Fiche " Valorisation des résultats des campagnes aéroportées "
Campagne d'évaluation 2020

Nom de la campagne : DACCIWA (Dynamics-Aerosol-Chemistry-Cloud Interactions in West Africa) Projet / Programme de rattachement : EU project FP7 Domaine scientifique : Atmosphere

Avion : ATR 42
Dates de la campagne : 27 June-17 July 2016 Nombre de jours scientifiques : 21 Nombre d'heures de vols : 80 Aéroport(s) : Military Airport, Lomé (Togo)
PI (Principal Investigator), Nom, prénom et organisme : Flamant Cyrille, DR CNRS, LATMOS Schwarzenboeck Alfons, PR UBP, LaMP Nombre de chercheurs et d'enseignants-chercheurs : **7** (C. Flamant, A. Schwarzenboeck, A ; Colomb, K. Sellegri, F. Burnet, C. Mari, C. Lavaysse) Nombre d'ingénieurs et de techniciens : **2** (R. Dupuy, T. Bourrianne) Nombre d'étudiants : **4 PhD** (P. Dominutti, F. Brosse, E. Bourgeois, R. Guebsi) & **7 Post-doc** (J. Brito, J. Duplissy, C. Denjean, F. Tocquer, A. Deroubaix, M. Gaetani, R. Meynadier)

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Résumé (20 lignes maximum) :

The main objective for the DACCIWA aircraft detachment was to build robust statistics of cloud properties in southern West Africa in different chemical landscapes: from the background state over the Gulf of Guinea (marine aerosols or mix between marine aerosols and biomass burning aerosols) to ship/flaring emissions to the coastal strip of polluted megacities to the agricultural areas and forest areas further north, and eventually dust from Sahel/Sahara.

Résultats majeurs obtenus
(maximum 5 pages)

1 – Contexte scientifique et programmatique de la campagne

West Africa is changing rapidly. An explosively growing population, massive urbanisation, complex meteorological influences, unregulated deforestation and air pollution modify the composition of the atmosphere not only impacting human health but also the weather and climate. How bad the problem actually is and how exactly these emissions are changing the region in the long-term is not clear.

Monsoon winds with sea salt from the south, Sahara winds with dust from the north, charcoal fires and burning rubbish from cities as well as power plants, ship traffic, oil rigs and out-dated engines – the air over the coastal region of West Africa is a unique mixture of various gases, liquids and particles. At the same time, multi-layer cloud decks frequently form in the atmosphere that exert a large influence on the local weather and climate. The composition of the particles in the air – and what impact they have on the formation and breakup of clouds – has not been studied in detail and this information is not included in the weather and climate models used to look to the future.

The EU-funded project DACCIWA (Dynamics-aerosol-chemistry-cloud interactions in West Africa) is investigating the relationship between weather, climate and air pollution in West Africa. It is coordinated by the Karlsruhe Institute of Technology (KIT) in Germany and consists of researchers from 16 international scientific organisations. For the first time, the entire chain of impacts of natural and manmade emissions on the West African atmosphere is investigated in a coordinated field campaign. As part of this campaign, three research aircraft based in Togo flew targeted missions over West Africa from June to July. In addition, DACCIWA scientists set up three highly instrumented measuring sites inland, launched weather balloons several times a day across the region, measured urban emissions and evaluated health data. This 5-year project lays the foundation for new and more precise climate, weather and air quality models that support policies towards a more sustainable development for the region.

2 – Rappel des objectifs

The project brought together three research aircraft from three countries: the German Deutsches Zentrum für Luft- und Raumfahrt (DLR) Falcon 20, the French Service des Avions Français Instrumentés pour la Recherche en Environnement (SAFIRE) ATR 42 and the British Antarctic Survey (BAS) Twin Otter. The aircraft component of the field phase of DACCIWA started on 27 June (first scientific flight on 29 June) and concluded on 16 July 2016 (last scientific flight). The three research aircraft will be deployed from the Lomé Military Airport and conducted a total of over 155 science flight hours, including hours sponsored through 3 European Facility for Airborne Research (EUFAR) projects. The aircraft were used in different ways based on their strengths, but all three had comparable instrumentation with the the capability to do gas-phase chemistry, aerosol and clouds, thereby generating a rich dataset of atmospheric conditions across the region.

DACCIWA operations were coordinated from the DACCIWA Operations Center (DOC) located in Hotel Onomo in Lomé, ~15-20 minutes away from the Lomé Military Airport. The DOC began operations on 25 June to prepare forecasts for the first potential flight operations and to test communications with the 2 ground-based supersites (Savé, Benin and Kumasi, Ghana) as well as with the ground-based site in Ile-Ife (Nigeria). Forecasting support for the project resumed on 15 July 2016. Two daily briefing meetings were organized at the DOC during the period of the aircraft detachment, at 1100 and 1900 UTC between 25 June and 15 July.

The overarching objective of the airborne component of the DACCIWA project was to accommodate the objectives of work packages WP3 (Chemistry), WP4 (cloud-aerosol interactions) and WP5 (Radiation) as thoroughly as possible, but also contribute to the experimental strategy of WP1 (Section 3) and WP2 (Section 5). For that purpose, six types of flight objectives were conducted over Togo (detachment base) and surrounding countries (Ivory Coast, Ghana, Benin and Nigeria): (i) Stratus clouds, (ii) Land-sea breeze clouds, (iii) Biogenic emission, (iv) Megacities emission (v) Flaring emission and (vi) Dust and biomass burning aerosol. The focuses of the 3 EUFAR projects were: (i) Ship tracks in the Gulf of Guinea, (ii) Mid-level clouds over Benin and (iii) Low-level atmospheric circulation in the Gulf of Guinea. Flight Plans were engineered so that they could accommodate several objectives.

3 – Données acquises et analyses effectuées

The ATR42 payload was the following:

SAFIRE ATR 42 DACCIWA Instrumentation			
Instrument	**Parameter**	**Responsible Person**	**Institution**
Meteorology and turbulence			
Rosemount T	Temperature	T. Perrin	SAFIRE
P (static & dynamic) : Rosemount 120 & 1221,	Pressure	T. Perrin	SAFIRE
5-port turbulence probe	Momentum fluxes, heat fluxes	T. Perrin	SAFIRE
GE hygrometer (dew-point), kh20	Humidity: dew point; UV absorption (kh20)	P. Durand	LA
INS + GPS	Wind component, position	T. Perrin	SAFIRE
Aerosol Inlet			
Adjustable (flow, orientation) Aerosol Community Inlet	Particle aerosol sampling D50 = 4-5 µm	T. Bourrianne	CNRM
Aerosol total concentration			
Aircraft DUAL CPC counter MARIE	Particle number concentrations D>4nm & D>15 nm (variable)	A. Schwarzenboeck	LaMP
CPC3788	Total counter (water CPC) (>3nm)	T. Bourrianne	CNRM

CPCboot	Turbulent Mixing CPC (>3nm)	A. Schwarzenboeck	LaMP
Aerosol particle size distribution			
SMPS & V-SMPS	Ambient & desorbed (T selectable) particle size distribution 0.02-0.5 µm; 90s time resolution	A. Schwarzenboeck	LaMP
OPC 1.129, V-OPC 1.129	Ambient & desorbed particle size distribution 0. 25-2 µm; 1s time resolution	A. Schwarzenboeck	LaMP
Grimm 1.109	Ambient particle size distribution 0.25-2 µm 1s time resolution	T. Bourrianne	CNRM
UHSAS-A	Aerosol size distribution 0.06-1µm; 1s time resolution	A. Schwarzenboeck / T. Perrin	LaMP/ SAFIRE
PCASP	Aerosol (& cloud) particle size distribution 0.1-3 µm ; 1s time resolution	T. Perrin	SAFIRE
Aerosol particle optical properties			
PSAP (3λ)	Absorption coefficient, black carbon content Blue 470nm, green 522nm, red 660nm;	A. Schwarzenboeck	LaMP
AURORA 3000	Lightscatter coefficient (sigma), backscatter coefficient 450 nm, 525 nm, and 635 nm; 0-20000 Mm-1, 5 lpm	A. Schwarzenboeck	LaMP
CAPS	Extinction Mm-1 630nm	T. Bourrianne	CNRM
Aerosol particle chemical properties			
API-TOF	Ion clusters	A. Schwarzenboeck	LaMP / U. Helsinki
cToF-AMS	Size resolved CN chemical composition (volatile and semi-volatile components) 0.05-0.6 µm	E. Freney	LaMP
Dual stage impactor	Sub and supermicronic elementary particle analysis: TEM/SEM-EDX Two stages: sub- and supermicron particles	E. Freney	LaMP
SP-2 single particle soot photometer	Measures black carbon (soot) mass in individual aerosol particles and particle optical size using light-scattering black carbon mixing state at the single-particle level	T. Bourrianne	CNRM
CCN properties			
CCNC (mini CCNC)	CCN concentration Supersaturation to be chosen	F. Burnet	CNRM
Gas chemistry			
PTR-MS (Proton Transfer Reaction Mass Spectrometry)	Primary / secondary VOCs real-time monitoring of VOC (mass!) like acetone, acetaldehyde, methanol, ethanol, benzene, toluene, xylene and others	T. Perrin	SAFIRE
Mozart	CO, O3 measured every second, then averaged over 30 s O3: 1ppbv; CO: 5ppbv	T. Perrin	SAFIRE
TEI 42CTL NOx analyser	NOx; measured every 1s, then averaged over n x 10s 50ppt integration over 120 s	T. Perrin	SAFIRE
SO2 Analyser	SO2	A. Colomb	LaMP
Aerolaser HCHO	HCHO (Formaldehyde) Ppbv	A. Colomb	LaMP
PICARRO	CO2, CH4, CO cavity ring down spectroscopy carbon dioxide (CO_2) every 5s with precision 150 ppb; methane (CH_4) 1 ppb, and CO to a	T. Perrin	SAFIRE

	precision of 30 ppb		
Meteo Consult Photoelectric detectors	Upwelling and downwelling photolysis frequency J(NO2) 300-380 nm	T. Perrin	SAFIRE
Remote sensing & radiation			
ULICE	Aerosol / cloud / canopy lidar UV backscatter	P. Chazette	LSCE
CLIMAT radiometer	Brightness temperature in the IR (8.7, 10.8 and 12 µm)	T. Perrin	SAFIRE
Kipp & Zonen CMP22 (x2)	Upwelling and downwelling Visible radiances and fluxes 0.2-3.6 µm 5 s response time	T. Perrin	SAFIRE
Kipp & Zonen CGR4 (x2)	Upwelling and downwelling IR radiances and fluxes 4.2 - 42 µm 0 - 700 W/m²	T. Perrin	SAFIRE
Properties of liquid clouds			
Fast-FSSP et BCPD	Droplet spectrum (2-50 µm)	T. Bourrianne	CNRM
PVM	Cloud liquid water content LWC, Deff	T. Perrin	SAFIRE
CDP-2	Cloud droplet spectrum (2-50 µm), LWC, Deff	A. Schwarzenboeck	LaMP
CDP-1	Cloud droplet spectrum (2-50 µm), LWC, Deff	T. Bourrianne	CNRM
SPP-100 ER (extended range)	Extended range cloud droplet spectrum (3-95 µm)	A. Schwarzenboeck	LaMP
2D-S with/without FCDP	Imaging Probe for large drizzle droplets 10-1280 µm	A. Schwarzenboeck	LaMP

4 – Principaux résultats obtenus (avec quelques illustrations)

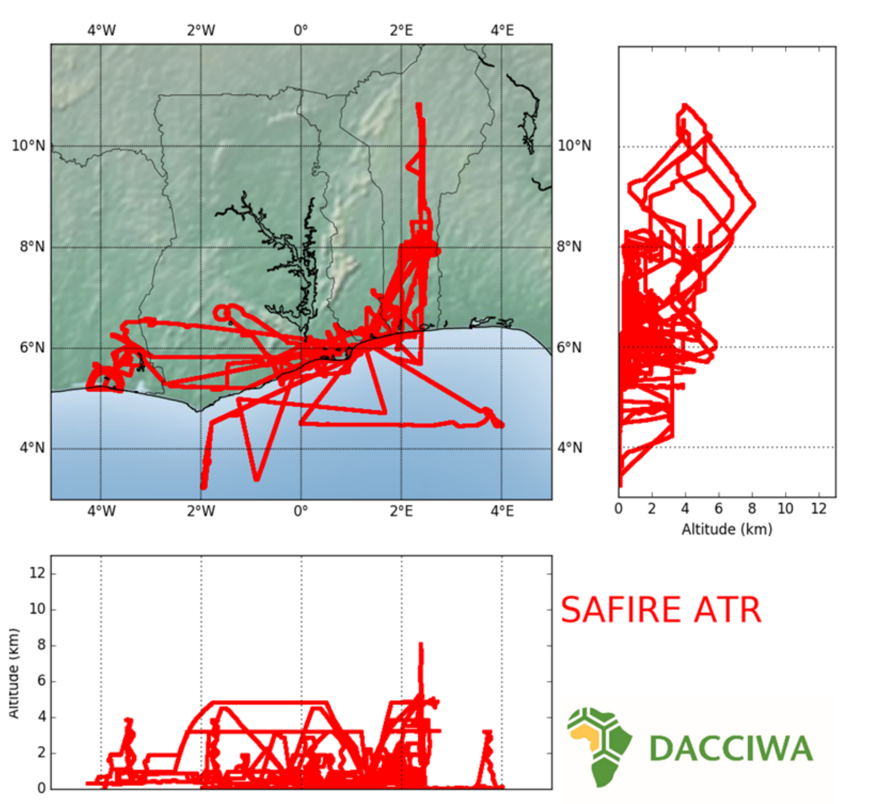

Figure 1 : ATR 42 flight tracks for the entire campaign (27 June – 17 July 2016).

The ATR conducted 20 scientific flights (including 3 for the EUFAR OLACTA and MICWA projects) for a total of ~68 flight hours.

Among these flights (most of them having multiple objectives), the ATR conducted:
- City emissions flights: Abidjan (4), Accra (4), Kumasi (1), Lomé (5);
- Biogenic emissions flights: Benin (1), Ghana (5), Togo (1);
- Biomass burning aerosol and dust aerosol flights: dust (3) and biomass (7);
- Cloud-aerosol interaction flights: Lomé-Savé (11), Accra-Kumasi (3), Lomé-Abidjan (3), others (6);
- Radiation flights: calibration (1), closure (1).

Tableau récapitulatif

1

		Nombre
1	Publications d'articles originaux dans des revues avec comité de lecture référencées dans **JCR** *(**J**ournal **C**itation **R**eports)* (ajouter des lignes si nécessaire)	
	Année n+2 : 2018	3
	Année n+3 : 2019	5
	Année n+4 : 2020	2
	Total	10
2	Publications dans d'autres revues ou ouvrages scientifiques faisant référence dans le domaine	
3	Publications sous forme de rapports techniques	
4	Articles dans des revues ou journaux « grand public »	
5	Communications dans des colloques internationaux	13
6	Documents vidéo-films	2
7	DEA ou MASTER 2 ayant utilisé les données de la campagne	1
8	Thèses ayant utilisé les données de la campagne	2
9	Transmission à une banque de données	Fait sur BAOBAB/SEDOO-AERIS
10	Considérez-vous la publication des résultats terminée ? Si en cours, préciser et donner les échéances	En cours

Références

R1 - Références des publications d'articles originaux dans des revues avec comité de lecture référencées dans JCR *(vérifier dans la base « Journal Citation Reports » via « ISI Web of Knowledge » si les revues sont bien référencées)* **et résumés des principales publications.** *(Les classer par années croissantes)***.**

2018

C. Flamant, A. Deroubaix, P. Chazette, J. Brito, M. Gaetani, P. Knippertz, A. H. Fink, G. de Coetlogon, L. Menut, A. Colomb, C. Denjean, R. Meynadier, P. Rosenberg, R. Dupuy, P. Dominutti, J. Duplissy, T. Bourrianne, A. Schwarzenboeck, M. Ramonet and J. Totems, 2018b: Aerosol distribution in the northern Gulf of Guinea: local anthropogenic sources, long-range transport and the role of coastal shallow circulations, *Atmos. Chem. Phys.*, **18,** 12363–12389.

C. Flamant, P. Knippertz, A. Fink, A. Akpo, B. Brooks, C. Chiu, H. Coe, S. Danuor, M. Evans, O. Jegede, N. Kalthoff, A. Konaré, C. Liousse, F. Lohou, C. Mari, H. Schlager, A. Schwarzenboeck, B. Adler, L. Amekudzi, J. Aryee, M. Ayoola, A. Batenburg, G. Bessardon, S. Borrmann, K. Bower, J. Brito, F. Burnet, V. Catoire, A. Colomb, C. Denjean, K. Fosu-Amankwah, P. Hill, J. Lee, M. Lothon, M. Manaran, J. Marsham, R. Meynadier, J.-B. Ngamini, P. Rosenberg, D. Sauer, V. Smith, G. Stratmann, J. Taylor, C. Voigt and V. Yoboué, 2018: The Dynamics-Aerosol-Chemistry-Cloud Interactions in West Africa field campaign: Overview and research highlights, *Bull. Am. Meteorol. Soc.,* **99,** 83–104, doi.org/10.1175/BAMS-D-16-0256.1.

J. Brito, E. Freney, P. Dominutti, A. Borbon, S. Haslett, A. Batenburg, C. Schulz, A. Colomb, R. Dupuy, C. Denjean, A. Deroubaix, H. Coe, J. Schneider, S. Borrmann, K. Sellegri, C. Flamant, P. Knippertz and A. Schwarzenboeck, 2018: Assessing the role of anthropogenic and biogenic sources on PM1 over Southern West Africa using aircraft measurements, *Atmos. Chem. Phys.* 18, 757–772.

2019

A. Deroubaix, L. Menut, C. Flamant, J. Brito, C. Denjean, V. Dreiling, A. Fink, C. Jambert, N. Kalthoff, P. Knippertz, R Ladkin, S. Mailler, M. Maranan, F. Pacifico, B. Piguet, G. Siour and S. Turquety, 2019: The diurnal cycle of coastal anthropogenic pollutants transport over southern West Africa during the DACCIWA campaign, *Atmos. Chem. Phys.*, **19,** 473-497.

S. Haslett, J. Taylor, K. Deetz, B. Vogel, K. Babić, N. Kalthoff, A. Wieser, C. Dione, F. Lohou, J. Brito, R. Dupuy, A. Schwarzenboeck, P. Zieger, and H. Coe, 2019: The radiative impact of out-of-cloud aerosol hygroscopic growth during the summer monsoon in southern West Africa, *Atmos. Chem. Phys.,* **19,** 1505-1520.

S. Haslett, J. W. Taylor, M. Evans, E. Morris, B. Vogel, A. Dajuma, J. Brito, A. Batenburg, S. Borrmann, J. Schneider, C. Schulz, C. Denjean, T. Bourrianne, P. Knippert, R. Dupuy, A. Schwarzenböck, D. Sauer, C. Flamant, J. Dorsey, I. Crawford and H. Coe, 2019: Remote biomass burning dominates southern West African air pollution during the monsoon, *Atmos. Chem. Phys.,* **19,** 15217–15234.

L. Menut, P. Tuccella, C. Flamant, A. Deroubaix, and M. Gaetani, 2019: The role of aerosol-radiation-cloud interactions in linking anthropogenic pollution over southern West Africa and dust emission over the Sahara, *Atmos. Chem. Phys.,* **19,** 14657–14676.

J. W. Taylor, S. Haslett, K. Bower, M. Flynn, I. Crawford, J. Dorsey, T. Choularton, P. J. Connolly, V. Hahn, C. Voigt, D. Sauer, R. Dupuy, J. Brito, A. Schwarzenboeck, T. Bourriane, C. Dejean, P. Rosenberg, C. Flamant, J. Lee, A. Vaughan, P. Hill, B. Brooks, V. Catoire, P. Knippertz, and H. Coe, 2019: Aerosol influences on low-level clouds in the West African monsoon, *Atmos. Chem. Phys.,* **19,** 8503-8522.

2020

C. Denjean, T. Bourrianne, F. Burnet, M. Mallet, N. Maury, A. Colomb, P. Dominutti, J. Brito, R. Dupuy, A. Schwarzenboeck, C. Flamant, P. Knippertz, 2020: Light absorption properties of aerosols over South Western Africa, *Atmos. Chem. Phys.,* **20,** 4735–4756.

C. Denjean, J. Brito, Q. Libois, M. Mallet, T. Bourrianne, F. Burnet, A. Colomb, R. Dupuy, C. Flamant, P. Knippertz and A. Schwarzenboeck, 2020: Unexpected strong absorption of biomass burning aerosol explained by black carbon mixing state, *Geophys. Res. Lett.,* submitted

R2 – Références des publications parues dans d'autres revues ou des ouvrages scientifiques faisant référence dans la discipline. *(Les classer par année)*.

R3 – Références des rapports techniques. *(Les classer par année)*.

R4 – Références des articles parus dans des revues ou des journaux « grand public ». *(Les classer par année)*.

- CNRS : http://www2.cnrs.fr/presse/communique/4663.htm
- Sciences et Avenir (Loïc Chauveau): http://www.sciencesetavenir.fr/nature-environnement/pollution/20160831.OBS7219/en-afrique-de-l-ouest-l-air-est-de-plus-en-plus-malsain.html
- Journal de l'Environnement (Stéphanie Senet): http://www.journaldelenvironnement.net/article/les-decharges-sauvages-asphyxient-les-villes-d-afrique-de-l-ouest,74184
- http://www.puissance2d.fr/Mieux-comprendre-les-impacts-de-la-pollution-en-Afrique-de-l-Ouest-avec-le-programme-DACCIWA
- www.savoirnews.net/pollution-et-presence-des-aerosols-en-afrique-de-louest-dacciwa-presente-les-grandes-conclusions-aux-decideurs-politiques/

R5 – Références des communications dans des colloques internationaux. *(Les classer par années croissantes)*.

2016

X. Shang, P. Chazette, C. Flamant, J. Totems, C. Denjean, R. Meynadier, T. Perrin and M. Laurens, 2016 : Aerosol study over the Gulf of Guinea region during DACCIWA using a mini lidar onboard the French aircraft ATR42, AGU Fall Meeting, San Francisco, Ca, 12-16 December 2016.

C. Liousse, P. Knippertz, C. Flamant, J. Adon, A. Akpo, I. Annesi-Maesano, E. Assamoi, A. Baeza, B. Julien, M. Bedou, B. J. Brooks, C. Chiron, H. Coe, S. Danuor, J. Djossou, M. J. Evans, B. Fayomi, A. Fink, C. Galy-Lacaux, E. Gardrat, O. Jegede, N. Kalthoff, M. Kedote, S. Keita, K. Kouame, A. Konare, J.- F. Leon, C. Mari, F. Lohou, L. Roblou, H. Schlager, A. Schwarzenboeck, E. N'datchoh Toure, V. Youboue , 2016: First highlights of the Dynamics-Aerosol-Chemistry-Cloud Interactions in West Africa (DACCIWA) field campaigns, AGU Fall Meeting, San Francisco, Ca, 12-16 December 2016.

J. Brito, J. Duplissy, C. Denjean, E. Freney, R. Dupuy, T. Bourrianne, F. Burnet, P. Chazette, P. Dominutti, A. Borbon, A. Colomb, K. Sellegri, C. Flamant, P. Knippertz and A. Schwarzenboeck, 2016: Aerosol physical-chemical properties in Southern West Africa: Recent findings using the SAFIRE ATR42 aircraft within the DACCIWA project, 22nd European Aerosol Conference, Tours, France, 4-9 September 2016.

2017

C. Flamant, P. Knippertz, A. Akpo, B. Brooks, C. Chiu, H. Coe, S. Danuor, M. Evans, A. Fink, O. Jegede, N. Kalthoff, A. Konaré, C. Liousse, F. Lohou, C. Mari, H. Schlager and A. Schwarzenboeck, 2017 : Aerosol-cloud interaction studies conducted during the Dynamics-Aerosol-Chemistry-Cloud Interactions in West Africa (DACCIWA) field campaign, 9th Symposium on aerosol-cloud-climate interactions, AMS Annual Meeting, Seattle, WA, 22-26 January 2017.

C. Flamant and the DACCIWA Aircraft Team, 2017: Aircraft-based investigation of Dynamics-Aerosol-Chemistry-Cloud Interactions in Southern West Africa, EGU General Assembly 2017, Vienna, Austria, 23-28 April 2017.

J. Brito, E. Freney, A. Colomb, R. Dupuy, J. Duplissy, C. Denjean, P. Dominutti, A. Batenburg, S. Haslett, C. Schulz, T. Bourrianne, F. Burnet, A. Borbon, J. Schneider, S. Borrmann, H. Coe, K. Sellegri, C. Flamant, P. Knippertz, and A. Schwarzenboeck, 2017: On the impact of anthropogenic emissions on biogenic SOA formation above West Africa: results from DACCIWA aircraft field campaign, EGU General Assembly, Vienna, Austria, 23-28 April 2017.

S. Haslett, J. Taylor, M. Flynn, K. Bower, J. Dorsey, I. Crawford, J. Brito, C. Denjean, T. Bourrianne, F. Burnet, A. Batenburg, C. Schulz, J. Schneider, S. Borrmann, D. Sauer, J. Duplissy, J. Lee, A. Vaughan, and H. Coe, 2017: The statistical distribution of aerosol properties in sourthern West Africa, EGU General Assembly, Vienna, Austria, 23-28 April 2017.

P. Chazette, J. Totems, C. Flamant, X. Shang, C. Denjean, R. Meynadier, T. Perrin, and M. Laurens, 2017: A mini backscatter lidar for airborne measurements in the framework of DACCIWA, EGU General Assembly, Vienna, Austria, 23-28 April 2017.

C. Denjean, T. Bourrianne, F. Burnet, A. Deroubaix, J. Brito, R. Dupuy, A. Colomb, A. Schwarzenboeck, K. Sellegri, P. Chazette, J. Duplissy, and C. Flamant, 2017: Impact of long-range transport pollution on aerosol properties over West Africa: observations during the DACCIWA airborne campaign, EGU General Assembly, Vienna, Austria, 23-28 April 2017.

2018

V. Hahn, C. Voigt, V. Catoire, V. Brocchi, D. Sauer, H. Schlager, G. Stratmann, H. Coe, J. Taylor, S. Haslett, J. Brito, A. Scwarzenboeck, R. Dupuy and C. Flamant, 2018: New in-situ measurements of microphysical cloud properties in West Africa – Impact of aerosol on low level clouds, EGU General Assembly 2018, Vienna, Austria, 8-13 April 2018.

C. Flamant, A. Deroubaix, P. Chazette, J. Brito, G. de Coetlogon, A. Colomb, C. Denjean, A. Fink, M. Gaetani, P. Knippertz, L. Menut, R. Meynadier, P. Rosenberg, A. Schwarzenboeck and J. Totems, 2018: Aerosol distribution in the northern Gulf of Guinea: local anthropogenic sources, long-range transport and the role of sea surface temperature-induced shallow circulations EGU General Assembly 2018, Vienna, Austria, 8-13 April 2018.

S. Haslett, J. Taylor, M. Flynn, K. Bower, J. Brito, A. Schwarzenboeck, R. Dupuy, A. Batenburg, J. Schneider, C. Schulz, S. Borrmann, C. Denjean, F. Burnet, D. Sauer, J. Lee, C. Flamant, P. Knippertz and H. Coe, 2018: Biomass burning from central Africa dominates air pollution across southern West Africa during the summer monsoon season, EGU General Assembly 2018, Vienna, Austria, 8-13 April 2018.

N. Maury, C. Denjean, T. Bourrianne, F. Burnet, R. Dupuy, J. Brito, A. Colomb, A. Schwarzenboeck and C. Flamant, 2018: The influence of urban emissions on cloud condensation nuclei properties over West Africa, EGU General Assembly 2018, Vienna, Austria, 8-13 April 2018.

R6 – Liste des documents vidéo-films. *(Les classer par année)***.**

KIT Press Office Trailer ➔ https://www.youtube.com/watch?v=I4aeUkpyh7w&feature=youtu.be
ULYSSE funded film made by Arnaud Mansat ➔ https://vimeo.com/184522021

R7 – DEA ou MASTER 2 ayant utilisé les données de la campagne (Nom et Prénom de l'étudiant, Laboratoire d'accueil. Sujet du DEA ou MASTER, Date de soutenance)

Stage de M2
Nicolas Maury : Impact des aérosols sur les propriétés des nuages de couche limite en Afrique de l'Ouest, soutenue le 5 octobre 2017

R8 – Thèses ayant utilisé les données de la campagne (Nom et Prénom de l'étudiant, Laboratoire d'accueil. Sujet de la thèse, Date de soutenance)

R9 – Liste des données transmis (Préciser les destinataires, SEDOO, autres banques de données, équipes scientifiques …)

En cours

R10 – Liste des résultats restant à publier – échéance