

Understanding Climate Predictability and Advancing Predictions: The Sub-Seasonal to Seasonal Prediction Project

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Sub-Seasonal Variability



2014 NA Winter

2014 UK Floods



2013 Australian Wildfires



2013 Atlantic Hurricane Season



Some Questions on Sub-Seasonal to Seasonal Predictions

- Research
 - Predictability (stratospheric - tropospheric interaction; soil moisture; ...)
 - MJO/ISO (tropical - extratropical interactions...)
 - Monsoons (simulation and predictability...)
 - Rainfall variability and extremes
 - Spread-skill relationship and forecast of opportunity
 - Polar prediction and sea ice

Some Questions on Sub-Seasonal to Seasonal Predictions

- Forecast and system design
 - Initialization & ensemble generation
 - Design of forecast system
 - Required resolution
 - Coupling for sub-seasonal predictions
 - Verification of sub-seasonal forecasts and extremes

- Some research and modeling issues can be addressed from the availability of hindcast and forecast data sets;
- Already, there are predictions system that are run operationally and target this time scale;
- **S2S Prediction project**: Collect and disseminate data from operational prediction systems to address research and modeling issues

S2S Prediction Project – Some Milestones

- **December 2011**: WWRP-WCRP workshop at the UK Met Office, Exeter
- **March 2013**: Implementation Plan
- **February 2014**: First S2S workshop at NCEP (supported by CPO/MAPP)
- **July 2014**: First test datasets from operational systems

The Concept...

- Collect data from operational centers that have monthly prediction systems – hindcasts and forecasts
- Make data available to the research community to
 - 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 centers and exploitation by the applications community
 - To capitalize on the expertise of the weather and climate research communities to address issues of importance for the success of the Global Framework for Climate Services

Data Protocols

- Same as for THORPEX/TIGGE: grib2; individual model runs
- Data will also be available via NetCDF
- Daily real-time and corresponding hindcasts on a common 1.5x1.5 Deg. grid
- # of variables ~ 100
- Data archived at ECMWF
- Data release to the research community – Three weeks behind real-time
- First test data sets to be available ~ July 2014

Inventory of Monthly Prediction Systems

	Time-range	Resol.	Ens. Size	Freq.	Hcsts	Hcst length	Hcst Freq	Hcst Size
ECMWF	D 0-32	T639/319L62	51	2/week	On the fly	Past 18y	weekly	5
UKMO	D 0-60	N96L85	4	daily	On the fly	1989-2003	4/month	3
NCEP	D 0-60	N126L64	16	daily	Fix	1999-2010	daily	4
EC	D 0-35	0.6x0.6L40	21	weekly	On the fly	Past 15y	weekly	4
CAWCR	D 0-120	T47L17	33	weekly	Fix	1989-2010	3/month	33
JMA	D 0-34	T159L60	50	weekly	Fix	1979-2009	3/month	5
KMA	D 0-30	T106L21	20	3/month	Fix	1979-2010	3/month	10
CMA	D 0-45	T63L16	40	6/month	Fix	1982-now	monthly	48
Met.Fr	D 0-60	T63L91	41	monthly	Fix	1981-2005	monthly	11
SAWS	D 0-60	T42L19	6	monthly	Fix	1981-2001	monthly	6
HMCR	D 0-60	1.1x1.4 L28	10	Monthly	Fix	1979-2003	Monthly	11

PROPOSED LIST OF VARIABLES TO BE ARCHIVED

Additions are marked in red.

1. Multi-level fields

	Unit	Abbrev.	Descript	1000	925	850	700	500	300	200	100	50	10
Geop. height	gpm	gh	Inst. 00Z	x	x	x	x	x	x	X	x	x	x
Spec. hum.	Kg/kg	q	Inst. 00Z	x	x	x	x	x	x	X			
Temperature	K	t	Inst 00Z	x	x	x	x	x	x	X	x	x	x
U	m/s	u	Inst 00Z	x	x	x	x	x	x	X	x	x	x
V	m/s	v	Inst 00Z	x	x	x	x	x	x	X	x	x	x
W	Pa/s	w	Ins 00Z					x					

2. Single-level fields

	Unit	Abbreviation	Description
Potential vorticity at 320K	$K m^2 kg^{-1} s^{-1}$	pv	Inst 00Z
10 metre U	$m s^{-1}$	10u	Inst 00Z
10 metre V	$m s^{-1}$	10v	Inst 00Z
CAPE	$J kg^{-1}$	cape	Daily Av. 4x
Skin temperature	K	skt	Daily Av. 4x
Snow depth water equivalent	$Kg m^{-3}$	sd	Daily Av. 4x
Snow density	$kg m^{-3}$	rsn	Daily Av. 4x
Snow fall water equivalent	$kg m^{-2}$	sf	Accumulated
Snow albedo	Proportion	asn	Daily Av. 4x
Soil moisture top 20 cm	$kg m^{-2}$	sm20	Daily Av. 4x
Soil moisture top 100 cm	$kg m^{-2}$	sm100	Daily Av. 4x
Soil temperature top 20cm	K	st20	Daily Av. 4x
Soil temperature top 100 cm	K	st100	Daily Av. 4x
Surf. Air Max. Temp.	K	Mx2t6	4xday
Surf. Air. Min. Temp.	K	Min2t6	4xday.
Surf. Air. Temp.	K	2t	Daily Av. 4x
Surf. Air Dewpoint Temp.	K	2d	Daily Av. 4x
Sea surface temperature	K	sstk	Daily Av. 4x
Sea ice cover	Proportion of sea ice	ci	Daily Av. 4x
Surf. Pressure	Pa	sp	Inst 00Z
Time Integrated Outgoing long-wave radiation	$W m^{-2} s$	ttr	Accumulated
Time integrated surface latent heat flux	$W m^{-2} s$	shf	Accumulated
Time integrated surface net solar radiation	$W m^{-2} s$	ssr	Accumulated

Proposed list of variables

Time integrated surface net thermal radiation	$W m^{-2} s$	str	Accumulated
Time integrated surface sensible heat flux	$W m^{-2} s$	shf	Accumulated
Time integrated surface solar rad. downwards	$W m^{-2} s$	ssrd	Accumulated
Time integrated surface thermal rad. downwards	$W m^{-2} s$	strd	Daily Av. 4x
Total cloud cover	%	tcc	Daily Av. 4x
Total column water	$kg m^{-2}$	tcw	Daily Av. 4x
Total precipitation	$kg m^{-2}$	tp	Accumulated
Convective Precipitation	$kg m^{-2}$	cp	Accumulated
Northward turbulent surface stress	$N m^{-2} s$	nsss	Accumulated
Eastward turbulent surface stress	$N m^{-2} s$	ewss	Accumulated
Mean sea-level pressure	Pa	msl	Inst 00Z
Water runoff	$kg m^{-2}$	ro	Accumulated
Surface water runoff	$kg m^{-2}$	sro	Accumulated

3. Ocean fields

	Unit	Abbreviation	Description
Sea surface salinity	psu	ssis	Daily Av. 4x
Depth of the 20 deg isoth.	m	20d	Daily Av. 4x
Heat content top 300m	Degrees C	tav300	Daily Av. 4x
Salinity in top 300m	psu	sav300	Daily Av. 4x
U surface current	$m s^{-1}$	u	Daily Av. 4x
V surface current	$m s^{-1}$	v	Daily Av. 4x
Sea surface height	m	sl	Daily Av. 4x

4. Constant fields

	Unit	Abbreviation	Description
Land sea mask	Proportion of land	lsm	daily
Orography	gpm	oreg	daily
Soil type	categorical	slt	daily

S2S Prediction Project

- http://www.wmo.int/pages/prog/arep/wwrp/new/S2S_project_main_page.html

