



Subseasonal-to-Seasonal
S2S
Prediction Project



The Sub-seasonal to Seasonal (S2S) Prediction Project

Yuhei Takaya

on behalf of S2S Steering Group

Outline

- Overview of S2S project
 - Sub-projects
 - Data archive
- Linkages between S2S and CBS/CCI activity
 - Verification
 - Pilot data exchange of subseasonal prediction

WWRP/WCRP S2S Project

- Website: <http://s2sprediction.net/>
- Implementation plan finalized & printed
- Terms of references have been drafted
- 5-year project, started in Nov. 2013.
- Co-chairs: Frederic Vitart (ECMWF), Andrew Robertson (IRI, Columbia Univ.)
- Project office: KMA/NIMR hosts the project office in Jeju island.
- Trust Fund: Contributions from Australia, USA and UK

Mission Statements

- “To improve forecast skill and understanding on the sub-seasonal to seasonal timescale with special emphasis on high-impact weather events”
→ facilitating operational subseasonal prediction.
- “To promote the initiative’s uptake by operational centres and exploitation by the applications community”
→ usable, applicable subseasonal forecast information
- “To capitalize on the expertise of the weather and climate research communities to address issues of importance to the Global Framework for Climate Services”
→ linkages with CBS/CCI activity

Sub-projects

Sub-seasonal to Seasonal (S2S) Prediction Project

Sub-projects

Teleconnections

Madden-Julian Oscillation

Monsoons

Africa

Extremes

Verification and Products

Research Issues

- Predictability
- Teleconnection
- O-A Coupling
- Scale interactions
- Physical processes

Modelling Issues

- Initialisation
- Ensemble generation
- Resolution
- O-A Coupling
- Systematic errors
- Multi-model combination

Needs & Applications

Liaison with SERA
(Working Group on Societal
and Economic Research
Applications)

S2S Database

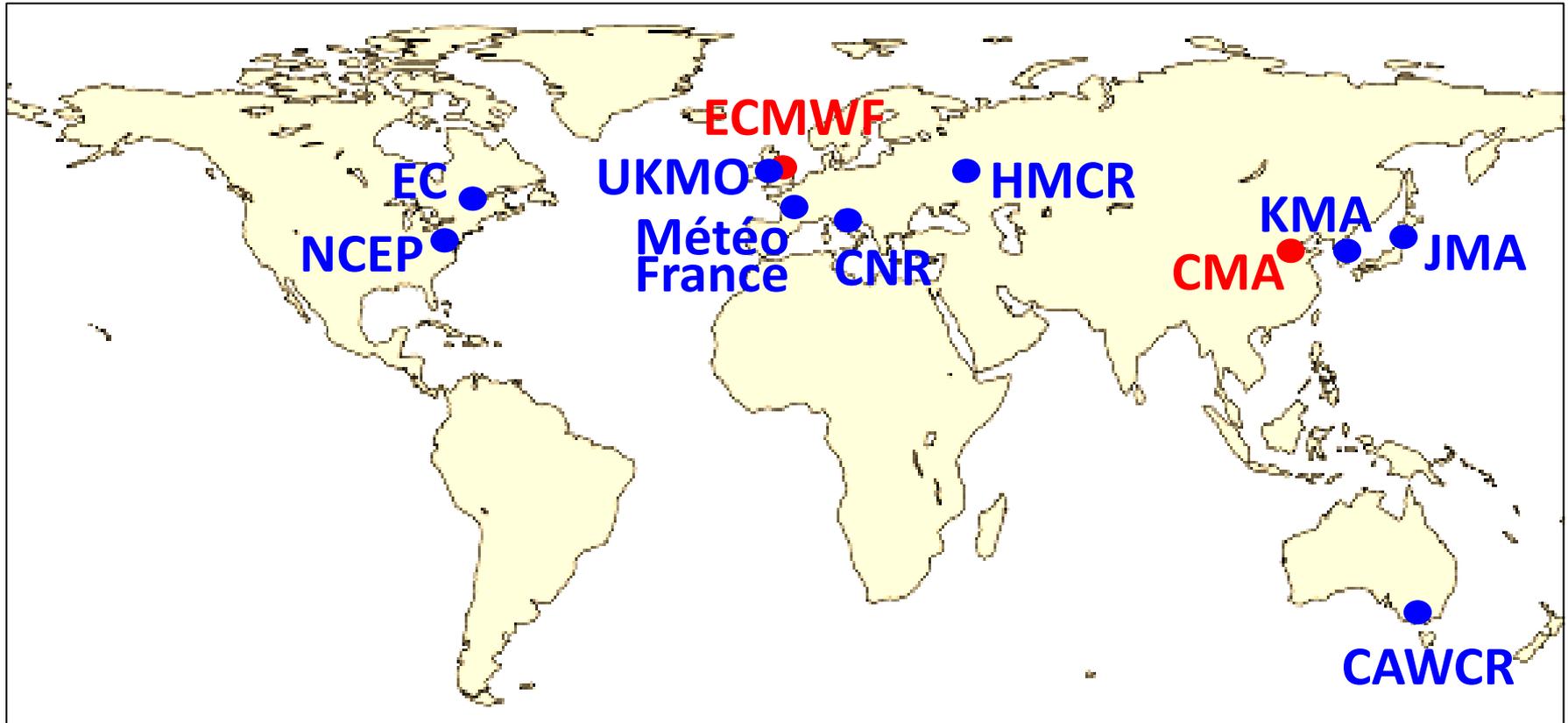
Database Description

- Daily real-time forecasts + re-forecasts
 - 3 weeks behind real-time
 - Common grid (1.5x1.5 degree)
 - Variables archived: about 80 variables including ocean variables, stratospheric levels and soil moisture/temperature
 - Archived in GRIB2 – NETCDF conversion available
- Database opened in May 2015, currently data of 6 models available (ECMWF, JMA, NCEP, BoM, Météo France and CMA) , reforecast in Oct. 2015.

Contributing Centres to S2S Database

● Data provider (11)

● Archiving centre (2)



EPS Configurations of S2S Partners

| | Time-range | Resol. | Ens. Size | Freq. | Hcsts | Hcst length | Hcst Freq | Hcst Size |
|---------------|------------|---------------|-----------|---------|------------|-------------|-----------|-----------|
| ECMWF | D 0-32 | T639/319L91 | 51 | 2/week | On the fly | Past 18y | 2/weekly | 11 |
| UKMO | D 0-60 | N216L85 | 4 | daily | On the fly | 1996-2009 | 4/month | 3 |
| NCEP | D 0-45 | N126L64 | 4 | 4/daily | Fix | 1999-2010 | 4/daily | 1 |
| EC | D 0-35 | 0.6x0.6L40 | 21 | weekly | On the fly | Past 15y | weekly | 4 |
| CAWCR | D 0-60 | T47L17 | 33 | weekly | Fix | 1981-2013 | 6/month | 33 |
| JMA | D 0-34 | T319L60 | 50 | weekly | Fix | 1981-2012 | 3/month | 5 |
| KMA | D 0-60 | N216L85 | 4 | daily | On the fly | 1996-2009 | 4/month | 3 |
| CMA | D 0-45 | T106L40 | 4 | daily | Fix | 1992-now | daily | 4 |
| Met.Fr | D 0-60 | T127L31 | 51 | monthly | Fix | 1981-2005 | monthly | 11 |
| CNR | D 0-32 | 0.75x0.56 L54 | 40 | weekly | Fix | 1981-2010 | 6/month | 1 |
| HMCR | D 0-63 | 1.1x1.4 L28 | 20 | weekly | Fix | 1981-2010 | weekly | 10 |

S2S Data Portal

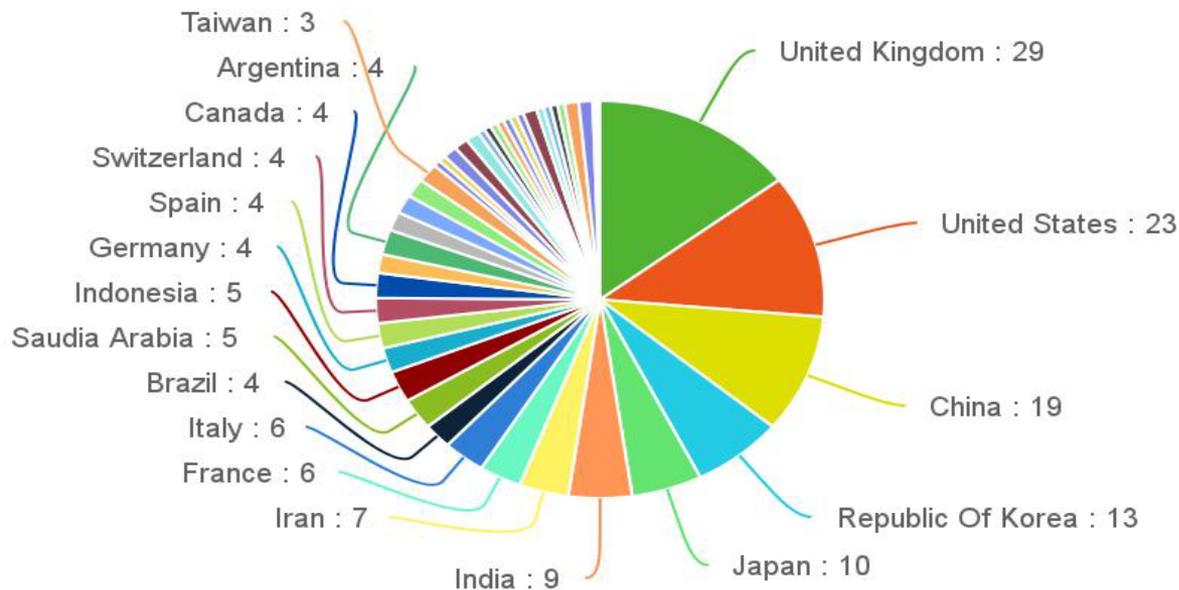
<http://apps.ecmwf.int/datasets/data/s2s/>

The screenshot shows the S2S Data Portal interface in Mozilla Firefox. The browser address bar displays the URL: `apps-dev.ecmwf.int/datasets/data/s2s/?origin=ecmf&levtype=sfc&type=cf`. The page features the ECMWF logo and navigation links: Home, My room, Contact, Search ECMWF, and Manuel Fuentes | Sign out. A main menu includes About, Forecasts, Computing, Research, and Learning. The left sidebar contains several sections: Origin (ECMWF, JMA, NCEP), Statistical process (Instantaneous and accumulated, Daily averaged), Type of level (Potential temperature, Pressure levels, Surface), Type (Control forecast, Perturbed forecast), About (Conditions of use, Documentation), Navigation (Datasets, Job list, Batch access), and See also... (FAQ, Accessing forecasts, GRIB decoder). The main content area is titled "Subseasonal to Seasonal Instantaneous and Accumulated" and includes several selection steps: "Select date" (Start date: 2015-01-01, End date: 2015-03-09), "Select a list of months" (2015), "Select step" (a grid of checkboxes for steps 0 to 714), and "Select parameter" (a list of parameters such as 10 metre U wind component, Convective precipitation, Land-sea mask, etc.).

Some statistics

- Usage (as of October): about **200** users, **28 TBs** downloaded (2.9 TB realtime, 25.1 TB reforecast)

S2S usage per country



Linkages between S2S and GPCs

ET-OPSLS Task Team 3: subseasonal prediction

A pilot activity of subseasonal prediction, **development and use of**

- **multi-model ensemble products,**
- **standard procedures for verification.**

This activity, coordinated by the Lead Centre for Long Range Forecast Multi-Model Ensemble (LC-LRFMME), is **in close collaboration with the WWRP/ WCRP Sub-seasonal to Seasonal (S2S) project.**

cf.) WMO Cg-17 (2015) Report

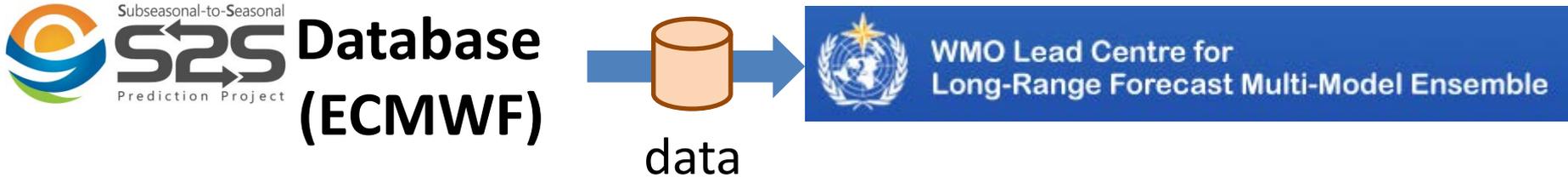


**S2S Verification
Subproject (Lead: Caio Coelho)**



**ET-OPSLS Task Team 3
(Lead: Suhee Park)**

Pilot exchange of sub-seasonal forecasts

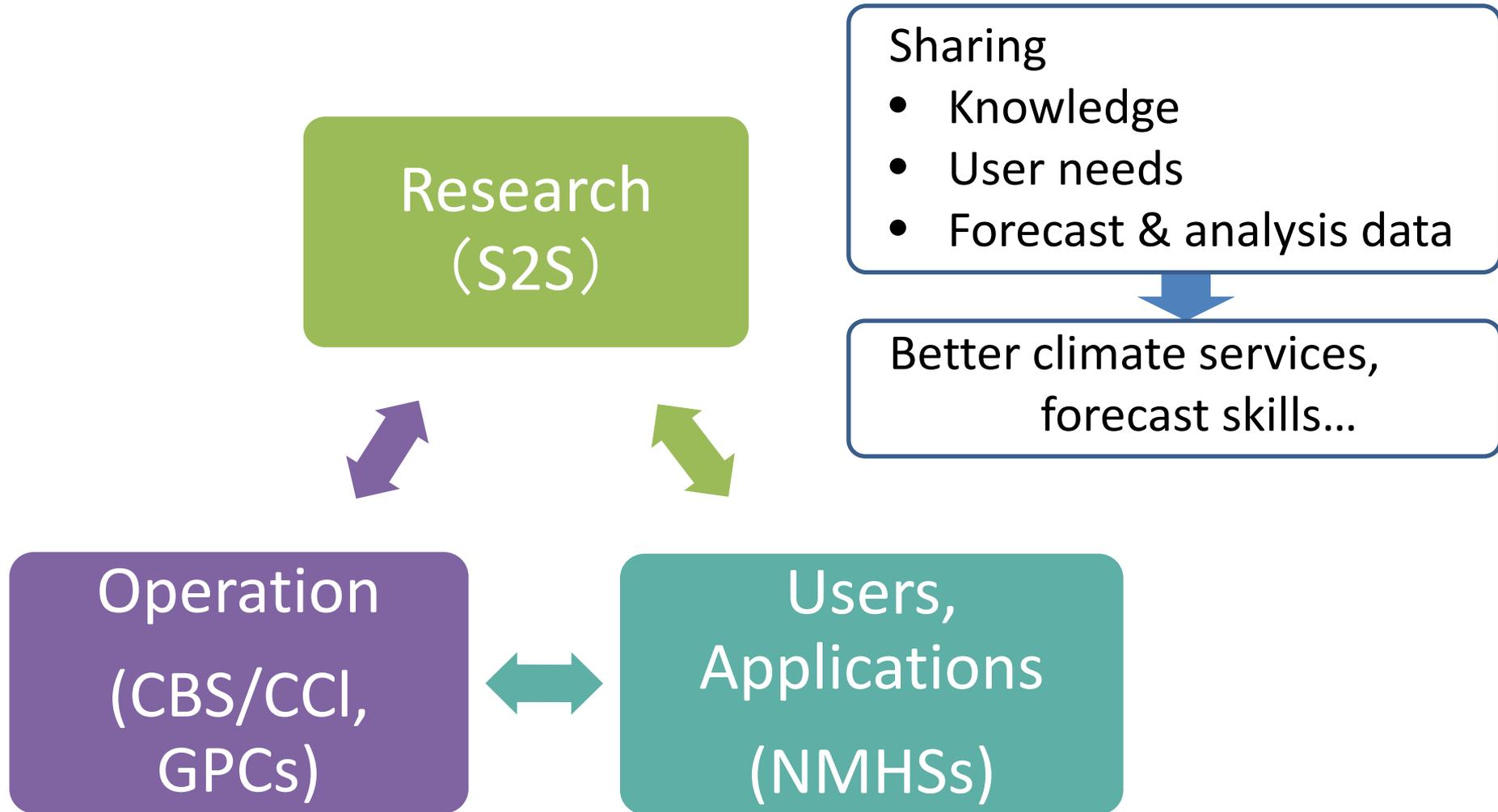


- It has been proposed for the LC to access the real-time forecasts from S2S Data Archive (ECMWF), without 3-week delay.
- Five Centers have agreed for this voluntary pilot exchange (May 2015; ECMWF, JMA, KMA, UKMO, NCEP).
 - Next year, LC will seek additional volunteers among available Centers.
- “Seamlessness” of the arrangement, enabling the research side to have access (with 3 week delay) to the same forecasts that the LC is getting.

Questionnaire on subseasonal verification practices

- The S2S sub-project on Products and Verification is preparing a questionnaire on subseasonal verification practices to be sent to GPCs.
- Responses will be summarised by the S2S sub-project on Products and Verification to help guide S2S verification research activities.
- This summary is also beneficial to discuss the standard verification of the subseasonal forecast at GPCs (CCI/CBS ET-OPSL) for implementing the operational subseasonal prediction activity.

Challenges of Synergy btw Research and Operation



S2S website

More information is available from <http://s2sprediction.net>.



About S2S ▾

News ▾

Documents ▾

Sub-projects

Database ▾

Meetings ▾

People ▾

Links

*** News ***

Reforecast data are now available at the ECMWF S2S Data Portal
<http://apps.ecmwf.int/datasets/data/s2s/>

Upcoming Events

AGU Session on Sub-seasonal to Seasonal Prediction of Weather and Climate, 14-18 December 2015, AGU Fall Meeting, San Francisco

Advanced School and Workshop on S2S Prediction and Application to Drought Prediction, 23 November to 4 December 2015, ICTP, Trieste, Italy

ECMWF Workshop on Sub-seasonal Predictability, 2-5

S2S Database

ECMWF CMA

S2S re-forecast data portal at ECMWF is now available!

Updated: 2015-10-21 09:40

Now 7 Centres data available at ECMWF Data Portal (<http://apps.ecmwf.int/datasets/data/s2s/>)

Updated: 2015-07-08 09:04

S2S News

News Letter

FAQs

Now 7 Centres data available at ECMWF Data Portal

At the ECMWF S2S Data Portal, <http://apps.ecmwf.int/datasets/data/s2s/>, there are now 7 centres' data (BoM, CMA, ECMWF, JMA, MeteoFrance, NCEP, and Rushdromet) available

Tweets

Follow



Reporting Climate @Reportingclimat

Climate scientist @ed_hawkins tells us why climate model "zoos" make regional forecasting hard
reportingclimatescience.com/news-stories/

7 Nov

Summary

- Brief introduction of S2S Project
- S2S Archive now open to researchers.
- Linkages between S2S and GPCs
 - ET-OPSLS pilot exchange of sub-seasonal predictions
 - Verification
- Better collaboration between S2S and CBS/CCI will be of great benefit for the operational subseasonal prediction!

Thank you for your kind attention.



Sub-seasonal variability =

“Bridge between weather and climate”

S2S Prediction Project =

“Bridge between research and operation”

to drive our science and technology forward, and to bring better weather/climate information

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S2S Database

S2S sub-projects

MJO and Maritime Continent (MC) Interactions: Evaluating State of the Art & Characterizing Shortcomings *In collaboration with the WGNE MJO Task Force*

Major Objectives:

- Assess current model simulation fidelity and prediction forecast skill over the MC across time scales, with emphasis on the MJO, and identify and rectify model biases.
- What roles do: 1) multi-scale interactions, 2) topography and land-sea contrast, and 3) ocean/land-atmosphere coupling play in the MC-MJO interaction and how do they influence predictability over the MC.

Modeling Resources to Exploit

- 1) S2S Database, 2) MJOTF-GASS Multi-Model Exp and 3) ISVHE

Potential Future Field Campaign

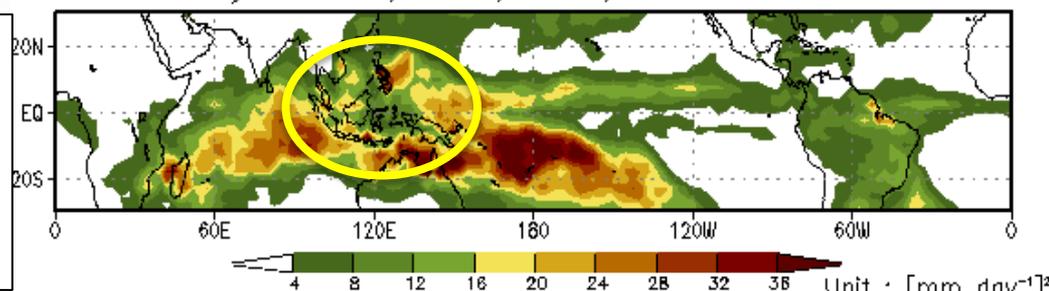
- Year of Maritime Continent (YMC) is a growing multi-nation effort to carry out a field campaign over the MC in 2017 to address objectives such as those above.

Tentative Development

- Spring 2016 Workshop for Subproject – S2S, MJOTF

Nexus of 1) land, atmosphere & ocean interactions and 2) multi-scale interactions: diurnal, mesoscale, synoptic, subseasonal, seasonal & interannual.

20–100 day variance, PRCP, GPCP, Winter



Main Goal

To develop skilful forecasts on the S2S time scale over Africa and to encourage their uptake by national meteorological services and other stakeholder groups.

Objectives:

- Assess the performance of forecasts for 5-40 days ahead using the S2S forecast archive, with focus on rain-day frequency, heavy rainfall events, dry spells and monsoon onset/cessation dates, with relevance to agriculture, water resources and public health.
- Develop metrics for measuring the success of forecasts in ways that are useful for farmers and other stakeholder communities.
- Improve understanding of the climate modes that drive sub-seasonal variability in Africa and their representations in models.
- The Africa sub-project will work with post-Africa Climate Conference 2013 framework (recently named “Climate Research for Development CR4D)” to connect international with African climate communities. An S2S activity is envisaged to be one of the first CR4D pilot activities, through a joint CR4D-S2S proposal to Future Earth program funding.

In collaboration with with GEWEX/CLIVAR monsoon panel

Major Objectives:

- Development of a set of scientifically and societally relevant intra-seasonal forecast products and metrics that are applicable to all the major monsoon systems which can be monitored with operational real-time forecast systems.
- Case studies of monsoon onsets

The S2S and ISVHE databases can be used to assess the skill of the forecasting systems to predict the onset of the various monsoons.

A compilation of the observed monsoon onsets has been produced and is available from the S2S website.

Major Objectives:

- Evaluate the predictive skill and predictability of weather regimes and extreme events (droughts, floodings, heat and cold waves)
- Assess the benefit of multi-model forecasting for extreme events
- Improve understanding of the modulation of extreme weather events by climate modes.
- Sub-seasonal prediction of tropical storms (link with TIGGE-GIFS and SWFDP)
- Case studies selected for the strong societal impact

A case study already completed: March 2013 cold wave over Europe. Results published in Meteoworld.

This sub-project will have links with HIW. A member of HIW (Brian Golding) will be part of this subproject.

Major objectives:

- Recommend verification metrics and datasets for assessing the forecast quality of S2S forecasts
- Provide guidance for a potential centralized effort for comparing forecast Quality of different S2S forecast systems, including the comparison of multi-model and individual forecast systems and consider linkages with users and applications.

Issues to be addressed:

- Identification of current practises in sub-seasonal to seasonal forecasts
- Identification of user-relevant variables and quantities to be verified
- Provision of guidance on minimum hindcast standards (hindcast length and ensemble size)
- Promotion of subseasonal forecasting intercomparison efforts and evaluation of benefit of multi-model approach.

Major objectives:

- Better understand sub-seasonal tropical-extratropical interaction pathways.
- Identify periods and regions of increased predictability (“forecasts of opportunity”)
- Improve sub-seasonal to seasonal forecasts of weather and climate for applications.

Issues to be addressed:

- Understand physical mechanisms of tropical-extratropical interaction
- Develop new comprehensive estimates of tropical diabatic heating
- Identify main errors associated with teleconnections.

S2S sub-projects

- The science plans of the 6 sub-projects have been discussed and finalized in the S2S steering group meetings. Updates to these plans are anticipated on an ongoing basis (www.s2sprediction.net)
- It is planned to open the membership of the sub-projects to persons outside the S2S steering group, to have a total membership for each sub-project of around 5-6 members.
- Cross-cutting activities which are relevant to all the sub-projects (predictability, teleconnections, role of ocean-atmosphere coupling..) will also take place.
- Sub-project activities are strongly dependent on the development and availability of the S2S database.