

# **S2S – Project achievements and Future Plans**

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# Mission Statement

- “To improve forecast skill and understanding on the sub-seasonal to seasonal timescale with special emphasis on high-impact weather events”
- “To promote the initiative’s uptake by operational centres and exploitation by the applications community”
- “To capitalize on the expertise of the weather and climate research communities to address issues of importance to the Global Framework for Climate Services”

- 5-year WWRP/WCRP project (2014-2018) (S2S Phase 1)
- 5-year extension has been approved: S2S Phase 2 (2019-2023)
- Project office: KMA/NIMR hosts the project office
- Trust Fund: Contributions from Australia, Canada and UK

# Sub-seasonal to Seasonal (S2S) Prediction Project

Sub-Projects

Teleconnections

Madden-Julian Oscillation

Monsoons

Africa

Extremes

Verification

## 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

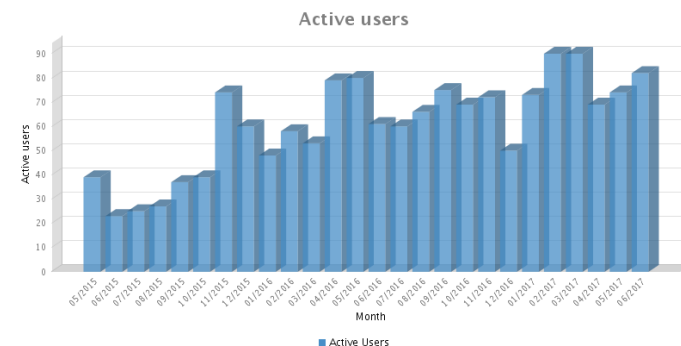
Liaison with SERA  
(Working Group on  
Societal and Economic  
Research Applications)

S2S Database

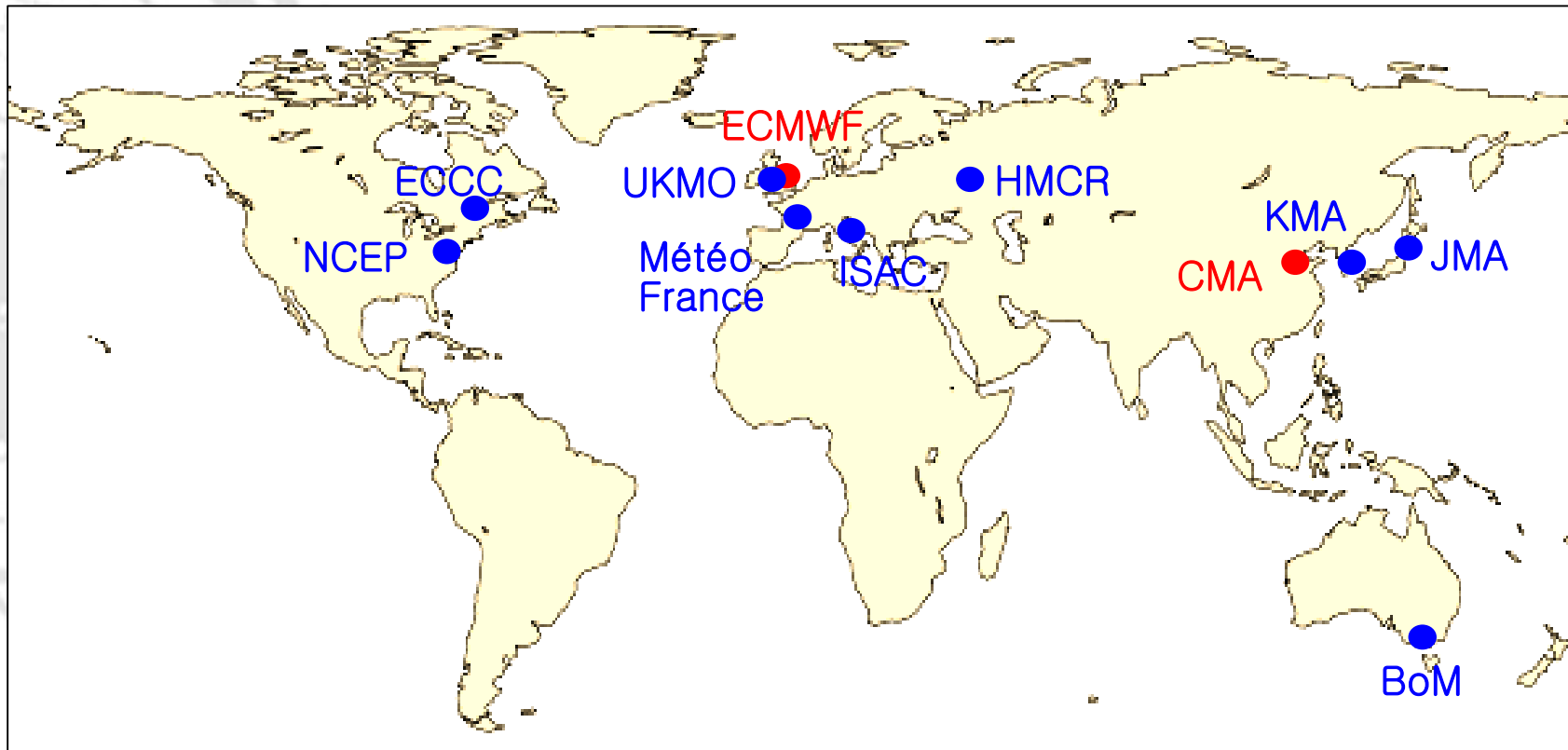
- Daily 3-week behind real-time forecasts + re-forecasts up to day 60
- 11 models currently available
- Same grid (1.5 degree) / format
- More than 80 variables available

## Use of S2S database:

- ~ 1000 registered users from 92 countries
- >300 TBs downloaded
- ~ 40 peer-reviewed publications on S2S database



- Data provider (11)
- Archiving centre (2)



# S2S database near-real time products

- ECMWF: <http://www.ecmwf.int/en/research/projects/s2s/charts/s2s/>
- “S2S Museum” at University of Tsukuba, Japan (Mio Matsueda)  
[http://gpvjma.ccs.hpcc.jp/S2S/S2S\\_SICmap.html](http://gpvjma.ccs.hpcc.jp/S2S/S2S_SICmap.html)

## S2S NAO index forecasts

Updated every day with a 21-day delay!  
The latest initial date is 20180819.

Initial time :

Year.Month 2018.02

Day 8

-1 Day

+1 Day

latest

Definition of leading mode  
is [here](#)

Initial days of forecasts:

centre	Sun	Mon	Tue	Wed	Thu	Fri	Sat
BolM							
CMA							
ECMWF							
ECMWF							
HMCR *1							
ISAC-CNR *2							
JMA *3							
KMA							
METFR *4							
NCEP							
UKMO							

\*1 HMCR: Wed (-31 May 2017); Thu (08 Jun. 2017-)

\*2 ISAC-CNR: Mon (-10 Jan. 2017); Thu (19 Jan. 2017-)

\*3 JMA: Tue, Wed (-15 Mar. 2017); Wed (22 Mar. 2017-)

\*4 METFR: 1st of each month (-Feb 2018), Thu (Mar. 2017-)

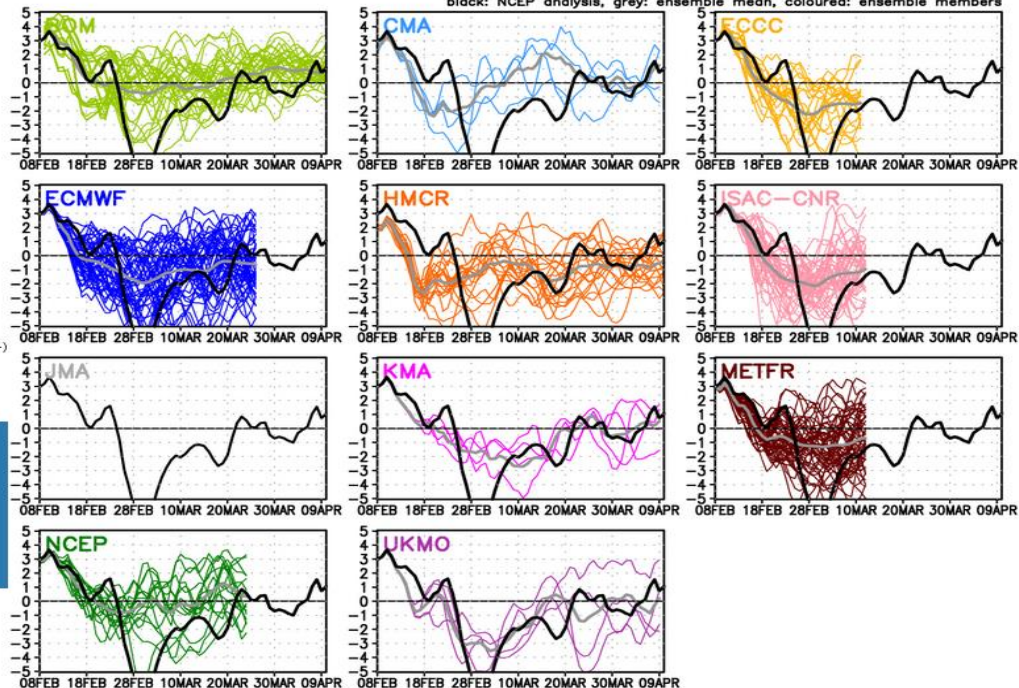
[Go to the S2S Museum \(top\)](#)



## NAO Index – 8 Feb 2018 start date

### S2S NAO index forecasts (initial: 2018.02.08, Thu)

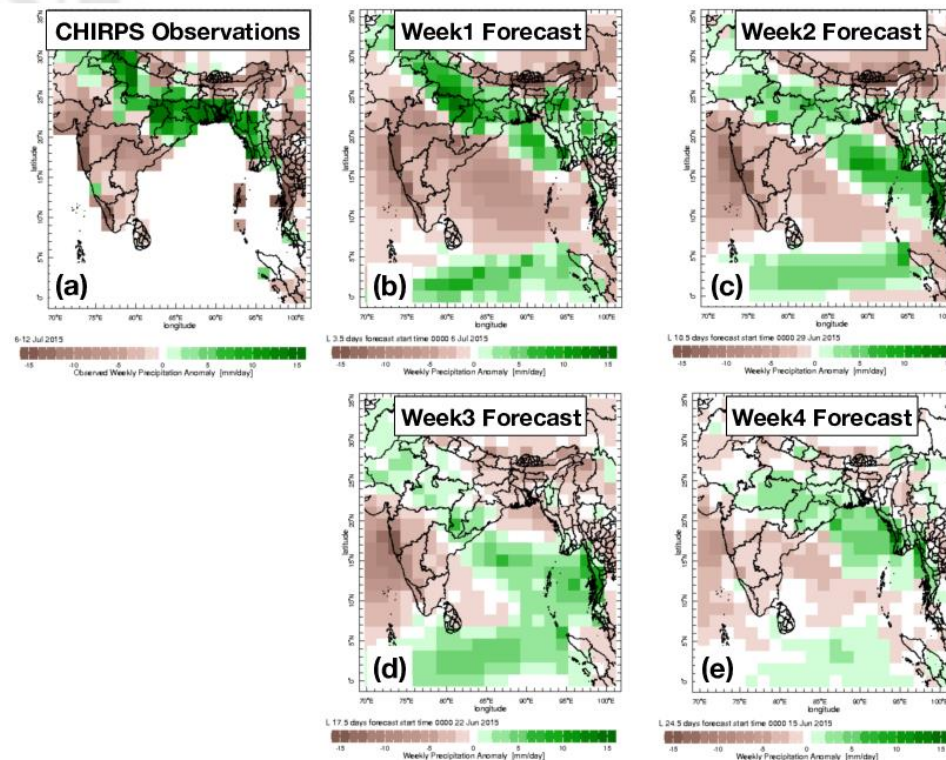
black: NCEP analysis, grey: ensemble mean, coloured: ensemble members





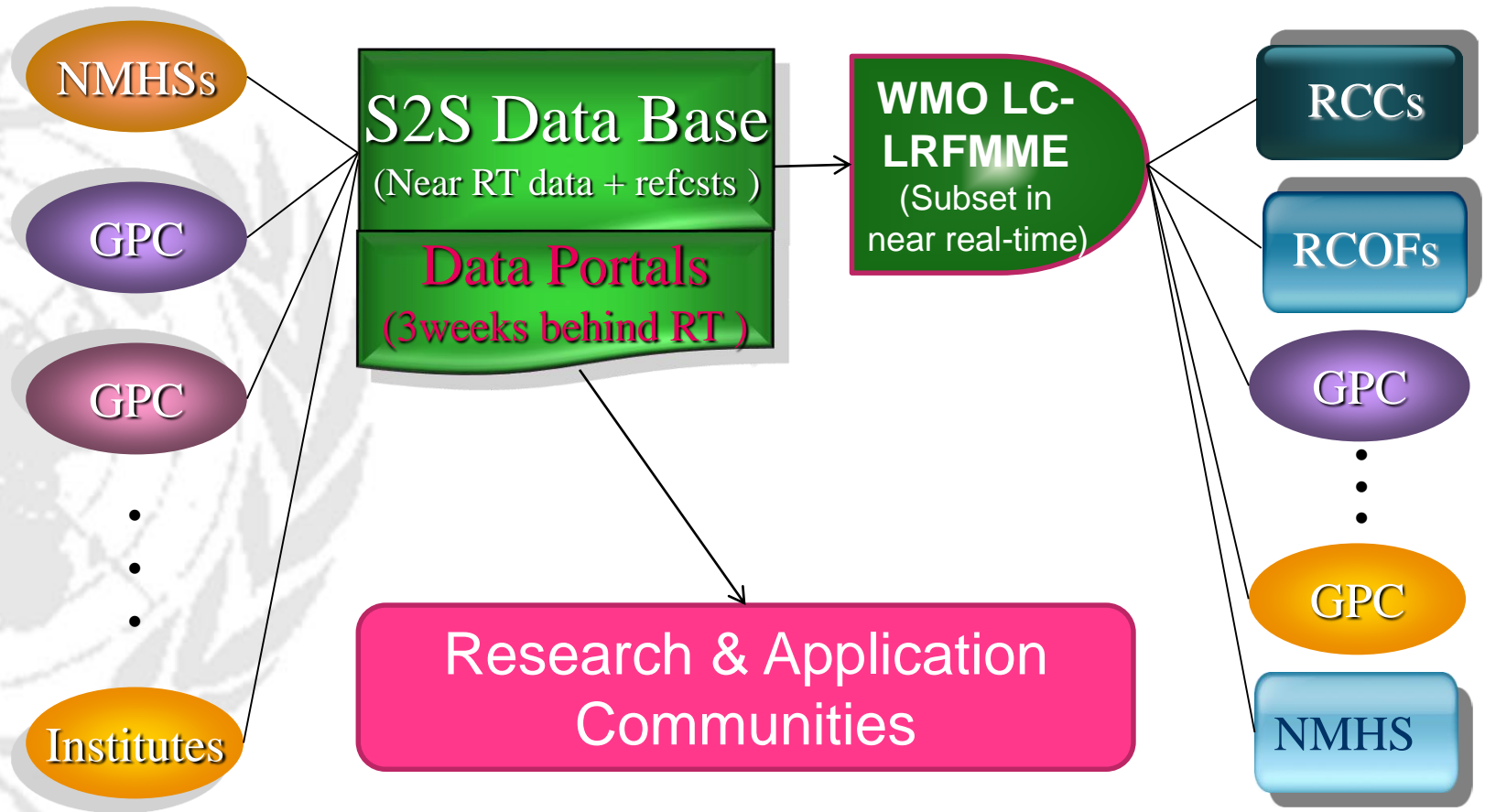
- Large subset of the S2S database available from the IRI Data library
- Online map-room for visualization of weekly fields and anomalies

*Weekly precipitation anomalies (mm/day) for July 6-12 2015*





# S2S Linkage with WMO CBS

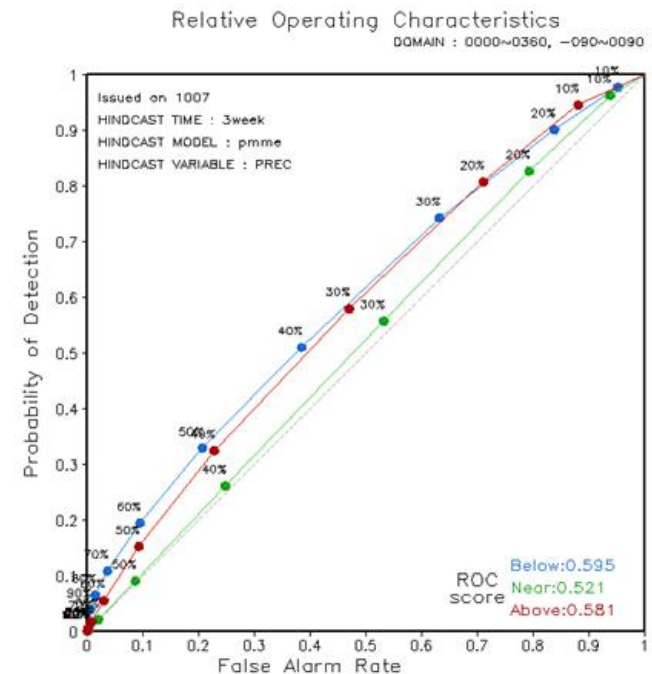
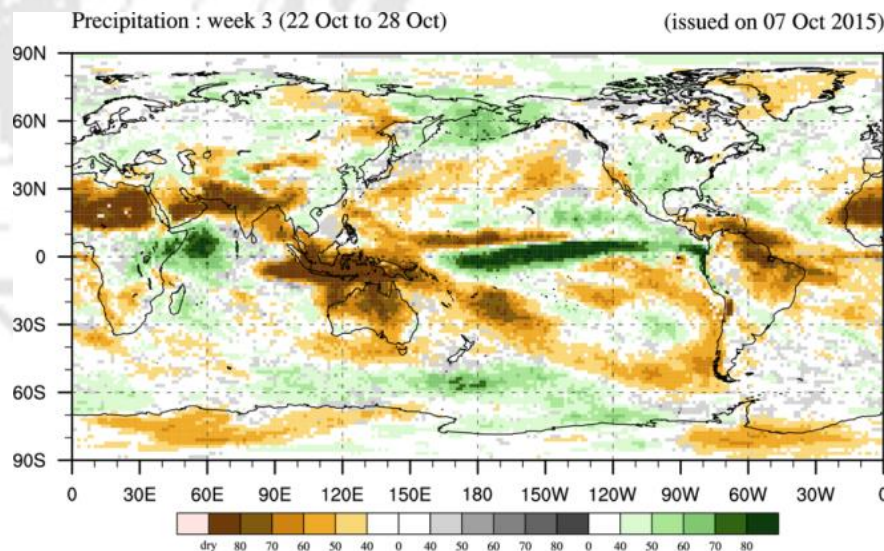


**S2S Producing  
Centres**

**WMO Users**

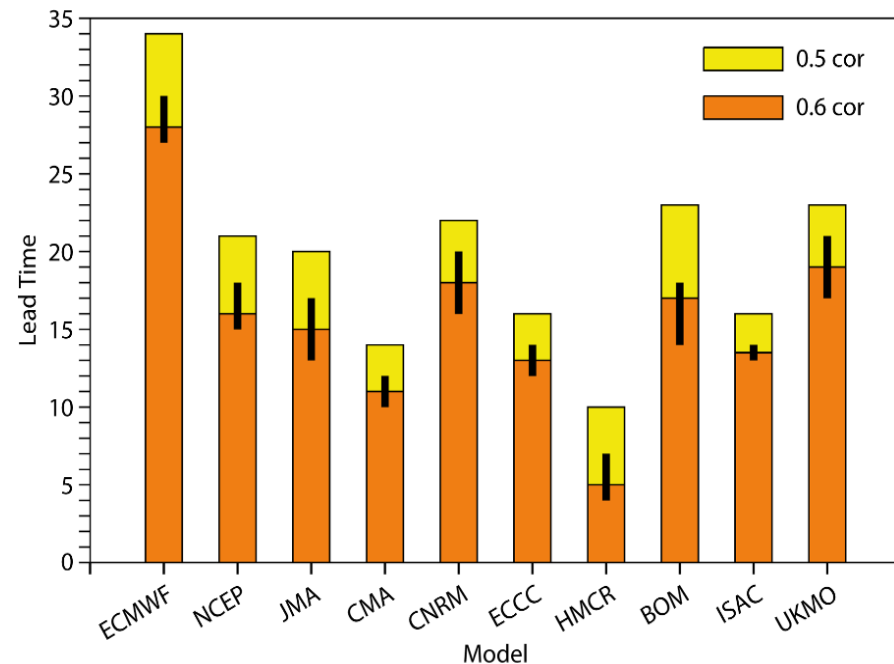
# S2S Linkage with WMO CBS

- **Prototype for real-time provision of MME S2S forecasts by WMO LC-LRFMME**
- **Variables:** SST, T2m, precipitation, u200, v200, u850, and OLR
- **Participating Models:** ECMWF, UKMO, JMA, NCEP/CPC, KMA
- Needs to be formalized by CBS



# Madden Julian Oscillation

- Predictive skill up to 5 weeks
- S2S models have a weaker and slower MJO than analyses
- MJO teleconnections too weak in the Euro-Atlantic sector

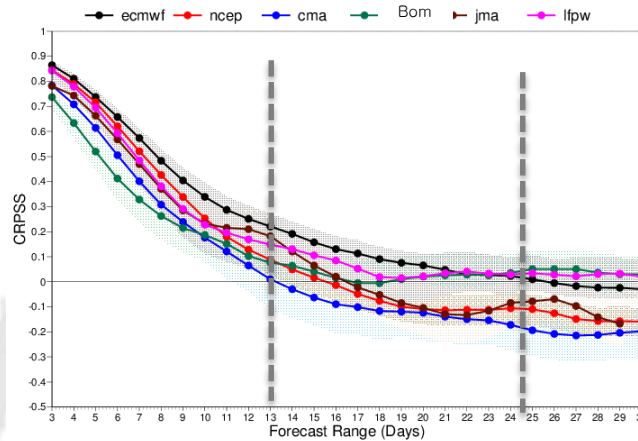


*Vitart, 2017*

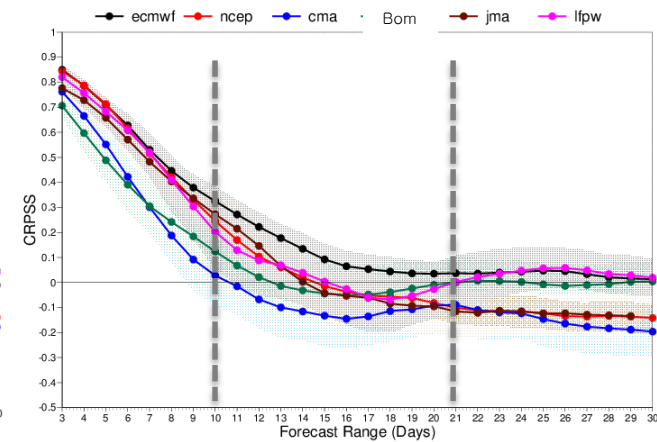
# Euro-Atlantic Weather Regimes

Predictive skill up to about 3 weeks for NAO+ and NAO – and up to about 16 days for the other weather regimes.

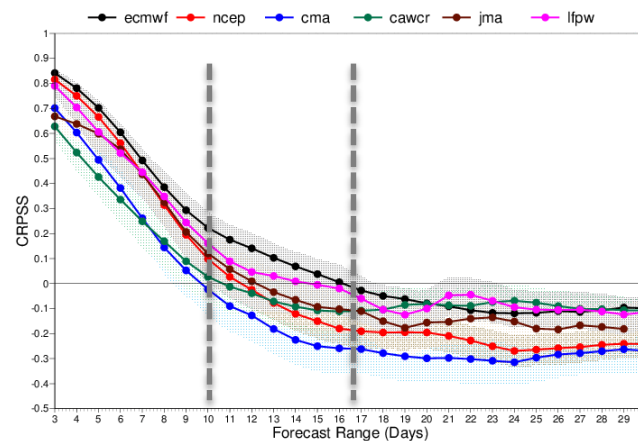
## NAO +



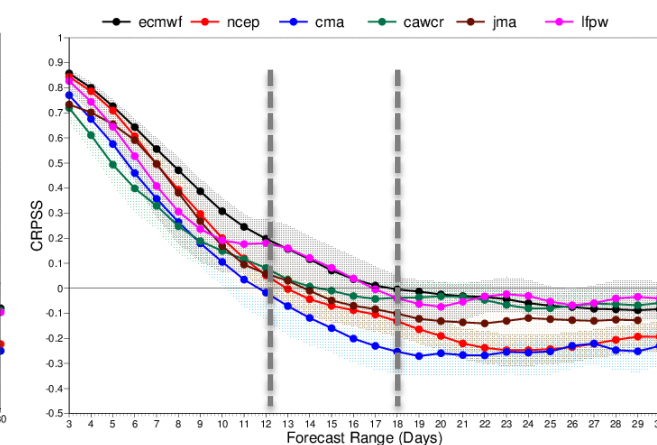
## NAO –



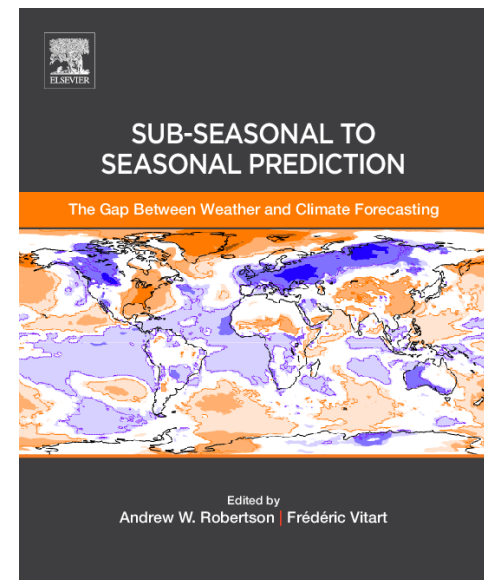
## Blocking



## Atlantic Ridge



- 18 Workshops/Sessions at AGU/EGU/IUGG...
- 9 training Courses on S2S targeting developing countries met services and researchers
- Book on S2S prediction (Oct 2018)





# The 2<sup>nd</sup> phase (2019-2013) will focus on

- **S2S Database enhancement**
  - *Add more variables, including ocean variables*
  - *Additional models, more variables available 6-hourly*
  - *Include derived products (e.g. model climatology)*
- **Research activities (incl. process oriented studies):**
  - *MJO and Teleconnections*
  - *Ocean initialization and processes*
  - *Land initialization and processes*
  - *Aerosols*
  - *Ensemble generation*
  - *Stratosphere*
- Enhancing operational infrastructure and user applications



# Enhancing operational infrastructure and user Applications

- Research to Operations (R2O) and S2S Forecast and Verification Products Development
  - *Pursue research for testing and developing methodologies for calibration, combination, verification and generation of forecast products*
  - *Coordination with the relevant WMO technical commissions to define the standards and protocols for operational implementation and exchange of S2S forecasts*
- Real-time Pilot for S2S Applications research & demonstrations
  - *Goal is to demonstrate the value of S2S forecasts to different GFCS sectors*
  - *Real time pilot: Make some derived variables available close to real-time for a limited period of time, such as 1 year.*
  - *Promote interdisciplinary research for the development of “Ready-Set-Go” – type S2S applications*

# WWRP/WCRP Sub-seasonal to Seasonal Prediction Project (S2S) Phase I Final Report

(November 2013–December 2017)



WORLD  
METEOROLOGICAL  
ORGANIZATION



World Climate Research Programme

WWRP 2018 - 4  
WCRP Report No. 11/2018

# WWRP/WCRP Sub-seasonal to Seasonal Prediction Project (S2S) Phase II Proposal

(November 2018–December 2023)



WORLD  
METEOROLOGICAL  
ORGANIZATION



World Climate Research Programme

[www.s2sprediction.net](http://www.s2sprediction.net)

# 2<sup>nd</sup> S2S International conference

- First International conference on sub-seasonal to seasonal prediction (Feb. 2014, College Park) was a kick off of the S2 project
- Second International S2S conference on sub-seasonal to seasonal prediction (S2S) main goals are:
  - Showcase results from Phase 1 (Themes 1 to 4)
  - Provide inputs for Phase 2 (Themes 5 to 8) with discussion sessions on Tuesday, Wednesday and Thursday.

Looking forward to your inputs!