WCRP
World Climate Research Programme

Report of the 19th session of the WCRP Working Group on Subseasonal to Interdecadal Prediction

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Disclaimer

Executive Summary

The WGSIP-19 session was held at the UK MetOffice, Exeter, UK on 9-13 October 2017, in the context of the pan-WCRP Modeling week held the same week. The main objective of the meeting was to review progress on the all WCRP prediction efforts within modeling centers and across WCRP relevant groups, as well as address connections with other modeling groups such as WGNE, WGCM, S2S, and the Grand Challenge on Near-Term Climate Prediction.

The present report is meant to complement the detailed PowerPoint Presentations available on the meeting web site and to synthesize discussions and actions agreed at the end of the session.

Participants of the WGSIP-19 session

Contents


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PRESENT: Francisco Doblas-Reyes (Co-chair), Bill Merryfield (Co-chair), Johanna Baehr, George Boer, Laura Ferranti, Jee Hoon Jeong, Yvan Orsolini, Andrew Robertson, Ramiro Saurral, Doug Smith, Adrian Tompkins, Mikhail Tolstykh, Tamaki Yasuda

EXCUSED: Pierre Gentine, Ousmane Ndiaye

JPS: Michel Rixen

1. Introduction

All members introduced themselves and the agenda was approved.

2. Review of WGSIP18 actions

1. Not clear whether much has happened on that front.
2. Covered by Arun.
3. The LC has been established at the Met Office. A call for GPCs will be opened in November. Data will be password-protected and available to producers and institutions collaborating with them. George said that this is DCPP component B and as such should be sent to ESGF too. However, the lead centre will also produce an annual-to-decadal outlook that is not part of component B. It might be worth to keep insisting to CBS to make everything public.
4. Recommendation to use research datasets because they are more complete for certain purpose. To be discussed in more detail later during the meeting with Arun and Caio.
5. There was only a WMAC presentation.
6. Reported to the moment when the new system is available.
7. Not done yet.
8. Only monthly-mean sea-ice data is available.
9. Done.
10. Not done yet.
11. The link to WGSIP has been accepted.
12. Converted into the Polar Amplification MIP.
13. To be discussed later during the meeting with Arun and Caio.
14. Not much happened yet, only some members involved in this kind of issues.
15. Michel to inform.
16. Draft circulated on time.
17. Addressed by Bill through his PPP involvement.
18. Done.
19. Done.

20. Mentioned the members of the panel.
21. Done.
22. Ongoing, revise the web page and look for missing links.
23. Done.
24. There were several concepts for the flyer, but no decision has been made yet.
25. To be discussed at the end of WGSIP19.
26. Regular process.
27. Done.

3. WGSIP's role in WCRP, objectives of meeting

The position of WGSIP within WCRP was reviewed in relation to other entities that address climate predictability and prediction, namely DCVP, DCPP, GC-NTCP, and S2S, as well as the WMO IPET-OPSLS that has a similar role to WGSIP on the operational side. Members were encouraged to keep in mind during the course of this week's meetings that these connections should be strengthened, with WGSIP serving in a coordinating role.
A request to address the different elements that are used to build the strategic plan was made so that a clear climate prediction position can be made in the summary presentations of Thursday.

4. WGSIP outreach and events

Members were updated on the upcoming publication of the Tompkins et al. BAMS article https://doi.org/10.1175/BAMS-D-16-0209.1 on the CHFP and the Merryfield et al. Eos article https://doi.org/10.1029/2017EO086891 describing current WGSIP projects. Plans for the International Workshops on Subseasonal to Decadal Prediction to be held 17-21 September 2018 in Boulder were also described.

5. Modeling centers update

ECMWF: The ECMWF strategy is to work towards an integrated and unified modelling and initialization system for the coupled ensembles across all timescales. This has been a key consideration for the configuration of SEAS5. Although the configuration is not necessarily optimal for seasonal prediction, the strategic advantages of working to improve a single model version, and in minimizing the number of different resolutions being used, are substantial. Several elements that were excluded from SEAS5, such as increased vertical resolution, more consistent land initialization, and radiatively active ozone, will continue to be evaluated towards operational implementation of SEAS6.

SEAS5 uses TCo319L91 cycle 43r1, and the high resolution configuration of the ocean model ORCA025L75 resolution (1/4 degree global, with 75 levels). This is identical to the extended range system, with the following exceptions:
• The amplitude of the non-orographic gravity wave drag (NOGWD) source term in the tropics is reduced to improve the phase and amplitude of the model QBO. The reduction of the parametrized NOGWD was needed to compensate for the better resolved wave activity in the

cubic grid. The impact is important at longer timescales, but is neutral in the medium and subseasonal range.

- Time-varying tropospheric sulphate aerosol is taken from CMIP5 (as used in ERA5) rather than using the default fixed climatology.
- Volcanic stratospheric aerosol continues to be treated with simplified time-varying values of volcanic aerosol specified as initial conditions. This is important for real-time seasonal forecasts, since it allows us to respond to any future major eruption in real-time. Although the methodology is the same as in SEAS4, the data files are updated to follow the latest data release from GISS, and the background "no volcano" state to which the model decays is reduced to a value consistent with the latest GISS data (an optical depth in the visible of 0.004). This means that prognostic ozone in SEAS5 does not interact with the radiation, with instead the default ozone climatology used for radiation.

For the SEAS5 initialization: the re-forecasts are initialized based on ERA-Interim data, and the real-time forecasts are initialized based on interpolation of the operational HRES analysis. For the ocean (ORAS5) and the free atmosphere this is straightforward. For the land surface it is more complex, both for medium-range and seasonal timescales, due to the issue of consistency between the re-forecasts and the real-time forecasts. The atmospheric initial perturbations follow the same approach as the extended range forecasts (EDA-based perturbations and singular vectors). Additional SST initial perturbations are added to the ocean. The real-time land surface initial conditions are interpolated from the operational TCo1279 analysis. The reforecast cannot be initialized directly from ERA-Interim, because the soil model used in ERA-Interim and operations are very different. Instead an offline integration of the land surface is used, forced by ERA-Interim fluxes, and created directly at the required resolution (TCo319 for SEAS5). Consistency of land surface initialization is particularly important for the seasonal range, since the land surface initial state can be responsible for a major portion of predictable variance in surface conditions on a 1-2 month timescale. SEAS5 skill in the tropics is significantly higher than the SEAS4 skill. One part of the improved skill in SEAS5 in the tropics is better ENSO forecasting, due largely to improvements in the IFS over the last six years, but also in part to the increased ocean resolution. The better performance in the tropical Pacific has several distinct aspects – the mean state has reduced bias, the amplitude of SST variability is more realistic, and the time variability, as measured by anomaly correlation, is more accurate. The amplitude is also improved in all regions, with a reduction in the excessive amplitude seen in the central Pacific (such as Nino3.4) and an increase in the far eastern Pacific (Nino1+2). This gives a larger improvement in the RMS scores than would result just from the improved correlation. It also means that we no longer need to correct the model variance when creating the Nino plume products, as was necessary for SEAS4 due to its excessive variance.

Although the tropical Pacific is greatly improved in SEAS5, the skill over the Atlantic shows some deterioration, in particular over the north-west corner, in the area of the Gulf Stream. Sensitivity experiments suggest the Atlantic degradation is associated with the high resolution ocean. Preliminary diagnostics point towards flow dependent imbalances in the ocean initial conditions, associated to different decadal regimes. The next four years will focus on learning from SEAS5 and developments for the next generation SEAS6, for its implementation by 2021. It is expected that the North Atlantic problem in ORAS5 can be sorted out in the next ocean reanalysis ORAS6. Overall, the inclusion in SEAS5 of prognostic sea-ice appears beneficial for the skill of T2m, especially over the land masses surrounding the Arctic.

ECCC (invited expert Hai Lin/S2S): GPC Montreal's operational seasonal forecasts have since their inception been based on multi-model ensembles drawn from the department's climate and weather prediction models. Since late 2011, the system has employed two versions of

CCCma's coupled climate model. Recently however a new coupled version of the department's GEM NWP model has been developed and tested for seasonal prediction. The model consists of a 1.4° horizontal resolution L79 version of GEM with a 0.075hPa top, coupled to the NEMO ocean model ORCA1 configuration (nominal 1° horizontal resolution, stretched to 1/3° meridionally at the equator with a tripolar Arctic, L50) and sea ice modelled by CICE. A full set of 12-month hindcasts initialized at the beginning of every month in 1980-2010 by ERA-Interim and ORAp5 has been run. This GEM-NEMO model performs particularly well in the first season (lead 0) over land, and will enhance the skill of GPC-Montreal's forecasts when it becomes operational, most likely within the next year. A pending decision is whether the system will then be based on three models, or on two (GEM-NEMO and the more skillful of the existing models, CanMC4).

BSC: Role of observational uncertainty in forecast verification, development of climate services examples for tropical cyclone frequency, illustration of the impact of forecast system improvement on maize yield seasonal predictions, importance of efficiency in forecast quality assessment (for Copernicus prototype) and in diagnostics for high-resolution (10 km) predictability experiments (online data analysis).

CNU, KMA and APCC: KMA developed a new land surface initialization scheme for their seasonal prediction system based on GloSea5, which is to be implemented in 2018. This effort was motivated by the big-failure in predicting the record-breaking 2016 East Asian heatwave, which lasted almost whole August causing tremendous socio-economic impacts. Its unprecedented long persistency and strength were not predicted at all by most existing models. Though a dry soil condition over the Northern Mongolia and China, and resulting land-atmosphere interaction have been suggested as one of primary causes, soil moisture was not initialized realistically in KMA GloSea5. The initialization is based on the offline simulation of land surface model – JULES, driven by atmospheric forcings. To reduce spurious climate drift by the initial condition, the estimated soil moisture is re-scaled to balance with GloSea5's own climatology by CDF matching technique. For further enhancement of soil moisture quality, we applied a statistical correction on precipitation forcing and a nudging of satellite-retrieved soil data which are shown to be very effective.

APCC: A considerable increase in APCC's MME forecast skill is observed in recent several years (2014-). This is thought to be contributed mostly by an increase in participating models, more than by an increase in ensemble numbers. This suggests the importance of model diversity in MME skill. APCC is conducting the CLIPS (Korea – Pacific Islands Climate Prediction Services) project ('15-'17) that is aiming to provide useful seasonal forecasts to Pacific Islands countries where the skill by dynamic models are believed to be high. A statistical downscaling model was developed based on the relationship between Pacific-wide large-scale climate pattern and climate variables at individual countries. By applying APCC's MME to the model, a downscaled and probabilistic seasonal forecast of 3 months rainfall is made, and provided to Pacific Islands through an offline software called PICASO (The Pacific Island Countries Advanced Seasonal Outlook)

CIMA: During the last months, activities related to sub-seasonal to interdecadal predictions at CIMA have included a new collaboration with the National Weather Service of Argentina to implement operational sub-seasonal (2-week horizon) to seasonal (up to 3 months) predictions on temperature and precipitation. Regarding decadal and beyond, a new project has been funded from the Ministry of Science and Technology of Argentina to analyze the potential for deriving operational interannual-to-decadal climate predictions over Argentina. This 2-yr project will address this issue in the coming months. Also, funding has been given to a new project co-

funded by Argentina and the EU to improve our knowledge of the SST and sub-SST variability in the South Atlantic region by deploying buoys and improving the satellite sampling over the region. These results might be useful for further understanding the existing relationship between the South Atlantic and climate variability over southern South America.

ICTP: The WGSIP flagship project CHFP description paper has been finalized and will appear in BAMS in November 2017. An update was provided concerning health system modelling developments ongoing at ICTP. The VECTRI malaria model is now installed at JAMSTEC and is being driven by SINTEX2 and WRF seasonal forecasts in a prototype health early warning system (HEWS) for the north-eastern region of S. Africa. This project grew directly out of a collaboration established via WGSIP. Research results were shown demonstrating how climate, initial condition and model parameter uncertainty can be ranked in terms of their importance for malaria transmission uncertainty in HEWS. Other demonstrations of the use of the system to advise the NGO Médecins Sans Frontières concerning recent malaria outbreaks in Kivu, Democratic Republic of Congo, which may be extended to a HEWS system. However, general development of HEWS is held back by the lack of available daily temperature and precipitation from operational forecast systems, hindered by the delay in NMME daily data release to 2018. It is also recommended that Copernicus ensures that digital daily T/P is made available from EUROSIP, and potentially extended to the S2S systems where possible.

INM RAS: M.Tolstykh presented a brief update on subseasonal and seasonal forecasting in Hydrometcentre of Russia. The old low-resolution version of the SL-AV global atmospheric model is still used for operational forecasts due to lack of computational resources. Its forecasts contribute to S2S and APCC multimodel ensemble. The new version of the SL-AV model is being tuned now. It has the horizontal resolution of 0.9x0.72 degrees in longitude and in latitude respectively, 84 vertical levels up to 0.5 hPa. Some intermediate results were presented. It is planned to start operational exploitation of this model version in 2018. It is also planned to run hindcasts with the coupled version of the same model.
There are also plans for running experimental decadal predictions at the Institute of Numerical Mathematics RAS with the INMCM coupled model.

JMA/MRI: JMA's new Global Ensemble Prediction System (GEPS), which unified three previous operational EPSs (Typhoon, One-week and One-month EPSs), started operation in March 2017. JAMSTEC/APL upgraded the seasonal prediction system. The new system includes enhanced horizontal and vertical resolutions, upgraded version of dynamical sea-ice model, and initialization of ocean data assimilation (3DVAR), leading to improvement of ACC of the tropical SST related to ENSO and IOD. Two modelling groups in Japan, MRI and MIROC participate in DCPP in CMIP6. The initialization scheme common in the two models consists of EnKF and full data assimilation with surface pressure and ocean temperature and salinity observations.

Met Office: Winter NAO predictions from GloSea5, which showed unprecedented high skill during the hindcast period, have continued to verify well during the operational period 2014-2017 and by extension winter NAO impacts are also skilfully predicted. However, the so-called signal to noise paradox (model predicts the real world better than itself) has yet to be resolved.
Skillful prediction of extratropical seasonal precipitation has been demonstrated for the Yangtze Basin, and experimental real time forecasts for Yangtze Basin rainfall are now being produced in collaboration with CMA. Skill has also been demonstrated for summer precipitation over (especially northern) Europe. This has been shown to derive largely from skill in predicting the specific humidity contribution to low-level moisture flux on multi-annual time scales, and the zonal wind contribution on interannual time scales.

A project titled “UNSEEN: Unprecedented Simulated Extremes in Ensembles” based on very large ensembles of initialized simulations has enabled improved estimations of the probability of record monthly rainfall totals in the UK.

NILU: We present an overview of recent developments with the Norwegian Climate Prediction model (NORCPM). As an initialised coupled prediction model, NORCPM evolved from the norwegian Earth System model and incorporates a data assimilation component based on the ensemble Kalman filter approach. It has been used to produce a analysis, based on assimilation of SST anomaly, but also ocean temperature and salinity, from which seasonal forecasts have been performed. Current studies assess the NORCPM prediction of ENSO, and how it compares with the NMME ensemble of models. Assimilation of sea ice is also investigated, using a strongly coupled (sea ice/ocean) data assimilation method. NORCPM is also used for the SNOWGLACE experiments, in a high-top version and with an initialised atmosphere.

IRI: Starting in April 2017, the IRI probabilistic seasonal climate forecast product is based on model output from NOAA’s NMME. This includes the ensemble seasonal prediction systems of NOAA’s National Centers for Environmental Prediction, Environment and Climate Change Canada, NOAA/Geophysical Fluid Dynamics Laboratory, NASA, NCAR and COLA/University of Miami. The output from each NMME model is re-calibrated using extended logistic regression prior to multi-model ensembling to form reliable probability forecasts. The forecasts are now presented on a 1-degree latitude-longitude grid. The forecasts and more information can be found here: http://iri.columbia.edu/our-expertise/climate/forecasts/seasonal-climate-forecasts/

In a joint project with the Met Office and ICPAC, a GPC Portal has been in installed at ICPAC in Nairobi, based on IRI Data Library, which provides digital access to the NMME model real time forecasts and hindcasts, and those of Glosea5. The portal can be accessed here: http://197.254.113.170/maproom/. Strengthening Climate Information Partnerships - East Africa is a UKaid-funded project of the WISER programme (Weather and climate Information and SERvices for Africa). SCIPEA aims to strengthen partnerships between organisations involved in production, use, research and training activities regarding seasonal climate forecast information, toward increased capacity for national/regional early warning and effective early actions.

The S2S and NOAA SubX project databases are both now available through the IRI Data Library. Please see this IRI media story for more information: http://iri.columbia.edu/news/iri-data-library-hosts-new-experimental-forecasts/. A paper was recently published on development of multimodeling method based on extended logistic regression for calibrated probabilistic week 3–4 forecasts (Vigaud, Robertson & Tippett, 2017, https://doi.org/10.1175/MWR-D-17-0092.1).

6. Related initiatives

S2S: The S2S project is preparing a proposal for a second 5-year phase, to begin in November 2018. Proposed activities are centered on (1) S2S Database enhancement, (2) Research activities (MJO Prediction and teleconnections; Ocean and sea ice initialization and configuration; Land Initialization and configuration; Aerosols; Ensemble generation), (3)

Research to Operations (R2O) and S2S Forecast and Verification Products Development, and (4) Real-time Pilot for S2S Applications research & demonstrations.

C3S (invited expert Anca Brookshaw/S2S): The presentation summarised the current status of the Copernicus Climate Change Service (C3S), with emphasis on the elements which form the content of the Climate Data Store. Activities on development of products based on observations (ECVs, CDRs) were mentioned, as was the progress with the new reanalysis, ERA5. The seasonal forecast component of the service was presented in some detail, covering the configuration of the contributing forecast systems (from ECMWF, UKMO, Météo-France, DWD CMCC) and the list of variables for which products are routinely produced and displayed on the C3S website at present. A brief list of draft plans for the future phase of Copernicus concluded the presentation. Questions were raised on data availability, both to clarify the content of the database and the availability of data for download.

GCFS/Uni Hamburg: A seasonal prediction system based in the MPI-ESM is jointly developed by MPI-M, DWD, and Univ. Hamburg, initializing atmosphere, ocean and sea-ice from re-analysis/observations. Its first version GCFS1 (German Climate Forecast System), based on MPI-ESM-LR (atmosphere: T63L47, ocean: 1.5 degrees, L40), delivers operational seasonal forecast since 2016: www.dwd.de/seasonalforecasts; GCFS1.0 also contributes to Copernicus, and will be updated to GCFS2.0 soon. GCFS2.0 is based on MPI-ESM-HR (atmosphere: T127L95, ocean: 0.4 degrees, L40). In addition, an initialized version based on MPI-ESM-MR (atmosphere: T63L95, ocean: 0.4 degrees, L40) is used for various scientific studies, including NAO hindcast skill for both winter and summer. Hindcast skill considerably increases through ensemble sub-sampling based on observed teleconnections for the past.

BLUE ACTION: A new H2020 project focusing on increased predictability over the Arctic started. The project is led by Steffen Olsen (DMI), and brings together people working on Arctic variability and predictability from a broad range of perspectives: oceanographic observations, climate modelers and stakeholders: http://www.blue-action.eu/

PAMIP (Polar Amplification MIP): Changes in sea ice will impact the wider climate system. However, the impacts cannot be inferred from observations alone, and modelling studies show a wide range of results. A new CMIP6 MIP, called Polar Amplification MIP (PAMIP) is therefore being developed. PAMIP will investigate the causes and consequences of polar amplification through coordinated multi-model experiments. Both the Arctic and Antarctic will be investigated, using atmosphere only and fully-coupled models forced with different combinations of sea surface temperature and sea ice concentration representing pre-industrial, present day, and future (2 degree warming) conditions. By taking differences between appropriate pairs of simulations it will be possible to address the following questions:

- What are the relative roles of local sea ice and remote sea surface temperature (SST) changes in driving polar amplification?
- How does the global climate system respond to changes in Arctic and Antarctic sea ice?

Analysis of PAMIP results will attempt to define “emergent constraints” to diagnose the real world situation from the spread of model simulations.

YOPP: M.Tolstykh presented the brief description of the Year of Polar Prediction (YOPP) which is the flagship activity of the WWRP’s Polar Prediction Project (mid-2017 to mid-2019). A lot of additional observations for atmosphere, ocean and most importantly, for the sea ice, will be collected during this period, especially during so called Special Observing Periods. These data provide a unique opportunity for process studies with the coupled models, all the members are

invited to use them. The YOPP modelling component is of interest for the WGSIP. Some details of the YOPP model output standard were given. All the centres are invited to contribute to YOPP by providing their subseasonal and seasonal forecasts.

FRAMS: A new Canadian project titled “Forecasting Regional Arctic Sea Ice from a Month to Seasons” (FRAMS) will be developing multi-model sea ice forecasting capabilities in support of the WMO’s new distributed Polar Regional Climate Centre (PRCC), whose node tasked with long-range (seasonal) forecasting will be based at GPC Montreal. The overall objective is to develop improved, multi-model user-relevant forecasts of Arctic Sea ice on time scales from a month to seasons. The project has three components focused on forecast product development, analysis of modelled and observed sea ice behavior, and identification of end user needs (mainly for the shipping sector).

NMME: The North American Multi-Model Ensemble (NMME) began the year with 8 models and 99 ensemble members, however the most recent addition CESM1 is temporarily off line. The new SubX (NMME Subseasonal Experiment) is publishing real-time forecasts and corresponding hindcasts on a weekly basis, and an NMME/SubX Science Meeting was held at NCEP in September 2017. An effort to provide daily forecast outputs for set of 13 key variables is in progress.

7. Science talk and WGSIP Projects

Science talk: Invited expert Hazel Thornton of the Met Office described recent efforts to provide skillful Winter outlooks for the UK’s energy industry. For example, there is a strong anti-correlation between energy demand (electricity, gas) and temperature (this relation is specific to the UK where energy is primarily directed toward heating rather than cooling). An issue with wind power is that its production tends to be low when demand is high. However GloSea5, in addition to predicting the winter NAO skillfully, predicts winter wind speed and wind power density well although those forecasts tend to be underconfident. Winter temperatures for the UK are predicted skillfully when the NAO is used as a predictor, although not from forecast temperatures from the model. These results translate into skillful predictions of energy demand which are informing winter briefings for the UK energy industry.

TELECONNECTIONS: The objective of this project is to evaluate the ability of current seasonal forecasting systems in representing trop-extratrop. teleconnections. The analysis, based on observational and model data, uses a common framework for a straightforward intercomparison. Tropical rainfall, averaged over some key areas, is used to represent the atmospheric heat sources.

Some preliminary results, looking at a number of seasonal forecast systems, show high levels of seasonal prediction skill for tropical. The Tropical East Pacific and the Tropical West Pacific are highly skilful. Predictions of tropical Indian and Atlantic rainfall show lower but good levels of statistically significant prediction skill.

Multi-model averages often produce higher skill than individual models but this is not always the case and at least one model beat the multi-model mean in all of the regions examined. Most tropical rainfall predictions exhibit a large wet bias and this often exceeds 20% of mean rainfall. However, there is little or no relationship between this bias and prediction skill. These preliminary results suggest that future prediction systems need to be improved through model development based on improved representation of physical processes, particularly in the Indian

and Atlantic Ocean basins. A paper in preparation will document the above analysis. As a second part of the study, during 2018, we are planning to look at the teleconnections patterns associated with tropical rainfall variability

SNOWGLACE: We presented an update on the current status of the SNOWGLACE project, including the funding situation, the number of participants and the number of completed simulations. At the moment, ECMWF, NILU and the Korean team (KOPRI-Chonnam University) have completed simulations, and first results on the snow and surface temperature skill were presented. The ECMWF simulations, albeit covering only 10 years, show a definite skill increment and enhanced reliability for snow depth, resulting from realistic snow initialisation. A data center is being established at KOPRI.

LRFTIP (presented during a joint session with WGNE, S2S & OMDP): The LRFTIP archive of hindcasts climatologies has grown considerably with the addition of many seasonal forecast models and variables from the CHFP and ENSEMBLES, as well as subseasonal data from S2S that was processed by Mikhail Tolstykh's team in Moscow. As a result there are now 15 decadal models, 19 seasonal models, and 4 subseasonal models represented. New exploratory diagnostics show for example that hindcasts from the UK Met Office S2S model suffer a large transient increase in cloud cover between day 1 and day 2 that is not seen in other S2S models. This is attributed to the use of a non-native analysis from ECMWF to initialize the atmospheric component. Efforts going forward will be directed mainly toward expanding the library of common diagnostics and bringing this resource to the attention of the larger research community.

CHFP: During the period November 2016-September 2017, CHFP has seen a noticeable increase in the number of registered users (44% increase) along with the amount of data downloaded. This has been mostly due to the publication of the BAMS article on CHFP, the ICTP summer school on s2S predictions in Dakar (Nov 2016) and to the advertisement of the database in ClimList. In this period, progress has been made towards unifying the format of the files within the database in order to upload them, in the near future, to a ESGF node that will be developed and maintained at CIMA. At the same time, new information on sea ice concentration and sea ice thickness has started to be included in the database as a potential support to the Year of Polar Prediction activities.

8. Linkages with WMO, GC-NCTP and DCPP

Research to operations discussion with IPET-OPSLS co-chairs Arun Kumar and Caio Coelho:

- ET-OPSLS co-chairs have produced a document highlighting a list of potential issues to be addressed to improve forecast products.
- WGSIP could address these by:
    - Forming new sub-groups
    - Writing a review paper based on the ET-OPSLS list
    - Writing a broader review paper
    - Holding a workshop
    - Starting a new WGSIP project
    - Forming a joint WGSIP-ET-OPSLS task group
- The ET-OPSLS document will be posted on the WGSIP website (MR)
- Mich stressed the need to consider all timescales

- Adam Scaife suggested focussing on the existing global seasonal climate update and the annual to decadal climate update which is being developed
- Paco suggested there could be a side event at the Barcelona meeting, and that perhaps the ET-OPSLS list could have more physics to make it more appealing

Discussion on the interacting and complementary roles of DCPP, GC-NTCP, the new WMO Lead Centre, and WGSIP

- Invited expert Adam Scaife gave an overview, highlighting that the Grand Challenge on Near Term Climate Prediction (GC-NTCP) will focus on
    - knowledge and mechanisms
    - standards for production of forecasts
    - making decadal forecasts operational under the WMO
    - producing an annual to decadal climate update
- WMO has now endorsed decadal predictions and appointed the Met Office as the Lead Centre for Annual to Decadal Climate Prediction (LC-ADCP), represented in this discussion by invited expert Jeff Knight. Applications for Global Producing Centres will be invited after November.
- Mutual awareness was increased of the annually updated, real time component of DCPP and the serving of that data on the ESGF

Science talk “Advancements and setbacks in the development of a decadal climate prediction system” by invited expert Wolfgang Müller (MPI/DCPP)

- MiKlip have produced 3 sets of decadal hindcasts
- Forecasts are also now available on the web
- Full field initialisation produces spurious AMOC variability and shows lower skill for AMO than anomaly initialisation, hence need an ocean analysis that is consistent with the model to avoid spurious AMOC
- Bias adjustment is a key issue – quantile mapping is one possible approach
- Decadal forecasts have been dynamically downscaled, though it is not clear whether this adds skill

WGSIP business

- WCRP strategy document was discussed – it was noted that the cross cutting foci do not seem to match the main two questions – this should be fed back to WCRP
- All WGSIP members are invited to contribute to WCRP survey
- The length of current WGSIP projects was discussed, suggesting 2 years for SNOWGLACE, 1 year for teleconnections, and ongoing for drifts
- A new WGSIP project on “Bridging the gap between research and operations” was suggested
- A rolling database of initiatives that use S2S information would be useful, and could be added to WGSIP website
- Proposed WGSIP project on impact of vegetation was discussed – response to be prepared by co-chairs and associated self-nomination by proposer Andrea Alessandri will be considered
- Next WGSIP session to be in 2019, possibly in Moscow, although there is a rolling invitation to Trieste. There could be a side event at the S2S2D workshop in Boulder in September 2018.
- Members rotating off: Paco, Ousman Ndiaye, Adrian Tompkins
- New member: Asmerom Beraki, CSIR (South Africa)
- Tongwen Wu from BCS self-nominated. Other people from China could also be considered – Adam Scaife could advise

APPENDIX A – ACTION LIST

Relation to WMO and ET-OPSLS

1. Organize one or more side meetings between participating WGSIP members and operational and other groups at September 2018 Boulder Conferences
2. Coordinate with ET-OPSLS and WMO on WGSIP engagement in proposed Second Workshop on Operational Seasonal Prediction in spring 2018 (co-chairs)
3. Continue to communicate with ET-OPSLS co-chairs on mechanism for developing one or more review papers addressing the operational prediction challenges in the document circulated by the ET co-chairs, and/or current exciting scientific challenges in climate prediction – co-chairs

CHFP

4. Keep WGSIP members apprised of status of addition of NMME hindcast data to CHFP (Ramiro)
5. Contact ~3 current seasonal forecast providers in China about acquiring their hindcasts for CHFP (Paco, Ramiro)
6. Contact JAMSTEC about acquiring hindcasts for SINTEX-2 (and possibly previous SINTEX version as well) for CHFP (Adrian, Ramiro)
7. Add RHMC SL-AV to CHFP once computer issues at GPC Moscow that have delayed this are resolved - Mikhail, Ramiro

S2S and other initiatives

8. Request S2S to add surface wind speed to S2S data base (carried over from WGSIP 18) – Andrew
9. Consult with Michel about what PCPI is doing on seasonal predictions – co-chairs

Decadal

10. Compile list of all groups having real-time decadal prediction capability for LC-ADCP to contact (co-chairs, WGSIP and DCPP members)

Projects

11. Further evaluate and develop response to Andrea Alessandri's proposal for a GLACE-ESM project involving WGSIP, which like GLACE-2 would be WGSIP-affiliated but not necessarily WGSIP-driven
12. Contact Hai Lin about possibility of joining WGSIP and S2S Teleconnection projects (Bill, Laura)
13. Develop concept note for a new WGSIP project on "Closing the Gap" (between research and operations), describing objectives, methods, and opportunities for making it collaborative with other groups such as ET-OPSLS, S2S and GC-NCTP (Doug and other interested WGSIP members) [possibly form joint WGSIP-others R2O2R panel]

Web

14. Add further links to relevant seasonal to decadal on-line resources to WGSIP web space, look for missing/broken links – Bill, all
15. Select flyer version, publish on web and circulate (carried over from WGSIP 18) – Michel

Business

16. Further discuss and develop arrangements for proposed WGSIP 20 meeting and associated climate prediction school in Moscow, Spring 2019 (Mikhail, co-chairs)
17. Contact prospective WGSIP members including from relevant GPCs – Co-chairs
18. Organize a teleconference before the JSC39

APPENDIX B – CONTACT LIST

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