

Report to CLIVAR SSG-19

Panel or Working Group: VACS

1. Contributions to developing CLIVAR science and fit, where appropriate, to the CLIVAR imperatives

The following are the VACS science priorities as identified and discussed at the last meeting in 2011, that can be matched to the CLIVAR imperatives.

Science Priorities

- **Data: Combined (blended) high quality data sets**
Data underpins climate science but data unavailability acts as a particular constraint in Africa.
- **Mechanisms: Improved understanding of weather/climate interface**
Rainfall is a key variable in African climate science. Rainfall comes from weather systems not climate. Efforts to connect across the interface of weather and climate are fundamental to progress in prediction but evidence of direct attempts is scant.
- **Models: what is the source of model errors and uncertainty**
Models are key to prediction. Model errors undermine the usefulness of prediction. A vital step in dealing with model errors is the diagnosis of their source.
- **Enhanced seasonal prediction capability**
Seasonal prediction is the route through which climate and society connect most closely in Africa. Several issues limit progress. The root causes of the limitations need to be made clear alongside deliberate strategies for undoing the limitations.
- **Attribution of recent climate changes (inc. Extremes) in Africa**
It is often said that Africa is hardest hit by climate change and claims abound as to weather and climate anomalies that purport to have their provenance in climate change. Rigor in this vital area is lacking and this climate science priority needs to promote the application of such rigor.
- **Services: production of climate and weather services that are better targeted to end user needs across all time scales**
The future of the climate science enterprise in Africa hinges on applications.

2. Briefly list any specific areas of your panel's activities that you think would contribute to the WCRP Grand Challenges as identified by the JSC at its most recent meeting¹

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1. Provision of skillful future climate information on regional scales (includes decadal and polar predictability)
2. Regional sea-level rise
3. Cryosphere response to climate change (including ice sheets, water resources, permafrost and carbon)
4. Improved understanding of the interactions of clouds, aerosols, precipitation, and radiation and their contributions to climate sensitivity
5. Past and future changes in water availability (with connections to water security and hydrological cycle)

VACS activities contribute to the following Grand Challenges:

1. *Provision of skillful future climate information on regional scales (includes decadal and polar predictability)*
Regional-scale climate prediction in Africa has served as a catalyst for the organization of climate science and its connectivity to users/society. The regional climate outlook forums have been running longer and are more numerous in Africa than on any other continent. This partly reflects the importance of climate prediction given the exposure of the continent to rainfed subsistence agriculture. RCOFS are represented on the VACS panel through panel members from the core RCOF regions. Key activities of the panel are uncovering the limitations to prediction and the connection of users with climate information. VACS panel meetings and conferences are one mechanism by which the impediments are identified.
4. *Improved understanding of the interactions of clouds, aerosols, precipitation, and radiation and their contributions to climate sensitivity*
Africa is the largest source of mineral aerosols on the planet. Mineral aerosols are a key cause of model error on NWP to climate timescales. VACS serves on two key field programmes in Africa aimed at addressing the links between mineral aerosols and climate (namely Fennec and DO4Models).
5. *Past and future changes in water availability (with connections to water security and hydrological cycle)*
Water is the prime focus of climate science in Africa – for example seasonal prediction is overwhelmingly concerned with rainfall prediction. VACS promotes the investigation of issues such as seasonal rainfall onset and cessation that are known to be scientifically challenging but which otherwise be neglected by the scientific community. VACS, for example, is represented on flagship and well-resourced research programmes, such as the Africa CSRP of the UK Met Office, which are able to take up these challenges through improvements in numerical models making up the GPCs.
6. *Science underpinning the prediction and attribution of extreme events*
VACS agreed in the last few months to promote this item through highly visible publications written by the panel to journals such as BAMS.
3. **Key science questions that you anticipate your community would want to tackle in the next 5-10 years within the context of a more ocean-atmosphere orientated CLIVAR (1-3 suggestions)**

Ocean atmosphere interaction and its relation to weather and climate is a key component underlying each of the prioritized themes outlined in Section 2. For

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6. Science underpinning the prediction and attribution of extreme events

instance it is the impact of ENSO that gives predictability in Southern Africa. Likewise variability in the Indian Ocean and in the Tropical Atlantic also has a profound impact on regional weather and climate. The future behavior of those modes of variability will be as important as the effect of global warming for Africa. The occurrence of extreme weather such as floods or dry spells is also impacted by those modes of variability. Closer to home, the Benguela Ninos, Atlantic Ninos, IOD and the Agulhas Current have also an impact on weather and climate.

4. Cooperation with other WCRP projects, outside bodies (e.g. IGBP) and links to applications

GEWEX – Since the last CLIVAR SSG, there has been dialogue with GEWEX on how to strengthen the partnership between GEWEX and CLIVAR for VACS. The interaction with GEWEX falls under what was CEOP and is now the GEWEX Hydroclimatology Panel (GHP), chaired by Dennis Lettenmaier. The direct contact for VACS has been Sam Benedict who coordinates GHP, and who was present at the 4th VACS meeting last year. The GHP regularly holds teleconference calls with its Regional Hydroclimate Projects that VACS will be invited to participate in.

NOAA and JCOMM Data Buoy Cooperation Panel (DBCP) – VACS has supported capacity development workshops organized in the Western Indian Ocean sector. Our main interlocutor is Sidney Thurston, International Coordinator for the NOAA Climate Program Office.

CORDEX – VACS is working to strengthen its links to the CORDEX-Africa activity to encourage community analysis of the CORDEX dataset. The CORDEX output will be potentially useful across many African regions and for use by the science, impacts, adaptation and vulnerability research communities. With the availability of CORDEX datasets and CMIP5 model runs, there scope for the update of the VACS African Climate Atlas (<http://www.clivar.org/organization/vacs/resources/vacs-climate-atlas>).

International Programmes

A number of international programmes were discussed by the panel at its last meeting are listed on the VACS website (<http://www.clivar.org/organization/vacs/resources/africa-regional-activities>) as well as in the meeting report. VACS has a key involvement in many of these initiatives and is directly represented in the majority. However, some of these activities e.g. ACMAD, need to have a stronger VACS representation.

5. Workshops/meetings held

The 4th VACS panel meeting was held in Cape Town from 21-23 November 2011. The meeting was hosted by the Oceanography Department, University of Cape Town.

The agenda was developed over a series of teleconferences staged over several months prior to the panel meeting in Cape Town. There were four components to the meeting:

1. WCRP briefing (JSC, GEWEX, CLIVAR, WGSIP)
2. Update on large international programmes in Africa
3. Climate Science Priorities
4. Panel Actions and Activities

6. New activities being planned, including timeline

Strengthening the network of climate scientists across Africa:

- Exchanges Special Issue, August 2012 – introducing the major international research projects that are ongoing across Africa
- VACS Newsletter – a quarterly (depending on demand) newsletter that would share new results, emerging scientist news and profiles, events and opportunities
- VACS database of climate scientists in Africa – searchable by topic and geographical area of study

Review papers to identify the science priorities for climate science in Africa

7. Workshops / meetings planned

The State of the African Climate System Conference (SACSC)

UNECA, Addis Ababa, Ethiopia

September 2013, in association with the Third Climate Change and Development in Africa (CCDA-3) Conference

5th VACS Panel meeting

Addis Ababa, Ethiopia

September 2013

8. Issues for the SSG

Positioning of VACS within the new WCRP structure.

The WCRP JSC has requested that VACS propose what panel members believe is the best framework for WCRP activities in Africa, including where the panel would be in WCRP's organisational structure. After discussion, and with the proposed science priorities in context, panel members would suggest that VACS should be renamed "**African Climate Panel**" and would still be part of CLIVAR. However, the panel recognizes that a strong interaction with GEWEX is necessary for the accomplishment of the science priorities.

With a more ocean-atmosphere oriented CLIVAR in the future, yet oceans remaining vital to the atmosphere overlying Africa, a CLIVAR-GEWEX nexus is thematically ideal for VACS although management under CLIVAR is optimal. From an African perspective, CLIVAR and GEWEX are complementary projects as we care about droughts, floods, and soil moisture but we know that ocean variability drives interannual and decadal variability. The real challenge in Africa is to have researchers, sciences managers and stakeholders to buy in the values and principles underlying CLIVAR and GEWEX

Annex A1

Proforma for CLIVAR Panel and Working Group requests for SSG approval for meetings

Requests should be made through D/ICPO (Catherine.beswick@noc.ac.uk), against the following headings:

1. **Panel or Working Group:** VACS
2. **Title of meeting or workshop:** 5th VACS Panel Meeting
3. **Proposed venue:** Addis Ababa, Ethiopia
4. **Proposed dates:** September 2013
5. **Proposed attendees, including likely number:** 15-20
6. **Rationale, motivation and justification, including: relevance to CLIVAR themes & JSC cross cutting topics and any cross-panel/working group links and interactions involved:**

The VACS panel will meet following the SACSC in 2013. This will be an opportunity for VACS, together with the SACSC science steering committee to assess the outcomes of the conference and prepare a statement on the future directions of African climate research in terms of science priorities and coordinated research.

7. Specific objectives and key agenda items:

In collaboration with the SACSC SSC, contribute to the development of research proposals to present to donor organizations address the research gaps and frontiers identified by the African research community.

8. Anticipated outcomes (deliverables):

9. Format: 2-3 day meeting

10. Science Organising Committee (if relevant)

11. Local Organising Committee (if relevant)

12. Proposed funding sources and anticipated funding requested from WCRP:

Estimated Meeting Costs

Flights to Addis Ababa	London ~ \$1000
	New York ~ \$2500
	Cape Town ~ \$1000
	Dakar ~ \$1600
	Niamey ~ \$1600
	Nairobi ~ \$1000
	Lagos ~ \$1000

Hotel costs ~\$100

Estimated per diem = \$150 (4 days = \$600)

Assuming full funding is required by VACS members to attend the meeting (Note 2-3 more days' per diem will be necessary to attend the SACSC, see Appendix A2):

WCRP funding requested for non-US members = \$14000

US CLIVAR funding requested for US members = \$9300

Annex A2

Proforma for CLIVAR Panel and Working Group requests for SSG approval for meetings

Requests should be made through D/ICPO (Catherine.beswick@noc.ac.uk), against the following headings:

1. **Panel or Working Group:** VACS
2. **Title of meeting or workshop:**
The State of the African Climate System Conference (SACSC)
3. **Proposed venue:** Addis Ababa, Ethiopia
4. **Proposed dates:** September 2013
5. **Proposed attendees, including likely number:** 100
6. **Rationale, motivation and justification, including: relevance to CLIVAR themes & JSC cross cutting topics and any cross-panel/working group links and interactions involved:**

As the continent predicted to be the second hardest hit by Climate Change impacts, immediately following polar zones (IPCC, 2007), Africa has a stake in improving the skill and salience of climate research outputs. Even more urgent is the need to ensure that future African climate research is both informed and driven by the critical adaption needs of African decision-makers, at both national and local levels, striving to adapt under an uncertain climate future.

As such, there is a need to bring together African decision-makers and climate researchers and scientists, around the common goals of identifying the state of knowledge on the African climate system, recognizing current gaps in climate knowledge, and defining and driving an African agenda for future climate research that will inform adaptation decisions by the mid- to end 21st century.

A conference bringing together all scientists of African science towards meeting African policy-makers' needs has never taken place on the continent. Aside from noteworthy regional climate research programs such as the AMMA in West Africa, African climate researchers remain isolated from one another, and distant from decision-makers in need of robust climate research outputs to make critical adaptation decisions.

Unlike other regions of the world where climate science research has been stepped up in recent years (see CLIVAR Asia), African climate research and knowledge on the African climate system remain lagging behind.

The **State of the African Climate System Conference 2013** proposes to narrow the

large gap sustained between African decision-makers and climate researchers and scientists, and to bring African climate scientists together to push back the frontiers of African climate science, and improve climate science outputs so that they may inform adaptation decision-making in Africa.

Following the twin-track approach of researching how to use existing climate information for decision-making, while improving predictability and skill of climate science outputs (ACPC, 2011), the **State of the African Climate System Conference 2012** will contribute a significant step to the latter endeavor, catalyzing climate science research for improved and more salient climate science outputs in the near-future.

7. Specific objectives and key agenda items:

The overall goal of the **State of the African Climate System Conference 2013** is to narrow the large gap sustained between African decision-makers and climate science researchers, towards the production of salient climate research outputs that will inform adaptation decisions in Africa by the mid- to end 21st century.

The specific objectives of this Conference are as follows:

- 1) Identify the current state of knowledge on the Variability and Changes in the African Climate system, as well as the stochastic limits of climate science prediction;
- 2) Define and Build consensus on critical climate research gaps / climate science frontiers that need to be addressed to inform adaptation decision-making in the near and longer-term in Africa;
- 3) Review and Assess the State of knowledge on each Climate Science frontier, through presentations by leading researchers in each field;
- 4) Identify missing links and obstacles that will need to be overcome in order to push back the frontiers of African Climate science;
- 5) Develop pan-African climate research program proposals for each critical Climate science frontier, and submit for funding to research donors in attendance.

8. Anticipated outcomes (deliverables):

Expected outputs and outcomes from the SACS Conference 2013 are summarized in Table 1.

Specific Objective	Expected Output	Expected Outcome
1. Identify the current state of knowledge on the Variability and Changes in the African Climate system, as well as the stochastic limits of climate science prediction	Climate science knowledge gaps are mapped and reviewed within the bounds of the stochastic limits of predictability, for all climate-sensitive sectors defined out of CCD-1	- Improved understanding of the stochastic limits of African climate predictability - Preliminary identification of gaps in climate science knowledge (African climate science frontiers)
2. Consensus on critical climate research gaps / climate science frontiers needed to be addressed to inform adaptation decision-making in the near and longer-term in Africa	- Current gaps in African climate knowledge (Climate Science frontiers) are identified - African Climate science research priorities are defined and prioritized	Narrowing of the large gap separating African climate researchers and adaptation decision-makers
3. Review of the State of knowledge on each identified Climate Science frontier	- Presentations by leading researchers working to push back each identified Climate Science frontier clarify current state of knowledge on the CS frontier - Review article on the state of knowledge on each CS frontier	Improved understanding of the current state of knowledge on each African Climate Science frontier
4. Identify obstacles needed to be overcome to push back the Climate science frontiers	Presentations by leading researchers working to push back the identified Climate Science frontier clarify obstacles to furthering knowledge on CS frontier, and ways forward to overcome them	Improved understanding of obstacles to furthering knowledge on each African Climate Science frontier, and ways forward to overcome them
5. Develop pan-African climate research program proposals for each critical Climate science frontier, and submit for funding to research donors in attendance.	- Research programs addressing the frontiers of African climate science (Onset/cessation, Inter-seasonal variability, Emerging climate risks, CC) are developed, and funded - African climate science research institutions/hubs selected to serve as hosts for each African Climate Science Frontier Research node	- Critical mass of African climate researchers catalyzed to push back frontiers of African CS - Deeper cross-African research collaborations between climate scientists researching the same CS frontier, as well as African climate science institutions - Strengthening of regional and national African climate science research institutions, enabling them to address the critical decision-making needs of policy makers and vulnerable communities

Table 1: Expected outputs and outcomes from the State of the African Climate System Conference 2012 (September, 2012)

9. Format:

State of the African Climate System (SACSC) is planned with the Third Climate Change and Development in Africa (CCDA-3) Conference that is being organized by the Africa Climate Policy Center (ACPC) in Addis Ababa, Ethiopia in September 2013. The SACSC will be part of pillar 1 of the CCDA-3: "Climate Science, Data and Information".

10. Science Organising Committee (if relevant)

A. Tall (VACS Co-Chair) is leading the SACS Conference proposal. A science organizing committee is will be formed that will comprise leading scientists from across Africa, aiming to be representative of all stake holders from the climate science community in Africa.

Specific Tasks:

- To validate the prior mapping of existing climate research institutes and researchers
- To review and consensually agree on a list of African Climate Research frontiers, for all climate-sensitive sectors recognized out of CCD-1, to serve as the basis for the review of papers
- To draft call for paper for the sub-theme
- To select the relevant papers for the sub-theme
- To design the programme and allocate time and speakers
- To decide on the number of participants in climate science
- To organize a panel discussion
- To organize a side event in CCDA II
- To fund raise and support conference participants
- To devise ways for the contribution of IPCC Working group II for African chapter, before the December 2012 deadline for contributions to the AR5
- To mobilize fund for climate research in Africa as well as for subsequent consultative meetings

11. Local Organising Committee (if relevant)

Local arrangements are being coordinated with ACPC staff.

12. Proposed funding sources and anticipated funding requested from WCRP:

All logistical planning and costs will be covered by ACPC. A fund raising team will seek additional sources of funding from international agencies to support delegates above and beyond the support that ACPC will provide. Funding bodies that will be donors for the proposals that will be the outcome of the conference will be invited to support the conference.

Proposed funding sources:

- WCRP - \$30K
- ACPC
- NOAA, USAID, Clinton Foundation
- START
- NERC, DfID, Met Office
- French agencies
- Other (development partners)