Project No: 603502

DACCIWA

"Dynamics-aerosol-chemistry-cloud interactions in West Africa"

Deliverable

D8.7 Engagement with policy stakeholders

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Contributing partners:	**KIT**
Project coordinator name:	Prof. Dr. Peter Knippertz
Project coordinator organisation name:	Karlsruher Institut für Technologie

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Dissemination level		
PU	Public	**X**
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Nature of Deliverable		
R	Report	
P	Prototype	
D	Demonstrator	
O	Other	**X**

DOCUMENT INFO

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Changes with respect to the DoW

Issue	Comments
Format of policy briefs	The dissemination team believes that with one policy brief covering all relevant topics instead of the originally planned three a larger critical mass of interested policy makers can be reached.
Policy brief meeting together with other cluster projects BACCHUS and StratoClim	The policy brief meeting in Brussels was to be organized by all three projects involved in the aerosol-climate cluster (DACCIWA, BACCHUS and StratoClim). DACCIWA and BACCHUS presented together, while StratoClim declined to be involved.

Dissemination and uptake

Target group addressed	Project internal / external
Policy makers, NGOs	external

Document Control

Document version #	Date	Changes Made/Comments
V0.1	25.10.18	First version to be completed by all authors
V0.2	15.11.18	Version to be approved by the General Assembly
V1.0	30.11.18	Final version including updates by all authors and approved by the General Assembly

Table of Contents

1 Introduction

The two primary tools for the DACCIWA communication and dissemination strategy towards policy makers are the development of a policy brief document and workshops based on this document.

The policy brief was coordinated and written by Mat Evans (UoY), together with the project manager and coordinator, and relevant people from the rest of the DACCIWA project. It was decided that having one comprehensive policy brief covering the main DACCIWA topics would have more impact than having three individual policy briefs. More so as the topics are largely connected and dependent on each other.

This policy brief then formed the basis of targeted workshops summarising the results of the different aspects of the project with a focus on policy implications in the southern West Africa region for the present and future to engage with a range of stakeholders. Four such workshops took place, three of which in southern West Africa and one in Brussels:

- Accra, Ghana: 12 October 2018
- Abidjan, Côte d'Ivoire: 18 October 2018
- Lomé, Togo: 19 October 2018
- Brussels, Belgium: 15 November 2018

2 Policy brief document

2.1 Motivation

The document (Annex 4.1) comprises the key results of the DACCIWA project and its implications for policy makers with easily understandable messages for non-experts. It was professionally designed to enhance its appeal to external readers and to increase the tangibility of the results. The document is aimed at different stakeholders such as African Governmental, the EU Commission, National Governments, NGOs and civil society.

2.2 Content

The following topics are discussed and explained in the document:

- Key findings
- Implications for policy
- Field campaigns
- Air pollution concentration and sources
- Health impacts
- Emissions
- Pollution impacts on weather and climate
- Long-term outlook
- Observations and models

2.3 Dissemination

The policy brief document was sent to all stakeholder contacts on the database we have generated over the course of the project and then specifically in preparation of the policy brief meetings. Additionally, the policy brief is available at the DACCIWA homepage (http://www.dacciwa.eu) and is permanently linked with a DOI in the zenodo repository (http://doi.org/10.5281/zenodo.1476843). A coordinated press release on those contents is in preparation and will be issued in January 2019.

3 Policy brief meetings

3.1 Accra (Ghana)

3.1.1 Framework of the meeting

Organisation: The meeting was organized by Prof. Leonard Amekudzi of the DACCIWA beneficiary KNUST.

Venue: Accra, Ghana; Erata Hotel

Date: 12 October 2018

Presenters from DACCIWA: Prof. Leonard Amekudzi (KNUST), Prof. Mat Evans (UoY), Prof. Peter Knippertz (KIT), Prof. Andreas Fink (KIT)

Figure 1: Banner of the Accra policy brief meeting.

Figure 2: Participants of the Accra policy brief meeting.

3.1.2 Agenda of the Accra Meeting

Time	Activity	Person Responsible
8:30 – 9:00	Registration	
9:00 – 9:15	Opening & Welcome Address	Prof. Leonard K. Amekudzi
9:15 – 9:30	DACCIWA Overview	Prof. Dr. Peter Knippertz
9:30 – 10:00	Questions	
10:00 – 10:30	Coffee Break	
10:30 – 10:45	DACCIWA Activities in Ghana	Prof. Leonard K. Amekudzi
10:45 – 11:15	Questions	
11:15 – 11:30	Key Results [Air Pollution and Chemistry]	Dr. Mat Evans
11:30 – 12:00	Questions	
12:00 – 12:15	Key Results [Meteorology]	Prof. Dr. Andreas H. Fink
12:15 – 12:45	Questions	
12:45 – 13:00	Concluding Statement/ Vote of Thanks & Closing	
13:00 – 14:00	Lunch	
End		

3.1.3 Participant Accra Meeting

Organisation	Number of participants
Ghana Meteorological Agency	6
Ghana Ministry of Communication	1
KNUST	2
University of Ghana	2
Ghana Space Science Institute	2
German Embassy	1
Swiss Embassy	1
EU Delegation	1
Press representatives	3
Total	19

Further, we invited representatives of the following organisation that could not be present but will be provided with a policy brief document:
UK Embassy, French Embassy, Ghana Environmental Protection Agency, Ghana Ministry of Environment, Science and Technology and Innovation, Ministry of Health, WASCAL (West African Science Service Center on Climate Change and Adapted Land Use) Ghana.

3.1.4 Press coverage

Representatives of the Ghana Press Agency and the Ghana Multimedia Group Limited were present at the meeting. A video report about the meeting with interviews of the DACCIWA representatives was shown on the evening news of GBC24.

3.2 Abidjan (Côte d'Ivoire)

3.2.1 Framework of the meeting

Organisation: The DACCIWA project management together with the DACCIWA collaborators of the Université Félix Houphouët Boigny (UFHB) organized the meeting with kind assistance of the EU delegation, the Swiss Embassy and the German Embassy.

Venue: Conference room of the EU delegation in Côte d'Ivoire, Abidjan

Date: 18 October 2018

Presenters from DACCIWA: Prof. Peter Knippertz (KIT), Prof. Véronique Yoboué (UFHB), Dr. Kouamé Kouadio (Institute Pasteur Côte d'Ivoire), Dr. Céline Mari (UPS), Dr. Cyrille Flamant (SU), Dr. Cathy Liousse (UPS)

Figure 3: Policy brief meeting Abidjan during discussion.

Figure 4: Participants of the Abidjan policy brief meeting at the EU delegation.

3.2.2 Agenda

At the Abidjan meeting, which was held in French, a special focus was on the impact of air pollution in Abidjan and on the health of different groups of persons especially exposed and endangered by this air pollution.
The participants were very interested in the results and a lively discussion took place.

09:00 - 09:30 Registration
09:30 - 09:40 ***Mots de bienvenue***
M. Laloge (Délégation de l'union Européenne en Côte d'Ivoire)
Prof. Peter Knippertz - coordinateur du projet DACCIWA (Karlsruhe Institut für Technologie, Allemagne)
09:40 - 09:50 ***Introduction et campagne de mesure de DACCIWA***
Dr Celine Mari-Bontour (Directrice du Laboratoire d'Aerologie, Université de Toulouse)
09:50- 10:10 ***Activités et campagne de mesure en Côte d'Ivoire***
Prof. Véronique Yoboué (Université Félix Houphouët Boigny d'Abidjan)
Dr. Kouamé Kouadio (Institute Pasteur Côte d'Ivoire)
10:10 - 10:40 ***Pollution de l'air***
- Sources et concentration
- Impact sur la santé
- Ensemble des données d'émission
Dr. Cathy Liousse (Université de Toulouse)
10:40 - 11:00 Pause-café
11:00 - 11:30 ***Météorologie***
- L'impact de la pollution sur le temps et le climat
- ***La perspective à long terme***
- ***Les observations et les modèles météorologique***
Dr. Cyrille Flamant (Sorbonne Université)
11:30 - 11:50 ***Résultats principaux et implications pour la politique***
Dr Celine Mari-Bontour (Directrice du Laboratoire d'Aerologie, Université de Toulouse)
11:50 - 12:30 ***Discussion***
12:30 - 13:30 Déjeuner à l'hôtel Ivotel

3.2.3 Participants

Organisation	Number of participants
Ministry of the Environment	5
Ministry of Health and Public Hygiene	2
Ministry of Women, Family and Children	2
Ministry of Economy and Finances	2
Chamber of Commerce and Industry of Ivory Coast	1
Ministry of Mines and Geology	1
Environmental Agency of Côte d'Ivoire	1
German Embassy	1
Swiss Embassy	1
EU Delegation	2
Press representatives	3
Total	21

Further, we invited representatives of the following organisation that could not be present but will be provided with a policy brief document:
UK Embassy, French Embassy, Benin Embassy, GIZ, UN delegation in Côte d'Ivoire, Ministry of higher education and scientific research, Ministry of petrol, energy and renewable energies, Ministry of transport, World Bank, National Weather Service (SODEXAM), WASCAL, Climate and Clean Air Coalition Côte d'Ivoire, African development bank, Centre Suisse de la recherché scientific.

Apart from the local participants and the presenters, also ten other DACCIWA members were present and actively participated in the discussions.

3.2.4 Press coverage

Journalists of the Ivorian press agency and of the local TV channel RTI1 were present. A video report about the meeting with interviews of the DACCIWA representatives was shown in the evening news of RTI1: https://youtu.be/aa_kyanvUOQ (starting around minute 20).

Also an article in the local newspaper "Fraternité matin" was published on 19 October 2018 (see Annex 4.2).

3.2.5 Acknowledgement

Marino Cuenat (Swiss Embassy) provided valuable inputs and ideas to organize this meeting and shared important contacts with us. The German Embassy provided us with many contacts of the Ivorian Ministries. The EU delegation (Michel Laloge, Gbedji Jean DOUZO and Leonce YAO) invited us to hold the meeting in their representative central conference room, sent out the invitations and took care of other logistic issues of the meeting. We would like to thank all mentioned persons and organization for all this help, which made this meeting a great success.

3.3 Lomé (Togo)

Thanks to the organization of the German Embassy and WASCAL two meetings took place. The meeting in the morning was focused on explaining the results to policy makers and the meeting in the afternoon to local scientists.

3.3.1 Framework policy brief meeting

Organisation: The German Embassy in Togo organized the meeting in collaboration with the EU Delegation Togo, the French Embassy Togo and the DACCIWA project management.

Venue: Residence of the German Ambassador in Lomé, Togo
Date: 19 October 2018

Presenters from DACCIWA: Dr. Céline Mari (UPS), Dr. Cyrille Flamant (SU), Dr. Aristide Akpo (Université Abomey-Calavi, Benin), Dr. Adrien Deroubaix (SU), Rémi Meynadier (AXA), Marco Gaetani (CNRS), Laurent Menut (CNRS)

Figure 5: Welcome of the German Ambassador Sanders to the policy brief meeting Lomé.

Figure 6: Dr. Cyrille Flamant presenting the DACCIWA results to Togolese policy makers.

Figure 7: Participants of the DACCIWA policy brief meeting in Lomé.

3.3.2 Agenda

Ambassade de la République fédérale d'Allemagne Lomé

Union européenne au Togo

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE
AMBASSADE DE FRANCE AU TOGO

DACCIWA

Programme de la séance d'information de „DACCIWA“
le 19 Octobre 2018 à Lomé

09h30 – 10h00	**Accueil**
10h00 – 10h10	**Mots de bienvenue** SEM l'Ambassadeur d'Allemagne Christoph Sander Antonio Capone – Chef de la section Infrastructures et Environnement (Délégation de l'Union Européenne) Morgan Rohel – Chargé de mission (Ambassade de France) Dr. Cyrille Flamant – coordinateur de la campagne de terrain du projet DACCIWA (Sorbonne Université)
10h15 –10h30	**Introduction et campagne de mesure de DACCIWA** Dr. Celine Mari-Bontour (Directrice du Laboratoire d'Aérologie, Université de Toulouse)
10h30 – 10h45	**Activités et campagne de mesure au Bénin** Prof. Aristide Akpo (Université d'Abomey-Calavi)
10h45 – 11h15	**Pollution de l'air** • sources et concentration • impact sur la santé • ensemble de données d'émission Dr. Céline Mari-Bontour (Université de Toulouse)
11h15 – 11h30	**Pause-café**
11h30 – 12h00	**Météorologie** • L'impact de la pollution sur le temps et le climat • La perspective à long terme • Les observations et les modèles météorologiques Dr. Cyrille Flamant (Sorbonne Université)
12h00 – 12h20	**Résultats principaux et implications pour la politique** Dr. Céline Mari-Bontour (Université de Toulouse)
12h20 – 13h00	**Discussion**
13h00 – 14h00	**Déjeuner sur place**

3.3.3 Participants

Organisation	Number of participants
ASECNA (Agence pour la sécurité de la navigation aérienne)	2
Ministry of agriculture	2
National environment agency (ANGE)	2
Togo weather service	2
Ministry of Mines and Energy	2
Ministry of Water and Mines Benin	1
GIZ (Deutsche Gesellschaft für internationale Zusammenarbeit)	1
German Embassy	2
French Embassy	1
EU Delegation	1
Press representatives	1
Total	17

Further, we invited representatives of the following organisation that could not be present but will be provided with a policy brief document:
WASCAL, OMS (WHO), Ministry of health and the social protection, Ministry of Environment Benin.

3.3.4 Press coverage

A journalist of the newspaper Savoir news was present at the meeting and a newspaper article was published at 20 October 2019 (link or see Annex 4.3).

3.3.5 Acknowledgement

The German Embassy with Judith Wilke and Ambassador Sanders was the leading organization for the meetings. They invited us to hold the meeting at a representative conference room at the German Embassy, provided us with many contacts and sent out the invitations. Further, they took care of other logistic issues of the meeting. The French Embassy (represented by Morgan Rohel) and the EU Delegation (represented by Antonio Capone) collaborated actively in the organization. We would like to thank all mentioned persons and organization for all this help, which made this meeting a success.

3.3.6 Framework University meeting Lomé

Organisation: The German Embassy in Togo initiated this meeting that was organized by WASCAL

Venue: University of Lomé, Togo
Date: 19 October 2018, 15:00-17:00

Presenters from DACCIWA: Dr. Céline Mari (UPS), Dr. Cyrille Flamant (SU), Dr. Aristide Akpo (Université Abomey-Calavi, Benin), Dr. Adrien Deroubaix (SU), Rémi Meynadier (AXA), Marco Gaetani (CNRS), Laurent Menut (CNRS)

Figure 8: Rémi Meynadier presenting the DACCIWA results at the University of Lomé.

3.3.7 Agenda University Meeting

The presentations followed the same agenda as for the policy brief meeting.

3.3.8 Participants Science Meeting

Organisation	Number of participants
ASECNA (Agence pour la sécurité de la navigation aérienne)	1
ANAC	2
Togo weather service	8
CEC Afrique	1
National agency of the civil protection	1
University of Lomé	9
WASCAL	2
Ministry of the Environment Togo	1
Ministry of the Environment Benin	1
Total	26

3.3.9 Acknowledgement

We would like to thank WASCAL Togo for the organization of this meeting.

3.4 Brussels (Belgium) 15 November 2018 together with BACCHUS

3.4.1 Framework policy brief meeting Brussels

Organisation: The meeting was organized by the DACCIWA project management.

Venue: Kooperationsstelle EU der Wissenschaftsorganisationen (KoWi), Rue du Trône 98 / 8. Etage, B-1050 Brussels
Date: 15 November 2018, 12:30-16:30

Presenters from DACCIWA: Prof. Mat Evans (UoY), Prof. Peter Knippertz (KIT), Prof. Andreas Fink (KIT)

Presenters from BACCHUS: Prof. Ulrike Lohmann (ETHZ), Prof. Ken Carslaw (UNIVLEEDS), Dr. Julia Schmale (Paul Scherrer Institute, Switzerland)

Figure 9: Prof. Peter Knippertz presenting the DACCIWA results at the Brussels meeting.

Figure 10: Representatives of BACCHUS and DACCIWA discussing with policy makers in Brussels

3.4.2 Agenda

- 12:30 Welcome with light lunch
- 13:30 Policy relevant key conclusions of DACCIWA (presentation and discussion)
    - Air pollution and health
    - Weather and climate

  Speakers DACCIWA:
    - *Prof. Dr. Peter Knippertz (Karlsruhe Institute of Technology, Coordinator DACCIWA)*
    - *Prof. Dr. Andreas Fink (Karlsruhe Institute of Technology)*
    - *Prof. Dr. Mathew Evans (University of York*)
- 14:50 Coffee break
- 15:10 Policy relevant key conclusions of BACCHUS (presentation and discussion)

  Speakers BACCHUS:
    - *Prof. Dr. Ulrike Lohmann (ETH Zürich, Coordinator of BACCHUS)*
    - *Prof. Dr. Ken Carslaw (University of Leeds)*
    - *Dr. Julia Schmale (Paul Scherrer Institut, Switzerland)*
- 16:30 End of Meeting

3.4.3 Participants

Organisation	Number of participants
European Commission DG RTD Unit I4 – Climate Action and Earth Observation	3
European Commission EASME - Executive Agency for SMEs	2
European Parliament Intergroup on "Climate Change, Biodiversity and Sustainable Development"	1
European Climate Research Alliance	1
Clora (Club des Organismes de Recherche Associés)	1
White Rose Brussels	1
Total	9

Further, we invited representatives by mail and some with additional telephone calls of the following organisation (around 70 persons in total) that could not be present but will be provided with a policy brief document:

- EC Unit Strategy I.1
- EC DG CLIMA, Climate Change Adaptation
- EC DG RTD – Food
- EC DG RTD, Unit Sustainable Development I.3;
- EC DG Santé
- Helmholtz Office Brussels
- Delegation of Germany in Brussels
- Climate Action Network Europe
- Joint Programming Initiative – Climate
- Members of the European Parliament
- Consulat Géneral Ambassade du Benin Brussels
- Embassy of Ghana in Brussels
- Embassy of Cote d'Ivoire at Brussels
- Embassy of Togo in Brussels
- Embassy of Nigeria in Brussels
- United Nations
- European center for development policy
- The European Environmental Bureau
- Sustainable agricultural initiative
- EPPA
- RDC Environment
- Deutsche Gesellschaft für internationale Zusammenarbeit GmbH (GIZ)

3.4.4 Acknowledgement

KoWi offered us their room for the meeting and organized the catering. Our former PO Aurelian Chitu provided us with relevant contacts within the European Commission to be invited. Angela Richter from the Helmholtz liaison office in Brussels provided further contacts and valuable advice on how to structure this meeting. The White Rose organization (a group of the universities of Leeds, York and Sheffield) sent out invitations to about 50 additional relevant stakeholders. The CLORA (Club des Organismes de Recherche Associés) and Swisscore organisations encouraged more persons to participate at our meeting. We would like to thank all mentioned persons and organisations for these efforts that are much appreciated.

4 Annexes

4.1 Policy brief document

DACCIWA
Dynamics-aerosol-chemistry-cloud interactions in West Africa

Policy-relevant findings of the **DACCIWA project**

funded by the European Commission

Acknowledgements

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DACCIWA
Dynamics-aerosol-chemistry-cloud interactions in West Africa

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France

SAFIRE

Germany

Technische Universität Braunschweig

Ghana

Ghana Meteorological Agency

Togo

Université of Lomé

United Kingdom

British Antarctic Survey

Key Findings

The EU funded project Dynamics-Aerosol-Chemistry-Cloud Interactions in West Africa (DACCIWA) produced the most comprehensive observational dataset of the atmosphere over southern West Africa to date. Analysing this dataset in combination with results of numerical modelling has led to the following conclusions:

Air pollution concentrations and sources

- Concentrations of small particles frequently exceed World Health Organization limits in southern West African cities.
- Annual concentration of gaseous pollutants do not currently exceed air quality guidelines but short term peaks may.
- Concentrations of small particles are highest in the dry season.
- During the rainy (summer) season, smoke from fires in Central Africa make a substantial contribution to air pollution in southern West Africa.

Health impacts

- The high particle concentrations in southern West African cities present substantial risks to public health and intensify common medical problems.
- The pollution impact is strongest in the rainy season and depends on pollution source.
- Domestic fires appear to be the most significant health risk due to extreme concentration levels.
- More aerosol observations, increased access to health statistics and associated socioeconomic data are needed.

Emissions

- Standard global estimates of human emissions are significantly underestimated for southern West Africa.
- Emissions of particles and organic gases from vehicles in southern West African cities are higher than those in other locations.
- Burning seemingly similar materials may lead to very different emissions.
- The underestimate in southern West African emissions likely leads to an underappreciation of the impacts of air pollution.

Pollution impacts on weather and climate

- A further increase in manmade pollution in southern West Africa will have a small effect on cloud properties due to the already high aerosol burden.
- An increased aerosol amount and/or shift to more water-loving particles will reduce the amount of sunlight reaching the Earth's surface, impacting on the circulation, clouds and possibly rainfall.
- More research is needed to better quantify the impacts of anthropogenic particles in southern West Africa.

Long-term outlook

- Temperatures over West Africa are projected to rise by 1 to over 3°C by 2050 depending on geographical location, emission scenario and model used.
- Even the sign of future changes in rainfall remains highly uncertain.
- Pollution exposure in the future will be influenced by local and remote anthropogenic emissions and altered patterns of transport and dust emissions.

Observations and models

- An adequate air quality monitoring system is absent in southern West Africa.
- The meteorological station network is sparse and existing data are not always available for research.
- Satellite observations provide a wealth of information but need more validating.
- Computer models still struggle to realistically represent the complex atmospheric dynamics and chemistry in West Africa.

Implications for policy

Improve air quality

- Reduce emissions associated with domestic burning. Alternative fuels and stoves using gas or electricity would help to achieve this (http://cleancookstoves.org).
- Reduce biomass burning locally in West Africa and work with Central African countries to reduce their enormous fire emissions.
- Establish regulations to reduce the sulfur content of fuels and to modernize the fleet of two wheel, four wheel and heavy goods vehicles.
- Work with Sahelian countries to reduce land degradation and thus dust emission.

Improve emission inventories

- Improve access to reliable socio-economic data for countries, regions and cities.
- Encourage studies on regionally specific emissions factors for activities such as waste burning, transport and domestic combustion.

Improve observations

- Install networks for long-term measurements of air pollutants focusing on cities and suburban areas.
- Sustain and expand networks for observations of meteorological data (e.g. surface stations and weather balloons), including an adequate sampling of the daily cycle.
- Make all these observations accessible to the international research, weather forecasting and climate community.

Support research and capacity building

- Fund and support follow-up research activities in Africa and Europe to work on the many open questions left at the end of DACCIWA.
- Support building capacity in weather, climate and air pollution science in Africa.
- Support improvements of computer models and satellite datasets for West Africa.

Introduction

Funded by €8.75M from the European Commission's Framework 7 programme the Dynamics-Aerosol-Chemistry-Cloud Interactions in West Africa (DACCIWA) project investigated the processes controlling air pollution, atmospheric composition, weather and climate over southern West Africa and their influence on health.

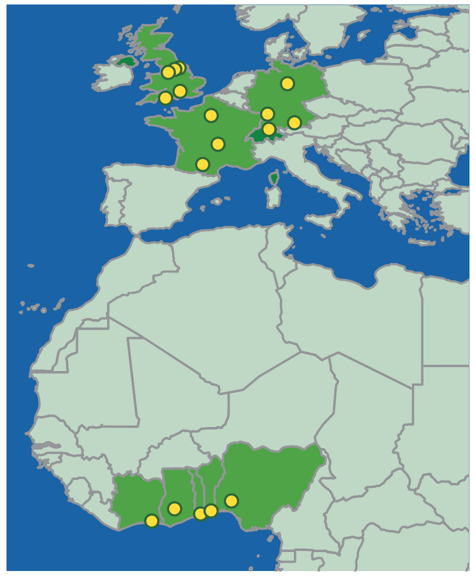


Figure 1. Yellow dots indicate location of the DACCIWA partners and collaborators. Shading shows countries involved in the project.

The project website **http://www.dacciwa.eu** hosts information about the project. The observational dataset is available from **http://baobab.sedoo.fr/DACCIWA**

Over the last 2 years DACCIWA scientists have been analysing data collected over West Africa from field programmes and satellites. This document outlines their initial policy relevant conclusions.

The field campaigns

A major component of the project was the collection of new measurements of the atmosphere over this observation-sparse region.

During June-July 2016 extensive measurements were made from three surface meteorological supersites, eleven meteorological balloon launch sites and three research aircraft (Figure 2). In addition, measurements of urban pollution were made from 4 air quality sites between 2015 and 2017.

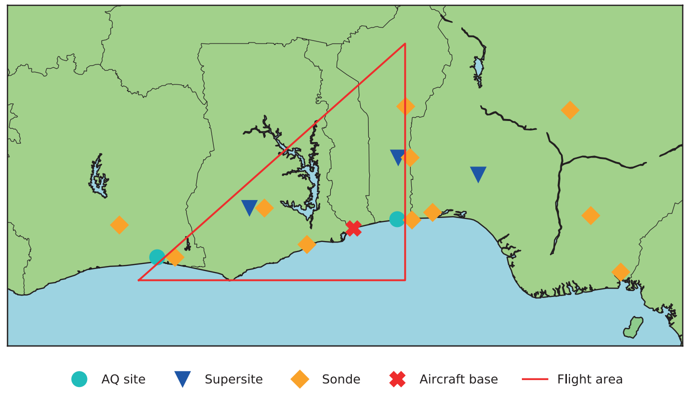


Figure 2. Location of measurement sites during the DACCIWA campaigns in 2016. Air Quality (AQ) sites measured the concentration of air pollutants. Supersites measured a range of meteorological and chemical parameters. Meteorological balloon sondes were released from 11 sites, partly in collaboration with West African weather services. Three research aircraft were based in Lomé (Togo) and sampled inside the red triangle.

The project had partner and collaborator institutions from Benin, Côte d'Ivoire, France, Germany, Ghana, Nigeria, Switzerland, Togo and the United Kingdom.

Air pollution concentrations and sources

Air pollution is a key global risk with the World Health Organisation (WHO) estimating 8 million people a year dying prematurely from breathing polluted air. DACCIWA made observations from the ground and from the air, to measure the concentrations and sources of air pollutants.

Concentrations of small particles frequently exceed WHO limits in southern West African cities.

Measurements of small particles suspended in the air (known as PM2.5) were made in the cities of Abidjan and Cotonou [Djossou et al. 2018]. The sites were close to major sources of air pollution: waste burning at a local landfill site, motor vehicles and domestic fires for cooking. All sites show PM2.5 concentrations almost continuously above 10 µg m^{-3} (the WHO annual limit) and regularly above 25 µg m^{-3} (WHO 24 hour limit) (Figure 3). These concentrations are higher than those typical for European cities but are less than those in Asia.

Annual concentration of gaseous pollutants do currently not exceed air quality guidelines but short term peaks may.

Long-term observations do not exist for gaseous pollutants (ozone O_3, nitrogen dioxide NO_2, sulfur dioxide SO_2) in southern West African cities. For DACCIWA bi-monthly surface observations were made during 2015-2017 at the four air quality measurement sites as well as the airborne observations during the summer of 2016. These pollutants did not exceed WHO limits [Bahino et al. 2018]. However, it seems likely that NO_2 exceedance could occur on specific days.

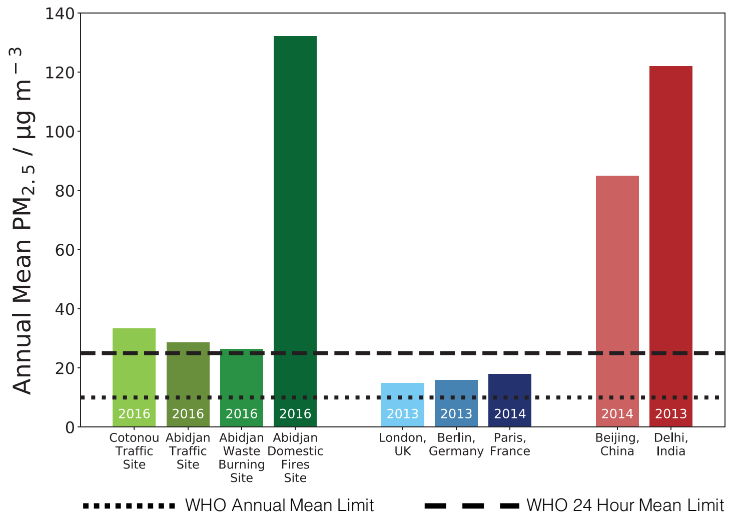


Figure 3. Observations of PM2.5 collected by the DACCIWA project from four sites in West Africa together with equivalent measurements made in Europe and Asia. Abidjan domestic burning site is indicative of an indoor site other sites represent the outdoor concentration. Dotted line indicates WHO annual standard, dashed line WHO 24 hour standard. Data from non-African cities comes from http://www.who.int/phe/health_topics/outdoorair/databases/cities/en/.

Concentrations of small particles are highest in the dry season.

The highest monthly PM2.5 concentrations are seen in the dry (winter) season (Figure 4). This is due to a combination of enhanced desert dust from the Sahara and smoke from the burning of savannah / agricultural land within southern West Africa on top of the local human pollution. Local wood burning emissions maximize in the rainy (summer season) due to less efficient burning of wet wood. The same seasonality was seen for other pollutants such as NO_2.

During the rainy (summer) season, smoke from fires in Central Africa make a substantial contribution to air pollution in southern West Africa.

Changes in the circulation and rainfall in the wet (summer) season, reduce the impact of desert dust and local agricultural and savannah fires. However, smoke from savannah and agricultural burning in Central Africa can be blown thousands of kilometers to the coast of southern West Africa (Figure 5). Remarkably, in these months 20–40% of the particle mass is produced from these Central African fires and transported into the region.

Air pollution in southern West African cities has a complex mix of sources which changes over the year, but is often above WHO levels with implications for human health.

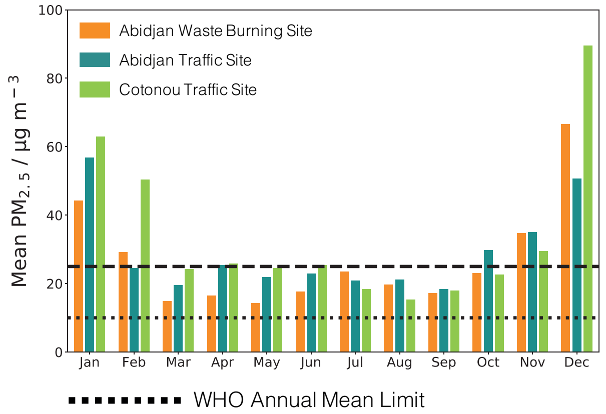


Figure 4. Monthly mean concentration of PM2.5 observed from Abidjan and Cotonou. Dotted line indicates WHO annual standard, dashed line WHO 24 hour standard.

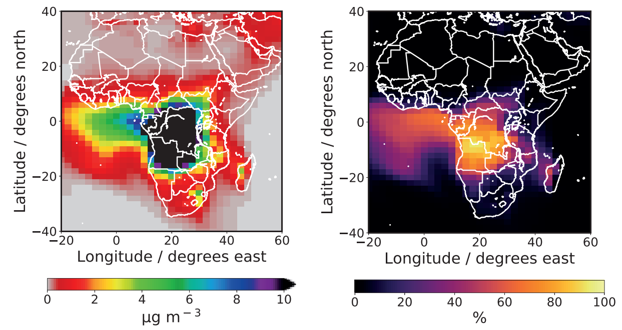


Figure 5. Absolute (left) and fractional (right) contribution of Central African agricultural and savannah burning, to June and July mean surface small particles concentrations, derived using the GEOS-Chem chemistry transport model. Over the coast of southern West Africa 25%-50% of the small particles come from fires in Central Africa.

Health Impacts

High concentrations of aerosols have an adverse impact on health through increased respiratory, cardiac and dermatological illness. A halving of air pollution emissions in Africa could reduce air quality deaths by a third [Liousse et al., 2014]. DACCIWA focused on the cities of Abidjan and Cotonou and for the first time investigated how the local population is impacted.

The high particle concentrations in southern West African cities present substantial risks to public health and intensify common medical problems.

Using the number of medical visits as a proxy for adverse health outcomes, long term relative risk values were calculated for each municipality in Abidjan. This describes the relationship between long-term exposure to PM2.5 and respiratory, cardiac and dermatologic health, as well as emergency room mortality. We estimate the number of visits to the emergency room could be reduced by 3–4% for respiratory or cardiac issues and that up to 4% of emergency room mortalities could be avoided with a reduction of PM2.5 concentrations to the WHO recommended limit of 10 µg m^{-3}.

The pollution impact is strongest in the rainy season and depends on pollution source.

Analyses for all three measuring sites in Abidjan show significant correlations between the number of hospital visits and PM2.5 concentrations, primarily during the rainy

Due to the extreme concentration levels domestic fires are a huge health risk, while the risks from heavy traffic or waste burning were less extreme.

(summer) season. This suggests that humidity may play a significant role in the interaction between particulate matter and health, possibly through helping bring pollutants into the lungs. The associations we see between particulate matter and health outcomes differ for each metropolitan area, suggesting not only the concentration levels, but also the source of PM2.5 should be taken into consideration when addressing air quality impacts on health.

These are the first health research results for Abidjan showing the associations between PM2.5 and emergency room visits for respiratory and cardiac problems (~3% increase in risk), as well as emergency room mortality (~4% increase in risk) and respiratory visits to outpatient health centres.

Domestic fires appear to be the most significant health risk due to extreme concentration levels.

Due to the extreme concentration levels (see previous section) domestic fires are a huge health risk, while the risks from heavy traffic or waste burning were less extreme. As this study focused more generally on the inhabitants of the neighbourhoods around the DACCIWA measuring sites, rather than specifically on bus drivers, people working in food preparation or at the landfill site, our results may be obscuring the serious risk associated with long periods of time near a significant emission source.

In-vitro experiments with aerosols taken from the four air quality sites show that primary organic matter particles cause the most inflammation. Thus the highest inflammatory impact on people occurs in the wet season at the domestic burning site.

Personal exposure measurements on different groups of the people around these sites showed that the health risk was highest for children in waste burning sites due to heavy metals, whereas for women the risk was highest in the domestic burning site in summer due to organic matter.

Sociological studies have shown significant differences between the occupational status of individuals and their vulnerability to air pollution in the four air quality sites.

More aerosol observations, increased access to health statistics and associated socioeconomic data are needed.

This study presents the first results of an epidemiological study on cardiorespiratory impacts of air pollution in the Guinea Coastal region using local measurements. We suspect that a larger, more significant effect would be observed with more detailed data. Both detailed health statistics and continuous, repeated pollutant measurements are necessary to improve epidemiological results and provide a deeper understanding of health impacts on urban, tropical metropolitan areas. Including socioeconomic information may also provide a lever to further understand the data, as not all inhabitants are equally likely to visit a doctor.

Figure 6. Food preparation produces large quantities of smoke and particulate matter. These fires in Yopougon, Abidjan, Côte d'Ivoire are responsible for the highest pollutant concentrations measured, yet primarily affect women and children.

Figure 7. A women brings her infant into see the doctor at the Soeur Catherine Medical Center in Yopougon, Abidjan, Côte d'Ivoire.

Emissions

To produce useful air pollution control strategies, estimates need to be made of the magnitude of the different emission sources. DACCIWA calculated new emissions for Africa, evaluated them against standard international emissions and against local observations.

Standard global estimates of human emissions are significantly underestimated for southern West Africa.

The EDGAR dataset [Crippa et al., 2018] is the global standard for air pollutant emissions. It can be inaccurate, especially in regions which have not been extensively studied. DACCIWA constructed new emissions [Keita et al., 2018] which used Africa specific information. Figure 8 shows a comparison between the mass of key air pollutants emitted over southern West Africa by the EDGAR and DACCIWA inventories, together with an emissions dataset that exploits the DACCIWA observations to optimize the emissions. For many species the EDGAR data underestimate the emissions in the region.

Emissions of particles and organic gases from vehicles in southern West African cities are higher than those in other locations.

DACCIWA made direct measurements of the particles and organic gases emissions from individual vehicles in Côte d'Ivoire [Keita et al., 2018]. They were significantly higher than had been assumed for the region (Figure 9). Old gasoline vehicles are more polluting (factor of a thousand) than new vehicles. Older diesel vehicles were only a factor of five worse. New four-stroke engines have significantly lower emissions than new two-stroke engines.

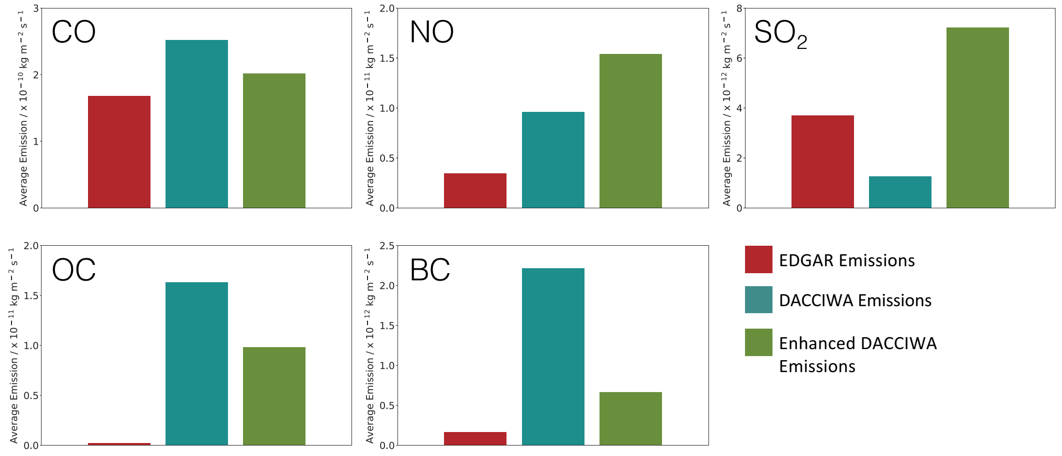


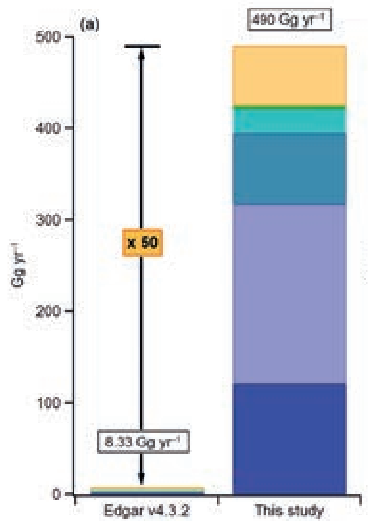
Figure 8. Comparison of average annual emission of CO, NO, SO_2, Organic Carbon and Black Carbon from southern West Africa as calculated by the EDGAR and DACCIWA emissions inventories together with an enhanced DACCIWA emissions datasets which exploits the DACCIWA observations to optimize the DACCIWA emissions inventory.

Burning seemingly similar materials may lead to very different emissions.

Keita et al. [2018] found that the emissions of particles from domestic fires depend strongly on the type of wood burnt. Hevea wood was found to be the largest emitter. The manufacture of charcoal is a big source of particles, and emissions from waste burning are high and offer a risk to health.

The underestimate in southern West African emissions likely leads to an under appreciation of the impacts of air pollution.

As global estimates of the human health impact of pollutants often use the EDGAR emissions, these estimates will likely underestimate the impact of PM2.5 on human health in southern West Africa. This may influence global health choices.



Standard global estimates of human emissions are significantly underestimated for southern West Africa.

Figure 9. Mass of organic compound emitted by the transport sector from Côte d'Ivoire estimated by the EDGAR emissions (left) and by the DACCIWA project (right). There is a 50 fold underestimate in the emissions inventory for these compounds. Figure taken from [Keita et al., 2018].

Pollution impacts on weather and climate

A key uncertainty in our assessment of future climate change is how aerosol – tiny particles in the air – interact with the atmosphere, specifically by scattering or absorbing sunlight either themselves or through their influence on cloud properties. DACCIWA has specifically investigated this issue for southern West Africa for the first time.

A further increase in manmade pollution in southern West Africa will have a small effect on cloud properties due to the already high aerosol burden.

Clouds form through condensation of water vapour on particles. Changes in their number and characteristics can thus affect cloud properties and also precipitation.

Over southern West Africa, however, the concentration of particles from local emissions and smoke imported from Central Africa (Page 13) is already so high that there are always enough particles and further increases merely change cloud properties. A deterioration in particle pollution will, therefore, have a small effect on rainfall through changes in cloud properties (Figure 10).

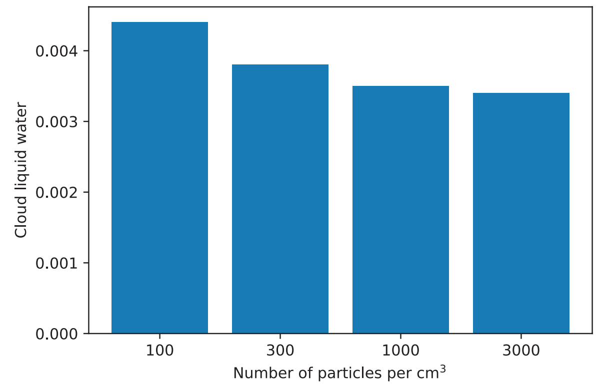


Figure 10. Total column liquid water across West Africa from the Met Office Unified Model for the 4th June 2016 using four different aerosol concentrations. Only the 100 cm^{-3} simulation representing very clean conditions shows appreciable differences in atmospheric liquid water content compared to the others. Typical concentrations of aerosol over West Africa are 500–1000 cm^{-3}.

An increased aerosol amount and/or shift to more water-loving particles will reduce the amount of sunlight reaching the Earth's surface, impacting on the circulation, clouds and possibly rainfall.

Aerosols also reduce the amount of sunlight reaching the Earth's surface. In a humid environment such as southern West Africa during the summer monsoon, aerosol particles can take up water, increasing their dimming effect by 5 to 7 times [Haslett et al., 2018]. Reductions in surface heating of 20 Wm^{-2} are seen [Deetz et al., 2018b]. This decreases the temperature contrast between land and sea and so delays the inland progression of the coastal front during the late afternoon and evening by up to 30 km (Figure 11, left) and the daytime development from low layer-clouds to deeper, more patchy clouds by 1–2 hours (Figure 11, right). There are first indications that the dimming leads to a reduction in rainfall, with possible impacts on food production, water availability and hydropower. The reduction of direct sunlight also affects plants and photovoltaic electricity generation. Increasing aerosol emissions and/or a shift to particles that more easily take up water such as sulfates or nitrates will exacerbate these impacts.

More research is needed to better quantify the impacts of anthropogenic particles in southern West Africa.

DACCIWA has demonstrated that interactions between aerosol particles, clouds, precipitation and sunlight over southern West Africa are complex. Several new processes have been discovered such as the coastal front and the relevance of water uptake. Yet, many details are unclear, for example how larger drops falling through the cloud from its top redistribute cloud water and thus change cloud lifetime [Dearden et al., 2018]. High sensitivities and compensating effects, together with variations with distance from the coast and time of day, make a quantitative analysis very challenging. Substantial uncertainties remain due to both limited observational data – even after the DACCIWA field campaigns – and large differences between computer models of different resolution and complexity.

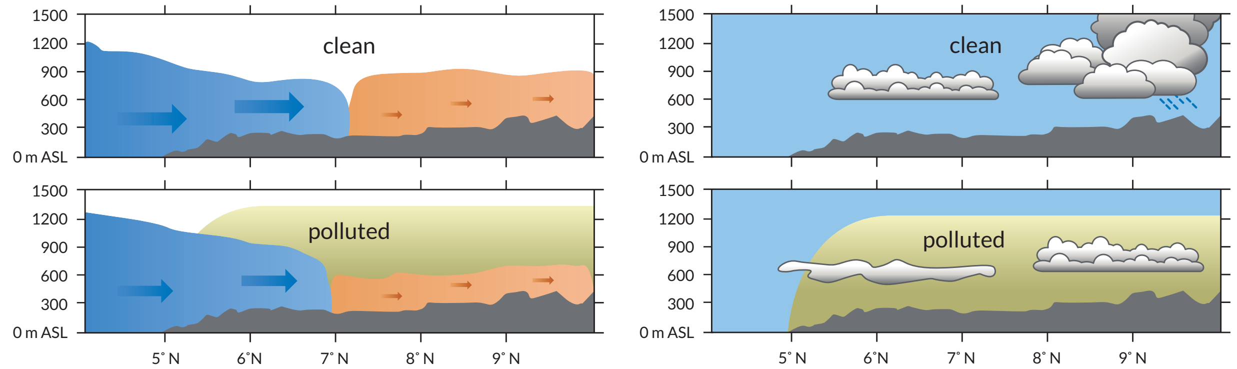


Figure 11. South–north vertical transects through southern West Africa illustrating impacts of pollution on clouds and precipitation (right) and the coastal front, a daily feature that moves inland during the evening and night (left). In the polluted case (bottom) the front is delayed relative to the clean case (top), which is related to reduced surface heating leading to a shallower and less warm layer over land and weaker inflow of cool maritime air. With respect to clouds reduced heating during the day leads to a delayed transition from shallow layer-clouds to deeper (potentially raining) clouds.

Long-term outlook

The future state of the atmosphere over southern West Africa is critically important for human health, food production and the economy. Local changes need to be considered within the context of a globally changing climate. DACCIWA has used computer models to investigate which factors are relevant for future developments.

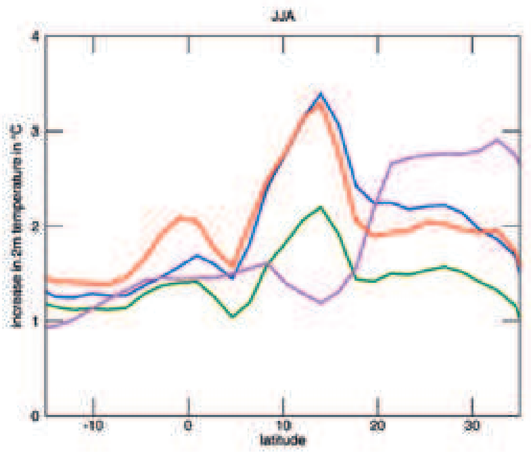


Figure 12. Increase in summer (June to August) near surface temperature between the present day and 2050 from a climate model under different assumptions. Blue, red, and magenta lines indicate simulations assuming a scenario with high emissions of climate gases; the green line is a low emission scenario. The blue, red and magenta lines indicate different assumptions about sea-surface temperatures, cloud-aerosol interactions and vegetation

Temperatures over West Africa are projected to rise by 1 to over 3°C by 2050 depending on geographical location, emission scenario and model used.

In line with projections for global warming, temperatures in southern West Africa will likely increase considerably from now until the middle of the 21st century. However, the exact size of this increase remains uncertain. DACCIWA has investigated several factors that determine the size of the increase in the summer June–August (Figure 12):

1) **Proximity to the ocean:** The temperature rise along the Guinea Coast will tend to be smaller than farther inland.
2) **Emission of climate gases:** For a low emission scenario (green line in Figure 15), temperature increases are mostly below 2°C across entire northern Africa but could exceed 3°C for high emissions (red, blue and magenta lines in Figure 12).
3) **Ocean:** Different assumptions about sea-surface temperature evolution have a small impact on the magnitude of the warming inland (compare blue and red lines in Figure 12).
4) **Aerosol, vegetation and other factors:** Warming is very sensitive to how vegetation and interactions between aerosol and clouds are represented in a climate model (compare blue and magenta lines in Figure 12).

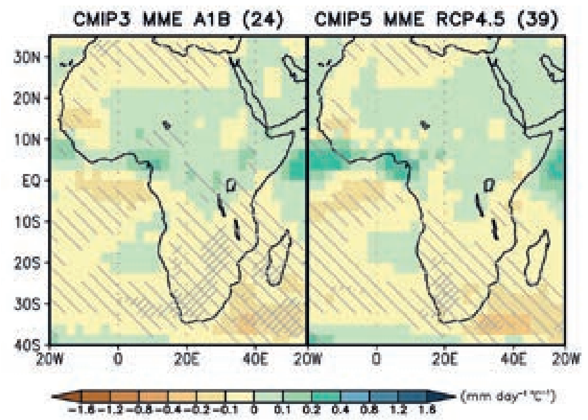


Figure 13. Change in June to September average rainfall for Africa in 2080–2099 with respect to 1986–2005. Left: SRES A1B scenario (CMIP3, 24 models); right: RCP4.5 scenario (CMIP5, 39 models). Precipitation changes are normalized by the global annual mean surface air temperature changes in each scenario. Light/dense hatching denotes where more than 66%/90% of models (or members) have the same sign with the ensemble mean changes. Taken from IPCC Fifth Assessment Report (IPCC 2013, Figure 14.23).

Even the sign of future changes in rainfall remains highly uncertain.

Computer models still struggle to realistically represent the West African monsoon [e.g. Hannak et al. 2017]. The last two IPCC multi-model assessments (CMIP3 and CMIP5) both show a rainfall increase along the Guinea Coast until the end of the 21st century but with a very low agreement between different models, even about the sign of the change (Figure 13). This impedes an assessment of the frequency of future droughts and floods. DACCIWA model experiments further confirm large sensitivities, showing that our understanding of future precipitation in the region remains to be poor.

Pollution exposure in the future will be influenced by local and remote anthropogenic emissions and altered patterns of transport and dust emissions.

Increased population and economic development over the next decades will likely lead to increased emissions of man-made aerosol and gaseous pollutants. At the same time, a changing climate will influence how much desert dust and biomass burning smoke is produced and transported into the region, while changes in rainfall will change the lifetime of these particles. Thus predicting the overall human exposure to pollutants is challenging. DACCIWA modelling results indicate that a potential increase in anthropogenic aerosol concentrations may be partly compensated by a decrease in dust concentrations during winter, while summer changes are more locally controlled (Figure 14). Evaluations of multiple modelling systems with different local emission scenarios will be needed to enhance confidence in future air pollution projections over the region.

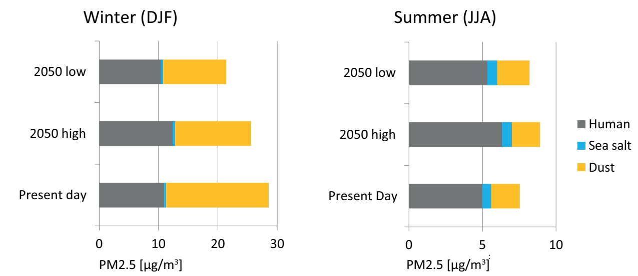


Figure 14. Multi-seasonal mean surface PM2.5 concentrations averaged over southern West Africa for December–February (left) and June–August (right). "low" and "high" refers to different scenarios of local emissions of air pollutants which remain highly uncertain.

Observations and models

High quality and accessible meteorological and air quality data are largely missing in Africa. This slows advances in weather forecasting, impedes solution to air pollution and leads to uncertainty in climate change prediction. DACCIWA has collected a plethora of data, made it freely available, and pinpointed deficiencies in how computer models represent the West Africa monsoon.

An adequate air quality monitoring system is absent in southern West Africa.

Historically, the long-term, publically accessible, monitoring of air pollutants has been the basis of assessing air quality and producing efficient solutions. The lack of this of data means that our understanding air quality in southern West Africa remains poor. Local, daily measurements of primary pollutants such as NO_x, SO_2, O_3 and particles are needed. Potentially other chemicals such as poly-aromatic hydrocarbons and heavy metals may play a disproportionately important role in West Africa (as they did historically in Europe). They should be monitored to assess their impact which is currently unknown.

The meteorological station network is sparse and existing data are not always available for research.

Meteorological observations have economic benefits that far exceed the expenses of their collection (http://www.wmo.int/pages/prog/amp/ pwsp/documents/wmo_1153_en.pdf). They are critical for producing accurate weather forecasts, to establish efficient early warning systems and to monitor climate change. Africa is notorious for its poor coverage of available data (Figure 15). DACCIWA established short term, state-of-the art meteorological networks and made the data freely available for research. It has also demonstrated how better data can advance our

A lack of observations of meteorology and air pollution in Africa holds back understanding.

understanding of the West African monsoon system which will ultimately lead to improved weather forecasts.

Making the case of an improved, open-access meteorological observing system in Africa to policymakers and wider society should be seen as a priority. Clearly, African National Weather Services need support to monitor weather and climate, and also to establish data centres that could also provide access to the currently unavailable historical data.

Satellite observations provide a wealth of information but need more validating.

Satellite observations can help supplement this lack of surface observations but there are limitations on their use. Real-time monitoring of rainfall is one of the grand challenges due to the immense socio-economic value of precipitation. Data from a dense rain gauge network around Kumasi set up by DACCIWA, show that satellite-based rainfall estimation have large errors and poorly sample extreme rainfall events (Figure 16). Although satellite observations of air pollutant concentration are available at increasing resolutions, they are still unable to capture spatial or temporal variations suitable for health. They can, however, provide useful regional climatologies for assessing model performance.

To capitalize on satellite-sensed parameters, ground truth for calibration is essential. The lack of observations in the region makes this difficult.

Computer models still struggle to realistically represent the complex atmospheric dynamics and chemistry in West Africa.

Computer models still struggle to realistically simulate the weather, climate and air pollution of West Africa. Even high-resolution, state-of-the-art weather forecasting models cannot reproduce the observed south–north distribution of rainfall and sensitivities to model resolution are immense (Figure 17). Generally, the quality of daily weather forecasts in southern West Africa is low [Vogel et al. 2018] and the credibility of future changes in rainfall is limited (see Figure 13).

DACCIWA has shown that one issue is the poor representation of the extensive and persistent low-level clouds. These clouds are important in regulating the amount of solar radiation reaching the surface and the rainfall [Kniffka et al. 2018]. In addition, DACCIWA research has shown that including aerosols improves seasonal forecasts for Africa [Benedetti and Vitard, 2018].

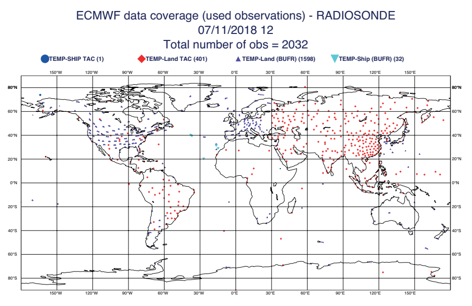


Figure 15. Meteorological sondes available to international meteorological services for inclusion into weather forecasts on 7th November 2018 at 12 UTC. Africa stands out as a continent with poor data coverage. Figure provided by European Centre for Medium-Range Weather Forecasts (ECMWF).

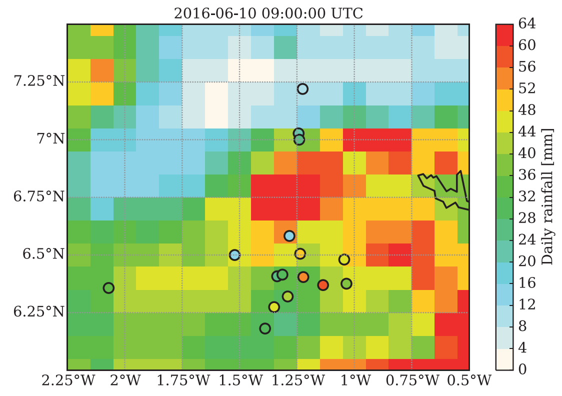


Figure 16. Daily rainfall measured on 10 June 2016, 0900 UTC by the Kumasi rain gauge network (coloured dots) and estimated by the satellite product "Integrated Multisatellite Retrievals for GPM" (IMERG, Version 5). The rain gauge network has been fully operational since December 2015 and is maintained by the Kwame Nkrumah University of Science and Technology (KNUST).

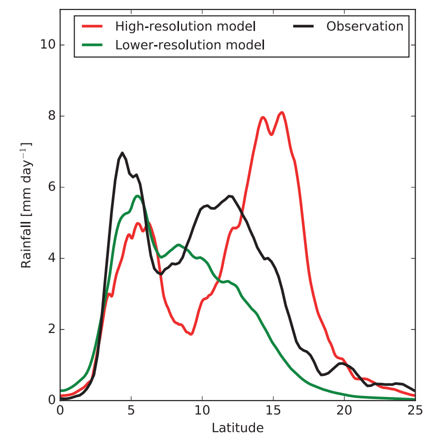


Figure17. North–south distribution of rainfall averaged from 8°W to 8°E in July 2006. Shown are satellite-based observations (black) and simulations with the ICON model currently operational at the German Weather Service in high-resolution (red) and somewhat lower resolution (green). All curves are smoothed for better visibility. Figure adapted from Kniffka et al. [2018]).

Journal publications produced by DACCIWA

Adler B, Babić K, Kalthoff N, Lohou F, Lothon M, Dione C, et al. **Nocturnal low-level clouds in the atmospheric boundary layer over southern West Africa: an observation-based analysis of conditions and processes.** Atmos Chem Phys Discuss. 2018;1–31. https://www.atmos-chem-phys-discuss.net/acp-2018-775/

Adler B, Kalthoff N, Gantner L. **Nocturnal low-level clouds over southern West Africa analysed using high-resolution simulations.** Atmos Chem Phys 2017;17(2):899–910. https://www.atmos-chem-phys.net/17/899/2017/

Amekudzi LK, Osei MA, Atiah WA, Aryee JNA, Ahiataku MA, Quansah E, et al. **Validation of TRMM and FEWS Satellite Rainfall Estimates with Rain Gauge Measurement over Ashanti Region, Ghana.** Atmos Clim Sci 2016;06(04):500–18. http://www.scirp.org/journal/doi.aspx?DOI=10.4236/acs.2016.64040

Amekudzi L, Yamba E, Preko K, Asare E, Aryee J, Baidu M, et al. **Variabilities in Rainfall Onset, Cessation and Length of Rainy Season for the Various Agro-Ecological Zones of Ghana.** Climate 2015;3(2):416–34. http://www.mdpi.com/2225-1154/3/2/416

Aryee JNA, Amekudzi LK, Atiah WA, Osei MA, Agyapong E. **Overview of surface to near-surface atmospheric profiles over selected domain during the QWeCI project.** Meteorol Atmos Phys 2018;1–15. **http://link.springer.com/10.1007/s00703-018-0618-1**

Babić K, Adler B, Kalthoff N, Andersen H, Dione C, Lohou F, et al. **The observed diurnal cycle of nocturnal low-level stratus clouds over southern West Africa: a case study.** Atmos Chem Phys Discuss 2018; 1–29. https://www.atmos-chem-phys-discuss.net/acp-2018-776/

Bahino J, Yoboué V, Galy-Lacaux C, Adon M, Akpo A, Keita S, et al. **A pilot study of gaseous pollutants' measurement (NO_2, SO_2, NH_3, HNO_3 and O_3).** Atmos Chem Phys 2018;18(7):5173–98. https://www.atmos-chem-phys.net/18/5173/2018/

Bärfuss K, Pätzold F, Altstädter B, Kathe E, Nowak S. **New Setup of the UAS ALADINA for Measuring Boundary Layer Properties, Atmospheric Particles and Solar Radiation.** Atmosphere 2018;9(1):28. http://www.mdpi.com/2073-4433/9/1/28

Benedetti A, Reid JS, Knippertz P, Marsham JH, Di Giuseppe F, Rémy S, et al. **Status and future of numerical atmospheric aerosol prediction with a focus on data requirements.** Atmos Chem Phys 2018;18(14):10615–43. https://www.atmos-chem-phys.net/18/10615/2018/

Benedetti A, Vitart F. Can the Direct Effect of Aerosols Improve **Subseasonal Predictability?** Mon Weather Rev 2018;146(10):3481–98. http://journals.ametsoc.org/doi/10.1175/MWR-D-17-0282.1

Bessardon GEQ, Fosu-Amankwah K, Petersson A, Brooks BJ. **Evaluation of Windsond S1H2 performance in Kumasi during the 2016 DACCIWA field campaign.** Atmos Meas Tech Discuss 2018; 1–31. https://www.atmos-meas-tech-discuss.net/amt-2018-179/

Brito J, Freney E, Dominutti P, Borbon A, Haslett SL, Batenburg AM, et al. **Assessing the role of anthropogenic and biogenic sources on PM1 over southern West Africa using aircraft measurements.** Atmos Chem Phys 2018;18(2):757–72. https://www.atmos-chem-phys.net/18/757/2018/

Brosse F, Leriche M, Mari C, Couvreux F. **LES study of the impact of moist thermals on the oxidative capacity of the atmosphere in southern West Africa.** Atmos Chem Phys 2018;18(9):6601–24. https://www.atmos-chem-phys.net/18/6601/2018/

Cabos W, Sein D V, Pinto JG, Fink AH, Koldunov N V, Alvarez F, et al. **The South Atlantic Anticyclone as a key player for the representation of the tropical Atlantic climate in coupled climate models.** Clim Dyn; 2017; ;48(11–12):4051–69. http://link.springer.com/10.1007/s00382-016-3319-9

Dearden C, Hill A, Coe H, Choularton T. **The role of droplet sedimentation in the evolution of low-level clouds over southern West Africa.** Atmos Chem Phys 2018;18(19):14253–69. https://www.atmos-chem-phys.net/18/14253/2018/

Deetz K, Vogel B. **Development of a new gas-flaring emission dataset for southern West Africa.** Geosci Model Dev 2017;10(4):1607–20. https://www.geosci-model-dev.net/10/1607/2017/

Deetz K, Vogel H, Haslett S, Knippertz P, Coe H, Vogel B. **Aerosol liquid water content in the moist southern West African monsoon layer and its radiative impact.** Atmos Chem Phys 2018;18(19):14271–95. https://www.atmos-chem-phys.net/18/14271/2018/

Deetz K, Vogel H, Knippertz P, Adler B, Taylor J, Coe H, et al. **Numerical simulations of aerosol radiative effects and their impact on clouds and atmospheric dynamics over southern West Africa.** Atmos Chem Phys 2018;18(13):9767–88. https://www.atmos-chem-phys.net/18/9767/2018/

Deroubaix A, Flamant C, Menut L, Siour G, Mailler S, Turquety S, et al. **Interactions of atmospheric gases and aerosols with the monsoon dynamics over the Sudano-Guinean region during AMMA.** Atmos Chem Phys 2018;18(1):445–65. https://www.atmos-chem-phys.net/18/445/2018/

Deroubaix A, Menut L, Flamant C, Brito J, Denjean C, Dreiling V, et al. **Diurnal cycle of coastal anthropogenic pollutant transport over southern West Africa during the DACCIWA campaign.** Atmos Chem Phys Discuss 2018;1–44. https://www.atmos-chem-phys-discuss.net/acp-2018-766/

Djossou J, Léon J, Akpo AB, Liousse C, Yoboué V, Bedou M, et al. **Mass concentration, optical depth and carbon composition of particulate matter in the major southern West African cities of Cotonou (Benin) and Abidjan (Côte d'Ivoire).** Atmos Chem Phys 2018;18(9):6275–91. https://www.atmos-chem-phys.net/18/6275/2018/

Dunning CM, Allan RP, Black E. **Identification of deficiencies in seasonal rainfall simulated by CMIP5 climate models.** Environ Res Lett 2017;12(11):114001. http://stacks.iop.org/1748-9326/12/i=11/

Dunning CM, Black ECL, Allan RP. **The onset and cessation of seasonal rainfall over Africa.** J Geophys Res Atmos 2016;121(19):11,405-11,424. http://doi.wiley.com/10.1002/2016JD025428

Flamant C, Knippertz P, Fink AH, Akpo A, Brooks B, Chiu CJ, et al. The **Dynamics–Aerosol–Chemistry–Cloud Interactions in West Africa Field Campaign: Overview and Research Highlights.** Bull Am Meteorol Soc 2018; 99(1):83–104. http://journals.ametsoc.org/doi/10.1175/BAMS-D-16-0256.1

Flamant C, Deroubaix A, Chazette P, Brito J, Gaetani M, Knippertz P, et al. **Aerosol distribution in the northern Gulf of Guinea: local anthropogenic sources, long-range transport, and the role of coastal shallow circulations.** Atmos Chem Phys 2018;18(16):12363–89. https://www.atmos-chem-phys.net/18/12363/2018/

Hannak L, Knippertz P, Fink AH, Kniffka A, Pante G. **Why Do Global Climate Models Struggle to Represent Low-Level Clouds in the West African Summer Monsoon?** J Clim 2017;201;30(5):1665–87. http://journals.ametsoc.org/doi/10.1175/JCLI-D-16-0451.1

Haslett SL, Taylor JW, Deetz K, Vogel B, Babić K, Kalthoff N, et al. **The radiative impact of out-of-cloud aerosol hygroscopic growth during the summer monsoon in southern West Africa.** Atmos Chem Phys Discuss 2018; 1–25. https://www.atmos-chem-phys-discuss.net/acp-2018-805/

Hill PG, Allan RP, Chiu JC, Bodas-Salcedo A, Knippertz P. **Quantifying the Contribution of Different Cloud Types to the Radiation Budget in Southern West Africa.** J Clim 2018;31(13):5273–91. http://journals.ametsoc.org/doi/10.1175/JCLI-D-17-0586.1

Hill PG, Allan RP, Chiu JC, Stein THM. A **multisatellite climatology of clouds, radiation, and precipitation in southern West Africa and comparison to climate models.** J Geophys Res Atmos 2016;121(18):10,857-10,879. http://doi.wiley.com/10.1002/2016JD025246

Kalthoff N, Lohou F, Brooks B, Jegede G, Adler B, Babić K, et al. **An overview of the diurnal cycle of the atmospheric boundary layer during the West African monsoon season: results from the 2016 observational campaign.** Atmos Chem Phys 2018;18(4):2913–28. https://www.atmos-chem-phys.net/18/2913/2018/

Keita S, Liousse C, Yoboué V, Dominutti P, Guinot B, Assamoi E, et al. **Particle and VOC emission factor measurements for anthropogenic sources in West Africa.** Atmos Chem Phys 2018;18(10):7691–708. https://www.atmos-chem-phys.net/18/7691/2018/

Kniffka A, Knippertz P, Fink AH. **The role of low-level clouds in the West African monsoon system.** Atmos Chem Phys Discuss 2018;(September):1–37. https://www.atmos-chem-phys-discuss.net/acp-2018-743/

Knippertz P, Coe H, Chiu JC, Evans MJ, Fink AH, Kalthoff N, et al. **The DACCIWA Project: Dynamics–Aerosol–Chemistry–Cloud Interactions in West Africa.** Bull Am Meteorol Soc 2015;96(9):1451–60. http://journals.ametsoc.org/doi/10.1175/BAMS-D-14-00108.1

Knippertz P, Evans MJ, Field PR, Fink AH, Liousse C, Marsham JH. **The possible role of local air pollution in climate change in West Africa.** Nat Clim Chang Nature Publishing Group; 2015;5(9):815–22. http://www.nature.com/doifinder/10.1038/nclimate2727

Knippertz, P.; Fink, A. H.; Deroubaix, A.; Morris, E.; Tocquer, F.; Evans, M.; Flamant, C.; Gaetani, M.; Lavaysse, C.; Mari, C.; Marsham, J. H.; Meynadier, R.; Affo-Dogo, A.; Bahaga, T.; Brosse, F.; Deetz, K.; Guebsi, R.; Latifou, I.; Maranan, M.; Rosenberg, P. D.; Schlueter, A., 2017: **A meteorological and chemical overview of the DACCIWA field campaign in West Africa in June–July.** Atmos. Chem. Phys. 2017; 17, 10893–10918. https://www.atmos-chem-phys.net/17/10893/2017/

Maranan M, Fink AH, Knippertz P. **Rainfall types over southern West Africa: Objective identification, climatology and synoptic environment.** Q J R Meteorol Soc 2018;144 (714):1628–48. http://doi.wiley.com/10.1002/qj.3345

McFarquhar GM, Baumgardner D, Bansemer A, Abel SJ, Crosier J, French J, et al. **Processing of Ice Cloud In Situ Data Collected by Bulk Water, Scattering, and Imaging Probes: Fundamentals, Uncertainties, and Efforts toward Consistency.** Meteorol Monogr 2017; 58:11.1-11.33. http://journals.ametsoc.org/doi/10.1175/AMSMONOGRAPHS-D-16-0007.1

Menut L, Flamant C, Turquety S, Deroubaix A, Chazette P, Meynadier R. **Impact of biomass burning on pollutant surface concentrations in megacities of the Gulf of Guinea.** Atmos Chem Phys 2018;18(4):2687–707. https://www.atmos-chem-phys.net/18/2687/2018/

Pacifico F, Delon C, Jambert C, Durand P, Morris E, Evans MJ, et al. **Measurements of nitric oxide and ammonia soil fluxes from a wet savanna ecosystem site in West Africa during the DACCIWA field campaign.** Atmos Chem Phys Discuss 2018; 1–37. https://www.atmos-chem-phys-discuss.net/acp-2017-1198/

Pfeifroth U, Trentmann J, Fink AH, Ahrens B. **Evaluating Satellite-Based Diurnal Cycles of Precipitation in the African Tropics.** J Appl Meteorol Climatol 2016;55(1):23–39. http://journals.ametsoc.org/doi/10.1175/JAMC-D-15-0065.1

Reinares Martínez I, Chaboureau J-P. **Precipitation and Mesoscale Convective Systems: Radiative Impact of Dust over Northern Africa.** Mon Weather Rev 2018;146(9):3011–29. http://journals.ametsoc.org/doi/10.1175/MWR-D-18-0103.1

Reinares Martínez I, Chaboureau J-P. **Precipitation and Mesoscale Convective Systems: Explicit versus Parameterized Convection over Northern Africa.** Mon Weather Rev 2018;146(3):797–812. http://journals.ametsoc.org/doi/10.1175/MWR-D-17-0202.1

van der Linden R, Fink AH, Redl R. **Satellite-based climatology of low-level continental clouds in southern West Africa during the summer monsoon season.** J Geophys Res Atmos 2015;120(3):1186–201. https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1002/2014JD022614

Young MP, Chiu JC, Williams CJR, Stein THM, Stengel M, Fielding MD, et al. **Spatio-temporal variability of warm rain events over southern West Africa from geostationary satellite observations for climate monitoring and model evaluation.** Q J R Meteorol Soc 2018; http://doi.wiley.com/10.1002/qj.3372

Other publications used in this report

Crippa, M.,Guizzardi, D.,Muntean, M., Schaaf, E.,Dentener, F., van Aardenne, J. A., Monni, S. , Doering, U., Olivier, J. G. J., Pagliari, V., Janssens-Maenhout, G., **Gridded Emissions of Air Pollutants for the period 1970--2012 within EDGAR v4.3.2**, Earth System Sci. Data Disc., 1-40, 2018, https://doi.org/10.5194/essd-2018-31

IPCC, 2013: **Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change** [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Liousse, C., Assamoi, E., Criqui, P., Granier, C., Rosset, R., **Explosive growth in African combustion emissions from 2005 to 2030**, Environmental Research Letters, 9 (3), 035003, 2014, https://doit.org/10.1088/1748-9326/9/3/035003

Vogel, P.; Knippertz, P.; Gneiting, T.; Fink, A. H.; Schlueter, A., 2018: **Skill of global raw and postprocessed ensemble predictions of rainfall over northern tropical Africa**. Wea. Forecasting, 33, 369–388, doi:10.1175/WAF-D-17-0127.1.

For more information on the
DACCIWA project visit:

www.dacciwa.eu

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4.2 Press coverage Abidjan

Impact de la pollution de l'air sur la santé: 67% des Abidjanais victimes d'infections respiratoires aiguës

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Le programme européen ayant pour but d'évaluer l'impact de la pollution de l'air sur la santé et les écosystèmes, ainsi que sur la météorologie au sud de l'Afrique de l'Ouest et dénommé Dacciwa, prendra fin en novembre prochain, après avoir été expérimenté depuis décembre 2013, au Bénin, au Ghana, au Nigeria, au Togo et en Côte d'Ivoire.

Après le Ghana, l'Union européenne et ses équipes d'experts ont organisé le jeudi 18 octobre 2018, à Abidjan, une cérémonie de restitution des résultats et des recommandations issus de l'étude, avec pour thématique «Pollution atmosphérique et impact sanitaire et climatique».

Cette étude, conduite pendant deux années, par le Pr titulaire de physique, Yoboué Valérie, coordonnateur du programme Dacciwa pour la Côte d'Ivoire et responsable de l'équipe Aérosols et pollution de l'université de Cocody puis le Dr Kouadio Kouamé de l'Institut Pasteur, a permis d'identifier trois sources de pollution. Ce sont la décharge d'Akouedo, le trafic urbain avec le site de l'ex-Renault dans le quartier des 220 logements à Adjamé et les feux domestiques avec comme symbole le site de fumage de poissons de Lubafrique à Yopougon Niangon nord.

Les deux équipes ont conclu que le district d'Abidjan est fortement pollué et que plus de 67% des Abidjanais, sur une population de 1000 personnes, souffrent d'infections respiratoires aiguës. Les statistiques des consultations dans cinq centres de santé à Cocody, Yopougon et Adjamé, montrent une courbe ascendante des maladies respiratoires, cardiaques et dermatologiques.

Pour le premier type de pathologie, on note respectivement 2773, 1063 et 2689 cas pour les centres de santé de Cocody, Adjamé et Yopougon. Pour la deuxième pathologie, on remarque 261,621 et 351 cas pour les différents centres par ordre décroissant puis enfin pour les consultations dermatologiques, toujours dans les mêmes centres de santé, ce sont 1160,381 et 880 cas enregistrés. Les populations les plus touchées, révèle l'étude, ce sont les femmes et les jeunes de moins de 18 ans d'âge dans une proportion de 54%.

Les experts nationaux de Dacciwa, tout en encourageant le gouvernement ivoirien pour des mesures déjà prises pour améliorer la qualité de l'air, notamment l'interdiction des véhicules d'occasion de plus de cinq ans et la diminution prochaine du soufre dans le carburant, a recommandé que les autorités ivoiriennes montrent plus de volonté politique.

Encourager et démocratiser le mécanisme d'utilisation des foyers améliorés, doter la Sir d'équipements techniques modernes pour produire du carburant selon des standards internationaux, mettre à la disposition de la recherche des moyens nécessaires pour l'observatoire de mesure de la qualité de l'air, des écosystèmes et de la météorologie. Avec l'existence d'un système national de mesure de la qualité de l'air puis la formalisation d'étude épidémiologique couplée à des mesures de pollution atmosphérique en Côte d'Ivoire, du chemin aura été déjà parcouru pour accroître le niveau de l'espérance de vie des citoyens.

Le gouvernement ivoirien aura ainsi remporté une bataille d'autant que les chiffres de l'Oms, liés à l'impact de la pollution de l'air sur la santé humaine et l'économie mondiale, donnent froid dans le dos. 2,5milliards d'habitants vivent avec des niveaux élevés de pollution de l'air dans des espaces intérieurs. La pollution de l'air des espaces extérieurs touche plus de 1,1milliard d'habitants, surtout dans les villes. 2,7 et 3 millions de décès, soit 6 pour cent de la population mondiale sont enregistrés par année. Par ailleurs, 9 sur 10 décès imputables à la pollution de l'air ont lieu dans les pays en développement. Et selon toujours l'Oms, ce sont 700 milles personnes qui meurent chaque année dans les pays en voie de développement.

Au-delà du cas de la Côte d'Ivoire, les travaux de restitution des résultats des études ont montré des constantes pour la région sud de l'Afrique de l'Ouest. Il a été recommandé que soit améliorés la qualité de l'air, les inventaires des émissions, que soit construits et améliorés les réseaux d'observation de la qualité de l'air, que la recherche soit soutenue, que soit renforcées les compétences et la formation des jeunes chercheurs.

Les travaux de restitution ouverts par Van Tilborg Hugo, le chef de la section infrastructures et énergie, visait à mettre à la disposition des gouvernements des outils fiables pour faciliter la prise de décisions, afin de relever le défi de la croissance verte et de résilience au changement climatique.

Franck A. Zagbayou

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4.3 Press coverage Lomé

SAVOIR NEWS

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Pollution et présence des aérosols en Afrique de l’ouest: Les grandes conclusions du « DACCIWA » présentées aux

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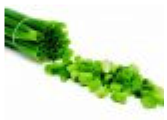

La ciboulette : Une plante avec de nombreuses vertus

19 septembre 2018 Commentaires fermés

ARTICLES LES PLUS LUS

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Le comité de pilotage national du bureau de restructuration et de mise à niveau des entreprises officiellement installé ce mercredi à Lomé

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Lomé : Braquage vers Bè-Lagune, une

décideurs politiques

20 octobre 2018 Savoir News POLLUTION Commentaires fermés

Vue partielle de l'assistance...

Les décideurs politiques (représentants des différents ministères, des services météorologiques, du monde universitaires) se sont réunis ce vendredi à Lomé en vue de prendre connaissance des grandes conclusions du projet « Dynamics Aerosol Chemistry Cloud Interractions in West Africa » (DACCIWA), a constaté une journaliste de Savoir News.

Financé à hauteur de 9 millions d'euros (5,903 milliards de F.CFA) par l'Union européenne (UE), DACCIWA a pour objectif d'évaluer l'influence des émissions produites par l'homme sur la composition atmosphérique en Afrique de l'ouest (Côte d'Ivoire, Ghana, Togo, Bénin et Nigeria) et d'évaluer leur impact sur la santé des hommes et des écosystèmes ainsi que sur la météorologie régionale.

Ce programme a permis pour la première fois à des scientifiques d'étudier intégralement les impacts des émissions naturelles et anthropiques sur l'atmosphère de cette région,

Prorogation/Recensement : Le groupe des 5 invite la coalition à « saisir cette opportunité » et demande au pouvoir de « poursuivre les mesures d'apaisement »


Lomé : Braquage vers Bè-Lagune, une somme d'argent emportée


Jubilé d'or du département d'allemand de l'Université de Lomé: Au-delà des festivités, l'Allemagne implique le partage d'expériences autour de la réforme LMD


Deuxième édition du Forum PPP Afrique 2018: L'agriculture togolaise au cœur des débats à Casablanca


Le comité de pilotage national du bureau de restructuration et de mise à niveau des entreprises officiellement installé ce mercredi à Lomé

MÉTÉO

ainsi que sur la santé des populations, grâce à une campagne de terrain de grande ampleur en juin et juillet 2016.

« L'idée du projet DACCIWA, c'est d'améliorer la connaissance des émissions anthropiques produits par l'homme, les industries, le trafic et tout ce qui est techniques de brulage agricole et domestique et comprendre comment cela va modifier les grands équilibres radioactifs et dynamiques de la sous-région ouest africaine. Une pollution modifie les propriétés des nuages, modifie la perception de la chaleur en surface, ce qui modifie la mousson et la pluviométrie dans la région », a expliqué Dr. Cyrille Flamant (directeur de recherche CNRS à l'université de Sorbonne).

Vue partielle de l'assistance.

« Trop souvent, les chercheurs se contentent de publier leurs résultats. Mais aujourd'hui, il faut qu'on arrive à toucher les populations et passer par les décideurs, leur dire que ce qu'on fait. Nous voulons sensibiliser les décideurs afin que dans un avenir très proche, ils prennent les mesures qui s'imposent pour améliorer le problème de la qualité de l'air en Afrique de l'ouest », a-t-il ajouté.

Étant un projet sous-régional, DACCIWA a révélé des données beaucoup plus exactes sur le niveau de la pollution, les sources de pollution, l'impact sur la santé humaine et l'impact sur la météorologie et le climat.

toujours la Céni et appelle encore au boycott du recensement

5ème journée/Éliminatoires CAN: Première séance des Éperviers

Les premiers résultats montrent, de façon surprenante, qu'une grande partie de la pollution est d'origine organique, liée à la combustion permanente, à basse température, dans les décharges à ciel ouvert. Les particules produites réduisent la quantité de rayonnement solaire qui atteint le sol, modifiant l'évolution diurne de la température, du vent et des nuages, ainsi que la dynamique atmosphérique.

« Un des premiers constats que nous avons fait, c'est que la pollution qu'on pensait importante aux larges de la côte à cause des bateaux et des plateformes pétrolières, est au contraire assez faible. L'autre grand constat que nous avons fait, c'est qu'effectivement au dessus de l'océan, il y a des quantités très importantes d'aérosols qui proviennent des régions où sont brûlées les forêts en Afrique centrale et en Afrique du sud. Et cela contribue des fois à 40 ou 50% de la pollution qui arrive à la côte, à Lomé mais aussi dans les grandes villes », a souligné M. Flamant.

Photo de famille, à la fin de la séance.

« La troisième grande conclusion, c'est que de manière générale, la pollution qui est émise dans les grandes villes en Afrique de l'ouest est au-dessus des normes imposées par l'OMS. Que ce soit à Lomé, Abidjan ou Cotonou, on est toujours au-dessus des normes surtout des émissions qui sont très nocives pour la santé », a-t-il ajouté.

Le Togo, tout comme les 4 autres pays, a joué un rôle très important lors de la campagne de terrain notamment en hébergeant les 3 avions de recherche (un français, un allemand et un britannique) sur l'aéroport militaire de Lomé ainsi que le centre d'opérations installé à Lomé.

« Pour le Togo, c'est la première fois qu'on a fait des mesures autour de Lomé à partir des mesures avions du panage de production de la ville. C'est vrai que Lomé ne pollue pas comme Lagos ou Abidjan, mais ce qui est important de relever c'est la présence des aérosols qui peut causer des problèmes respiratoires très importants », a confié le directeur de recherche CNRS à l'université de Sorbonne.

Désormais, l'Afrique de l'ouest dispose de donnés fiables pour inclure dans les politiques et projets de développement, l'aspect environnemental et préservation de l'écosystème pour la survie humaine.

Rappelons que le projet DACCIWA a démarré en décembre 2013 et prendra fin en novembre 2018. *FIN*

Chrystelle MENSAH

www.savoirnews.net, l'info en continu 24H/24

Articles Liés

Nouveau rapport de la Banque mondiale sur les politiques et institutions nationales en Afrique subsaharienne: Une amélioration favorable à la croissance dans 13 pays dont le Togo

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