BUNIAACIC kickoff meeting, INPA, Manaus, Brazil

15th – 17th February, 2012

Final agenda

Wednesday 15th February		
13:00 – 13:30	Welcome and Introduction to BUNIAACIC	Gordon McFiggans (Manchester)
13:30 – 14:15	Welcome to Brazil / Overview of LBA research / FAPESP perspectives. ATTO, Synergy between LBA and UK projects.	Paulo Artaxo (São Paulo / FAPESP). Antonio Manzi (INPA)
14:15 – 14:45	Perspectives from NCAS and NERC	Ally Lewis (NCAS)
14:45 – 15:15	Coffee	
15:15 – 16:00	Projects with funded UK involvement: SAMBBA	Jim Haywood (Met Office), Karla Longo (INPE), James Allan (Manchester)
16:00 – 16:40	Projects with funded UK involvement: CLAIRE-UK	Nick Hewitt (Lancaster), Eiko Nemitz (CEH, Edinburgh)
16:40 – 17:00	Ongoing UK research: Remote sensing	Michael Barkley (Leicester)
17:00 – 17:20	Ongoing Brazilian research: Rainwater composition.	Adriana Gioda (PUC Rio de Janeiro)
17:20 – 17:40	Ongoing Brazilian research: FAPESP AEROCLIMA and GoAmazon2014.	Paulo Artaxo (USP)
17:40 – 18:00	Other potential UK interests: Leicester PTR-MS OVOC measurements	Iain White (Leicester)
18:00 – 18:20	Other potential UK interests: Leeds FAGE LIF measurements.	Lisa Whalley (Leeds)
19:30 –	Dinner and discussion	
Thursday 16th February		
08:00 – 17:00	Site visit – ZF2 site and Embrapa. Pick up from hotel.	Whole team
19:30 –	Dinner and discussion	
Friday 17th February		
08:30 – 09:30	Discussion from site visit. Opportunities for pump-priming deployment in 2013	
09:30 – 10:00	Practicalities (shipping, CNPq scientific licence)	Paulo Artaxo
10:00 – 12:00	White paper preparation: Formulating a strategy for ongoing UK-Brazilian collaboration in Amazonian atmospheric research (break for coffee 10:30)	
12:00 – 13:00	Close, lunch and / or transfer to airport	

Brief Summary Notes of Presentations

Important: Note here that the following presentation commentaries are very subjectively reported simply as the meeting notes taken during the presentations. Please refer directly to the presentations for more accurate and comprehensive details.

Gordon McFiggans: provided an introduction to BUNIAACIC trying to "administratively" integrate the various proposed activities. This presentation is available as BUNIAACIC_GMcF_intro_15_2_12_short.ppt

Paulo Artaxo: Presented a scientifically integrative overview of atmospheric research activities within the various historical and current frameworks, in particular that of the ongoing AEROCLIMA initiative etc... covering both biogenic & BB aerosol in Amazonia & Pantanal. 3 presentations are available as "AEROCLIMA Presentation CLIAMB Feb 2012.pdf", "GoAmazon2014 Overview BUNIAACIC Feb 2012.pdf" and "GoAmazon2014 Overview CLIAMB INPA 15 Feb 2012 Artaxo Scot Martin.pdf"

It was stressed how the Amazon is a natural reactor in a biogenic system that controls the climate. Including PBAP

GoAmazon has been approved by 2014 w 20M of US money - focusing on i) C cycle and ii) Aerosol Life cycle, iii) Cloud life cycle and iv) Cloud-Aerosol-Precip Interactions (fx on deep convective clouds incl on lightning) - energy, carbon and chemical flows in Basin as urbanisation progresses

2 upwind sites, (ZF2 (AMAZE site - 100km north) & ATTO - 150km north) and 3 sites downtown Manaus, 1 local downwind, 2 more remote downwind and downriver. Ability to study sectorised pristine & Manaus influenced airmasses.

NB high-S power plants in Manaus, travelling 100 km+ thru pristine forest. Sample by transecting Manaus plume repeatedly.

For GoAmazon AAF Ops (G1), 40 days each in wet & dry seasons AMS, aerosol measurements, cloud probes, ARM facility, aerosol "chemical" container with various comprehensive instruments (note HTDMA & CCNc etc, but no AMS - just ACSM). 2014 to be extended to 2015 for long-term interannual variability) at the SW sites (Manaus plume)

There will be an AEROCLIMA deployment at Porto Velho during SAMBBA.

3 towers in the ZF2 site we're going to see tomorrow, 35 to 50 m. Fully instrumented. EMBRAPA site for LIDAR is fine, but close to road and is contaminated.

Manaus exhibits much lower seasonality in AOD; Rondonia (Porto Velho) shows much greater changes - also in BC (up to 20 mug/m3) and in neph measured scattering and MAAP measured absorption (though there is a contribution from wet season coarse biologicals - NOTE: making the single scattering albedo lower than in BB plume)

Manaus: O_3 10-15 ppb in wet season, up to 50 ppb in dry season - up to 80 in Porto Velho

Very high aerosol forcing across Amazonia during BB season. Note cloud fraction increases from 0.2 to a max of 0.6 with AOT then decreases (Koren et al, 2008). Huge effect on the forest photosynthesis and hence on CO2 drawdown.

300 m tower @ the ATTO site - very remote site, to start operation next week.

Will CLAIRE and GoAmazon be contemporaneous / collocated??? GoAmazon, preliminary activities ongoing from 2012.

Note: K34 walk-up tower (54 m) but no container, canopy 35 m. TT34 triangular tower (40 m) plus container

Ally Lewis: Presented an overview of UK NERC interests in Amazonian research. Firstly outlining the administrative and thematic structure of NERC, the overall research activity and centre interests were illustrated. The forthcoming theme action investigating Biodiversity and Ecosystem Services in Human-Modified Tropical Forests was discussed. The focus on biodiversity and primarily on Sabah deployments was highlighted, but an indication of Amazonian interests was indicated. The presentation is available as: "Ally Lewis_INPA.ppt"

Note we need a definitive plan for collaborative arrangements to present to NERC as an outcome of the meeting - as well as the obvious requirement for a definitive instrument deployment plan.

In addition, York interests in various GCxGCxMS, CLD & low energy trace gas sensors, and involvement in SAMBBA, was presented.

Jim Haywood: Presented SAMBBA from Met Office, NERC & Brazilian perspectives. The presentation is available as "SAMBBA The South American Biomass Burning Analysis 2011_BUNIAACIC_jmh.pdf"

i) Met Office - BB aerosols exerting signif radiative impact, beyond TOA forcing. To get the required seasonal and regional behaviour need to get dust, SS and BB aerosol prognostic instead of climatological (and previously just land-sea mask!) UM has a mean bias averaged across AMMA of +56 Wm-2 with even higher variability. NB MODIS shows average AOD in Sept of >1 across Amazon - huge.

ii) NERC - Reg & global climate, biosphere C cycle interactions, NWP improvement (clouds embedded in BB plumes), AQ

iii) INPE-MO MOU underpinning model development of BB emissions, INPE has included Freitas plumerise scheme incorporating CLASSIC in HadGEM2. INPE has operational tools for aircraft deployment optimisation (CATT-BRAMS: http://meioambiente.cptec.inpe.br - this is a coupled met-chem model)

Need plume injection height from the plume rise model.

Eiko Nemitz: Presented the CLAIRE-UK project. Envisaged as a collaborative initiative led by CEH and Lancaster to participate in 2 intensives at the ATTO site with some long-term flux deployment. The delay in the start date because of logistical considerations has caused a need to re-think the strategy. The presentation is available as: "CLAIRE-UK_intro.pdf"

The primary objectives of CLAIRE-UK were expressed as:

1.Quantifying above-canopy fluxes and within- canopy concentrations of primary bVOCs and selected gas-phase oxidation products

2.To detect and quantify the formation of bSOA and primary biological aerosol through flux measurements at the canopy scale;

3.Studying nitrogen cycling by measuring concentrations and fluxes of inorganic reactive trace gases and aerosols and the strategy to address them by the proposed workplan was presented.

Michael Barkley: Presented an overview of Amazonian atmospheric composition remote sensing activities carried out in the UK and combination with model studies. Various instruments discussed. Strong focus on HCHO, but also including CH4, LAI, LST and pyroconvection thru' FRP The presentation is available as: "Observing the Amazon from Space a UK Perspective Brazil2012_barkley.pdf"

Retrievals simpler near equator and from big sources, but difficult where there are clouds.

Limb gives vertical structure whereas Nadir gives just column density. GOME & SCHIAMACHY both long-term time series. NCEO - Leicester, RAL, Oxford & York all picking up many different species. All groups more than happy to provide the data.

Michael's interest is mainly isoprene (mapped using HCHO) - question (GMcF): why is HCHO considered unique for isoprene?

Wet season moderate, transition lowest and dry season high HCHO column. In transition, this corresponds to a zero isoprene emission level.

Use nested-grid GEOS-Chem to characterise isoprene emissions (3-schemes to test the inversions) - has difficulty in the Amazon, low NOx, difficult OH, can't get from emissions to concentrations easily.

Could benefit from HCHO in situ validation of satellite obs - requirement for long-term MAX-DOAS obs???

Other things that can be done from EO:

Estimating pyro-convection from fire radiative power,

CH4 & CO retrievals from TANSO on GOSAT

Land surface temperature (LST) from AATSR on ENVISAT - to drive uncoupled land-surface models or constraincoupled land-surface models

Detection of vegetation stress arising from hydrocarbon seepage???

Adriana Gioda: Presented Amazonian rainwater composition (trace metals, ions and organic compounds) studied at various Amazonian sampling locations. The presentation is available as "Ongoing Brazilian research Rainwater composition Adriana Gioda BUNIAACIC_Giodab.pdf"

TOC plus inorganics - looking for source attribution. Manaus (160 samples, 2008-2010) vs Rio Branco (200, 2005-2010) - avg event 20 mm ish, max 109 mm, mean 31 max 170 mm

pH Manaus 4 - 6, Rio Branco 3 - >8, mostly 5-6, but 40% of events >6 at the latter. Conductivity higher also in the latter in general - more of both anions and cations. Manaus lots of NaCl with some NH4NO3. Rio Branco NH4NO3 mainly, some Mg and Cl with SO4 with lower NaCl. Basically reflects longer transit over land in North Easterlies.

Question (GMcF): How is there so much NaCl?

Water soluble carbon - TC, IC and TOC all similar between sites - (TOC>IC in both cases). Note that TC is 80% of the total soluble mass.

Major metals found are Al anthropogenic, Zn biogenic?

Ian White: PTR-VOC measurements

CIRMS: A PTR-ToF in reality using Americium to give a low LoD.

Led through to discussion of results from the ACES experiments. Presentation available as "BUNIAACICIW PTR-MS OVOC .pdf".

Lisa Whalley: Discussed the FAGE OH, HO2 and OH lifetime measurements. Presenting the conundrum of the missing OH sources and sinks as diagnosed from the recent tropical measurements. Obvious interests in repeating the measurements in Amazonia. The presentation is available as "Leeds FAGE LIF measurements buniaacic_fage.pdf"

Site Discussion

SAMBBA:

Jim Haywood: Useful to see and find out about the instrumentational capability (including Doppler Raman lidar at Porto Velho) for coordination w SAMBBA flight planning: would be good to get coordinates of the stations. Noting that SAMBBA takes place in September 2012, no opportunities to coordinate w CLAIRE-UK.

Paulo: Coordinates in Paulo's presentation, .kml file to be sent. Note that importation takes time - planning essential. Porto Velho, no internet. Jim states not necessary.

CLAIRE-UK:

Nick: K34 tower long-term starting Jan 2013 (cannot ship before Sept 2012), possibly use ATTO for intensives if development proceeds favourably.

Eiko: Long-term K34 deployment critically reliant on personnel, internet, instrument housing (Wendy House?!) and on funding availability.

Paulo: concerns about viability of hitting scientific objectives because of the above resourcing, based on previous experience. Can it be done? Need to sort out the details of exact response to the resource limitations. Is K34 viable?

Eiko: What was written was 2-campaign plus PTR-MS long-term. Can the long-term PTR-MS be supplemented with other long-term measurements? Is the long-term operation viable at all?

Nick: MPI difficulties rule out ATTO.

Ann-Maria: running long-term PTR-MS operating at TT34 when all things working well, was visiting once every 4 days (notwithstanding power / internet problems / availability).

Lazlo: costing plan can be put together by the LBA office for logistics. There is the possibility of the "Science without frontiers" PhD studentships for local support.

Paulo: note that there are still difficulties with this local support and with the resourcing for internet connection etc…

Nick: not in position to make final decisions about the actual deployment until talk to personnel back home and establish the financial position and implications.

Eiko: AMS-sharing still potentially possible (timing of availability for BUNIAACIC deployment), but lots of considerations. Cannot compromise on objectives (e.g. for BUNIAACIC, must have AMS-ACSM intercomparison and contemporaneous AMS-HTDMA-CCNc measurements).

Possibility of using ACSM for long-term aerosol measurement alongside PTR-MS between the intensives when the HR-ToF-AMS is available

BUNIAACIC:

Cannot coordinate BUNIAACIC with SAMBBA - timing doesn't work. Coordination with CLAIRE-UK may be possible, but need to learn of the CLAIRE-UK planning decisions ASAP. Needs to fit in with the duration of the BUNIAACIC award (May 2014 end) and with the ACCACIA cruise (probably anytime after June 2013). NB Radioactive sources are better procured in Brazil by Paulo (well in advance). We also need to coordinate with the progress of GoAmazon 2014 by the time of our deployment (first container this summer / autumn 2012), should know the status of the DoE funded programmes by the time of the GoAmazon steering meeting in August 2012. Paulo will keep us informed.

NB studentship…

Logistical consideration discussion:

Shipping options - what to ship and what not to ship & procurement

Importation (from the LBA office, Roberta in charge) - inadvisable to import container, break the shipment into bite-size chunks - with realistic, but non-real (!) costings (storage fees depend on value). **Customs clearance takes 2 months ± 1 month in Manaus, if there are no problems**.

Sometimes customs clearance quicker in Sao Paulo, but importation will be handled by University of Sao Paulo, not LBA office.

***Payment for everything must be through APLBA - need to open an account with APLBA in advance. Accounts can be set up quickly - all payments must be made to APLBA in advance (need to sort this out in advance). All freight must be prepaid to avoid excess charges.

Logistics (from the LBA office, Ruth in charge) access to site, vehicles, transportation

Scientific authorisation: CNPq authorization required, takes about 3 months, lasts for 3 years (possibility of 1 year extension). Every researcher needs to sign a separate form. Paulo and myself need to fill in the science proposal for BUNIAACIC. Complete the CNPq authorization for BUNIAACIC & CLAIRE-UK together (from the LBA office, Erika in charge, along with all). Available electronically and in hard copy before we leave.

"White paper preparation" discussion: consolidating ideas for future collaboration

Vehicles for collaboration: Joint biodiversity / biogeochem cycles programme Brazilian component - recommendation should be for all projects to have a joint LBA & / or FAPESP funded partner

Aerosol-cloud interaction and / or EO (scale-up) validation (including of AC interaction):

UK advantages: Aerosol-cloud interaction developments would feed through ACID-PRUF in a common model framework (HadGEM2ES - possibility to move to HadGEM3). Through validated plume rise (BC, VOCs) etc… Similar developments for aerosol-cloud interaction (in the more pristine environment)

MetOffice would buy into it. Key developments brought by Brazilian researchers.

Biogenic pristine composition

Anthropogenic ("urban" emission) - effects on the background

Biomass burning - effects on the background

Possibly try Manaus deployment in and out of BB season - "does BB contribute more to AC interaction perturbations of pristine background than anthrop emission in the BB season?"

Is the aircraft the right vehicle - from an EO perspective would like HCHO, CHOCHO, O3 etc… of the molecular absorbers. What about AOD, r_{eff}, liquid water path. Need vertically resolved measurements - short-term better than none (seasonality preferred). What about ground-based remote sensing for seasonality, ground-truthed vs in situ intensive obs (lidar, MAX-DOAS)

The Amazon in Future Climates - perturbation games in ES models - plenty of UK expertise here

Airborne flux capability for NOx and VOCs (aerosol) on the Dornier - longer-term ambition

Flux scale-up requires this airborne intermediate scale.

(O)VOC deposition rate (not net deposition flux) needs to be resolved

Paulo:

Fast photochemistry including OH

Biology & atmospheric chemistry: (ties into the biodiversity joint call & other linkages)

genetic analyses of airborne material. FX on cloud microphys (e.g. ice nuclei)

Linkage between oxidant stressing and movement of airborne biological material

First week July for UK meeting - scale 20-30 people