FICHES INSTRUMENTS
SOP-Sol (hors océan)

Octobre 2004

Code	PI (Nom, E-Mel)	Labo and AMMA rep.	AMMA Period	Funding Source
code AS.BVC_T2	Ph.Drobinski and C.Basdevant	CETP, Alain Protat	06/2006	API

Description of the instrument. The constant volume ballon (CVB) drift with the air masses advected by the the southwesterly monsoon winds at a pre-set constant density level over the African continent.

Data provided to the AMMA data base. Trajectories and thermodynamical measurements: wind speed and direction, temperature, pressure and humidity.

Scientific team: Claude Basdevant (PI, IPSL/LMD), Philippe Drobinski (coordinator of the ballon deployment during AMMA, IPSL/SA)

Technical team Bernard Dartiguelongue (CNES) and Nicolas Verdier (CNES)

Scientific Objectives.

The CVB will be deployed during SOP-1 (monsoon onset) and will allow to address several scientific issues :

1) lagrangian trajectory and humidification of the monsoon (diurnal cycle)
2) modulation of the monsoon by the african easterly waves (maximum of perturbation at 700 hPa)
3) estimation of the monsoon penetration over the continent and determination of the monsoon onset
4) quantification of the performances of NCEP/ECMWF on the meteorological fields (wind speed and direction, pressure, temperature and moisture) in the AMMA region.
5) validation of research models (e.g. Méso-NH) for the understanding of the dynamical processes associated with the monsoon onset.
6) assimilation of the full thermodynamical dataset during SOP-1 in 3D-VAR MANDOPAS at th escale of western Africa. The objective is to compute water vapour budgets from the analyses of the full dataset (ground-based, airborne and satellite-borne measurements). The relevance of the CVB data must be addressed using simulations.

Observing Strategy

The CVB will be launched at a density level ranging between 1.07 and 1.03. At this time, three possible launching site are investigated (west of Ghana near the coast, Cotonou or Parakou in Benin). The best choice is west of Ghana and a prospection mission is envisaged before the end of the year. In case, there is no possible site in this area, the CVB would then be launched from either Cotonou or Djougou.

The sampling strategy will be mixed: half of the CVB will be launched regularly during SOP-1, in order to document the monsoon onset. The remaining half will be used to increase the sampling before and after the monsoon onset (the intensification of the sampling will rely on the monsoon onset prediction by numerical models at AOC).

Links with other instruments

The choice of the three possible sites was made so that the CVB fly over the instrumented meso-scale site (Djougou in particular). Most probably, CVB will be launched during the aircraft flights (the 2 Falcon carrying the lidars LEANDRE-2 and WIND, and the ATR-42 carrying in-sity sensors).

Operation and collaborations

AN AFRICAN CONTACT IS BEING SOUGHT TO FACILITATE THE CHOICE OF THE LAUNCHING SITE AND THE DEPLOYMENT OF THE CVB (AIR TRAFFIC CONTROL).

FINANCIAL PART

Budget CNES (Rough Orders of Magnitude Costs, CNES staff cost TBD):

2004 : mission de recherche de site (1 person CNES) > **3 k€ (**not accounted for in the 2004 budget**)**

2005 : Campagne préliminaire (4/5 aérostats ; 3/4 personnes ; 3 semaines)
aérostat (ballon + nacelle + gaz) : 7 k€ ; total > **30 k€**
mission (1 personne) : 4,5 k€ ; total > **18 k€**
transport (1 container maritime + frais de manutention) > **10 k€**

consommables : radiosondes… > **1 k€**
aléas (installation, aménagement du site ou pas…) > **10 k€**

Total CNES AMMA en 2005 : External expenses 59 k€, CNES Staff cost TBD

2006 : Campagne nominale (35 aérostats; 4 personnes; 6 semaines)
aérostat (ballon + nacelle + gaz) : 6 k€ ; total > **210 k€**
consommables : radiosondes… > **3 k€**
mission (1 personne) : 11 k€ ; total > **44 k€**
transport (envoi aérien + 1 container maritime + frais de manutention) > **15 k€**
aléas > **25 k€**

Total CNES AMMA en 2006 : 297 k€, CNES Staff cost TBD

Budget non CNES:
2004 : mission de recherche de site (PI scientifique, C. Basdevant) > **3 k€**

2005 : Campagne préliminaire
mission (PI scientifique, C. Basdevant) : 4,5 k€ ; total > **4,5 k€**

Total non CNES AMMA en 2005 : 4,5 k€

2006 : Campagne nominale (35 aérostats; 4 personnes; 6 semaines)
mission (PI scientifique, C. Basdevant) : 11 k€ ; total > **11 k€**

Total non CNES AMMA en 2006 : 11 k€

External costs, (CNES staff costs are TBD)

Year	2004	2005	2006
Mission	6 k€	22,5 k€	55 k€
Equipment		51 k€	253 k€
Total	6 k€	73,5 k€	308 k€

Code	**PI (Nom, E-Mel)**	**Labo and AMMA rep.**	**AMMA Period**	**Funding Source**
code AS.Drift_T1	Ph.Drobinski and J.L. Redelpserger	CETP, Alain Protat	08-09/2006	API NCAR CNES

Description of the instrument. The Stratospheric Balloon Driftsonde System, "SBDS", developed in cooperation by NCAR and CNES, drifts in the straosphere, carrying several dozens of dropsondes which are dropped either on command or at regular interval. It is planned to be operated during SOP-2/3.

Data provided to the AMMA data base. Vertical profiles of thermodynamical variables: wind speed and direction, temperature, pressure and humidity.

Scientific team: Jean-Luc Redelsperger (PI driftsonde, CNRM), Philippe Drobinski (coordinator of the ballon deployment during AMMA and PI driftsonde, IPSL/SA), Dave Parsons (PI driftsonde, NCAR)

Technical team Ph Cocquerez (management of CNES balloons for AMMA)), Stéphanie Venel (CNES), Nicolas Verdier (CNES), Hal Cole (NCAR)

Scientific Objectives.
The SBDS should be deployed during a continious period of about six weeks balanced beween SOP-2 (convection) and SOP-3 (cyclogenesis). It will allow to address several scientific issues :

7) complement the radiosounding network in regions void of measurements
8) impact of the assimilation of the dropsonde data
9) quantification of the performances of NCEP/ECMWF on the meteorological fields (wind speed and direction, pressure, temperature and moisture) in the AMMA region.
10) validation of research models (e.g. Méso-NH) for the understanding of the dynamical processes associated with convection and cyclogenesis.

Observing Strategy
- SOP2: up to 15 SBDS of two different types will be launched at a flight level of about 60/50 hPa from N'Djaména in Tchad, producing about 600 dropsoundings. Most of the dropsoundings, typically 500 will

be dedicated to the probing the African AMMA zone, the remaining ones will be done over the Altlantic Ocean for the study of hurricane genesis.

- SOP3: up to 10 SBDS will be lauched from the same location as for SOP-2, producing about 500 dropsoundings mainly for probing the cyclogenesis Atlantic zone.

Links with other instruments

There is no envisaged coordination with other instrumentation.

Operation and collaborations

It is envisaged to launch the SBDS from a French military base at N'Djaména (Chad), where we expect the ground infrastructure to be available. Prior to the launch campaign, flight authorizations will have to be obtained, and an agreement will have to be reached with the Air Traffic Control Authorities of the region. A support from the AMMA project management will be necessary for these agreements.

SBDS is jointly developped and will be jointly operated by CNES and NCAR (USA).

FINANCIAL PART

CNES budget (Rough Orders of Magnitude Costs):

2004 : none

2005 : External costs : **500k€**, CNES staff : **50k€**

2006 : External costs : **480k€**, CNES staff : **250k€**

NCAR budget : TBD

2004/2005/2006 : unknown

Budget non CNES :

2004 :

2005 : 1 coordination meeting at Toulouse (PI, P. Drobinski) : 1 k€ ; total > **0.5 k€**

2006 : Field campaign (1 person; 6 weeks)
mission (PI, P. Drobinski or J.L. Redelsperger) : 11 k€ ; total > **11 k€**

Fiche Instrument AMMA

Code	PI (Nom, E-Mel)	Labo and AMMA rep.	AMMA Period	Funding Source
AS.GPS_1	Olivier BOCK Olivier.Bock@aero.jussieu.fr Marie-Noelle BOUIN bouin@ensg.ing.fr	SA, O. Bock	2006	API

Description of the instrument. Ground-based GPS station network - SOP

Data provided to the AMMA data base. integrated water vapor in the atmosphere

Equipe scientifique et technique. (collab. with french labs : IGN, LDL et LGIT).

Scientific Objectives.

The GPS network for the SOP will complement the EOP network with (a) stations on the corners of the quadrilateral centered on Djougou for monitoring water budget fluctuations, (b) more stations in a larger domain which are intended to improve meteorological analyses through 3D/4Dvar assimilation (NB: Near real-time assimilation will not be possible during the SOP).

Observing Strategy.

Every GPS station provides raw data that must be transferred to the analysis center to produce precipitable water vapor and horizontal gradients with 30min - 1H time resolution (NB: products are integrated from the surface, at each GPS station).

In the framework of the EOP, 2 analysis centers are considered: one in Africa (e.g., at Niamey AOC) and one in France (at IGN). The timeliness of water vapor products depends on the communication links available : for the EOP, a maximum of +72H delay is planned. For the SOP, a +12H delay can be considered if the raw data are transferred to France via a satellite link. This would allow to use GPS precipitable water estimates for planning aircraft flights and for model forecast verification.

Links with other instruments.

Continuous IWV observations with GPS can be used for calibrating satellite humidity data and validating meteorological analyses/forecasts. The assimilation of GPS data is considered in post-processing (reanalysis).

WPs relying on the instrument: 1.1, 1.2, 2.1, 4.1

OPERATION and COLLABORATIONS

Deployment (site, dates, logistics).

Deployment is considered for 5 stations during SOP1,2,3. The final locations of sites will be decided after a first visit. The present proposal is :

(a) water-budget sub-net: Cotonou or Djougou or Parakou (depending on the site chosen for the EOP), Tamale (Ghana), Minna or Abuja or Ilorin (Nigeria) or possibly Zinder (Niger).

(b) meso-scale: Tombouctou and Ouagadougou (and possibly Bamako).

African Partners. national met. services (DMNs) and universities (presently identified for EOP)

Other.

FINANCAL PART

Acquisition / Upgrade / Jouvence: 20 K€ + 36 k€ (to share) =56 k€ (2005)
Required Ancillary Equipments: 0
Transport and installation on site : 17,5 K€ (2006)
Operation : 4 k€ + 4.8 k€ (comm. Satellite) = 8.8 k€ (2005)
Missions : 11.6 k€ (2005) + 47.8 k€ (2006)

Funding sources

API- France	2004	2005	2006	2007	2008
Autre source française		76,4	65,3		
NERC or other British source					
Other National Source					
IP Europe					
TOTAL	0	76,4	65,3	0	0

(k€)

Ref.: O. Bock, et al., " GPS Water Vapor Project associated to the ESCOMPTE Programme: Description and first results of the field experiment," Phys. Chem. Earth, 29, 149-157, 2004.

Details of the financial section

(in black = figures for equipment based on quotations and for missions based on AMMA-IP, in red=approx.)

1. Equipement : 20 K€ + telecom satellite link

(for 5 GPS stations)

- Receiver + antennae + PC (from INSU) :			0 k€
- Connectique (parafoudre…)	5 x 1 k€	=	5 k€
- Panneaux solaires + batteries :	5 x 3 k€	=	15 k€
- Satellite link equipment (Inmarsat) on some sites :	4 x 9 k€	=	36 k€

to **share (useful to other instrumentation)**

2. Required Ancillary Equipments : 0 k€

3. Transport and installation on site : 17,5 k€

- Onsite monumentation and installation:	5 x 2 k€	=	10 k€
- Transport of equipment on 5 sites:	5 x 1.5 k€	=	7.5 k€

4. Missions : 11.6 k€ (2005) + 47.8 k€ (2006)

1) Visit in 2005 (for 2 pers., 4 d./ site, 2 flights + onsite transportation) :

- Flights (Paris – Afrique) :	2 x 2 p. x 0.80 k€	=	6.4 k€
- Per diem:	4 x 2 p. x 4d x 0.1 k€/d	=	3.2 k€
- Local transportation:	1 vehicle for 15 d	=	2.0 k€

2) Installation of 5 stations (for 2 pers., 1 week / site) :

- Flights (Paris – Afrique) :	5 x 2 p. x 0.80 k€	=	8.0 k€
- Per diem:	5 x 2 p. x 7d x 0.1 k€/d	=	7.0 k€
- Local transportation:	5 x 1 vehicle for 7 d	=	5.0 k€

3) Maintenance visit combined with EOP (for 2 pers., 5 days / site, budget for 3 sites)

- Flights (Paris – Afrique) :	3 x 2 p. x 0.80 k€	=	4.8 k€
- Per diem:	3 x 2 p. x 5d x 0.1 k€/d	=	3.0 k€
- Local transportation:	3 x 1 vehicle for 5 d	=	3.0 k€

4) Unmounting of 5 sites (for 2 pers., 5 days / site)

- Flights (Paris – Afrique) :	5 x 2 p. x 0.80 k€	=	8.0 k€
- Per diem:	5 x 2 p. x 5d x 0.1 k€/d	=	5.0 k€
- Local transportation:	5 x 1 vehicle for 5 d	=	4.0 k€

5. Operations : 4 k€ + satellite communications

- Surveillance and daily maintenance of site, on the basis of salary for an engineer.			
	0.2 k€ / month x 4 months x 5 sites	=	4.0 k€
- Inmarsat satellite communications (for two stations):			
	4 x 10 €/day x 120 days	=	4,8 k€

Comments :

- The visit in 2005 might not necessitate to concern the 5 sites since some will be visited in 2004 through the EOP (e.g. Bamako, Tombouctou, Parakou/Djougou).
- The maintenance visit might be combined with a visit planned for the EOP at mid-year, therefore reducing its cost. This depends, however, on the final location of the SOP stations (NB : EOP stations planned at Cotonou, Niamey, Gao, and Conakry).

Fiche Instrument AMMA

Code	PI (Nom, E-Mel)	Labo and AMMA rep.	AMMA Period	Funding Source
AS.Ronsard_OG.Scialom Recherches sur Orages et Nuages par Système de Radar Doppler	Georges Scialom scialom@cetp.ipsl.fr	CETP, A. Protat	05-08/2006	API, INSU

Description of the instrument. Dual-polarization Doppler C-band radar , developed at CETP. Range 100-200 km following the mode, sweep velocity= about 30 sec/turn, peak power= 250 kw. Observations within precipitation (troposphere) and clear air (boundary layer).

Data provided to the AMMA data base. Reflectivities or C_n^2, velocities, variances, ZDR, PHIDP, RauHV

Scientific team. Georges Scialom, Y. Lemaître, A. Protat, CETP

Technical team. Jacques Faroux, CETP

Scientific Objectives. Atmospheric Dynamics and thermodynamics at convective scale and mesoscale, scale interactions, quantification of mass, moment, heat, and water of observed systems (squall lines,…) at these scales. Microphysical characterization of systems and dynamic-microphysical interactions (new theme which will benefit from the dual polarisation of the radar allowing a detailed characterization as a function of the zone of the observed squall line (convective part, reflectivity trough and stratiform zone)). Role of the ice phase. Processes implied in the life cycle of the deep convection (initiation in clear air, development, decay) thanks to Ronsard clear air capabilities. Quantitative estimate of rain rates. Sensitivity tests using a radar simulator and meso-NH runs, and validation of satellite rain estimation methods. Validation/initialization of model by radar data (wind and hydrometeor type). RONSARD is a radar rather important and relatively costly to set up, but it allows obtaining a good resolution on the structure of rain and wind fields. It is moreover not much attenuated (C band). It also works in clear air within the boundary layer, providing C_n^2 and wind fields.

Observing Strategy. Documentation of the internal structure of systems convective systems by volumetric scans and vertical scans in coordination with the X-Port radar and dense pluviographs networks on the Donga basin.

Links with other instruments. With X-Port radar during the SOP

WPs relying on the instrument: 1.2, 2.1, 2.3, 4.3 (satellites), 4.1 (assimilation)

OPERATION and COLLABORATIONS

Déployment (site, dates, logistics). Tests in Palaiseau in 2004, then installation at about 20-30 km from X-Port radar during spring 2006. Electric power from electrogenic group or by the electric network.

African Partners. Ph-D student (S. Diatta, Laboratoire de Physique de l'Atmosphère Siméon Fongang, Dakar, supervised by N. Viltard)

Other. DLR Munich (Germany) Martin Hagen (implentation of a bi-static receiver)

FINANCIAL PART

Acquisition / Upgrade / Jouvence. Developed at CETP with funds from INSU and API , presently under tests :

2004: Tropicalization:	26.0 k€
2005: Electronic complements and spare parts:	28.7 k€
Total:	54.7 k€

Required Ancillary Equipments. Electrogenic group, Data transmission
2004 PC Linux +IDL license for 3D wind retrieval in slight delay after data acquisition: 5 k€

Transport and installation on site :

2006	Preparation of terrain:	20.0 k€
	Transport:	60.0 k€

Operation :

Missions :	2005: Location search:	4.0 k€
	2006: Mission SOP scientists:	49.1 k€
	2006: Mission SOP Technicians:	62.1 k€

Total cost of operation of the instrument in AMMA : 279.9 k€

Funding sources (k€)

API- France	**31**	**32.7**	**101.2**		
INSU	**25**				
NERC or other British source					
Other National Source					
IP Europe					
TOTAL	**56**	**32.7**	**191.2**	**0**	**0**

Reference:

AMMA Instrument File

Code	PI (Name, E-Mail)	Labo and resp. AMMA	AMMA Period	Source of Funding
AS.TRESS_TamC.Flamant (**TRESS**)	Pierre Flamant flamant@lmd.polytechnique.fr Cyrille Flamant cyf@aero.jussieu.fr	LMD, SA, C. Flamant	2004-2006	CNES, API

Description of the instrument. TReSS is an autonomous and high-performance system designed to observe radiative and structural properties of clouds and aerosol layers, as well as atmospheric boudary layer (ABL) dynamics. The standard payload is made of the following instruments: 1) a multi-wavelength elastic and Raman channels backscatter Mini-Lidar operating at 532, 1064 and 607 nm (with diverse polarization capability at 532 nm), 2) a sun-photometer, 3) an IR radiometer, 4) a pyranometer and 5) a full sky visible channel web-type camera. TReSS is operational and makes routine measurements since 2003 on the campus of the Ecole Polytechnique in Palaiseau. TReSS will participate to the CALIPSO CAL/VAL effort in 2005.

Data provided to the AMMA data base. Aerosol and molecular extinction and backscatter coefficient profiles; aerosol layers optical and geometrical depths; ABL depth; aerosol optical depth at 5 wavelengths; thick cloud base altitude; thin cloud optical and geometrical depths; integrated water vapor content; global and diffuse solar flux; IR irradiance in the 9.5-11.5 µm range.

Scientific and technical team. Cyrille Flamant (CR CNRS/IPSL), Pierre Flamant (DR CNRS/IPSL), Juan Cuesta (Thésitif CNRS/IPSL), Jacques Pelon (DR CNRS/IPSL), Claude Loth (IR CNRS/IPSL).

Scientific Objectives. Improved knowledge of heat low dynamics and radiative properties. Measurements in Tamanrasset will also be used for CAL/VAL issues concerning CALIPSO and the A-Train.

Concerning AMMA:

- to provide an optimal set of observations for improving the knowledge of the heat low dynamics, including its diurnal evolution and aerosol radiative forcing,

- to provide a high-quality set of observations for improving the representation the heat low dynamics and the impact of aerosol radiative forcing in numerical simulations and meteorological analyses (such as provided by ECMWF), in a region where observations are scarce.

Concerning the A-Train:

- to provide observations relevant for the calibration/validation of selected level 2 aerosol products over the Sahara,

- to provide observations relevant for the validation of selected level 1 and level 2 CALIPSO measurements (combined lidar and IR Radiometer measurements) over the Sahara.

Observing Strategy. The diurnal cycle being very marked in this region and the mesoscale variability being important (both in terms of PBL/SAL structral parameters and dust emissions), the experimental strategy calls for a complementary ground-based / spaceborne observational approach to address these key issues. The objective of ground-based (resp. spaceborne) component of the experimental strategy is to document the diurnal cycle (resp. mesoscale variability) of relevant variables in the heat low region.

Links with other instruments. Lidar and sun-photometer networks in the AMMA domain. Network of aerosol-related stations.

WPs relying on the instrument: 1.2, 1.3, 2.1, 4.1

OPERATION and COLLABORATIONS

Deployment (site, dates, logistics). TReSS is to be deployed at the climatic station of Tamanrasset under the auspices of the Météo Alégrienne. Operations will be conducted during SOP 0 through 3.

African Partners. Météo Algérienne, Université d'Alger

Other. (1) Lidar Network throughout the AMMA domain ; (2) Several AMMA scientists have been contacted and have expressed great interest for the measurements and proposed scientific objectives: D. Parker, J. Haywood, J.-L. Redelsperger, J.-P. Lafore, D. Tanré, J.-J. Morcrette, A. Beljaars and A. Tompinks.

FINANCIAL PART

Acquisition / Upgrade / Jouvence. The container in which TReSS is currently operating needs to be upgraded in order to be able to operate in very "dusty" conditions. The air-conditioning needs to be boosted, the container needs to be sealed and pressurized, a new window needs to be installed for lidar operations: **30 k€** (tropicalisation of the shelter: 23 k€ + round-trip Paris-Vendée: 1 k€ + mecanics for adapting a new window: 3.5 k€ + new optical window: 3.5 k€).

Required Ancillary Equipments. Sonic anemometer + temperature and pressure sensors : **20 k€**.

Transport and installation on site. Paris-Marseille by truck (round-trip / 2 k€) + Marseille-Alger by ship (round-trip / 3 k€) + Alger-Tamanrasset by truck (round-trip / 5 k€): **10 k€**

Operation. Spare parts, consumables : **5 k€**

Missions : 26 k€ for operations during the SOP (TReSS will operate in SOP 0, 1, 2 and 3) + **15 k€** (over 3 years) for national and international meetings

Total cost of operation of the instrument in AMMA : 106 k€

The cost of the TReSS deployment is to be shared between the API-France (30%) and the CNES (70 %).

Funding sources (k€)

Source of funding	2004	2005	2006	2007	2008
API- France	**15**	**19.5**	**7.8**		
CNES		**45.5**	**18.2**		

The cost has been computed on a 30%/70% basis between the API and CNES.

Reference: Claude Loth, Juan Cuesta, Pierre H. Flamant, 2004 : « TReSS » : A transportable remote sensing station for atmospheric research and satellite validation, Proceedings of the 22nd ILRC, 12-16 June 2004, Matera, Italy

Fiche Instrument AMMA

Code	PI (Nom, E-Mel)	Labo et resp. AMMA	Période AMMA	Source du Financement
AE.DUST_0D	Véronique Pont ponv@aero.obs-mip.fr	LA, C. Mari	2006 SOP sèche/humide	API

Description de l'instrument. Site de Lamto en configuration Instrument AE.AEROSOL_RW complété par deux impacteurs DKT 13 étages (saison sèche) et station de flux et Site de Djougou en configuration Instrument AE_VAN_OR complété par deux impacteurs DKT 13 étages, un compteur CCN, un HTDMA et VTDMA (saison sèche et humide)

Données fournies pour la Base de données. Impacteurs: Concentrations des éléments carbonés (total, BC/OC), minéraux et traces par gamme de taille associée à chaque étage de l'impacteur. Flux solaires et IR. CCCN, HTDMA, VTDMA: nombre de noyaux de condensation nuageuse pour des sursaturations comprises entre 0.2 et 2% mesure du caractère hygroscopique et volatil des aérosols (facteur de grossissement résolu en taille), mélange interne et externe.

Equipe scientifique et technique. A. Mariscal, V. Pont, C. Liousse, E. Gardrat, P. Castera, C. Galy-Lacaux, JP Lacaux (LA), D. Tanré, G. Brogniez et C. Verwaerde (LOA), H. Cachier, J. Sciare et R. Sarda (LSCE), B. Dupré et R. Freydier (LMTG), L. Gomes, P. Tulet, F. Burnet, T. Bourrianne et J.M. Etcheberry (CNRM), P. Laj, K. Sellegri, D. Picard, et P. Villani (LaMP), JC Roger, P. Dubuisson et X. Meriaux (ELICO)

Objectifs Scientifiques. Transport et impact climatique des aérosols ouest-africains. Documentation des propriétés hygroscopiques et radiatives du mélange d'aérosols (poussière désertique, feux de biomasse, feux de fuel fossile). Documentation de la spéciation chimique associée à la distribution granulométrique avec un zoom sur les fonctions organiques de l'aérosol carboné (formation, transport, vieillissement).

Stratégie d'observation. En période de mesures intensives, deux séries de 2*13 filtres par jour seront collectées (2 impacteurs DKT: un pour analyse minérale, un pour analyse carbone). Prélèvement d'air par pompage à des plages horaires intégrant d'une part le pic de pollution lié aux sources en matinée, d'autre part le pic de pollution photochimique aux fortes heures d'ensoleillement, pendant une durée horaire à déterminer. Ceci aussi bien en saison sèche qu'en saison humide (SOP0, SOP 1 et 2). Ces mesures viennent compléter toutes les mesures faites dans le cadre de l' Instrument AE.AEROSOL_RW. En saison humide (SOP1 et 2), mesure en continu du nombre de noyaux de condensation nuageuse, et du spectre granulométrique à humidité ambiante et sa modification à humidité (H-tdma) et température(V-tdma) contrôléec . Ces mesures viennent compléter le set de données fournies par l'Instrument AE_VAN_OR. Mesure en continu du flux solaire et IR.

Liens avec d'autres instruments. L_Depot_RW (Réseau ORE IDAF (super-sites de Lamto, Djougou Banizoumbou)) ; AE_VAN_OR (site de Djougou) ; Photomètre (demande LOA pour Lamto) ; Photomètre de Djougou (LOA) ; TEOM, Lidar, Photomètre de Banizoumbou (LISA).

WPs utilisateurs: 1.1, 2.4 (2.4.1, 2.4.2 & 2.4.3), 4.1 et 4.3

MISE EN ŒUVRE et COLLABORATIONS

Déploiement (lieu, dates, logistique associée). 1 mois de mesures intensives sur Lamto (Côte d'Ivoire)durant la SOP sèche 2006; 2 mois de mesures intensives pendant la SOP humide 2006 à Djougou. Installation d'une station de flux courant 2005 (LOA).

Collaborateurs africains. V. Yoboué A. Konare, LAPA de Côte d'Ivoire, Fofana Mamadou (Station géophysique de Lamto)

Autres.

PARTIE FINANCIERE

Acquisition ou Remise à niveau / Jouvence. Acquisition DKT **24 k€,** Acquisition station de flux**15k€**, Acquisition compteur CCN (modèle U. Wyoming) **32k€,** 1 source radioactive supplémentaire **4 k€**

Equipements annexes requis.

Transport et installation sur site : 40k€

Fonctionnement : Analyses filtres **16.5 k€;** consommables (filtres) **6 k€**(SOP sèche et humide)
Matériel pour H/V-TDMA (carte d'acquisition, filtres, porte filtres, assecheurs, climatisation) : **20 k€**
Missions : 2005 :10k€ (réunion coordination et installation flux mètre), **30 k€** (missions pour 6 personnes à Lamto (SOP sèche 2006) sur un mois) ; **2006 : 52 k€** (missions pour 4 personnes sur 8 semaines 15/06 au 15/08 2006- SOP humide et missions pour 2 africains sur site)

Montage financier (k€)

Source du financement	2004	2005	2006	2007	2008
API- France	**0**	**150**	**95,5**	**24**	**20**
Autre source française					
IP Europe					
Participation étrangère					
TOTAL	**0**	**150**	**95,5**	**24**	**20**

Fiche Instrument AMMA

Code	PI (Name, E-Mail)	Labo and AMMA rep.	AMMA Period	Funding Source
AE.Dust.ST_flux_SOP	J.L. Rajot rajot@ird.ne	IRD - LISA	2006	API-France, IP-Europe

Description of the instrument. Measurement station of wind erosion fluxes and dust physical-chemical characteristics. Two isokinetic samplers (PIP) equipped with 7 sampling outlet (3 bulk filtration lines, 1 cascad impactor, 1 size optical analyzer (GRIMM), 1 spectral aethalometer (MAGEE 7 λ) 1 Nephelometer (AE.Nephelo.Nc). Meteorological mast (10 Anemometer, 1 wind vane, 4 air temperature, 2 RH). Wet and dry deposition samplers. 50 poles with 3 sand catchers each (BSNE), 4 saltation samplers (Saltiphone, Sensit)

Data provided to the AMMA data base. Dust vertical fluxes (erosion deposition) and horizontal fluxes (saltation), surface dynamic parameters (Z0, U*), mineralogical and chemical dust composition, hygroscopic properties, size distribution, absorption and scattering (see AE.Nephelo.Nc) properties.

Equipe scientifique et technique. Jean Louis Rajot (IRD) Béatrice Marticorena (LISA) Paola Formenti (LISA), Annie Gaudichet (LISA), Stéphane Alfaro (LISA), Bernadette Chatenet (LISA-IRD), Zibo Garba (UAM-Niamey)

Scientific Objectives. To measure dust fluxes in the Sahel related to soil uses and climate variations. To assess dust (and nutriments balances) in the Sahel. To characterize dust radiative impact related to dust sources and to dust physical and chemical properties

Observing Strategy. Continuous measurements during SOP 0, 1 and 2 especially within local erosion events – simultaneous ground based and aircraft measurements.

Links with other instruments. Nephelometer : AE.Nephelo_ST. Dust Sahelian transect stations : AE.Dust_ST, Dust aircraft platform

WPs relying on the instrument: 1.1, 2.4, 4.1, 4.3

OPERATION and COLLABORATIONS

Déployment (site, dates, logistics). Niger, Banizoumbou, SOP 0, 1 et 2, Nephelometer (AE.Nephelo_ST), Sahelian transect ground based stations (AE Dust ST)

African Partners. Univ A. Moumouni Niamey (Z Garba…) and others to be found

Other.

FINANCIAL PART

Acquisition / Upgrade / Jouvence. 0 €
Required Ancillary Equipments: 25100 €.
Transport and installation on site: 24000 €
Operation and analyses: 31000 €
Missions: 47000 €
Total cost of operation of the instrument in AMMA: 127100 €

Funding sources (k€)

Funding source	2004	2005	2006	2007	2008
API- France	12.3	54.8	39	21	
Other National Source					
IP Europe					
other international sources					
TOTAL	**12.3**	**54.8**	**39**	**21**	**0**

References: Alfaro, S.C., L. Gomes, J.L. Rajot, S. Lafon, A. Gaudichet, B. Chatenet, M. Maille, G. Cautenet, F. Lasserre, H. Cachier, and X.Y. Zhang. J. Geophys. Res. 108, D23, 8641, doi:10.1029/2002JD003214, 2003.
Lafon S, J.L. Rajot , S.C. Alfaro, A. Gaudichet. Atmospheric Environment 38:1211-1218, 2003.
Rajot, J.L., Alfaro, S.C., Gomes, L. and Gaudichet, A. Catena. 53:1-16, 2003.

Fiche Instrument AMMA

Code	PI (Name, E-Mail)	Labo and AMMA rep.	AMMA Period	Funding Source
AE.Nephelo_Nc	P. Formenti formenti@lisa.univ-paris12.fr	LISA	2006	API-France

Description of the instrument. Nephelometer (TSI, model 3563) to be implemented at the dust fluxes and dust characteristics measurement station in Banizoumbou. To measure the dust scattering coefficients integrated between 7 and 170° at three wavelengths (450, 550, and 700 nm).

Data provided to the AMMA data base. Spectral dust scattering coefficients.

Equipe scientifique et technique. Paola Formenti, Stéphane Alfaro (LISA) Jean Louis Rajot (IRD)

Scientific Objectives. To characterize dust radiative impact related to dust sources and to dust physical and chemical properties

Observing Strategy. Continuous measurements during SOP 0, 1 and 2 especially within local erosion events – simultaneous ground based and aircraft measurements.

Links with other instruments. Ground based dust fluxes and dust characteristics measurement station (…), dust dedicated aircraft platform (…), Dust Sahelian transect (AE.Dust_ST)

WPs relying on the instrument: 2.4.1 – 4.2.2.4 (2.4.3 – 4.1.3.G – 4.2.1.1)

OPERATION and COLLABORATIONS

Déployment (site, dates, logistics). Niger, Banizoumbou, SOP 0, 1 et 2, Ground based dust fluxes and dust characteristics measurement station (…), Sahelian transect ground based stations (AE Dust ST)

African Partners. Univ A. Moumouni Niamey (A.O. Manga…) and others to be found

Other.

FINANCIAL PART

Acquisition / Upgrade / Jouvence. 76,000 €

Required Ancillary Equipments: 1,600 €.

Transport and installation on site: see dust fluxes an dust characteristics station

Operation and analyses: 31000 €

Missions: see dust fluxes an dust characteristics station

Total cost of operation of the instrument in AMMA: 77,600 €

Funding sources (k€)

Funding source	2004	2005	2006	2007	2008
API- France	**39.6**	**38**			
Other National Source			3		
IP Europe					
other international sources					
TOTAL	**39.6**	**38**	**3**	**0**	**0**

References: Bodhaine, B.A., N.C., Ahlquist, and R.C. Schnell, *Atm. Env.*, 25A, 10, 2268-2276, 1991

Fiche Instrument AMMA

Code	PI (Nom, E-Mel)	Labo and AMMA rep.	AMMA Period	Funding Source
AE.SOUND_O3	Valérie Thouret thov@aero.obs-mip.fr	LA, C. Mari	2004-2007	API-France, IP-Europe

Description of the instrument. Sounding PTU + Ozone –electrochemical sonde -

Data provided to the AMMA data base. Ozone vertical profiles from the ground to 30 km altitude

Equipe scientifique et technique. Valérie Thouret , Armand Mariscal (LA, Toulouse) and DMN Benin

Scientific Objectives. Sampling the vertical distribution of ozone in the troposphere and in the stratosphere at the vicinity of Cotonou. Characterisation of the seasonal (and interannual if possible) variations of ozone over equatorial Africa. Assessment of transport pathways from the different source regions. More over, this sounding aims to complement the SHADOZ network which provide no ozone data over continental equatorial Africa except Nairobi so far. This network aims to characterize the ozone distribution in the tropics and thus to participate to the validation of the AURA satellite products.

Observing Strategy. One sounding a week for the two years of the EOP (Dec. 2004-Nov. 2006) at fixed day and time. The frequency will be three times a week during the SOP (Jun-Aug 2006).

Links with other instruments. Coupling with ground based observations (AE.VAN_OR, AE.Aerosol_RW), aircraft data (SOP et MOZAIC if available) and satellite data (ex: AURA validation in the frame of SHADOZ).

WPs relying on the instrument: 1.1, 2.4, 4.1, 4.3

OPERATION and COLLABORATIONS

Déployment (site, dates, logistics). Cotonou from Decembre 2004 on. Site belonging to the meteo station from the airport. Logistics from DMN (Met. Services from Benin) for one sounding a week.

African Partners. DMN from Benin, Brazzaville University (A. Minga)

Other.

FINANCAL PART

Acquisition / Upgrade / Jouvence. 126 sondes and balloons : 130 k€
Required Ancillary Equipments. Antenna : 4 k€. (may be re-evaluated in 2005)
Transport and installation on site : 5 k€ (may be re-evaluated in 2005)
Operation : consummables (Hélium) : 9 k€
(45 bottles of 9m^3 at 200 € each: price from Air Liquide France… may be different in Benin)
Missions (2004 only):
(Training in Toulouse in Oct. 2004 and mission in Cotonou in Dec. 2004) : 10 k€
(details : 3*(1000 + 114*8) + 2*(1000 + 123*8) = 9704 €)
Total cost of operation of the instrument in AMMA : about 158 k€

Funding sources (k€)

Funding source	2004	2005	2006	2007	2008
API- France	**57(+36)**	**14,5**	14	32	15
Other National Source	**20**				
IP Europe	**50**				
TOTAL	**127(163)**				

Fiche Instrument AMMA

Code	PI (Nom, E-Mel)	Labo and AMMA rep.	AMMA Period	Funding Source
	Serge Soula sous@aero.obs-mip.fr	LA,	2004-2007	API-France

Description of the instrument. Electric field-mill, precipitation current sensor (5 stations).

Data provided to the AMMA data base. Electric field evolution at the ground, flash rate.

Equipe scientifique et technique. Serge Soula , Fabrice Gangneron (LA, Toulouse)

Scientific Objectives. The knowledge of the relations between the lightning activity and the microphysics of the convective system. The determination of the relationship between precipitation and lightning activity. The approach of the determination of the production of NOx by lightning flashes (LNOx). An evaluation of the efficiency of the system ZEUS which will detect a proportion of the cloud-to-ground lightning activity over Africa. Our electric field measurement will be an interesting complement for another lightning detection system in the LF range (for cloud-to-ground flashes) installed by the DLR with the objective of the LNOx estimation.

Observing Strategy. Continuous measurement during the SOP (Jun-Aug 2006).

Links with other instruments. Coupling with polarimetric radar observations about the microphysics of the convective systems and with the precipitation estimation from the radars or from local measurements. Coupling with the systems of global lightning detection. Associating with the chemistry ground based observations (AE.VAN_OR,) and aircraft data.

WPs relying on the instrument: 1.2, 2.1, 2.4

OPERATION and COLLABORATIONS

Déployment (site, dates, logistics). A site in Parakou at the meteorological station. A site in Djougou area associated with X-Port radar location. Other sites to define on the axis Parakou-Djougou.

African Partners.

Other.

FINANCAL PART

Acquisition / Upgrade. 5 field-mills (5 × 4 k€) + sensor for precipitation current (5 × 1 k€)

Required Ancillary Equipments. Acquisition system : 5 × 1 k€

Transport: 2 k€

Operation : Installation and adaptation of the stations during SOP : 5 k€

Missions : - 2 persons for 3 months during the SOP : 30 k€ - Other missions : 2 k€

Total cost of operation of the instrument in AMMA : about 69 k€

Funding sources (k€)

Funding source	2004	2005	2006	2007	2008
API- France		5	39		
Other National Source	15 + 10				
IP Europe					
TOTAL	25	5	39		