IGAC SSC Activity Update – September 2014

Atmospheric Composition and the Asian Summer Monsoon (ACAM) Initiative (<u>https://www2.acd.ucar.edu/acam</u>)

A jointly sponsored IGAC/SPARC activity that seeks to provide a forum for interested scientists to collaborate and organize their efforts related to four scientific themes:

- Emissions and Air Quality in the Asian Monsoon Region
- Aerosol, Clouds, and the Asian Monsoon
- Asian Monsoon Convection and Chemistry
- UTLS Response to the Asian Monsoon

Working groups have been organized to address four areas identified during the first ACAM Workshop that would build a stronger community of scientists.

WG1: organize data sharing for ACAM-relevant measurements

WG2: form a partnership with the CCMI activity to facilitate two-way interaction

WG3: field campaign concept development

WG4: develop the talent and expertise of ACAM scientists for utilizing community models and datasets that can be used for ACAM research

ACAM Activity Formation Committee

Laura Pan (co-Lead) NCAR, USA

Michelle Santee (SPARC Liaison) NASA JPL, USA

Hiroshi Tanimoto (IGAC-Asia Liaison) NIES, Japan Jim Crawford (co-Lead) NASA LaRC, USA

Mary Barth (IGAC Liaison) NCAR, USA

Arnico Panday (ICIMOD Liaison) ICIMOD, Nepal

Sachiko Hayashida (2nd workshop Local organizing committee, Chair) Nara Women's University, Japan

Vinayak Sinha (WG1 co-Lead) IISER, India

Jessica Neu (WG2 co-Lead) Jet Propulsion Laboratory, USA

Hans Schlager (WG3 co-Lead) DLR, Germany

Mary Barth (WG4 co-Lead) NCAR, USA Gabi Stiller (WG1 co-Lead) Karlsruhe Institute of Technology, Germany

Chiara Cagnazzo (WG2 co-Lead) ISAC-NRC, Italy

Jianchun Bian (WG3 co-Lead) IAP/CAS, China

Ritesh Gautam (WG4 co-Lead) Indian Institute of Technology (Bombay), India

ACAM 2014 Events

AOGS Special Session (July 2014) on "interaction of Atmospheric Composition and the Asian Summer Monsoon" convened by Sachiko Hayashida, Suresh Babu, and Masatomo Fujiwara (6 oral presentations and 7 posters)

Side meeting at AOGS on 2nd ACAM Workshop and direction for the ACAM activity

Decision on location and timing of Second ACAM Workshop and formation of the local organizing committee

Working group formation and identification of leadership for each group. (28 ACAM scientists already belong to one or more working groups)

ACAM activity presentations to SPARC (Hans Schlager, January 2014), CCMI (Jessica Neu, May 2014), and to the Malaysian science community at the Workshop on Atmospheric Chemistry and Climate Change in Asia (WACCA, John Pyle, May 2014)

Training events publicized through the ACAM mailing list:

ICIMOD WRF-Chem Tutorial, 1-5 June 2014, Kathmandu, Nepal

NASA Webinar Training on Remote Sensing for Air Quality Applications for Indian Sub-Continent and Surrounding Regions (generated 17 registrants associated with ACAM)

Working Group 1 – Data Sharing (Membership)

Vinayak Sinha (co-lead)	Indian Institute of Science Education and Research (IISER), Mohali
Gabriele Stiller (co-lead)	Karlsruhe Institute of Technology
Brice Barret	CNRS
Jianchun Bian	IAP
Gao Chen	NASA Langley Research Center
Cathy Clerbaux	LATMOS/CNRS
Jim Crawford	NASA Langley Research Center
Ritesh Gautam	Indian Institute of Technology (IIT) - Bombay
Mark Lawrence	Institute for Advanced Sustainability Studies (IASS) - Potsdam
Johnny Luo	City College of New York
lq Mead	University of Cambridge
Prabir Patra	Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
M. Venkat Ratnam	National Atmospheric Research Laboratory, India
Maheswar Rupakheti	Institute for Advanced Sustainability Studies (IASS) - Potsdam
Eri Saikawa	Emory University
Hans Schlager	DLR - Institute of Atmospheric Physics
Jean-Paul Vernier	NASA Langley Research Center
Hiroshi Tanimoto	National Institute for Environmental Studies (NIES)
Bob Yokelson	University of Montana

Working Group 1 – Data Sharing (Plans)

As an initial step, the goal is to establish a web page with the following information:

- identification of suitable data for ACAM science
- short descriptions and links to access for each data set
- terms of data access (publically available or registration required ?, data protocol ?, attribution ?, etc)

This web site would not contain any data, but just provide information where to find relevant data for use within the ACAM topics.

Gabi Stiller is willing to do this for the satellite data together with the other colleagues of the WG; this development would be ongoing and would also require us to attract colleagues from the satellite community who are not (yet) members of the ACAM community.

It would be of further interest to see if any level-3 products or higher could be made available for ACAM by our satellite colleagues in the WG; for example averages over the monsoon region (regional/temporal mean data), global or regional maps on certain altitude/pressure/potential temperature levels, cross-sections along latitudes or longitudes etc.

Working Group 1 – Data Sharing (Plans, cont.)

Examples of available in situ data include observations from Vinayak Sinha on PTR-MS VOCs, O3, NOx, CO, SO2, PM 2.5 and PM 10 and OH reactivity (seasonally) which is over three years.

There are also multi-year datasets from the Central pollution control board of India for O3, NOx, CO, SO2, PM 2.5 and PM 10 from several cities. One of Vinayak's students is working compiling it and doing a basic quality check but this will take time.

Some working group members will be able to provide field campaign or satellite data directly (Cathy Clerbaux for IASI, Gabi Stiller for MIPAS, Jianchun Bian and M. Venkat Ratnam for field campaign data, Bob Yokelson for data to be collected in Nepal). For others, we will need to reach out to the community (MOZAIC/IAGOS data are good examples).

Working Group 2 – CCMI (Membership)

Chiara Cagnazzo (co-lead) Institute for Atmospheric Sciences and Climate Jessica Neu (co-lead) NASA JPL Fatima Ahamad University Kebangsaan University of Edinburgh Massimo Bollasina Free University of Berlin Peter Braesicke Gao Chen NASA Langley Research Center Federico Fierli Institute for Atmospheric Sciences and Climate Ellie Highwood University of Reading Markus Kunze Free University of Berlin William Lau NASA Goddard Space Flight Center JAMSTEC Shin-ya Ogino Laura Pan National Center for Atmospheric Research Arnico Panday ICIMOD Prabir Patra JAMSTEC Mijeong Park National Center for Atmospheric Research Eri Saikawa **Emory University** Michelle Santee NASA JPL **Betsy Stone** University of Iowa **Bob Yokelson** University of Montana Jin-Ho Yoon PNNI

Working Group 2 – CCMI (Recent Activities and Plans)

Recent Activities:

Presentation by J. Neu at CCMI meeting in Lancaster

Formation of working group

Identification of monsoon-related model evaluation projects within the CCMI community

<u>Plans:</u>

Continue to expand working group membership

Organize a session on evaluation of monsoon processes for the June 2015 ACAM meeting

Begin to put together a list of measurements being used by current projects and a "wish list" of measurements that do not currently exist

Continue to advocate for expansion of monsoon diagnostics within the CCMI community

Create a link between ACAM and the FP7 StratoClim Project, specifically: -joint investigations of CCMI simulations of the Asian Monsoon Anticylone -link between CCMI model outputs and observations that will be available from measurement campaigns in the Asian Monsoon region

Working Group 2 – CCMI (Ongoing and Planned Analysis)

- Impact of China's air pollution mitigation policies on Asian air quality
- Assessment of the representation and influences of the Asian monsoon anticyclone on stratospheric water vapor in models
- Investigations of dynamical and chemical processes determining intra-seasonal, interannual, and decadal variability of water vapour in the UTS, also in the AM region.
- Studies on S. Asian monsoon variability and its driving mechanisms, especially the role of anthropogenic aerosols
- Idealised sensitivity about ozone concentration changes in the Asian summer monsoon anticyclone and lower stratospheric water vapour.
- Develop monsoon-centric diagnostics of UTLS composition
- GHG measurement sites in Bangladesh, Sri Lanka (planned), global modeling of GHGs and air pollutants
- Understanding aerosol emissions from Nepal and Bhutan and their impacts on S. Asian air quality
- Link between the aerosol that absorb solar radiation and the Asian Monsoon
- Investigation of air mass exchange from the troposphere into the stratosphere in the Asian monsoon region

Working Group 3 – Field Campaign Concepts (Membership)

Jianchun Bian (co-lead)	IAP
Hans Schlager (co-lead)	DLR - Institute of Atmospheric Physics
Brice Barret	CNRS
Jim Crawford	NASA Langley Research Center
Mark Lawrence	Institute for Advanced Sustainability Studies (IASS) - Potsdam
Bill Lau	NASA Goddard Space Flight Center
Johnny Luo	City College of New York
lq Mead	University of Cambridge
M. Venkat Ratnam	National Atmospheric Research Laboratory, India
Maheswar Rupakheti	Institute for Advanced Sustainability Studies (IASS) - Potsdam
Gabriele Stiller	Karlsruhe Institute of Technology
Hiroshi Tanimoto	National Institute for Environmental Studies (NIES)
Jean-Paul Vernier	NASA Langley Research Center
Bob Yokelson	University of Montana

Goal: To gather and categorize all information about ACAM-related field campaigns and to share among the ACAM community; to set up a platform under the ACAM Activity for all teams involved in the ACAM-related field campaign and scientists interested in field campaign to communicate with each other; to provide some potential ideas for future field campaigns and solicit input from the ACAM community

Balloon Measurements of the Asian Tropopause Aerosol Layer : BATAL-2014

J.-P Vernier^{1,2}, T. Wegner², D. Fairlie², R. Eckman², M. Natarajan², K. Bedka², L. Ziemba², T. Knepp¹, L. Thomason², F Wienhold³ H. Gadhavi⁴, A. Jayaraman⁴ ¹ SSAI; ² NASA Langley; ³ETH, Switzerland; ⁴NARL, India

CALIPSO Upper Tropospheric Aerosol Climatology



We mounted a balloon field campaign to characterize the aerosol optical properties and size distribution of the Asian Tropopause Aerosol Layer (ATAL). The objective of this mission was to better understand the role of convection over the Indian sub-continent in the formation of the ATAL. A 10-day field NASA-funded experiment between 15-27 August 2014, based in Gadanki (13.4N,71.2E, India) at the National Atmospheric Research Laboratory (NARL), has deployed 7 flights of a two-wavelength aerosol backscatter sonde and one Optical Particle Counter configured for light weather balloons. The set of balloon aerosol observations will provide further benefit to NASA by aiding calibration and validation studies for CALIPSO, OMI, MODIS, OMPS, the soon-to-be-deployed CATS lidar (2014) and SAGE III (2015), the latter two on the International Space Station.

Balloon Measurements of the Asian Tropopause Aerosol Layer : BATAL-2014

- 8 Langley Scientists involved in the BATAL campaign (two traveled to Gadanki, India)
- 9 NARL Scientists operating ground-based lidars and radars and launching ozonesondes
- 7 flights of a two-wavelength aerosol backscatter sonde
- 1 Optical Particle Counter flight configured for light balloon
- 3 combined flights with US backscatter-and Indian ozone-sondes



Before the OPC launch, Gadanki, India, 23 Aug 2014



Balloon near the Green beam of the groundbased lidar, 20 Aug 2014, Gadanki, India

The BATAL campaign was a collaborative effort between NASA and NARL to sample upper tropospheric aerosol over Asia. This initiative demonstrated the willingness from both sides to participate in joint experiment which can help understanding how aerosol can affect our climate, an important topic underlined in the last IPCC AR5 climate report.

Balloon Measurements of the Asian Tropopause Aerosol



Layer : BATAL-2014

Preliminary results



Fig.2 CALIPSO (Scattering Ratio@532nm) 15-18 km; 15-27 Aug 2014. Aerosol in the Upper Tropospheric over India and W. China were present during the campaign



Fig.3. Corresponding MeteoSat 7 IR channel on 23 Aug near 15 UTC showing deep convective clouds (in white) west from the launching place.

Upper tropospheric aerosol maps (e.g. fig.2) using near realtime CALIPSO data were produced during the BATAL campaign as a guidance for balloon-borne measurements. Example of Backscatter Ratio and Temp balloon profiles (fig.1) obtained on 23 Aug 2014 shows two distinct aerosol layers in the Upper Troposphere and Lower Stratosphere : one associated with the old Kelud plume near 19-22 km and another one near the cold point tropopause (16-18 km) also observed by CALIPSO. A number of BR profiles also showed numerous sub-visible cirrus clouds near the tropopause which may have eventually interacted with the ATAL. Brightness Temperature imagery(fig.3) shows deep convective systems west from the 23 Aug flight (fig.1).

Working Group 4 – Training (Membership and Recent Activities)

Mary Barth (co-lead)	National Center for Atmospheric Research
Ritesh Gautam (co-lead)	Indian Institute of Technology (IIT) - Bombay
Cathy Clerbaux	LATMOS/CNRS
Mark Lawrence	Institute for Advanced Sustainability Studies (IASS) - Potsdam
Prabir Patra	JAMSTEC
Maheswar Rupakheti	Institute for Advanced Sustainability Studies (IASS) - Potsdam
Gabrielle Stiller	Karlsruhe Institute of Technology
Hiroshi Tanimoto	National Institute for Environmental Studies (NIES)

Goal: Develop the talent and expertise of ACAM scientists for utilizing community models and datasets that can be used for ACAM research

Recent Activities Related to ACAM:

ICIMOD WRF-Chem Tutorial, 1-5 June 2014, Kathmandu, Nepal

NASA Webinar Training on Remote Sensing for Air Quality Applications for Indian Sub-Continent and Surrounding Regions

Working Group 4 – Training (Plans)

Ideas for Upcoming Activities:

Include a training session as part of the ACAM Workshop in June 2015 - Topic could focus on aerosols and/or air quality and tools to address topic (satellite data, model data, analysis tools). Suggestions welcome for ideas and needs from the community. To be successful this would require us to identify a group of scientists who are willing to give lectures and/or hands on demos on various aspects of satellite/model data/tools

Disseminate information on web-based training events (requires ACAM members to be alert to opportunities and forward them to the WG4 leads)

Organize stand-alone training events (e.g., at IIT, Bombay where several international meetings, workshops and training schools are hosted throughout the year)

ACAM Second Workshop

- June 8-10, 2015.
- in Bangkok, Thailand
- Swissotel Le Concorde
 - 204 Rachadapisek Road, Huay Kwang Bangkok
 10320 Thailand
 - Tel: +66 2694 2222 Fax: +66 2694
 2218 <u>bangkok-leconcorde@swissotel.com</u>

Swissotel Le Concorde







LOC ACAM 2015 (not final)

Current LOC Members:

- Sachiko Hayashida (Chair, Japan)
- Narisara Thongboonchoo (Thailand)
- Kim Oanh (Thailand/Vietnam)
- Hiroshi Tanimoto(Japan)
- Vanisa Surapipith (Nepal)
- Prabir Patra (Bangladesh/Japan)
- Suresh Babu (India)
- Jason Cohen (Singapore)
- Jun Matsumoto (Japan)
- Masatomo Fujiwara (Japan)
- Jianchun Bian (China)
- Rokjin Park (Korea)
- Manish Naja (India)
- Suvarna Fadnavis (India)
- Iq Mead (Malaysia)