

**2nd WCRP-ICTP Summer School 2016**  
**Climate System Prediction and the Delivery of Actionable Regional Climate Information**

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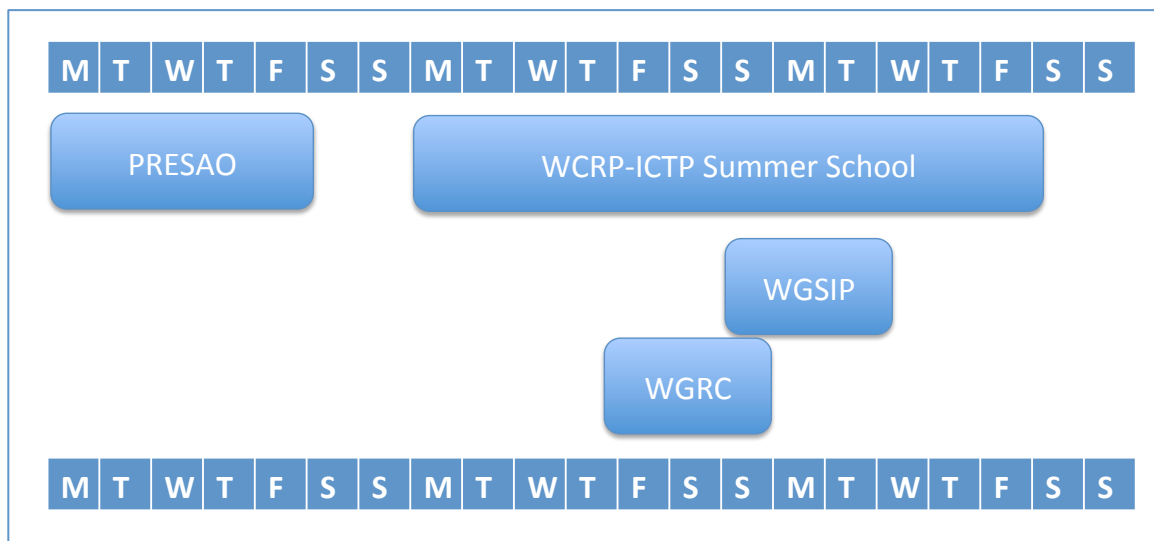
Planning Committee

O. Ndiaye, ANACIM  
A. Tomkins, ICTP  
R. Boscolo, WCRP  
A. Pirani, CLIVAR

Proposed dates: Sep/Oct/Nov 2016

Duration: 10 working days

We are seeking to organize the school in conjunction with the 2016 meeting of the WCRP Working Group on Seasonal to Interannual Prediction (WGSIP) and Working Group on Regional Climate (WGRC) to leverage funds and participation of members as school.



Participants

The Steering Committee will select 30-36 students, from developing and developed world institutions. A stringent selection process will be designed to identify top quality students based on a set of specifically developed evaluation criteria. Applicants are welcome to submit an abstract, both to help in the selection process, and also adding to the interactive part of the school, with a dedicated poster session where they can present their work. Additional information used in the selection is a statement of motivation and a supporting letter from the applicant's supervisor.

## Overview

The summer school is aimed at increasing capacity in research that addresses the priorities of the international climate research community (WCRP Grand Challenge on the provision of regional climate information), the improvement of forecasting systems and operations (in collaboration with Global Producing Centers, the African Centre of Meteorological Applications for Development (ACMAD), The AGro HYdro-METorological, (AGRHYMET), the WMO Regional Climate Outlook Forum for West Africa (PRESAO), and National Hydro-Met Services (NHMS) and the delivery of actionable climate information in support of the Global Framework on Climate Services (GFCS).

This summer school is proposed as the first in a series of internationally-coordinated regional training activities, tailored according to each region's requirements, aimed at raising the quality of regional climate predictions, implementing existing state-of-the-art tools into operations in all regions and the and their integration of operational products into the decision making process.

## Topics

The school will be organized around four broad topic areas:

- 1/ Understanding of the remote and local drivers of climate variability
- 2/ Climate prediction system development and verification
- 3/ Integrated predictions for impacts (e.g. health, agriculture), including downscaling
- 4/ The distillation of climate products towards the provision of regional climate information.

The school will train the participants on how to exploit the key freely available state of the art international multi-model, multi-institutional data resources, in particular the Climate-system Historical Forecast Project (CHFP), the Sub-seasonal to Seasonal Prediction Project archive, and the Coupled Model Intercomparison Project (CMIP) archive. These datasets enable the study of coupled climate processes, an assessment of current sub-seasonal to multi-annual prediction capabilities, the study of sources of predictability, and they provide a framework for assessing the observing system and for integrating process studies and field campaigns into climate model and prediction system improvements.

The school will also address the "Distillation" paradigm of the international climate research community on how to address, integrate and analyze the multi-model multi-method ensembles of climate simulations from the user perspective, according to scale and sector needs.

For the two week duration of the school, lectures will take place in the mornings, with occasional lectures in the evenings. The afternoons and remaining evenings

will be devoted to the practical application of the material covered in the lectures. This will be accomplished through introductory tutorial sessions and a set of research problems that will form the core of the school. Small groups of participants (~5) will work in teams supported and mentored by the faculty (and assistants where possible) with the aim of advancing the problems over the 2-week duration of the school. The expectation is that at least some of these projects would lead to peer-reviewed publications.

The intensive practical component will train the participants in the application of the topics covered in the lectures and also enhance their capacity for independent high quality research and analysis, achieving the standard necessary for peer-review publication. Close collaborative interactions between the participants and the faculty will be a key aspect of the school, favoring the development of relationships that will hopefully continue beyond the end of the school.

### Research Projects

Research problems are a key aspect of the summer school. It is envisioned that 6 teams, each with 4-6 students, will work to tackle around 6 problems that are to be developed specifically for the school by its lecturers. Problems will be carefully selected by the school's steering committee to ensure that they will be tractable via team work with the resources that will be available, that students working in teams with experienced lecturer-advisors will be able to advance the problems over the 2-week duration of the school, and that the results are likely to be publishable. The full set of problems will be presented on the first day, and students will be organized into teams before the start of the school, so that they can immediately begin to think about how they will tackle their projects.

Many, if not all, of the projects will rely on both the use of the advanced analysis techniques that will be taught at the school and a understanding of the relevant underpinning physical processes. The participants will give an update on their progress half way through the school, and they will present preliminary results at the end the school together with a plan for how the student team will continue to collaborate. The expectation would be that at least some of these projects would lead to publications and could be further developed after the end of the school in collaboration with some of the lecturers. A similar approach has been very effective in finalizing and publishing the results from ETCCDI workshops, as well as the First WCRP-ICTP Summer School on Attribution and Prediction of Extreme Events, 2015, where articles produced from the participants will be submitted to a special issue of Weather and Climate Extremes in 2016.

### Potential Project Topics:

- 1) Climate variability and predictability
- 2) Current level of skill; verification techniques
- 3) Development of climate prediction systems
- 4) Bias correction and calibration

- 5) Use of climate predictions in applications (eg agriculture, health)
- 6) Statistical downscaling
- 7) Communication of climate predictions

### Key Tools

The tools used in the summer school are particularly aimed at providing new and enhanced opportunities for research using open access state of the art datasets generated through international collaboration, as well as the use of highly portable software for analysis such as the IRI Climate Predictability Tool that is already extensively used for analysis and capacity development purposes in the region through IRI's collaborative activities with AGRHYMET, ACMAD and for the PRESAO.

### West Africa Focus

West Africa has some of the strongest climate variability at all time scales: sub-seasonal, inter-annual and decadal that has a direct, significant impact on people's livelihood. Most of the population in these countries are amongst the poorest in the world that depends mostly on rain-fed agriculture and share cross boundaries rivers in a rain-fed catchments (Niger, Senegal, Volta ...). This all calls for the careful management /planning of the resources that are related to climate variability (pastoralism, agriculture, water resources). Most of the countries in this region lie under Malaria endemic zones which is also related to rainfall variability. Many studies has been conducted over the West African Sahel that enable the development of applied operational activities (e.g. the AGRYMET products and the West Africa Climate Outlook Forum - PRESAO since 1998). The next stage is to develop an end-to-end system in the region that integrates climate products with applications (water, health, agriculture) at the institutional scale, and then down to the local (e.g. farmer) level.

With recent development in forecasting systems, our better knowledge of the climate system and new technology to share climate information, it is important to build capacity in West Africa to enable national climate and applications specialists to better respond to the increasing and the urgent need for climate services of the population at regional, national and local scales. Lack of capacity is a key limiting factor for the ability to respond to such demand, as well as the complex challenge of delivering useful information at higher spatial scale (near to farm level), the need for increased skill (eg forecasting extreme events), and a better understanding of the climate system and projections of climate change.

## Potential Faculty

### *Climate Variability and Predictability*

Benjamin Kirtman	U. Miami, USA
Alessandra Giannini	IRI, USA
Doug Parker	U. Leeds, UK
M. Shongwe	SAWS, S. Africa
Michaela Biasutti	Lamont Doherty, USA

### *Climate Prediction Systems*

Arun Kumar	CPC, USA
Francisco Doblaz Reyes	IC3, Spain
W. Landman	CSIR, S. Africa

### *Verification and Products*

Richard Graham	UK Met Office, UK
J.-L. Ceron	Meteo France
W. Thiaw	CPC, USA
Simon Mason	IRI, USA

### *Applications*

Adrian Tompkins	ICTP, Italy
Ousmane Ndiaye	ANACIM, Senegal
Andrew Robertson	IRI, USA

### *Downscaling*

Benjamin Lamptey	ACMAD, Niger
Andre Kamga	ACMAD, Niger
J. Polcher	IPSL, France
A. Cofino	U. Cantabria Spain
B. Hewitston	UCT, S. Africa

Venue: Dakar, Senegal - hosted by the National Civil Aviation and Meteorological Agency (ANACIM)

ANACIM is located near to Dakar airport. It has three air-conditioned conference rooms which can accommodate 40, 20 and 20 people respectively. There are video projectors incorporated and 2 extra video projectors available. We have portable facilities for translation (interconnected mic and earphones). IT experts are on hand to provide installation help (contact: aii.mbengue@gmail.com).

A set of computers (10) and two servers are available at ANACIM, more can be added. The airport has a training center belonging to the civil aviation (ASECNA) with much better facilities (computer, etc ) that we can also request since ANACIM is

part of the civil aviation. We can utilize their accommodation rooms (student room) for visitors. (contact: contact@asecna.aero)

Funding:

ICTP: 10K EUR

WCRP (direct funding of school, and indirect funding through WGSIP/WGRC meeting)

Additional Potential Sponsors:

GFCS

ClimDev

DfID

USAID, NSF

US CLIVAR, NOAA

ICSU

CCAFS

CCI

Budget:

We estimate the following budget:

- 400 to 500 euro per in-region participant for travel
- 500-1000 euro for travel from outside the region, including intercontinental trips
- ~ 800 euro for hotel costs
- ~ 300 euro for per diem.

So each regional participant will cost 1600 to 2000 euro and external participants will cost around 3000 euro.

We therefore estimate the cost of bringing 20 in-region participants as around 40,000 euro and 10 external participants as 30,000.

The faculty will be part in-region and part external so we estimate a cost for 10 faculty and 10 teaching assistants to be 50,000 euro.

Total preliminary budget estimate is 125,000 euro

## WCRP-ICTP Summer School - Timeline

Project Activities	From 01 January 2016 – 01 Nov 2016									
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Formation of SC and Faculty list, development of school structure and content										
Preparation of course content and research projects (data, software)										
Open Registration, including abstract submission and on-line application for financial support										
Review process of all the applications and selections of grantees										
Notification of selection outcome and granted support to the successful candidate										
Assist the successful candidates with travel, accommodation and VISAS. Submit interim report										
Participation to the Summer School										





## Draft Schedule

### Week 1

	Monday	Tuesday	Wednesday	Thursday	Friday
9h-9h45	Climate Prediction Introduction				
9h45-10h30	Distillation Challenge				
Coffee break					
11h-12h30	Prediction Systems	Introduction to CPT	Practical exercise		Practical exercise
Lunch					
14h-15h30	West Africa Climate System	Introductory exercises	Group projects	Group projects	Group projects
Coffee break					
16h-17h30	Presentation of potential projects and first group discussions	Group projects	Group projects	Group projects	Project progress reports (15 min each)
After dinner	Welcome reception	Advanced Lecture		Dinner Outing	

**Week 2**

	Monday	Tuesday	Wednesday	Thursday	Friday
9h-9h45					
9h45-10h30					Final Project wrap up and ongoing collaboration planning
Coffee break					
11h-12h30	Practical exercise	Practical exercise -	Practical exercise	Practical exercise	Project presentations (30-minutes each)
Lunch					
14h-15h30	Group projects	Group projects	Group projects	Group projects	Project presentations (30-minutes each)
Coffee break					
16h-17h30	Group projects	Group projects	Group projects	Group projects	
After dinner		Advanced Lecture		End of School Dinner	

