Annex:

Minutes of 1st IGAS-WP4-workshop (30-31 January 2013 in Jena, Germany)

WP4 meeting (Day 1: 30.January-2013-14:00-18:00)

Notes taken by Julia Marshall, Edited by Herman Smit

Attendees: Herman Smit (HS), Peter van Velthoven(PvV), Andreas Volz-Thomas (AVT), Christoph Gerbig (CG), Andreas Petzold (AP), Markus Hermann (MH), Armin Rauthe-Schoech (ARS), Damien Boulanger (DB), Bjoern Broetz (BB), Jim Butler (JB), Clemens Druee (CD), Julia Marshall (JM), Annette Filges (AF)

-adoption of the agenda (see Annex-1)

Implementation QA/QC different instruments in IAGOS

Quality Aeronautical parameter from aircraft system (e.g. P, T, Wind):

- discussion on (i) use of AMDAR-data to assess quality of aeronautical aeronautical parameter from passenger aircraft; (ii) in how far AMDAR data are available on all Lufthansa aircraft were
- CD could check if the data are available for MOZAIC measurements if he has the tail number of the aircraft and the time period of the measurements: ***AVT has e-mailed to CD this info to CD***
- CD mentioned that even getting the AMDAR data for 10-15 years of MOZAIC data would take something like six weeks, these giant files need to be unpacked from the DWD tape archive and the information extracted
- it seems that it's difficult to determine which sensor (serial number) is on which aircraft - Lufthansa doesn't have this information easily available
- discussion of the difference between the MOZAIC-measured temperature and the aircraft-measured temperature: there is a weak bias
- ARS mentioned that in the CARIBIC data they see occasionally (rarely) very large deviations in temperature measured by the CARIBIC vs. aircraft temperatures, but they think this is due to icing up of the sensor. This is a rare thing though, and not like the 2%-5% of anomalous temperature measurements that HS mentioned from early analysis of the MOZAIC temperature data
- temperature is particularly important for water vapour, pressure is expected to be pretty good (as good as is necessary), and no one really expects the wind to be so good
- CG asks about the positional data (latitude, longitude, altitude) - it seems that we get INS positional data, but there's a problem with GPS data at present
- we should get radar altitude (for first two kilometers) *and* GPS altitude in the database, but there's an (unknown) error in the GPS altitude at present, and it's missing

How to proceed on positional data and temperature data:

- in CARIBIC the aircraft often don't land right at the airport (a few kilometers): they correct the INS lat/lon by assuming a linear drift over the course of the flight
- DB says this isn't a problem with IAGOS data, it should be pretty close
- Does this mean that the positional data is from GPS and not INS? Is this what gaps in the lat/lon data is? Unclear.

>>Action #01: DB is going to check the location of the IAGOS data and that of airports, to see if this really isn't a problem. DB will prepare a factsheet about the lat/lon error distribution/uncertainty: < 15.March 2013

- CD says they never have only GPS, as the US maintains the right to turn this off
- altitude readings can be a mess (overlapping sections when they switch from one method to another)
- the pressure itself should be okay...

>>Action #02: HS will prepare template that summarize exactly what pressure, temperature, and positional data we get (for IAGOS-core and IAGOS-CARIBIC), then we can decide how to deal with this: **Info <15.March2013**

>> Action #03: Comparison temperature measurements made by A/C and CARIBIC or MOZAIC:
-MH will ask AZ about this, he's already done some tests of comparison of T measured by A/C and CARIBIC.
-HS will compare the temperature measurements they have made by different sensors (A/C and MOZAIC): **Report <1.May 2013**

Topic: Preparation of SOP's, Calibration Plan, Factsheets

-HS had sent around template, including terminology on metrology as used by WMO

-Terminology on metrology as used by WMO:

- accuracy vs. precision, CD mentioned systematic error (or bias) vs. random error, or precision and random error...
- are these the terms that we're going to use?
- avoiding "accuracy", because it implies we know the "true" value
- precision has to be specified also with respect to integration period of measurement/instrument that influences standard deviation of the measurement

-SOPs incl. fact sheet needs to describe the conditions under which the measurement is made: in-flight performance (incl. impact of sampling system):

- MH and ARS mentioned the importance of including the uncertainty under atmospheric conditions (possibly different from that which is measured during calibration in the laboratory)
- both laboratory calibration performance and airborne performance should be included
- AP suggests we define a list of terms/glossary that we adopt for use within the project, HS suggests that we use the list that he's already circulated...
- should there be a flagging - should there be a red, yellow, green flag? Or should suspicious data not be included in the database? If it's totally garbage it shouldn't be included, if it's just suspicious it could be included but with a suspicious flag...
- what to do with values below the detection limit? These should be included as is, even if negative it keeps the distributions "clean")
- there can be more than one kind of flag... This needs to be summarized in a document, if these data should be included during calibration (with a given flag), suspicious data (with another flag), etc...

Topic: Input for SOP document...

- data quality objectives.....:
  - should they be defined by the (biased and overly optimistic) instrument PI?
  - or should this come from GAW/SAG? From MACC-II?
  - best if you can refer to an official external document
  - points two and three are the most controversial points... The proposal mentions that we need to follow GAW recommendations, so if we don't we may have to explicitly argue why not.
  - we should all try to fill this out as is, if it turns out that many PIs have problems with section three, then we can rework it.

-theoretical precision should be in section 4 (measurement technique of inst-X), section 7 should have a fully transparent propagation of errors
-internal/external reviewers discussed, decided that for IAGOS-ERI/WP3.3-Deliverable only internal review necessary. At next WP4 meeting at IAGOS-ERI GA at Madrid in June 2013 the topic of external review of SOP's will be on the agenda.

-DLR still listed for aerosol instrument --> does this require an amendment? Answer: No not necessary.

Action #04: Preparation SOP's : **Internal Review< July 2013**

Action #05: Preparation of final delivery report of WP3.3 describing the QA/QC-concept of IAGOS (Lead: Smit,contributors: IAGOS-Instrument PI's **): < August 2013**

Task WP4.1:

Brief overview give by HS (Slides from Presentation: *Smit-IGAS-WP4-KickOff-Jena-Jan2013.ppt*)

Task WP4.2:

Overview presented by CG (Presentation: *IGAS_Task4.2_Gerbig.key.pdf*)

Topics discussed:

- should NRT data be destroyed after six months?
- discussion regarding delayed-mode vs. final data, and how these exist in the database (by version number, revision number, flags, levels...)
- version numbers seem that they would be by species... and there might be two versions, the preliminary data plus the "final" version that has seen the calibration and has been fully checked by the PI according to the SOP. This status would be indicated by the flag. For the data user there should be a static warning that data with a given flag are preliminary and might be changed, they should check back before publishing.

>> Action #06: Preparation of a document with guidance about the storage of IAGOS data, with flags, uncertainties, etc. To be prepared in Juelich (Lead: HS) and then circulated for feedback from others.

At end of the afternoon session a short discussion of matching parameters - consider looking at correlation statistics as a function of matching criteria. There should be more intercepts with IAGOS-core so the statistics will be more robust. The match parameters may have to be adjusted by species. Some discussion about where these computations should take place

WP4 meeting (Day 1: 31.January-2013-09:00-12:30)
Notes taken by Julia Marshall, Edited by Herman Smit
Attendees: Herman Smit (HS), Andreas Volz-Thomas (AVT), Christoph Gerbig (CG), Andreas Petzold (AP), Markus Hermann (MH), Armin Rauthe-Schoech (ARS), Damien Boulanger (DB), Julia Marshall (JM), Annette Filges (AF)

Task WP4.3:

Overview prepared by Valerie Thouret and presented by HS (Presentation: *IGAS_WP4-T43 (Thouret).ppt*)

Discussion on topics:

- discussion about matching parameters...
- set up broader matching parameters (wide matching in space, each PI can determine how tight the matching must be)
- perhaps different matching parameters for different species, and different for stratosphere/troposphere
- what is an "internal" comparison? perhaps the same species on any IAGOS aircraft (core or CARIBIC)? or only IAGOS-core/IAGOS-core?
- when should back-trajectories be included?

-clarifying what goes in task 4.3 (internal consistency) and 4.4 (external consistency)... 4.3: only flight tracks and data from within IAGOS, 4.4 bringing in back-trajectories/air masses, and comparison with external data as well (other flight campaigns, etc.)

Task WP4.4:

Overview presented by ARS (Presentation: *RautheSchoech_IGAS_KickOffMeeting_WP4_Task_4.4.ppt*)

Discussion on topics:

- how to account for clouds (relevant for aerosols)? MH will take the matches given from the 4.4 back-trajectory matching tool, and then apply their own cloud-filtering tool on this smaller dataset
- a combination of forward and backward trajectories with IAGOS could be used to combine with any other external datasets (rather than calculating backward trajectories for external datasets, such as CONTRAIL)
- ARS wants to collect examples of NOAA/GMD, CONTRAIL & HALO/FALCON flight data to develop import routines
- action item: CG will provide examples of NOAA/GMD & CONTRAIL data, ARS will contact Bjoern to deal with HALO data, Hans Schlager will provide data from EUFAR, MH will contact Anthony Clark for aerosol data
- first step might be to ask for flight track data so they can look at potential matches, and then they can ask for specific data where there are matches afterwards
- need to restrict the data list somewhat... each PI needs to choose datasets they're interested in, and we'll have to restrict the list at some point, so perhaps one dataset for each species/data set (EUFAR might already be too much data)
- perhaps need to mark with the trajectory if there's a thermodynamic change (delta in potential temperature), there's a relevant paper that AP will send to ARS
- back-trajectories: it would be nice to have the same trajectories for CARIBIC and IAGOS, but PvV is already preparing nice particle dispersion data for CARIBIC, DB has to check

exactly what's going on in Toulouse for back-trajectories right now (what's in the database, what's available...)

Action #07: Who is doing what have been slightly changed. To avoid any misunderstandings Task leaders of WP4.3 and WP4.4 should harmonise the content of boths tasks **(< 01 March 2013).**

Any Other Business

WP4-Meetings:

1. WP4-Meeting at IAGOS-ERI at Madrid in June 2013
2. WP4-Workshop (0.5-1day) connected to IGAS-GA at Utrecht in November 2013
3. ..... Telecons in between when needed.....

E-mail List of IGAS-WP4 Participants:

Beswick, Karl	karl.beswick@manchester.ac.uk
Boulanger, Damien	damien.boulanger@aero.obs-mip.fr
Braathen, Geir	gbraathen@wmo.int
Gallagher, Martin	martin.gallagher@manchester.ac.uk
Gerbig, Christoph (Lead WP4.2)	cgerbig@bgc-jena.mpg.de
Hermann, Markus	hermann@tropos.de
Marshall, Julia	marshall@bgc-jena.mpg.de
Nédélec, Philippe	philippe.nedelec@aero.obs-mip.fr
Petzold, Andreas	a.petzold@fz-juelich.de
Pontaud, Marc	marc.pontaud@meteo.fr
Rauthe-Schöch, Armin (Lead WP4.4)	armin.rauthe-schoech@mpic.de
Rohs, Susanne	s.rohs@fz-juelich.de
Schlager, Hans	hans.schlager@dlr.de
Smit, Herman G.J. (Lead WP4)	h.smit@fz-juelich.de
Thouret, Valérie (Lead WP4.3)	valerie.thouret@aero.obs-mip.fr
Velthoven, Peter, van	velthove@knmi.nl
Volz-Thomas, Andreas	a.volz-thomas@fz-juelich.de
Zahn, Andreas	andreas.zahn@kit.edu
Ziereis, Helmut	helmut.ziereis@dlr.de

To all: Anybody forgotten on Maillist of IGAS-WP4??

Actions

Action #01: DB is going to check the location of the IAGOS data and that of airports, to see if this really isn't a problem. DB will prepare a factsheet about the lat/lon error distribution/uncertainty: < 15.March 2013

Action #02: Preparation of factsheets on performance of aeronatical system of A/C to measure:

a) Pressure
b) Temperature
c) Wind
d) Altitude
e) Geographical position (latititude and longitude)
f) GPS (lat., long., and alt.

Outline, first rough draft prepared by Smit (< 01 March 2013)
Preparation factsheets for IAGOS-Core (Incl. MOZAIC) and for IAGOS-CARIBIC
To be done by:

1. IAGOS-Core (Incl. MOZAIC): Lead=Smit & Nedelec
2. IAGOS-CARIBIC: Lead= Rauthe-Schöch

Time Table:

a) Version 1 by end of March 2013
b) Version 2 by End of April 2013
c) Documents to be discussed/approved in June at IAGOS-ERI-meeting at Madrid

Action #03 : Evaluation of performance of MOZAIC-T measurements made by A/C and FZJ (Lead Smit)

1. Analysis and preparation of evaluation report by End of April 2013
2. Distribution among IAGOS-PI's for comments etc in May 2013
3. Presenting and discussing results at IAGOS-ERI-Meeting in June at Madrid

Action #04: Preparation of SOP's for each IAGOS-Instrument by PI's

Time table:

1.) Each IAGOS-instrument PI is responsible to prepare his/her SOP-document (incl. Fact sheet)
2.) Draft SOP-document for one IAGOS-Instrument prepared by FZJ will be distributed among IAGOS-Inst-PI's: < 01. March 2013
3.) Preparation of first version SOP : < 15 April 2013
4.) Internal review of SOP-V1: < 15 May 2013
5.) Preparation of second version SOP: < 01 June 2013
6.) SOP-V2 reports will be put at IGAS-WP4 internal web page for IAGOS-Inst PI's < 01.June 2013
7.) Progress made on SOP-V2 reports to be discussed at IAGOS-ERI meeting at Madrid

Parallel: Factsheets V1 as submitted just before IGAS-kick off meeting will be sorted out and give guidelines to harmonise the different factsheets (Lead: Smit + Hermann)

List of IAGOS-Instrument-Observations , their PI's, Internal experts to review the draft SOP documents, incl. Fact sheets.

Instrument	PI	SOP	Internal Experts	Comments
I-Core-O3-UV	Nedelec		Zahn?	HS will ask AZ
I-Core-CO-IR	Nedelec		Gerbig	
I-Core-RH/T	Smit		Zahn?	HS will ask AZ
I-Core-BCP	Gallagher		Petzold	
I-Core-Aerosol-A/B	Petzold		Wiedensohler?/Hermann	AP will ask AW
I-Core-CO2-CRDS	Gerbig	One out of 4	Rauthe-Schöch	
I-Core-CH4-CRDS	Gerbig		Rauthe-Schöch	
I-Core-CO-CRDS	Gerbig		Rauthe-Schöch	
I-Core-H2O-CRDS	Gerbig		Smit	
I-Core-NOX/NOY-CL	Volz-Thomas		Ziereis	
I-Carb-O3-UV	Zahn		Smit	
I-Carb-O3-CL	Zahn		Smit	
I-Carb-H2O-CR2	Zahn		Smit	
I-Carb-H2O-PAS	Zahn		Smit	
I-Carb-CO-RF	Rauthe-Schöch		Gerbig	
I-Carb-CO2-WAS	Rauthe-Schöch		Gerbig	
I-Carb-CH4-WAS	Rauthe-Schöch		Gerbig	
I-Carb-Aerosols-A/B	Hermann		Wiedensohler?/Petzold	MH will ask AW
I-Carb-NOY	Schlager/Ziereis		Volz-Thomas	
I-Carb-VOC	*Zahn*		Volz-Thomas	

Action #05: Preparation of delivery report on WP3.3 describing the QA/QC-concept of IAGOS (Lead: Smit,contributors: IAGOS-Instrument PI's)
Time table: Draft of version V1 and V2 same time table as for individual SOP-reports

Action #06: Preparation of document „Guidelines to store IAGOS-measured data"

No general guidelines to store IAGOS-measured data exist up to now such that IGAS-WP4 should prepare this asap.
Preamble:

1. Each IAGOS-Instrument PI is responsible for the QA/QC for NRT, Delayed Mode and Final Data.
2. NRT-data is a subset of IAGOS-Core data that is put on the GTS/WIS data network, **but** only will be used by a selected group of data user like MACC. These data will be deleted after 6 months
3. Delayed mode data is non-validated (preliminary) data: Release in IAGOS data base < 1 Month after measurement: Status only temporary. Question: In how far these data can be accessed by Non-IAGOS data users??

4. Final Data has to be validated and approved by the IAGOS-Instrument PI < 12 Months after measurement. Validation traceable (i.e. in the SOP's)

Recommendations::

1.) Each stored IAGOS-measurement data point consists of:
   a) Measured value
   b) Overall Uncertainty
   c) Flag = Index number giving state of validation, reliabilty of measurement

Overall Uncertainty consist of contributions of calibration **and** in-flight performance (Incl. sampling)

Flag, i.e. index number giving:
- State of validation: Non-Validate = Delayed Mode (Preliminary) data or Validated = Final data
- Reliability: Best Quality, Limited Quality, Unqualified, No data available, Lower & Upper detection limit (definition required according ISO conventions)

Flag=Index value should follow logical selection criteria

2.) Each measured IAGOS-Component should have a version number like e.g V-2.1 which is linked to a look-up table or log-book like document describing the status, i.e. data revisions made
For example:
On IAGOS-Data Base website an overview table with all all measured components and their data version number, linked to log-book of

Time table of preparation of document „Guidelines to store IAGOS-measured data":

a) First draft version (V1) of document: < 1. April 2013 prepared by Smit
b) Distributed among IAGOS-Core & CARIBIC PI's for comments, additions & suggestions (April 2013)
c) Second draft version (V2): <20 May 2013 edited by Smit
d) Distributed among IAGOS-Core & CARIBIC PI's for comments, additions & suggestions (< 20 May 2013)
e) Completion of Final Version by beginning of June 2013 edited by Smit
f) Approval at IAGOS-ERI meeting at Madrid (June 2013)

Action #07: Who is doing what have been slightly changed. To avoid any misunderstandings Task leaders of WP4.3 and WP4.4 should harmonise the content of boths tasks **(< 01 March 2013).**

Action #08: Preparation of a report describing the QA/QC concept of WP4 (=Deliverable 4.1). Lead: Smit and contributions by WP4-task leaders **(Draft < 1.November 2013 ; Final < 1.December)**

Additional to be done before first WP4-workshop in November 2013::

WP4.3:

a.) Preparation (automatic) tool(s)
b.) Flagging the cases of concidence in time of flight-tracks or airports for MOZAIC and IAGOS-Core
c.) Instrument-PI's should then analyse the flagged cases to test the performance of their instrument on internal consistency (e.g. precision , bias??)

Valerie/Damien: Please update!!

WP4.4:

a.) Preparation (automatic) tool(s)

b.) Statistical overview of number of scores as a function of the criteria of coincidence in time and space for MOZAIC and IAGOS (Core+CARIBIC)

Armin/Markus: Please update!

Annex-1

Agenda 1st WP4-workshop (30-31 January 2013 in Jena, Germany)

At 30.01.2013:

13:45-15:15 -Adoption of Agenda and Julia Marshall as Rapporteur
-Implementation QA/QC different instruments in IAGOS (90 min)
- Implementation plan
- Preparation of SOP's, Calibration Plan, Factsheets: Comments by each WP4-PI
- External experts from GAW/SAG's or else: Select candidates?
- Quality Aeronautical parameter from aircraft system (e.g. P, T, Wind): > Setting up workgroup to address QA-Aeronautical parameters ??

15:45-17:45 -Continuation of Implementation QA/QC IAGOS-instruments.
-QA/QC-evaluation of IAGOS Measurements (2x60 min)
-Task 4.1: Coordination & overall QA/QC-evaluation (Herman Smit)
-Task 4.2: QA/QC procedure and its traceability (Christoph Gerbig)

At 31.01.2013:

09:00-10:30 Consistency-Testing of IAGOS Measurements (2x45 min)
-Task 4.3: Evaluation of measurements on Internal consistency (Valerie Thouret)
-Task 4.4: Evaluation of measurements on External consistency (Armin Rauthe-Schöch)
-Quality of Forward-and Backward Trajectories

11:00-12:15 Concluding Discussion (75 min)
-What to be done ?
-Who will be doing what?

Annex-2

Template for Standard Operating Procedures (SOPs) for IAGOS-measurement of atmospheric component X by instrument Inst

1 Introduction

2 Rationale and Objectives:
Why X-measurements?

3 Data Quality Objectives for Inst-X Measurements
How accurate X-measurements has to be to achieve certain scientific objectives?

4 Measurement Technique of Inst-X
Typical performance characteristics: Estimation of uncertainities

5 Measurement Setup
4.1. Location and installation requirements
4.2. Air inlet design

6 Primary standards for Inst-X
6.1. Central Calibration Laboratory (CCL) (role, activity and needs)
6.2. World Calibration Centre (WCC) (role, structure, activity and needs)

7 Quality Assurance and Quality Control
7.1. Measurement and measurement protocol (quality checks, pressure, leak checks a.s.o.)
7.2. Corrective actions (e.g. facing possible interferences, a.s.o.)
7.3. Calibration (procedure, time interval, recommended concentration range)
7.4. Audit procedures
7.5. Measurement uncertainties
(incl. analysis of the propagation of different instrumental uncertainty sources into overal uncertainty)

8 Data Management
8.1. Data evaluation, flagging and control
8.2. Metadata and ancillary data
8.3. Data archiving and data submission
8.4. Data revision

9 Outlook

References

Annex I Fact-sheet of Instr-Xi
Annex II Abbreviations and acronyms
Annex III Terms and definitions
Annex IV List of contributors

Info-sites:
GAW-Reports:: *http://www.wmo.int/pages/prog/arep/gaw/gaw-reports.html*

Glossary on QA/QC terms:: http://gaw.empa.ch/glossary/glossary.html