

PROJECT REPORT

Report of the eighteenth session of the Working Group on Sub-seasonal to Interdecadal Predictions (WGSIP)

ANACIM/ERNAM, Dakar, Senegal 23-25 November 2016

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Attendees of the WGSIP18 session

PRESENT: Francisco Doblas-Reyes, Bill Merryfield, Ousmane Ndiaye, Andrew Robertson, Ramiro Saural, Doug Smith, Adrian Tompkins, Mikhail Tolstykh, Tamaki Yasuda

INVITED: Aida Diongue Niang, Anna Pirani

EXCUSED: Swadhin Behera, George Boer, Laura Ferranti, Pierre Gentine, Jee-Hoon Jeong, Yvan Orsolini

JPS: Michel Rixen

1. Introduction

This report only summarizes discussions and outcomes of the 18th session of the WCRP Working Group on Sub-seasonal to Inter-decadal Prediction. Full presentations delivered during the meeting can be found on the corresponding meeting web page.

a. Welcome, introductions, objectives of the meeting and approval of the agenda – WGSIP Co-chairs

WGSIP Co-chairs Bill Merryfield and Francisco Doblas-Reyes welcomed all participants, thanked Drs Aida Diongue Niang, Ousmane Ndiaye and ANACIM for hosting the meeting and for making all necessary logistics arrangements. Doug Smith from UKMO was welcomed as new WGSIP member. A quick round table allowed all participants to introduce themselves. Co-chairs highlighted the priority of this session to review progress on sub-projects, decadal activities, linkages to WMO operational efforts and get updates from national centers, and to interact closely with the ICTP "School on Climate System Prediction and Regional Climate Information" (http://indico.ictp.it/event/a14270/) held over the week. The agenda was approved without changes, except for some swapping for logistics reasons.

b. Welcome address - ANACIM

Dr Aida Diongue Niang, Director of Meteorological Services welcomed all participants on behalf of ANACIM and thanked WCRP for having Ousmane Ndiaye as a WGSIP member. She recalled that the primary sector in Senegal relies heavily on climate and weather conditions. The increasing demand for quality seasonal and decadal predictions requires further research to meet expectations. Senegal intends to enhance its contribution to IPCC. She highlighted the great opportunity to have WGSIP members contributing as faculty to the school and suggested to hold this kind of events on a regular basis.

c. WCRP JPS update – M. Rixen

The relevance of the Grand Challenge on Water for the Food Baskets of the World for WGSIP was pointed out. It was confirmed that people nominated for IPCC reports via WCRP have to secure travel support via resources other than WCRP. The fate of the Working Group on Regional Climate is still unclear and will likely be discussed at the JSC38 session. The access to ESGF might be limited by bandwidth issues in some Developing Countries.

d. Review of WGSIP17 actions – W. Merryfield

Most WGSIP17 actions have been completed. The following ones required some follow-up or clarification:

- ACTION 4: done but add Butler et al doi10.1002/gj.2743
- ACTION 6: Adrian Tompkins offered to develop the conversion script
- ACTION 7: Lisa Alexander and Xuebin Zhang have been invited to the S2S Extremes workshop but were not available. Further contacts will be pursued.
- ACTION 8: done, Yvan Orsolini/Francisco Doblas-Reyes talked to Thomas Jung (Chair of PPP), see also SNOWGLACE and PPP presentations below
- ACTION 15: this is part of the WGSIP18 agenda
- ACTION 17: several WGSIP members (Andrew, Francisco, Mikhail) have attended RCOF meetings in person or via teleconference. JPS will check how WGSIP can be engaged more formally with the RCOFs

e. JSC37, WMAC5 and Grand Challenge updates – F. Doblas-Reyes

Two new Grand Challenges were endorsed: "Carbon Feedbacks in the Climate System" and "Near-Term Climate Prediction", for a total of seven grand challenges. As WGCM has served as a useful home to the Grand Challenge on Cloud, Circulation and Climate Sensitivity to coordinate and promote the activity, it was suggested that WGSIP could play a similar role for the Grand Challenge on Near Term Climate Prediction. The objectives of this grand challenge are: a) research and development to improve multi-year to decadal climate predictions, b) collate and synthesize prediction output and tailor climate information, and c) develop organizational and technical processes, including international coordination to underpin future routine provision of prediction services. The grand challenge includes synthesis of real-time prediction information from multiple existing, initialized prediction systems, and assessment of the confidence the scientific community has in the information to develop a Global Decadal Climate Outlook. A concept note and a white paper are in preparation. It was further recommended to have S2S and WGSIP briefings at the next JSC session, instead of doing it through WMAC, given the growing momentum and success of the climate prediction activity. The plans for next 12 months are: new strategy, CMIP6, renewed communication plan, newsletter and revamp of the web. There was also a complaint from the co-chairs of the core projects for the projects to be part of the decision making process. WCRP offered to support the research community on accessing the Lead Centre results (hindcasts and plots). WMAC5 was the only forum for the working groups to report. During this meeting the next model development summer school at CPTEC in 2017, on parameterisations in the grey-zone area, was announced. A joint modelling working

group meeting at the Met Office was announced for October 2017 to support the development of a WCRP modelling strategy for the following ten years. It was decided to solicit input from modelling centres about their expectations from WCRP, as well as the cross-WCRP ambitious initiative to improve model precipitation in all kind of simulations.

f. Expanded scope of WGSIP on decadal time scales

Bill Merryfield recalled the many decadal-related programmatic elements in WCRP, which need to be streamlined. It was suggested this could be addressed in the context of the development of the WCRP new strategic document. WGSIP web pages will need to be updated to reflect the change in scope into "Sub-seasonal to Inter-decadal Prediction".

g. Overview of ICTP School – A. Tompkins

Adrian Tompkins provided a quick summary of the school agenda and activities and encouraged WGSIP members to interact closely with school attendees. The current mix of experienced and younger students offers opportunities for cross-mentorship. He proposed a possible follow-up school in 2018 jointly with the WGSIP session, possibly at ICTP. Anna Pirani suggested assembling a FAQ document emerging from the school. Michel Rixen noted the evolution in education and training practices, relying increasingly on on-line learning tools and suggested future school to factor these into future activities.

WGSIP members contributed significantly to the school, by providing keynote lecturers and supporting hands-on training sessions. A presentation by Wilfran Moufouma-Okia from IPCC TSU I exposed students to regional climate science, Assessment Reports and processes.

2. WGSIP Projects

a. SNOWGLACE - Y. Orsolini and J.-H. Jeong

A SNOWGLACE meeting will take place in March 2017 in Beijing, focused on snow observations and re-analyses over the Himalaya-Tibet Plateau region and their impact on monsoon seasonal forecasts. For verification in SNOWGLACE, it is planned to look at the benefit of using snow depth rather than snow water equivalent, as there are different ways to model snow density. The ERA-Interim land analysis could be useful to that effect. It was suggested to compare skill to persistence, but is somewhat included in the Brier skill score. It was noted that the snow forecast reliability as shown in the (rainbow) regional maps of reliability category would depend on time of year. It is difficult using the SNOWGLACE simulation design to discriminate between thermodynamic effects (snow insulating) and radiative effects, without additional dedicated experiments. There is currently no evidence for snow initialization impact upon the seasonal NAO prediction skill, yet there is an impact on subseasonal timescale in case studies.

b. Drifts and shocks – W. Merryfield and M. Tolstykh

This activity is very relevant to the WGNE Systematic Error Workshop and WGSIP members were encouraged to submit abstract on this theme. A dedicated session is planned for. In CanCM models, there is no on-line data assimilation in the ocean, as this is mainly done via a 2DVAR approach applying a correction to the initial conditions. There is a challenge to extract statistically significant results from model outputs. Predictions at different lead times could be compared as a proxy for shocks. It was noted that cloud cover may induce shocks on fluxes too. Some techniques used in NWPs like digital filtering could be explored to reduce shocks and maximize the benefit of initial conditions. It was noted that coupled data assimilation might reduce shocks but there would still be a drift.

c. Teleconnections – L. Ferranti

It was recommended to have some further discussion on cooperation between the teleconnection work in WGSIP and S2S and to forward the EOS draft article to Cristiana Stan. Laura Ferranti has been invited at the planned ICTP workshop on teleconnection in fall 2017.

d. CHFP, ESGF and observational requirements – R. Saurral

Members acknowledged the increased number of users of CHFP and encourage regional studies to feed back to centres. The upgrade of CHFP as an ESGF node is still in the working. It is also planned to reformat the NMME files in the SPECS format and to add the RHMC SL-AV model by June 2017. Copernicus will follow the SPECS format whilst the Decadal Forecast Exchange will use the CMIP6 specifications.

e. Decadal Climate Prediction Project and Grand Challenge on Near-Term Climate Prediction – D. Smith

There remains a fundamental challenge for decadal predictions to analyse single events in the context of the rather short record going back to 1960 which cannot be extended further because of the lack of ocean data. It was proposed for WGSIP to look at possible contributions to the UNFCCC Global Stocktake in relation to National Determined Contributions. The DCPP work on decadal prediction addresses scenario-based simulations but expectations on using such predictions for mitigation purposes need to be managed. It was agreed to watch the outcomes of the CBS session and to further promote open and free access to Decadal data and products. It was commented that DCPP, and by extension WGSIP, remains the natural home for the Grand Challenge on Near-Term Climate Prediction.

f. Discussion including draft EOS article – all

A draft EOS manuscript describing the 3 WGSIP sub-projects has been prepared and circulated to WGSIP members and should be submitted soon.

3. Modeling centers update

Briefers were invited to focus on updates since the last session and to cover Global Producing Centres and Lead Centres matters as applicable.

a. CNU/Korea and APCC – J.-H. Jeong (remotely)

Bill Merryfield welcomed the use of the POP ocean component in a new in housedeveloped Seamless Coupled Prediction System (SCoPS) for use in APCC's multimodel ensemble, and noted the importance to maintain some diversity of models. KMA remains the official provider of seasonal forecasts. APCC has the intention to become a formal provider too but performance needs to be checked.

b. BSC – F. Doblas-Reyes

Drift analysis helps uncovering model errors, there are already useful illustrations of the usefulness of drift analysis for model improvement. It is important to factor in observational error and satellite retrievals in the R&D model evaluation process. High-resolution ocean and atmospheric models allow a better representation of tropical instability waves but improvements are not systematic everywhere. The need to link event attribution with climate prediction has been recently covered by the EU EUCLEIA project, but much more remains to be done.

c. CIMA – R. Saurral

It was emphasized that weather and climate risks are relevant to many sectors, including fisheries, agriculture and the wind energy. The climate in South America is very sensitive to Antarctic sea-ice.

d. ECCC - W. Merryfield

ECCC seasonal hindcasts have been downscaled experimentally to 25 km resolution over a North American domain using the CanRCM4 regional model, and apparent conditional added value for precipitation forecasts in certain circulation regimes has been identified. Andrew Robertson suggested statistical downscaling as a means to provide a baseline against dynamical downscaling. He also recalled the S2S Academv Report (available from https://www.nap.edu/catalog/21873/nextgeneration-earth-system-prediction-strategies-for-subseasonal-to-seasonal). Adrian Tompkins suggested a phase correction on the combined CanCM3 and CanCM4 for the ENSO forecast. It was shown that skill scores for ECCC seasonal predictions of snow water equivalent and soil moisture are sensitive to the verification product employed, with multi-product blends tending to yield higher scores than individual products. Francisco Doblas-Reves raised the issue of observational uncertainty and the need to make ET-OPSLS aware of current research efforts in this direction.

e. ECMWF – L. Ferranti

There might be some connection between the MJO strong signal and wind burst. The large El-Nino plume uncertainty includes one ensemble member well above the 5 Deg C, which could be physically unrealistic, or else could provide insights about a potential for unprecedented extreme ENSO events. The S2S chart pages are part of the S2S project. System 5 is targeted for implementation in July 2017.

f. ICTP – A. Tompkins

Members were invited to consider a possible WGSIP 2018 at ICTP with some school. The deadline for ICTP funding proposals for 2018 activities is Feb 2017. It was suggested to add a strong decadal prediction component in future schools.

g. INM RAS – M. Tolstykh

It was suggested to collect information about global energy balance tuning methods applied to seasonal and decadal control runs from all centres and to investigate the resulting spatial heat balance patterns.

h. NILU – Y. Orsolini (remotely)

The Solar effects on natural climate variability in the North Atlantic (SOLENA) activity is not strictly focused on seasonal prediction, although its emphasis on the role of the NAO in modulating solar cycle atmospheric impacts is relevant to climate prediction. It was suggested to also use the S2S database to investigate summertime teleconnections from the Atlantic to the Far East. Hindcasts from the Norwegian climate prediction model NorCPMv1 (based on NorESM with ensemble Kalman filter initialization) are currently under development but it is unsure whether this will become an operational activity.

i. IRI – A. Robertson

The IRI ENSO Forecast web page now includes a regression-calibrated ENSO forecast plume. IRI is now testing an NMME-based seasonal forecast product for precipitation and near-surface temperature, and plans to switch to this new product in 2017. IRI is co-developing (with UKMO and ICPAC) a data-library portal at ICPAC to enable GPC forecasts from Exeter, Washington, Montreal to be easily accessed in East Africa, along with those of other NMME models. The IRI Data Library and forecast products are mainly supported by projects funds. Commercial users of IRI forecast products are invited to contribute financially.

j. UK Met Office – D. Smith

Skilful predictions of the NAO are seen in the recent winters. There is also some skill a year ahead. The new MO decadal prediction system shows skill for predicting multi-year Sahel rainfall. It was commented that there is no signature of a dipole in the Gulf of Guinea reflecting the skill of rainfall in Sahel. The atmospheric response to Arctic sea ice depends on the model bias – hence coordinated experiments are needed to investigate further, and will be undertaken in EU APPLICATE project.

k. JMA/MRI – T. Yasuda

MRI and MIROC have similar decadal trends and the question of a change in the observing system and consistency in reanalyses was raised. The contribution to the decadal component of LRFTIP was welcomed.

I. NMME – W. Merryfield

The NMME multi-model shows better skill than the individual systems as expected and has been reported in the literature. NMME contributors are committed and see value in maintaining and developing this activity further not only as a research but also as an operational effort. It was suggested to strengthen the dialogue between WGSIP, NMME and GPCs/LC. NMME now employs 8 models and ~110 ensemble members following the addition of the CESM1 model in 2016.

m. SNWS (ANACIM) – O. Ndiaye

The private sector is now selling weather and climate predictions apparently without substantial skill in Senegal and competes with the ANACIM mandate and poses also some certification problems. A dialogue with industry would be required to overcome this issue.

n. GPCs not currently represented on WGSIP – W. Merryfield

It was suggested to increase the representation of GPCs on WGSIP, possibly on the decadal time scale too.

o. Science talk – P. Gentine (remotely)

Granger causality, which is quite commonly used in hydrology could be useful in many areas of WCRP research. It was proposed to inform the community about this tool.

p. Discussion on strategy: common challenges on seasonal and decadal predictions – all

Co-chairs stressed the importance to promote the analysis of simulations. It was agreed to consult with WGSIP members on on-going work on 1) ensemble size vs lead time 2) impact of observational platforms 3) decadal extremes, monsoon onset and see if there are opportunities to establish new projects. Some close coordination with the DCVP is needed on how to organize the work between prediction and predictability. WGSIP seems to be a natural home for the GC NTCP (analog to WGCM and GC Cloud) and consultation should take place to that effect.

4. Collaboration with related initiatives

a. Subseasonal-to-seasonal Predictions (S2S) project – A. Robertson

The S2S database now contains data from 10 out of 11 centres via ECMWF, with the 11th one (KMA) to be added shortly. Ocean variables will be added in 2017, in NetCDF format. The CMA archive is also now active, and a small S2S subset is available at IRI. The IRI S2S data has facilitated S2S training exercise in Africa (including the ICTP/WCRP school). S2S plans to make a set of indices computed from the S2S models (starting with the RMM indices) in 2017. Given the critical mass and momentum on S2S activities and outcomes, it was proposed to ensure a dedicated brief at the JSC38 session. There is scope to strengthen research collaboration with S2S on teleconnections through more-frequent liaison with the respective sub-projects on both sides, and by requesting S2S project feedback on WGSIP's analysis of initial drift using S2S data led by M. Tolstykh. Access to S2S forecasts in real-time by NMHSs on bilateral agreement would be possible. It was noted that daily-average surface wind speed would be useful for wind-energy applications, and to propose that S2S addit to the database.

b. Polar Prediction Project (PPP) and Year of Polar Prediction (YOPP) plans relevant to WGSIP – M. Tolstykh/F. Doblas-Reyes

SIPN has shown the large spread of methods, but there are prospects with sea-ice dynamical prediction. However, this should be put in the context of a rapidly changing Arctic. WGSIP should consider launching a second phase of the IceHFP sub-projects, but this activity would need contributing centres to volunteer and SIPN may provide such framework. WGSIP should attend their next meeting. It was proposed to ensure that future contributions to CHFP include sea-ice variables. Some coordination with PCPI on eventual seasonal prediction efforts in the context of YOPP would be welcome. It was suggested to circulate the YOPP modelling plan to WGSIP members and to draft a WGSIP response to PPP, addressing also possible observations which might be useful for WGSIP.

c. European projects – SPECS, EUPORIAS, APPLICATE

A EU ECOMS conference was held last October at the UKMO. The need to feature climate prediction in the upcoming IPCC WGI report was highlighted. It was suggested to collect and publish seasonal to decadal on-line resources on the WGSIP web page. The trade-off between resolution and ensemble size remains a critical open question in the context of limited computing resources. CDO can handle the latest SPECS convention with multiple time dimensions. EUPORIAS seasonal forecasting has evolved into C3S. WGSIP members endorsed coordinate idealized experiments in the context of APPLICATE.

d. Copernicus Climate Change Services (C3S) – F. Doblas-Reyes

BSC is involved in the evaluation and quality control component of C3S. GLOSEA5 is already stored at ECMWF. Seasonal forecasts will be global and also include statistical downscaling products. A contract on the feasibility of initialized decadal prediction is run by Chris Hewitt. C3S poses a possible challenge to the mandate of NMHSs as everything will be freely and openly accessible. The same applies to NMME. The CLIPC portal will be integrated in C3S. Some coordination between Copernicus services is in place to avoid duplication of effort. E.g.. MyOcean is responsible for ocean reanalyses.

5. WGSIP and WMO links

a. Prospective WMO Polar Regional Climate Centre/MME for sea ice prediction – W. Merryfield

The planned PRCC is envisaged to have three nodes, located in northern Europe, the Russian Federation and North America. ECCC's Canadian Centre for Meteorological and Environmental Prediction (CCMEP) near Montreal has expressed interest in hosting the North American Polar RCC node, including a focus on multicentre seasonal forecasting of sea ice.

b. Coordination with CBS/CCl ET-OPSLS - W. Merryfield and L. Ferranti

WGSIP and S2S have been invited to review the pilot Lead Center S2S web page where various subseasonal to seasonal products are being made available. Access to such page is needed to provide such feedback. It was suggested that all communication between WCRP and the CBS/CCI would be channelled through WGSIP. It was proposed at the April 2016 ET-OPSLS meeting attended by Bill Merryfield and Laura Ferranti that enhanced WGSIP/ET-OPSLS cooperation could include "horizon scanning" of the research landscape to identify new products and services having potential societal value, as well as improved climate prediction practices. This could be provided in the form of brief reports produced by WGSIP, possibly in conjunction with WGSIP meetings, beginning with WGSIP19 in 2017.

6. WGSIP Business

a. Next sessions and meetings

The WGSIP19 session will be held in conjunction with the joint modelling Working Groups meeting, 9-13 Oct 2017 in Exeter. This event will offer options for possible bilateral meetings with WWRP, S2S, OMDP, DAOS, PDEF, CORDEX, DCPP for example.

Mikhail Tolstykh offered the possibility to host the WGSIP20 session in Moscow, Russia. The frequency of sessions has varied in the past, from 12 months to 18 months and could be adjusted in the future depending on needs of the working group.

Amongst others, the following upcoming meetings were highlighted:

- WGNE Systematic Error Workshop, 19-23 June, Montreal, Canada (http://collaboration.cmc.ec.gc.ca/science/rpn/wgne_wse/en/)
- PPP Steering Group Meeting, 27 Feb 1 Mar 2017, NCEP, Maryland, United States, for which Mikhail will need inputs from WGSIP
- The 7th International Verification Methods Workshop (7IVMW), 3-11 May, Berlin, Germany
- A possible S2D conference in 2018, to be discussed at the upcoming DCPP conference call on 16 Dec 2016
- Upcoming RCOFs meeting

b. Memberships

Seven members will have their current term ending in Dec 2017 and are invited to provide co-chairs with an indication whether they would consider a possible extension to serve on WGSIP. It was suggested to consider including some new members from Australia, New Zealand or South Asia and also to improve the representation of decadal expertise (including possibly linkages to APPLICATE) on the working group.

c. Web space renewal and flyer

Michel Rixen will review the web site to reflect the updated scope of WGSIP and will include the description of sub-projects based on the 1-pager provided by the respective leaders. The updated flyer will be distributed again.

d. Review of Draft actions list

The draft action list was reviewed at the end of the session and is reported in ANNEX B.

ANNEX A – Contact list

Members

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ANNEX B - ACTION LIST

Relation to WMO and ET-OPSLS

1. Contact CCL to explore how WGSIP members could be invited to relevant RCOF meetings - Michel

2. Contact ET-OPSLS to provide feedback on their draft S2S page/material – Laura, then all

3. Check CBS outcome and promote open and free access to Decadal data and products – Co-chairs WGSIP and DCPP with GFCS

4. Consult with ET-OPSLS on whether current public hindcast data are suitable to conduct proposed ET-OPSLS research topics – Co-chairs

JSC

5. Include an S2S and WGSIP (including DCPP) briefing in JSC38 agenda – Cochairs and Michel

CHFP, NMME, S2S

- 6. Add RHMC SL-AV to CHFP Mikhail (July 2017)
- 7. Request S2S to add surface wind speed to S2S data base Andrew

8. Ensure future contributions to CHFP include daily data, sea-ice cover and thickness - Ramiro

9. Develop a small script to convert NMME to CHFP/SPECS format – Adrian

DECADAL

10. Consult with DCVP and DCPP on targeted projects (via telecon first) – Co-chairs (before fall 2017 meeting)

11. Discuss with GC NTCP whether they see value in having WGSIP as home (analog to WGCM and GC Cloud) – Paco (next GC NTCP conference call)

12. Liaise with APPLICATE to confirm WGSIP endorsement of proposed idealized experiments - Doug

PROJECTS

13. Horizon scanning of research by WGSIP members and community on new products and services of potential societal value, and improved climate prediction practices, possibly including 1) optimization of ensemble size vs lead time for lagged ensembles 2) impact of observing systems such as tropical moored buoy arrays 3)

quantifying risk of extremes in initialized hindcasts 4) monsoon onset/cessation and wet/dry/hot/cold spells 5) observational uncertainty. Record inputs in brief report for ET-OPSLS to be prepared in conjunction with WGSIP 19, and assess if there are opportunities to establish new projects – Co-chairs, all

14. Collect information on heat balance tuning methods from centres as part of the drift and initial shocks project – Bill/Mikhail

PPP

- 15. Check what PCPI is doing on seasonal predictions Michel
- 16. Circulate YOPP plan to members and prepare a draft response to PPP Mikhail
- 17. Contact SIPN and attend their next meeting Co-chairs

Publications

- 18. Share EOS article with Cristiana Stan Bill
- 19. Finalize BAMS article Adrian
- 20. Encourage nominations of decadal experts in IPCC AR6 Doug

Workshops

21. Promote and contribute to the Systematic Error Workshop - Michel, all

WEB

22. Add links to relevant seasonal to decadal on-line resources - Bill and all

23. Update WGSIP web page to reflect new scope of WGSIP and sub-projects description - Michel

24. Select flyer version, publish and circulate – Michel

BUSINESS

25. Explore the possibility to host the 2018/2019 WGSIP session at ICTP or Moscow and elsewhere with some school – Co-chairs, Adrian, Mikhail

26. Contact prospective WGSIP members including from relevant GPCs – Co-chairs

27. Organize a teleconference before the JSC38