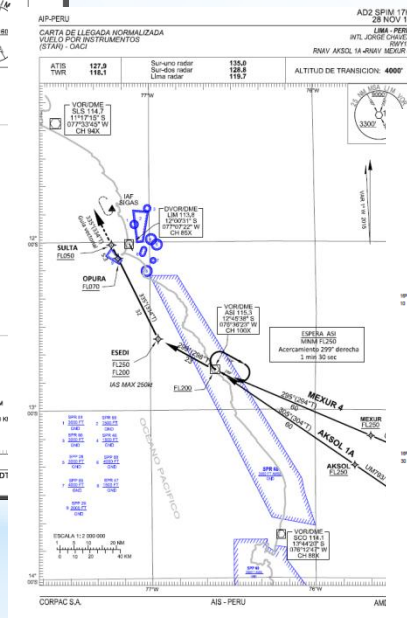
CARTOGRAFIA AERONAUTICA

ANTES : Cartas Individuales

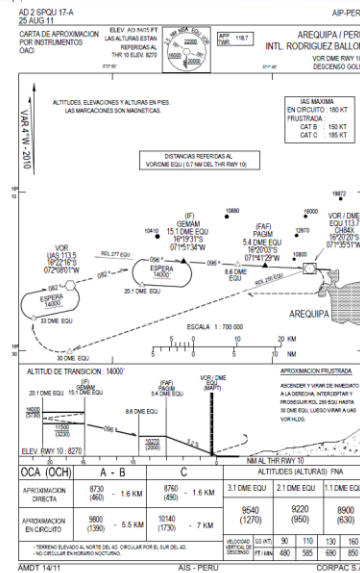
SID



STAR



IAC



Los elementos aeronáuticos dentro una Base de Datos Geográfica (GDB)

Los elementos aeronáuticos dentro una Base de Datos Geográfica (GDB)



Migración a características AIXM 5.1

```
<?xml version="1.0" encoding="UTF-8"?><aixm-message:AIXMBasicMessage xmlns:aixm-message="http://www.aixm.aero/schema/5.1/message"
< aixm-message:hasMember>
  <aixm:StandardInstrumentDeparture xmlns:aixm="http://www.aixm.aero/schema/5.1" gml:id="gmlID113">
    <gml:identifier codeSpace="http://www.comsoft.aero/cadas-aimdb/caw">6b5c9740-61dd-44c5-9927-c6fbbc3b373d</gml:identifier>
    <aixm:timeSlice>
      <aixm:StandardInstrumentDepartureTimeSlice gml:id="gmlID114">
        <gml:validTime>
          <gml:TimePeriod gml:id="gmlID115">
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            <gml:endPosition>2015-09-24T00:00:00.000Z</gml:endPosition>
          </gml:TimePeriod>
        </gml:validTime>
        <aixm:interpretation>SNAPSHOT</aixm:interpretation>
        <aixm:sequenceNumber>1</aixm:sequenceNumber>
        <aixm:communicationFailureInstruction xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        <aixm:instruction xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        <aixm:designCriteria xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        <aixm:codingStandard xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        <aixm:flightChecked xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        <aixm:name>RWY 15 RNAV ILROL3F- RNAV AMVEX-RNAV ARTUX1F</aixm:name>
        <aixm:RNAV xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        <aixm:availability xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        <aixm:airportHelipoint xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        <aixm:aircraftCharacteristic xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        <aixm:flightTransition xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        <aixm:guidanceFacility_navaid xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        <aixm:annotation xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        <aixm:safeAltitude xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        <aixm:designator>ILROL3F</aixm:designator>
        <aixm:contingencyRoute xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        <aixm:takeoff xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        <aixm:extension>
          <cae:StandardInstrumentDepartureExtension xmlns:cae="http://www.comsoft.aero/cadas-aimdb/extension" gml:id="gmlID116">
            <cae:featureCode>ILROL3F</cae:featureCode>
          </cae:StandardInstrumentDepartureExtension>
        </aixm:extension>
      </aixm:StandardInstrumentDepartureTimeSlice>
    </aixm:timeSlice>
  </aixm:StandardInstrumentDeparture>
</aixm-message:hasMember>
</aixm-message:AIXMBasicMessage>
```

Close



Almacenamiento en AIMDB

Data Management | Application Log | SDO Workpackages | Business Rules | User Management

Show Features Beginning - 2015-09-24 00:00:00

Feature Type Selection

No Work Package selected. Create new StandardInstrumentArrival

OrganisationAuthority

Procedures

- InstrumentApproachProcedure
- StandardInstrumentArrival (26)**
 - AirportHeliport
 - ArrivalLeg
 - InformationService
 - NavigationAreaRestriction
 - RunwayDirection

Feature Selection

Feature Type	Feature Code
StandardInstrumentArrival	ASUPA1B
StandardInstrumentArrival	CEDRO4
StandardInstrumentArrival	CEMIL3A
StandardInstrumentArrival	DARKI1A
StandardInstrumentArrival	DARKI1C
StandardInstrumentArrival	DARKIAB
StandardInstrumentArrival	ENPAP1D
StandardInstrumentArrival	IKARO2A
StandardInstrumentArrival	ILO3
StandardInstrumentArrival	ISAVO2A

Data Management | Application Log | SDO Workpackages | Business Rules | User Management

Show Features Beginning - 2015-09-24 00:00:00

Feature Type Selection

No Work Package selected. Create new StandardInstrumentArrival

TONOS3A

- StandardInstrumentArrival TONOS3A
 - AirportHeliport
 - ArrivalLeg
 - InformationService
 - NavigationAreaRestriction
 - RunwayDirection
 - SafeAltitudeArea
 - TouchDownLIROff

Feature Selection

Changes - StandardInstrumentArrival: TONOS3A

Show Correction History Add Modification / Show Snapshots

Event	Sequence No.	Correction No.	Validity Begin	Validity End
Creation	1	0	2014-08-27 13:31:23	

Current

Basic | Main | Availability | Aircraft Characteristic | **Flight Transition**

Vector Heading

Departure Runway Transition

Trajectory

Transition Leg

▼ ProcedureTransitionLeg - (GAVAR -)

Seq Number ARINC

Annotation

The Segment Leg

Feature type ArrivalLeg Feature code (GAVAR -)

▼ ProcedureTransitionLeg - (- TONOS)

Seq Number ARINC

Annotation

The Segment Leg

Feature type Feature code

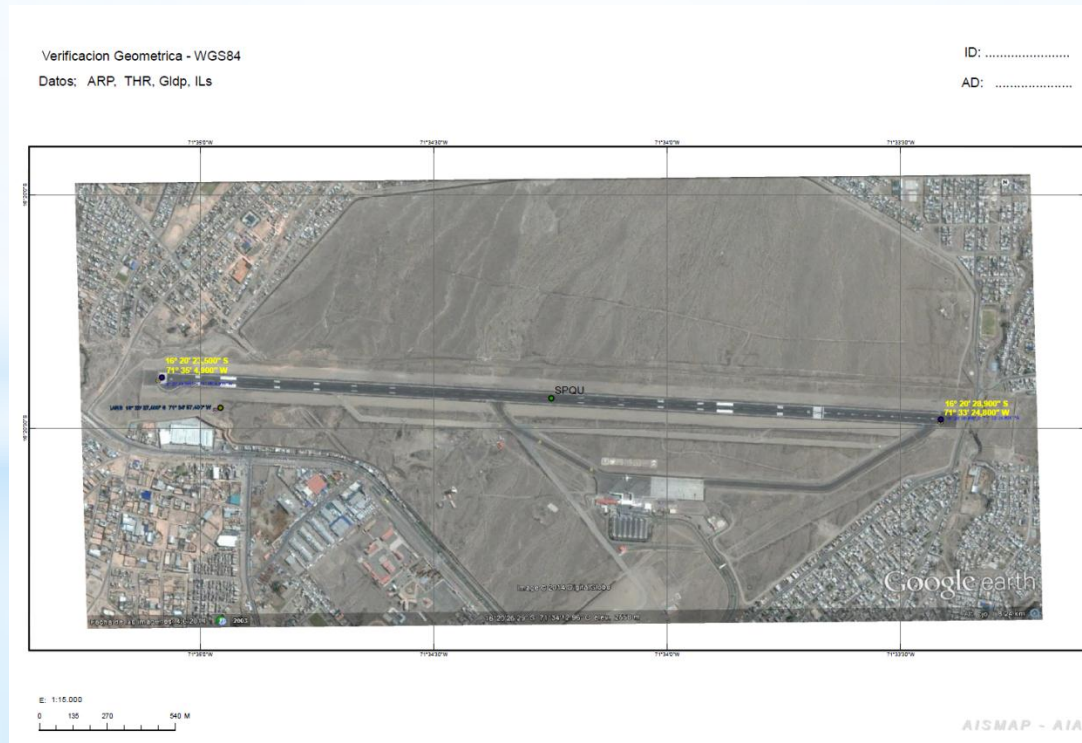
PREPARACION DE DATOS AERONAUTICOS

Según Geometría

Líneas: *Tramos de Ruta, Circuitos de Espera, Radiales*

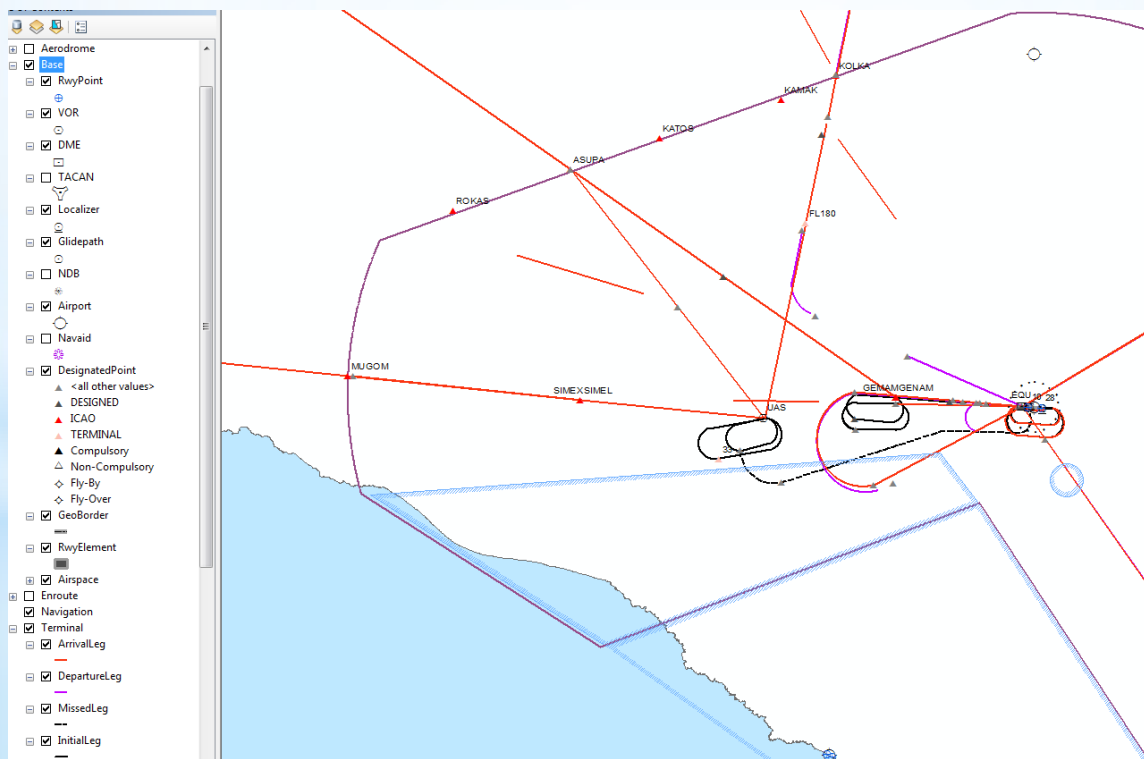
Puntos: *Umbrales, Radioayudas, Waypoint, ARP*

Polígonos: *Runway, TMA, SWY, SLO, AMA*



Sistema de Referencia WGS84

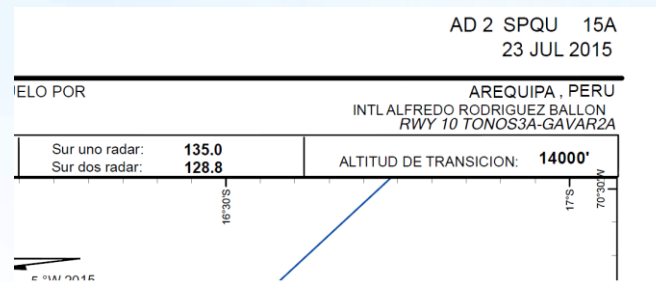
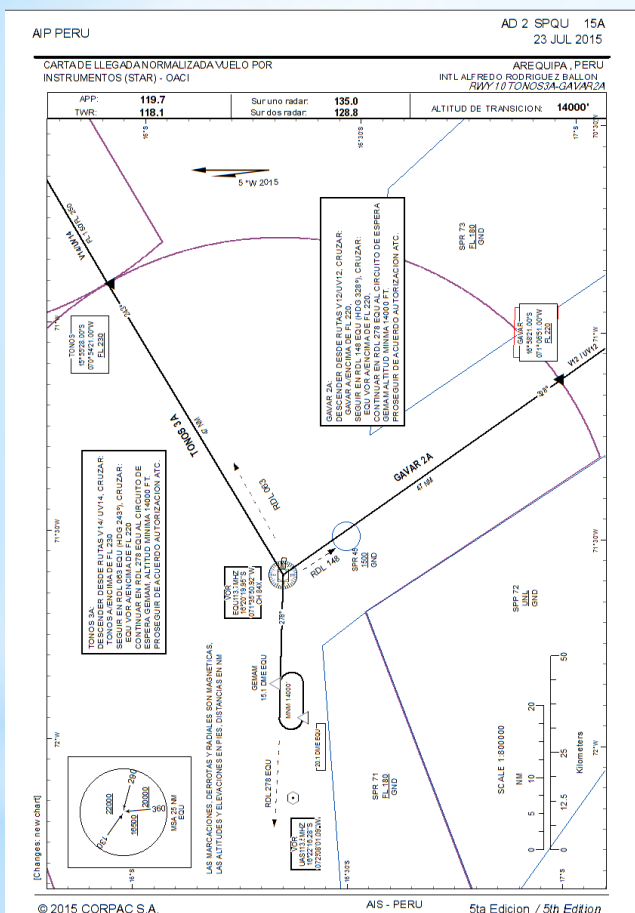
Todos los elementos geométricos (características) serán integrados en una plataforma GIS, quedando definido un mismo Sistema de Referencia, considerando sus coordenadas geográficas, posteriormente será migrado a un Entorno AIMX 5.1 y finalmente se almacenara en la Base de Datos (AIMDB).



Datos Aeronauticos / Caracteristicas AIXM

- STAR
- Tramo de Llegada
- MSA

Carta

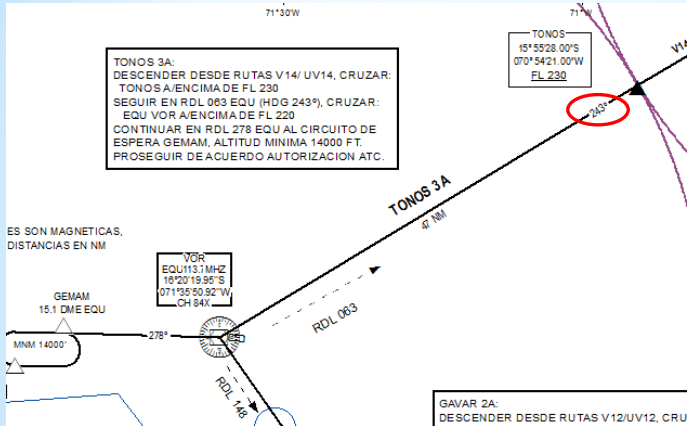


AIXM 5.1

```
<?xml version="1.0" encoding="UTF-8"?><aixm:message:AIXMBasicMessage xmlns:aixm:message="http://www.aixm.aero/schema/5.1/message" xmlns:gml="http://www.aixm.aero/schema/5.1/gml">< aixm:message:hasMember>< aixm:StandardInstrumentArrival xmlns:aixm="http://www.aixm.aero/schema/5.1" gml:id="gmlID149">< gml:identifier codeSpace="http://www.comsoft.aero/cadas-aimdb/caw">df5c4dc7-22c9-40a9-8cb6-92ef3cfb3ba5</gml:identifier>< aixm:timeSlice>< aixm:StandardInstrumentArrivalTimeSlice gml:id="gmlID150">< gml:validTime>< gml:TimePeriod gml:id="gmlID151">< gml:beginPosition>2015-09-24T00:00:00.000Z</gml:beginPosition>< gml:endPosition>2015-09-24T00:00:00.000Z</gml:endPosition></gml:TimePeriod></gml:validTime>< aixm:interpretation>SNAPSHOT</aixm:interpretation>< aixm:sequenceNumber>< aixm:sequenceNumber>< aixm:communicationFailureInstruction xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>< aixm:instruction xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>< aixm:desigCriteria xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>< aixm:codingStandard xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>< aixm:flightChecked xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>< aixm:name>RWY 10 TONOS3A-GAVAR2A</aixm:name>< aixm:RNAV xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>< aixm:availability xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>< aixm:airportHeliport xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="urn:uuid:6ed68ce-eb09-4b20-bdc7-4207d5026886"/>< aixm:airocraftCharacteristic xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>< aixm:flightTransition>< aixm:ProcedureTransition gml:id="gmlID152">< aixm:transitionLeg>< aixm:ProcedureTransitionLeg gml:id="gmlID153">< aixm:theSegmentLeg xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="urn:uuid:d2f0a63-6701-4a70-87c4-51f4fa0f4ef"/></aixm:transitionLeg>< aixm:transitionLeg>< aixm:ProcedureTransitionLeg gml:id="gmlID154">< aixm:theSegmentLeg xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="urn:uuid:77db0525-0711-4c12-8568-92fab939a5ce"/></aixm:transitionLeg></aixm:transitionLeg></aixm:flightTransition></aixm:StandardInstrumentArrivalTimeSlice></aixm:timeSlice></aixm:message:hasMember></aixm:message:AIXMBasicMessage></aixm:message>
```

Tramo de Llegada (Arrival Leg)

Carta

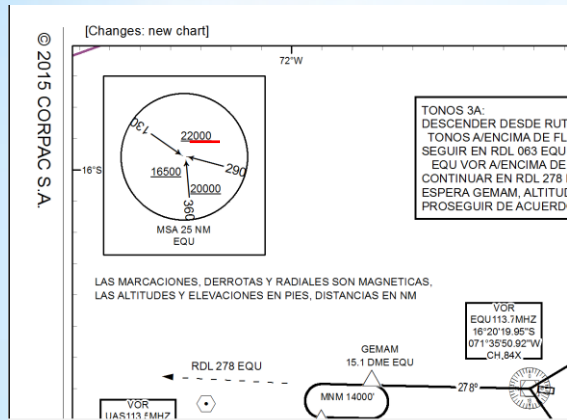


AIXM 5.1

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< aixm-message:hasMember>
  < aixm:ArrivalLeg xmlns:aixm="http://www.aixm.aero/schema/5.1" gml:id="gmlID183">
    < gml:identifier codeSpace="http://www.comsoft.aero/cadas-aimdb/caw">397514db-6bc6-4962-9139-6e1b65969086</gml:identifier>
    < aixm:timeSlice>
      < aixm:ArrivalLegTimeSlice gml:id="gmlID184">
        < gml:validTime>
          < gml:TimePeriod gml:id="gmlID185">
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            < gml:endPosition>2015-09-24T00:00:00.000Z</gml:endPosition>
          </gml:TimePeriod>
        </gml:validTime>
        < aixm:interpretation>SNAPSHOT</aixm:interpretation>
        < aixm:sequenceNumber>1</aixm:sequenceNumber>
        < aixm:endConditionDesignator xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        < aixm:legPath>STRAIGHT</aixm:legPath>
        < aixm:legType>ARINC</aixm:legType>
        < aixm:course>243</aixm:course>
        < aixm:courseType>MAG_TRACK</aixm:courseType>
        < aixm:courseDirection xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        < aixm:turnDirection xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        < aixm:speedLimit uom="KM_H">0</aixm:speedLimit>
        < aixm:speedReference xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        < aixm:speedInterpretation xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
        < aixm:bankAngle xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:nil="true"/>
      </aixm:ArrivalLegTimeSlice>
    </aixm:timeSlice>
  </aixm:ArrivalLeg>
</aixm-message:hasMember>
</aixm-message:AIXMBasicMessage>
```

MSA - Altitud Mínima de Sector

Carta



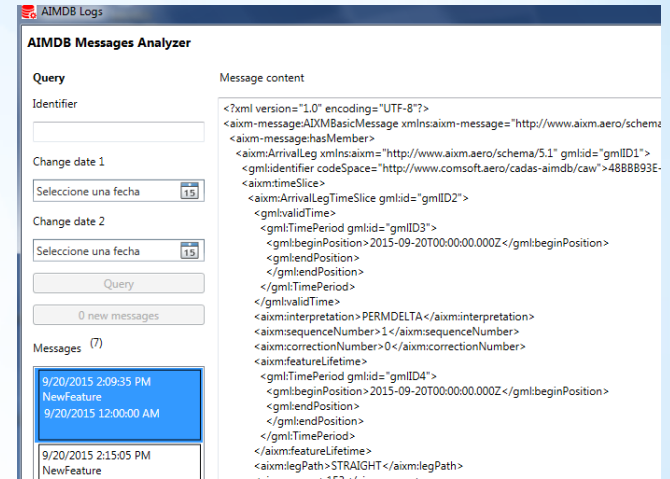
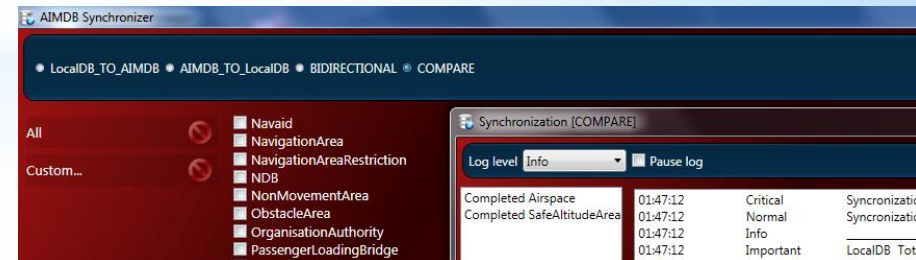
AIXM 5.1

Close

Backing Timeslice

```
<aixm:SafeAltitudeArea xmlns:aixm="http://www.aixm.aero/schema/5.1" gml:id="gmlID138">
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  <aixm:timeSlice>
    <aixm:SafeAltitudeAreaTimeSlice gml:id="gmlID139">
      <gml:validTime>
        <gml:TimePeriod gml:id="gmlID140">
          <gml:beginPosition>2015-09-24T00:00:00.000Z</gml:beginPosition>
          <gml:endPosition>2015-09-24T00:00:00.000Z</gml:endPosition>
        </gml:TimePeriod>
      </gml:validTime>
      <aixm:interpretation>SNAPSHOT</aixm:interpretation>
      <aixm:sequenceNumber>1</aixm:sequenceNumber>
      <aixm:safeAreaType>MSA</aixm:safeAreaType>
      <aixm:centerPoint_navaidSystem xmlns:xlink="http://www.w3.org/1999/xlink" xlink:href="urn:uuid:d9644fc8-a5d1-4325-9931-b">
        <aixm:sector>
          <aixm:SafeAltitudeAreaSector gml:id="gmlID141">
            <aixm:sectorDefinition>
              <aixm:CircleSector gml:id="gmlID142">
                <aixm:arcDirection>CWA</aixm:arcDirection>
                <aixm:fromAngle>130</aixm:fromAngle>
                <aixm:toAngle>290</aixm:toAngle>
                <aixm:innerDistance uom="NM">25</aixm:innerDistance>
                <aixm:lowerLimit uom="FT">22000</aixm:lowerLimit>
              </aixm:CircleSector>
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          </aixm:SafeAltitudeAreaSector>
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                <aixm:toAngle>0</aixm:toAngle>
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                <aixm:outerDistance uom="NM">25</aixm:outerDistance>
                <aixm:lowerLimit uom="FT">20000</aixm:lowerLimit>
              </aixm:CircleSector>
            </aixm:sectorDefinition>
          </aixm:SafeAltitudeAreaSector>
        </aixm:sector>
      </aixm:centerPoint_navaidSystem>
    </aixm:SafeAltitudeAreaTimeSlice>
  </aixm:timeSlice>
</aixm:SafeAltitudeArea>
```

Cambios en la AIMDB

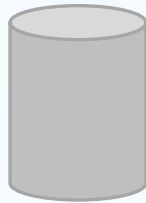
[illegible]

CARTOGRAFIA AERONAUTICA

Elementos Aeronauticos

- Airport
- Runway
- ARP
- TMA
- FIR
- Tramos de Ruta
- Puntos de Notificacion
- Radioayudas
- Calles de Rodaje
- Obstáculos
- SLO
- Zonas Prohibidas
- Glidepath
- Localizer
- ..

GDB



Plataforma GIS

- Topología
- WGS84
- Atributos

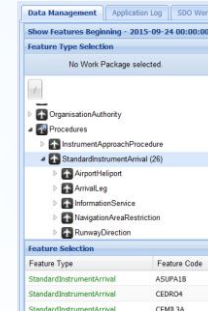
AIXM



Caracterisitcas AIXM 5.1

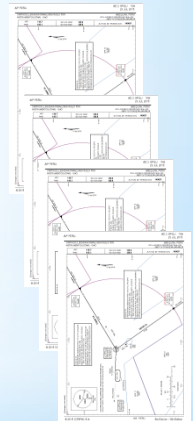
Referencias
Estructura Jerarquica

AIMDB



Datos Aeronáuticos
Centralizados

CARTOGRAFIA
AUTOMATIZADA



Anexo 4 - OACI

RAP 304 - MTC