

In-service Aircraft for a Global Observing System

# WP-2 Coordination with Global Networks, Users, and Airlines

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## WP-2 : Coordination with Global Networks, Users, and Airlines

No	Objective/Deliverable	Partner	due
D2.1	Documentation of IAGOS-NRT products for provision to GMES	CNRS	46
D2.2	Documentation of scientific database of the RI: structure, data products (incl. QA/QC) and links to other data centres	CNRS	46
D2.3	Documentation of RT data transmission through AMDAR to the GTS & WIS	MF	46
D2.4	Model for Memorandum of Understanding between the RI and Airlines	AIRBUS	46

## Task 2.1 : Coordination with GMES for Real Time Data Provision

Deliverable(s)	D2.1: Documentation of IAGOS-NRT products for provision to GMES (CNRS/M46)
Milestone(s)	M2.1.1: Review of NRT-data transfer between data centres (CNRS/M24)
Status	M2.1.1 was delivered last year D2.1 is on track.
Achievements	<i>The Reception Station + Data Base + Web Interface are all set and have been able this summer to deliver NRT data from the Lufthansa aircraft (D-AIGT) to CNRS</i>
Deviations from Contract	None

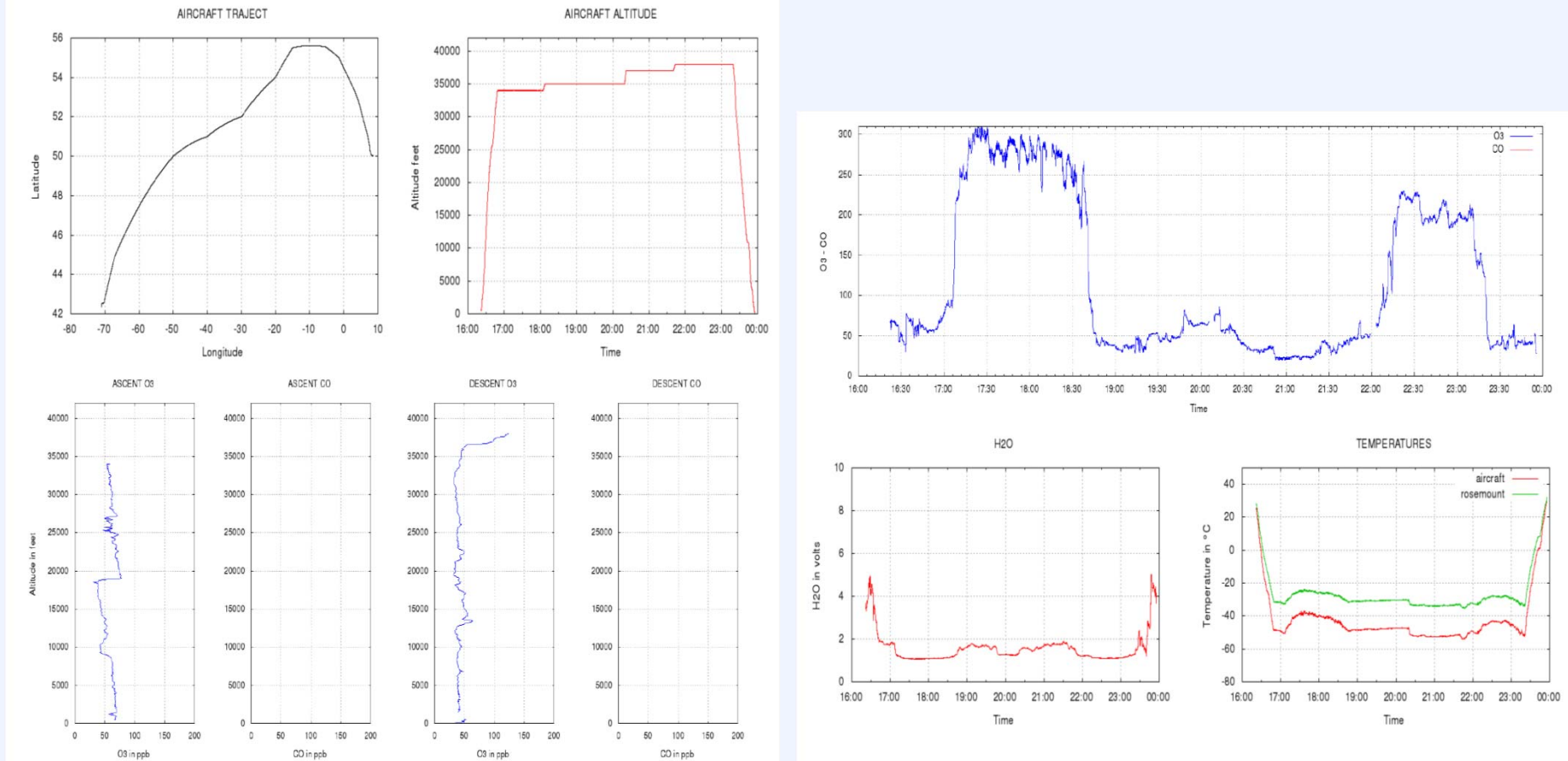
# Summary (done Y3)

- *Reception station, data base and web interface are operational.*
- *Status of NRT data processing operations during summer 2011:*
  - *Quicklooks are produced in NRT*
  - *Problems with O3 & CO analysers in Package 1 onboard Lufthansa aircraft, as revealed by preliminary comparisons with MOZAIC*
  - *Tools for NRT data processing are in progress (removal of outlaws, noise filter, calibration corrections, ...).*
- *These data stream might be used pre-operationally, before availability of RT data on the GTS.*
- *Data format: ASCII or NetCdf, plus BUFR (encoding software provided by Météo-F) for vertical profiles*
- *Metadata definitions are in progress*

# NRT IAGOS data transmission

## Quicklook for flight Frankfurt – Boston on July 16, 2011

Flight: 2011071616213403 16/07/2011 16:21:34 - 23:55:46 FRANKFURT - BOSTON



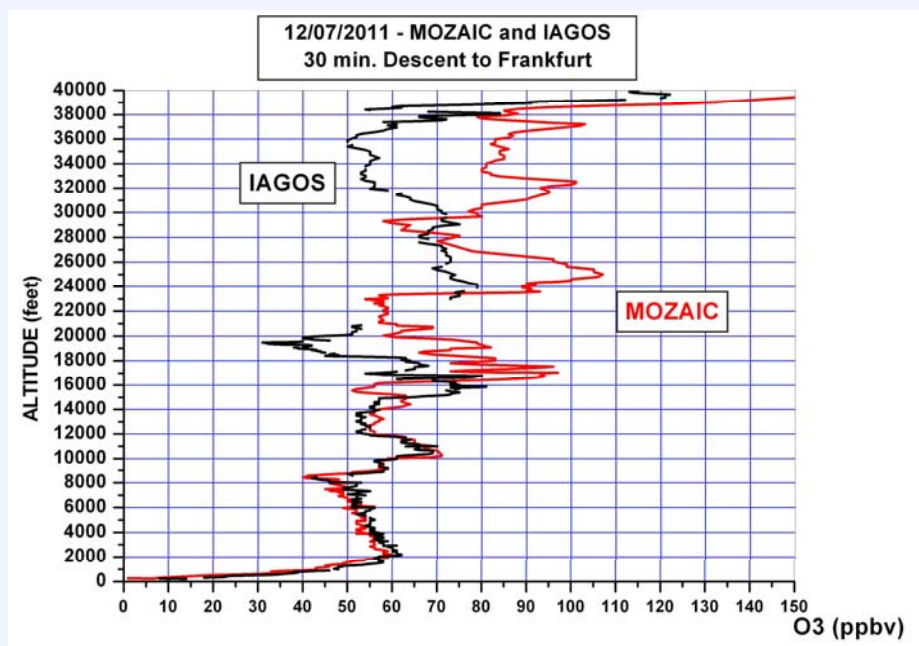
Jean-Pierre Cammas, WP-2

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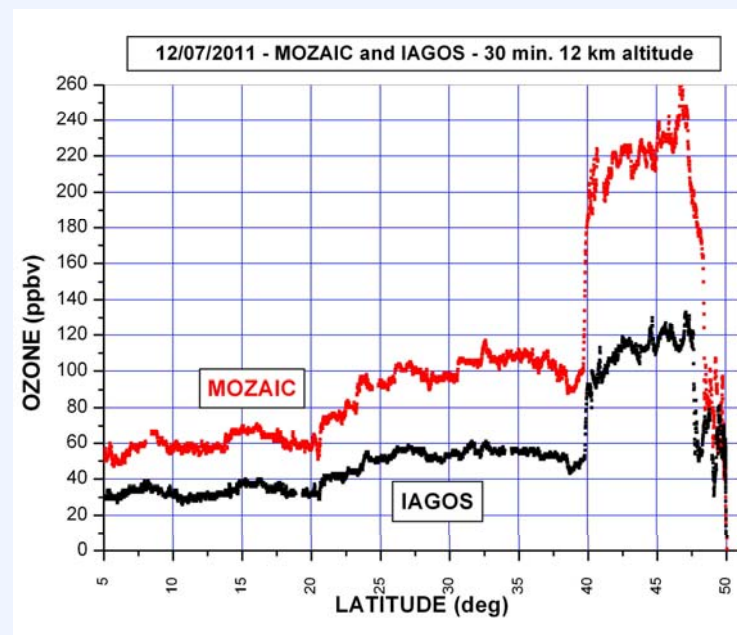
# Preliminary comparisons for NRT data

## IAGOS / MOZAIC

### Vertical profile



### Latitude time series



## Provision of data from the RI to National Meteorological Centres and GMES centres (**Météo-France**)

- *Short presentation of IAGOS real-time data at MACC Second General Assembly 18-22 October 2010 (In Situ data Acquisition)*
- *a set of MOZAIC data (March 2009) was provided to ECMWF for data assimilation experiments (March 2011)*
  - *Data provided with IAGOS BUFR encoding (3 11 011), with packing of data*
  - *2 data sets : raw MOZAIC observations and ascent/descent profiles in 40 characteristic levels as to be processed on board for the Real-Time IAGOS reports.*

# Summary (To be done Y4)

- *Solve the problems with O3 & CO analysers in Package 1*
- *Finalize the tools for NRT data processing (including QA/QC)*
- *Automate the provision of NRT data to other data centres, e.g. MACC-2 (EU FP7, GMES), see M2.2.2 (Review of links to other data centres)*
- *Finalize the documentation to the users*

# Deviations from Annex I

- *None*

## Use of Resources

- *Man.month:*
  - **CNRS: 6**
  - **Météo-France: 3**
  - **FZJ:**
  - **WMO:**

## Task 2.1 : Coordination with GMES for Real Time Data Provision

Deliverable(s)	D2.1: Documentation of IAGOS-NRT products for provision to GMES(CNRS/M46)
Milestone(s)	<b>M2.1.2: Review of use of WIS for optimal RT-data flow (CNRS/M36)</b>
Status	<b>M2.1.2 is on track</b> M2.1.2 may need additional work, depends on where to put the borderline between M2.1.2 and M2.3.2 (Adaptation of RT data transmission to WIS). Needs to be clarify (MF, WMO, CNRS).
Achievements	IAGOS BUFR template submitted by MF to the Expert Team on data Data Representation & Codes (WMO) ; now tested with real observations
Deviations from Contract	M2.1.2 proposed to be postponed to M48

# The WMO Information System (WIS): pillar of the WMO strategy for managing and moving weather, water and climate information in the 21st century.

- GTS is the real time network of WIS (WMO Information System)
  - National Meteorological and Hydrological Services + related centres (ECMWF, ...) are connected to GTS
- WIS will provide 2 fundamental types of services
  - **Data Discovery, Access and Retrieval service**: This service is based on request/reply “pull” mechanism with relevant data management functions; it would be implemented essentially through the internet.
  - **Timely delivery service for data and products**: This service is based on delayed mode “push” mechanism; it would be implemented through a combination of dedicated telecommunication means and of public data-communication networks, especially the internet.
- For these 2 new types of services, a wide variety of optional data representation formats will be available.
- Achievement done in IAGOS: IAGOS BUFR template submitted by MF to the Expert Team on data Data Representation & Codes (WMO) ; now tested with real observations
- Access (free, only delivery costs, TBC) for authorized users
  - See WIS web server : [http://www.wmo.ch/pages/proc/www/WIS/overview\\_en.html](http://www.wmo.ch/pages/proc/www/WIS/overview_en.html)

# Deviations from Annex I

M2.1.2 proposed to be postponed to M48, due to delay in RTTU definition & operation

## Use of Resources

- *Man.month:*
  - **CNRS: 0.2**
  - **Météo-France:**
  - **FZJ:**
  - **WMO:**

## Task 2.2 : Coordination with Research Users

Deliverable(s)	D2.2: Documentation of scientific database of the RI: Structure, data products (incl. QA/QC) and links to other data centres (CNRS/M46)
Milestone(s)	M2.2.1: Review of structure of the scientific database of the new RI (CNRS/M24)
Status	M2.2.1 was delivered last year D2.2 is on track
Achievements	The development of the scientific data base of the RI is all set. The core is the current MOZAIC data base developed by ETHER (french thematic pole for atmospheric chemistry, CNES & CNRS).
Deviations from Contract	None

## Data management structure of the scientific database of the RI (CNRS-LA)

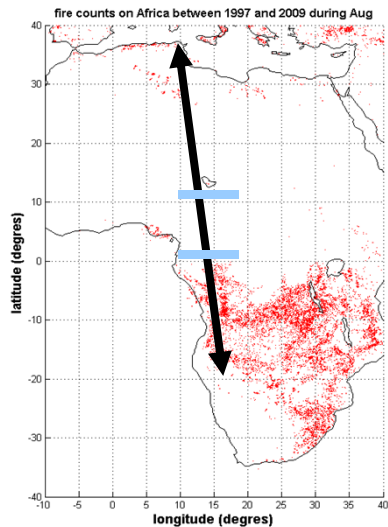
- o *Development of the structure of the data base:*
  - o *The IAGOS data base builds upon the MOZAIC DB (1994-2011)*
  - o *The data management structure is ready to accept new data from IAGOS instrumentation*
  - o *There is still some collaboration work to tackle with PIs of the new instrumentation (BCP, Packages 2c and 2d).*
- o *Strong support from ETHER (CNES & CNRS):*
  - o *Computer-scientist position for the DB: it has evolved from a temporary position (since 2005) to a permanent position (opened in October 2011)*
  - o *Program to inject added-value on IAGOS observations (based on ECMWF analyses): Height of the tropopause relative to the aircraft position, potential vorticity and air mass origins (Flexpart) along the aircraft path ...*
  - o *New program: Further quantify the sensitivity of IAGOS measurements (CO, NOx, ...) to anthropogenic emissions. Involves the coupling of the IAGOS DB with inventory emissions (ECCAD) and Flexpart lagrangian calculations. Will start on MOZAIC data. A 2-years temporary position for a research engineer is requested to develop the system. Proposal will be submitted to ETHER in October 2011.*

## Example of added-value on MOZAIC observations with lagrangian calculations for air mass origins:

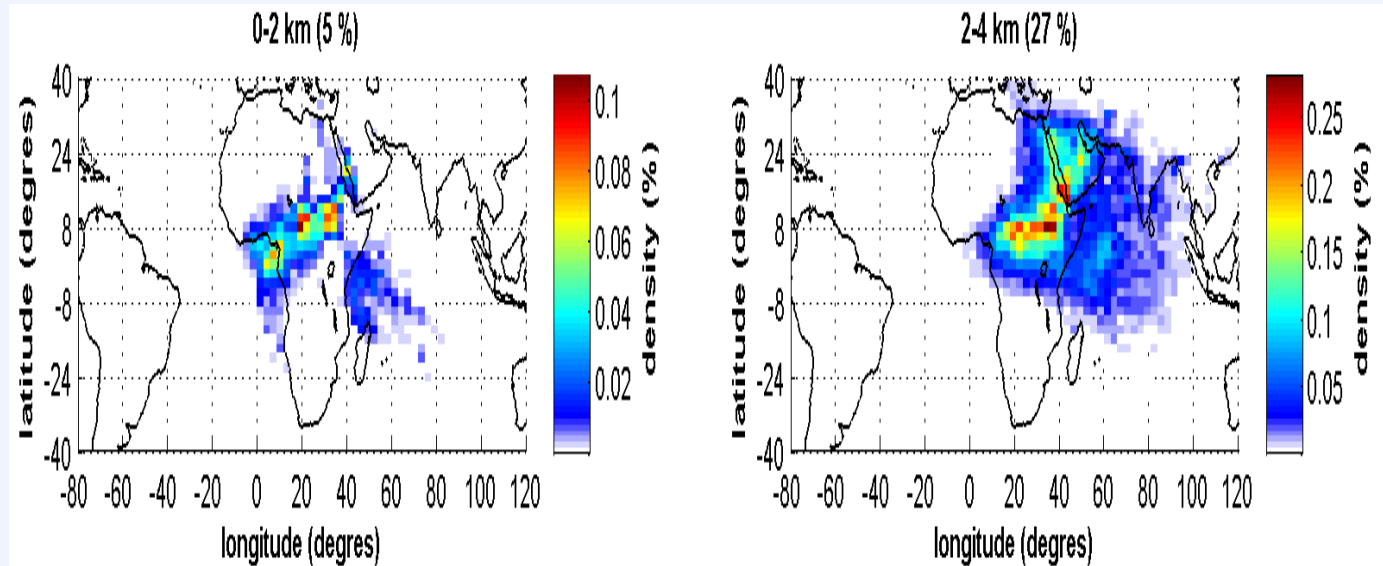
What is the domain of influence of biomass fire emissions on MOZAIC observations over Africa ?

Case of MOZAIC observations just north of the burned area (0-10°N latitude band) during austral winter (July-August-September)

Burned area (JAS)



PDFs of 10-days retro-plumes for MOZAIC observations (1994-2008) in the latitude band 0-10°N



# Deviations from Annex I

- *None*

## Use of Resources

- Man.months:
  - **CNRS: 5**
  - **CNES (ETHER):** *internal resources used for the development of the scientific data base, 1 full computer-scientist position (October 2005 – October 2011)*
  - **FZJ:**
  - **UCAM:**
  - **UMAN:**
  - **MPG:**
  - **IFT:**
  - **WMO:**
  - **DLR:**

## Task 2.2 : Coordination with Research Users

Deliverable(s)	D2.2: Documentation of scientific database of the RI: Structure, data products (incl. QA/QC) and links to other data centres (CNRS/M46)
Milestone(s)	<b>M2.2.2: Review of links to other data centres (CNRS/M36)</b>
Status	<b>M2.2.2 is on track</b>
Achievements	Links to other scientific data centres have been established
Deviations from Contract	None

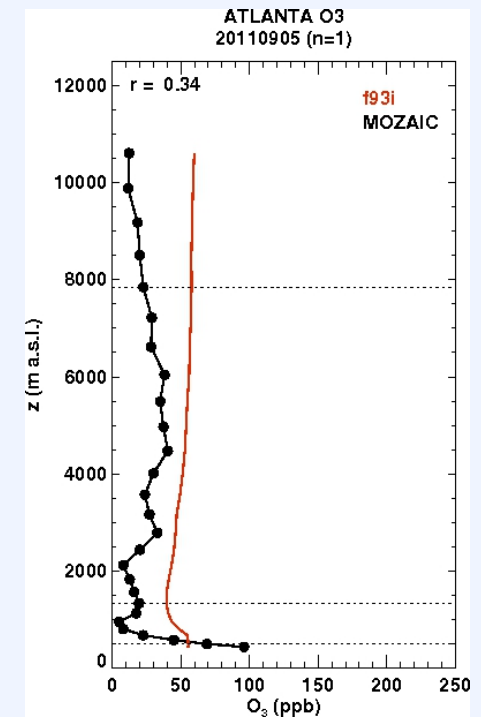
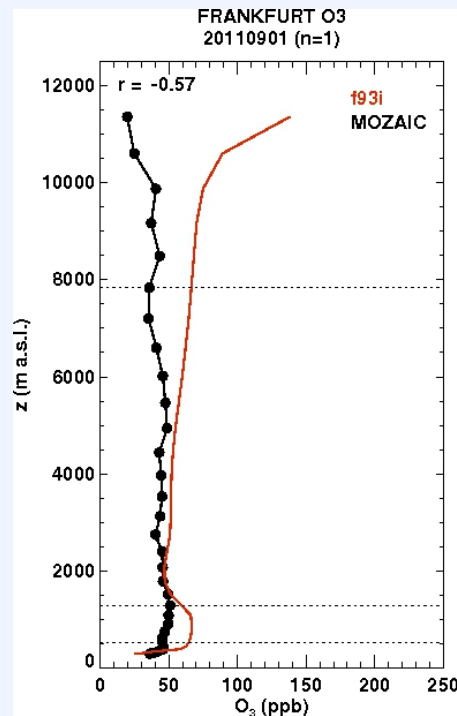
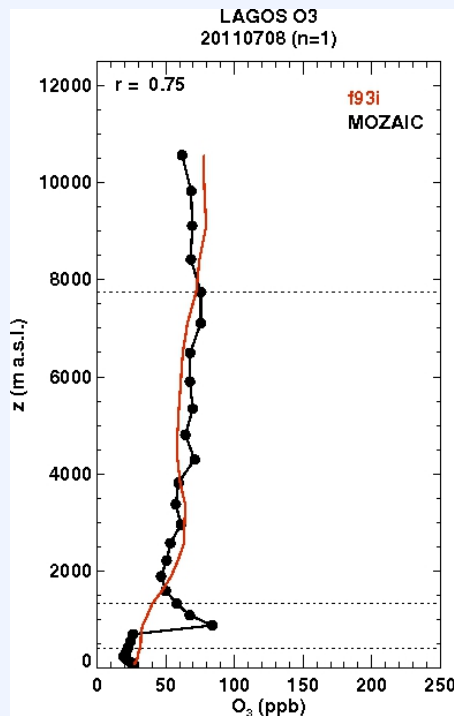
# Summary

## ***Collaborations are established with other projects and data base centres:***

- ***GMES: EU-FP7 MACC (2009-2011) and EU-FP7 MACC-2 (2011-2013)***
  - *CNRS & FZJ partners of MACC and MACC-2*
    - *Ordonez et al., 2010: High pollution event during the summer heat wave 2003*
    - *Elguindi et al., 2010: CO climatology and long range transport of biomass fires plumes*
  - *Preliminary NRT comparisons between IAGOS and MACC models: NRT pre-processed data are being used at CNRS to automate the routines for evaluation of GMES global models (MACC & MACC-2, EU FP7).*
  
- ***ESFRI: EU-FP7 ENVRI (Common operations of environmental research infrastructures)***
  - *A cluster of ESFRI environmental RIs with the objective to define an infrastructure environment bringing together the observatories, sensors, data, software and computational facilities at an appropriate integrated large scale.*
  - *Interest for IAGOS is in cross-discipline metadata approaches*
  - *IAGOS is invited to attend ENVRI project steering meetings*
  
- ***French ICOS-IAGOS partnership: GHG-OS project (GreenHouse Gases – Observing System, EQUIPEX-2011) submitted in September 2011***
  - *Use of airborne GHG measurements to investigate the errors in carbon mass flux calculations due to uncertainties in transport (vertical, horizontal long-range)*
  - *Budget for IAGOS equipment (Installation kit + P1 + P2d) for 1 aircraft based in Paris*
  
- ***Within IAGOS: CARIBIC***
  - *Data exchange for a comparison study of coincident data (A. Zahn, T. Schuck, P. Nédelec)*
  - *Next phase: Develop the interoperability between data bases (IGACO strategy for aircraft data implementation)*

# Preliminary comparisons for NRT data

## IAGOS / MACC



# Deviations from Annex I

- *None*

## Use of Resources

- Man.months:
  - **CNRS: 3**
  - **FZJ:**
  - **IFT:**

## Task 2.3 : Coordination with AMDAR for Real Time Data Transmission

Deliverable(s)	D2.3: Documentation of RT-data transmission through AMDAR to the GTS & WIS (MF/M46)
Milestone(s)	M2.3.1: Review of implementation of RT data transmission in E-AMDAR (MF/M36)
Status	D2.3 and M2.3.1 are on track.
Achievements	Cooperation agreement with EUMETNET for use of E-ADAS IAGOS test BUFR files defined and distributed. Involvement of Météo-France Operations in data transmission
Deviations from Contract	None

# Summary (done Y3)

- *The general status of the IAGOS-ERI project and the status of the real-time data transmission was presented at the WMO 13<sup>th</sup> AMDAR Panel meeting, Genève, 5-8.10.2010.*
- *Submission of a cooperation between IAGOS-ERI and EUMETNET to the EUMETNET General Assembly (9-10 of May, 2011) : ACCEPTED*
  - *By Météo-France Director, with mandate by IAGOS-ERI*
  - *For the use of E-ADAS for real-time transmission and processing of IAGOS reports*
  - *Preparation and operational costs to be paid by IAGOS*
  - *Real-Time data to be made available on the GTS*
- *A new set of IAGOS test profiles was defined :*
  - *6 IAGOS and 1 MOZAIC aircraft configurations defined (P1 alone, P1+P2a, ...)*
  - *Data from all sensors simulated*
  - *Data available in TEXT, IRF (binary IAGOS Report Format), and BUFR available.*
  - *BUFR data use only template 3 11 011, and not 3 11 012 (loop on 3 11 011, not accepted by WMO).*
- *Tests were made at Météo-France Operations for sending and archiving IAGOS reports using the new IAGOS BUFR template (Dec. 2010).*
- *New set of IAGOS test profiles sent to E-ADAS and CGP (August 2011).*

# Summary (to be done Y4)

- *Formal request by Météo-France for tests on IAGOS BUFR data at European Meteorological Services, assistance for tests.*
- *Complete definition of data transmission between DLH ground segment and E-ADAS (within contract with company ATMOSPHERE, WP 4.1)*
- *Update of E-ADAS for IAGOS data reception, processing and release on the GTS (contracted to CGP by FZJ)*
- *Test of IAGOS BUFR data reception and decoding at Météo-France Operations.*
- *End-to-End test of data transmission from the DLH aircraft to E-ADAS (within contract with company ATMOSPHERE, WP 4.1).*
- *Attend to AMDAR meetings.*

# Deviations from Annex I

- *No deviations from nominal schedule*

## Use of Resources

- Man.months:
  - **Météo-France: 7**
  - **CNRS: 0**
  - **WMO:**
  - **FZJ:**
  - **Airbus:**
- *Météo-France: additional internal resources used to contribute to the study on sending some environmental parameters inside the AMDAR report (ARINC 620 V5): reactive gases, greenhouse gases, aerosol observation for identification of volcanic ash .*

## Task 2.4 : Coordination with Airlines

Deliverable(s)	D2.4: Model for Memorandum of Understanding between the RI and Airlines (AIRBUS/M46)
Milestone(s)	M2.4.1: Review of legal status of aircraft platform of RI in foreign country (AIRBUS/M12) M2.4.2: Evaluation of risks for RI in collaborating with airlines (AIRBUS/M30)
Status	M2.4.1 delivered on M24 D2.4 and M2.4.2 are on track
Achievements	Risks for RI in collaborating with airlines are covered by the STC holder (SNT) and by MoUs/Contracts.
Deviations from Contract	M2.4.2 was postponed to M36 due to the late replacement of Airbus-UK by Airbus-F

# Evaluation of risks for RI in collaborating with airlines

- **For all aspects concerning the installation of the IAGOS Packages, the responsibilities have to be endorsed by the STC holder, i.e. Sabena Technics**
  - *Sabena Technics has all the agreements for applying the STC to Airbus A340 aircraft (EASA Part 21 J and G). Sabena Technics has indeed, once the STC is approved, to comply with the STC Holder Responsibilities as defined by the EASA [Ref.3]*
  - *CNRS has all the ownership of the study and can be considered as the STC owner.*
- **For all aspects concerning the operational use of IAGOS system, some risks may appear, e.g. for datalink costs recovery or maintenance of the IAGOS Packages.**
  - The contract or the Memorandum of Understanding between the airline and the RI shall clearly cover those financial or physical aspects.
  - Clause example in a MoU: The members of the IAGOS-ERI consortium agreement, represented by FZJ and CNRS, intend to reimburse THE AIRLINE for engineering labour costs for scheduled and unscheduled maintenance of the IAGOS instruments during the operational phase

*[Ref.3] COMMISSION REGULATION (EC) No 1702/2003 of 24 September 2003 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations;*

# Memorandum of Understanding

*The IAGOS MoUs will involve the airline and the owners of the STCs with regards to intellectual rights (CNRS and FZJ).*

*Questions:*

- Do the providers of the STCs with regard to aeronautical authorities (Sabena Technics, Lufthansa Technics) have to sign the MoU ?*
- Could the institutions (CNRS and FZJ) be replaced by the RI itself, depending on what legal status will be adopted (ERIC or international association) ?*

*MoUs in progress: Cathay Pacific, Air France, Iberia*

# Deviations from Annex I

- Due to the late replacement of Airbus-UK by Airbus-F:
  - M2.4.2 postponed to Month 36 and will be delivered

## Use of Resources

- *Man.months:*

*Airbus: 1 ?*

*CNRS: 1*

*Météo-France : 3*

*FZJ:*

*DLH:*

- *Météo-France:*

*meetings with Air France for Real Time data transmission*

*Study of Radio-communication equipments started.*