

TIGGE Museum (google “TIGGE Museum”)

MJO forecasts

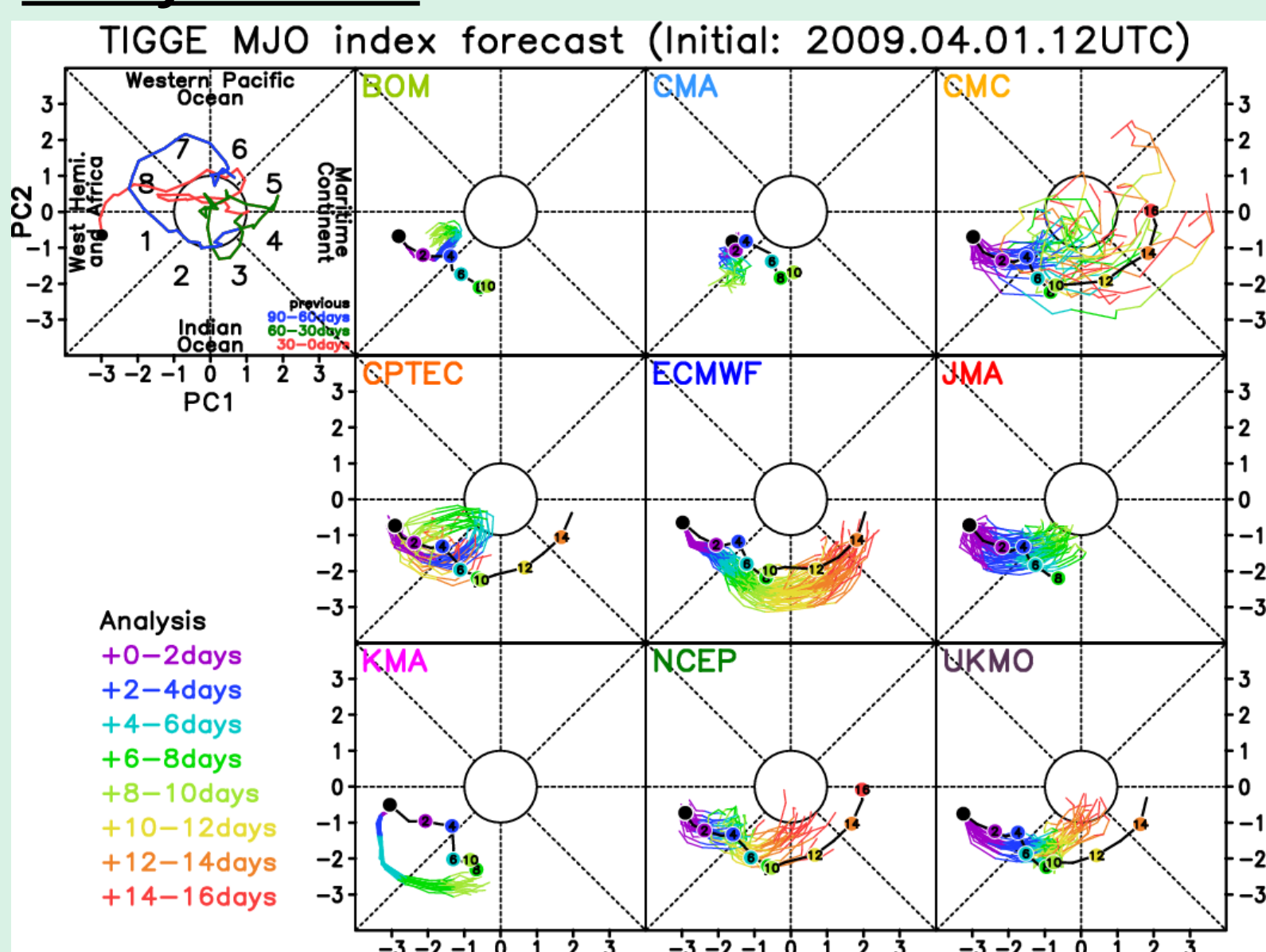


Figure 1: (top left) ECMWF analysis for the real-time multivariate MJO index for the 90 days prior to the initial date of the forecast. (right 9 panels) Real-time multivariate MJO index forecasts by BoM, CMA, CMC, CPTEC, ECMWF, JMA, KMA, NCEP, and UKMO, initialised at 1200 UTC on 1 April 2009. The black circle and the black line with numbered circles correspond to each analysis. The numbers in the coloured circles indicate the number of days from the initial date. The coloured lines indicate ensemble members. The colour changes reflect the lead time of the forecast. Analyses and forecasts generally travel in a counterclockwise direction. (Matsueda and Endo, 2011, GRL)

Probabilistic blocking forecasts

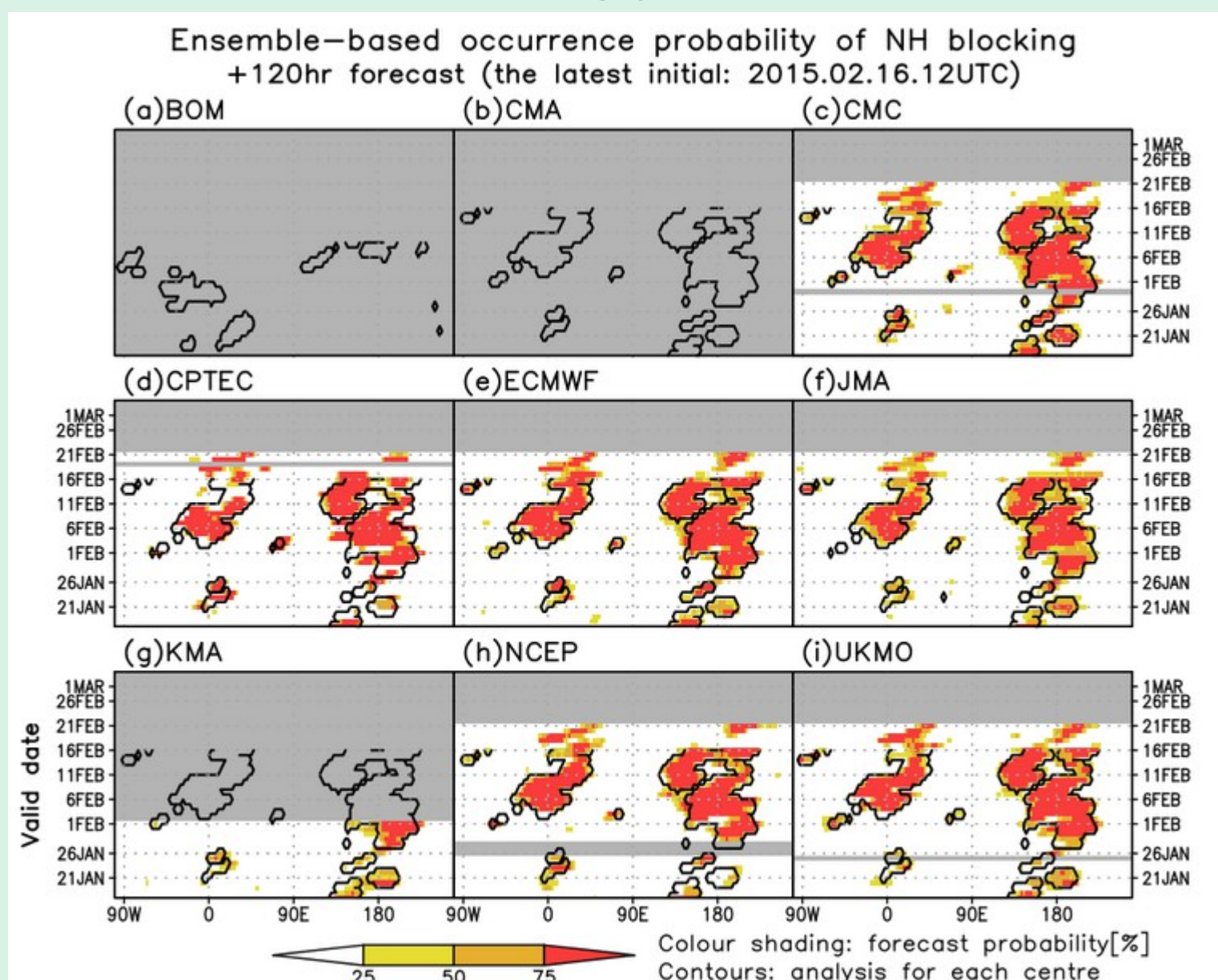
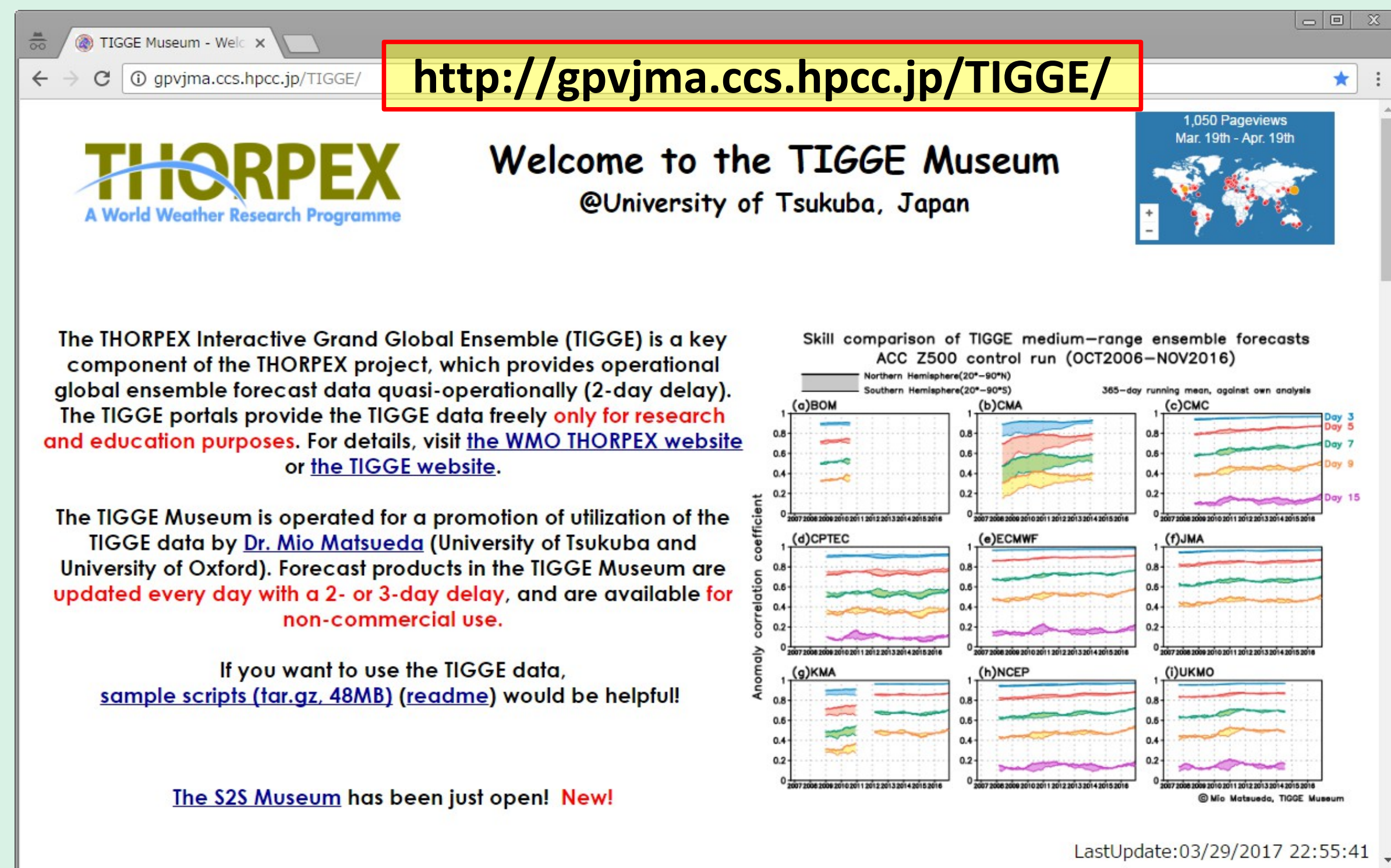


Figure 2: Hovmöller diagram of 120-hr probabilistic blocking forecasts initialised at 1200 UTC on 16 February 2015. Areas surrounded by black solid lines and coloured areas indicate observed blocking and blocking probabilities predicted by ensemble members, respectively. (Matsueda, 2009, SOLA and Matsueda 2017 (under review, GRL))



List of forecast products

- Z500 Spaghetti & stamp maps
- **MJO (Madden-Julian Oscillation)** (high/low T, heavy rainfall & strong winds)
- **Atmospheric blocking** (daily and seasonal scores, MJO & blocking)
- Teleconnection indices (EA, PNA, WA, WP, & EU)
- EPS meteograms (UK&Europe)
- **Severe weather events**
- **Forecast verifications** (Model biases)

Data detail of the TIGGE data (as of December 2015)

	fcst length	model resolution	ens. size	fcst freq. (UTC)	initial perturbation (model resolution)	model uncertainty	DA for cntrl analysis	data available period	orig data grid
BoM (Australia)	10 days	TL119L19	33	00, 12	SVs (TL42L19)	No	?	2007.09.03.00 - 2010.07.20.12	1.5 x 1.5
CMA (China)	10 days	TL213L31	15	00, 12	BVs (T213L31?)	SPPT	GSI	2007.05.15.00 -	0.28125 x 0.28125
CMC (Canada)	16 days	N200L40 (800 x 400)	21	00, 12	EnKF (66kmL74)	SPPT, SKEB, multi-param	EnKF	2007.10.03.00 -	1.0 x 1.0
CPTEC (Brazil)	15 days	T126L28 (384 x 196)	15	00, 12	EOF-based (T216L28)	No	from NCEP	2008.02.01.00 -	0.9375 x 0.9375
ECMWF (Europe)	15 days	Tco639L91(<D10) Tco319L91(>D10)	51	00, 12	SVs (TL42L24)	SPPT, SKEB	ensemble 4D Var	2006.10.01.00 -	N320 reduced gauss (640 lat, 1080 lon@35N)
JMA (Japan)	11 days	TL479L60	27	00, 12	SVs (TL63L40)	SPPT	4D Var	2006.10.01.12 -	1.25 x 1.25
KMA (Korea)	12 days	N320L70 (1280 x 640)	24	00, 12	ETKF (N320L70)	SKEB2, RP2	Hybrid ens. and 4D Var	2007.12.28.00 - 2010.11.30.12 (prev.) 2011.03.01.00 -	0.375 x 0.5625
Met.Fra (France)	3 days (06) 4.5 days (18)	T538C2.4L65	35	06, 18	SVs (T44L65, T95L65)	multi package?	4D Var	2007.10.25.18 -	1.5 x 1.5
NCEP (US)	16 days	T319L91(<D10) T254L91(>D10)	21	00, 06, 12, 18	ETR (T254L91)	SP	GSI	2007.03.05.00 -	1.0 x 1.0
UKMO (UK)	7.25 days	N400L70 (1600 x 800)	12	00, 06, 12, 18	ETKF (N400L70)	SKEB2, RP2	4D Var	2006.10.01.00 -	0.3 x 0.45

SPPT: Stochastic perturbation of physics tendency
SKEB: Stochastic Kinetic Energy Backscatter
RP: Random Parameter
GSI: Gridded Statistical Interpolation

Probabilistic forecasts of severe weather events

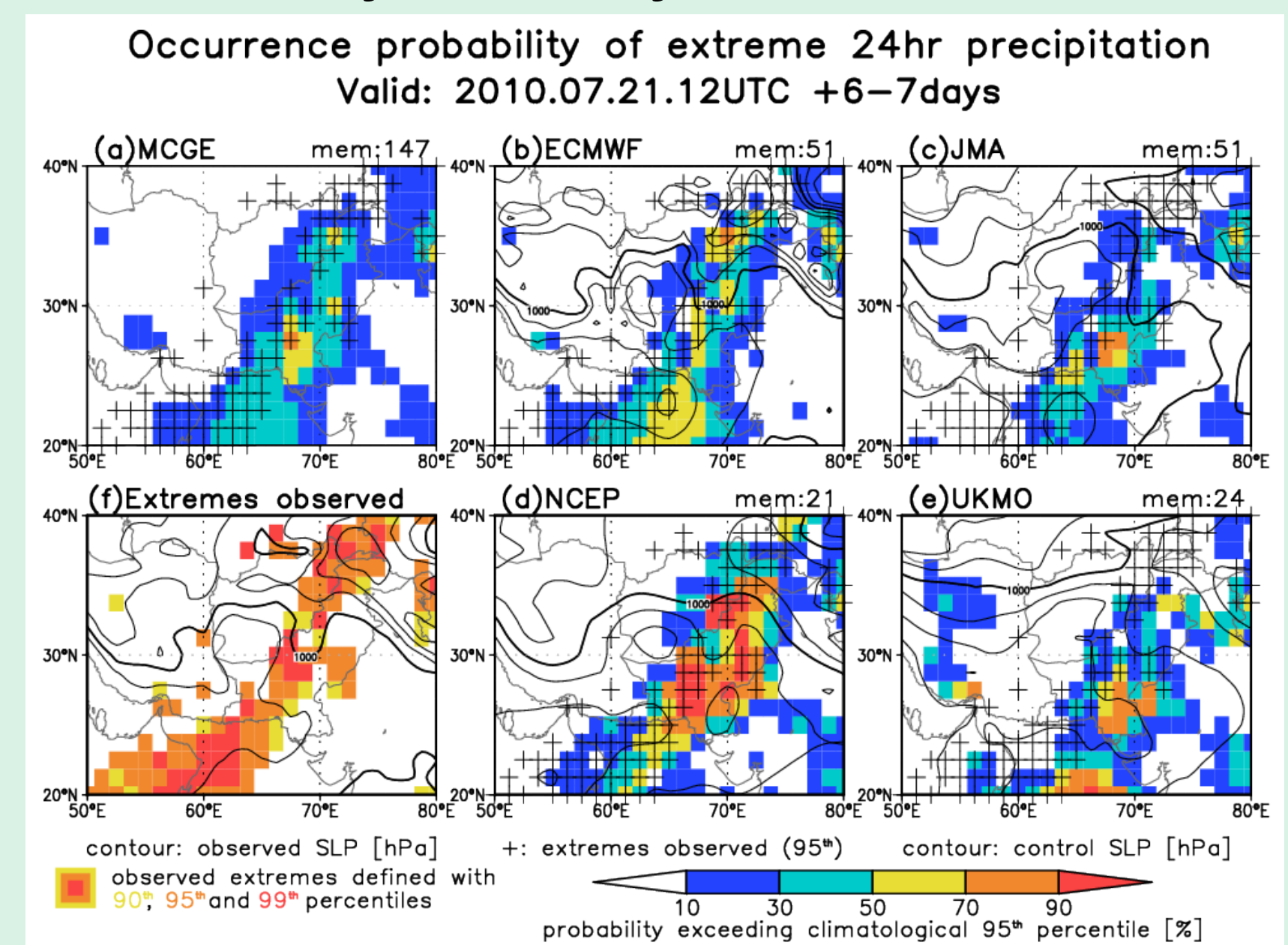


Figure 3: Occurrence probabilities of extreme 24-hr rainfall for the 2010 Pakistan floods. The shading indicates occurrence probabilities by the (a) multicentre grand ensemble, (b) ECMWF ensemble, (c) JMA ensemble, (d) NCEP ensemble, and (e) UKMO ensemble, initialised at 1200UTC 21 July 2010, and valid at 1200UTC 27 – 28 July 2010. Contours in (b–e) indicate predicted sea level pressure (SLP) in each control run. (f) Observed extremes defined with the observed climatological 90th, 95th and 99th percentiles (shading) and SLP (contours). The hatching in (a–e) indicates observed extremes defined with the observed 95th percentiles in (f). The climatological 95th percentiles of the models were used to define the predicted extremes. (Matsueda and Nakazawa, Meteorol. Appl., 2015)

Daily forecast skill of Z500 over the NH

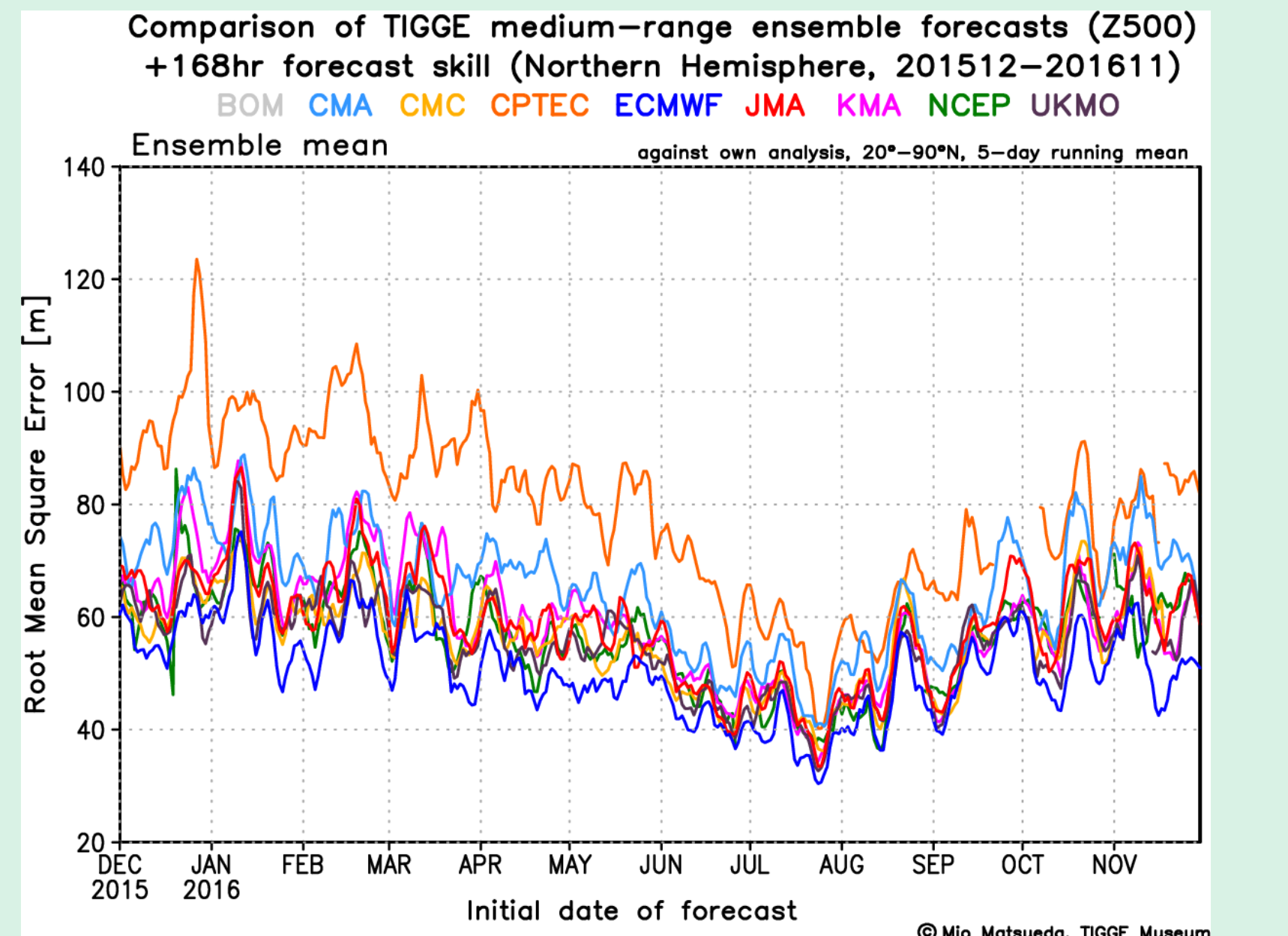


Figure 4: Root Mean Square Error (RMSE) for 7-day ensemble mean forecasts of 500 hPa height (Z500) over the Northern Hemisphere, initialised in December 2015 – November 2016. Each forecast is verified against its own analysis.

S2S Museum (google “S2S Museum”)

NAO index forecasts

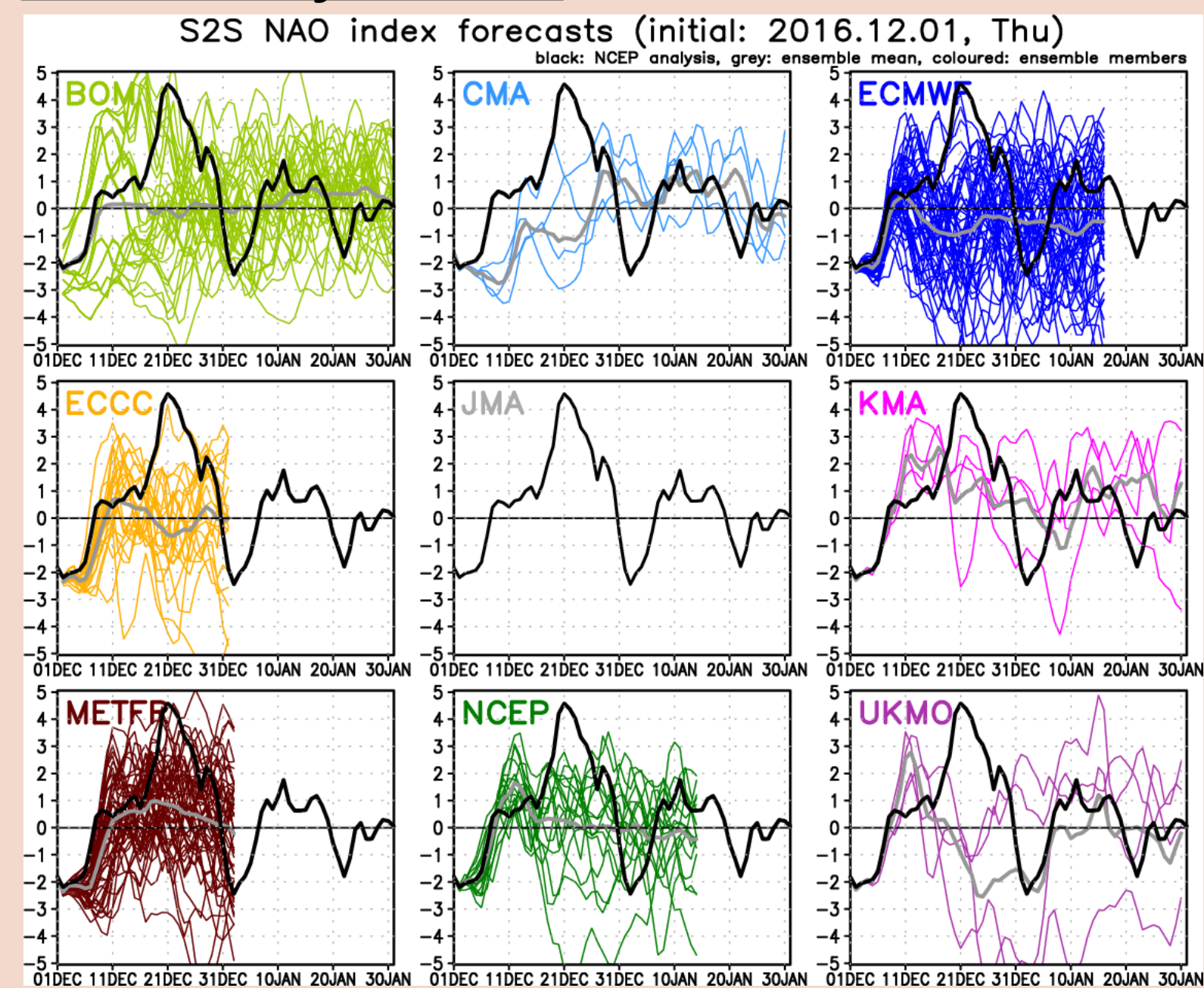


Figure 5: NAO index forecasts by BoM (yellow-green), CMA (aqua), ECMWF (blue), ECCC (yellow), KMA (pink), METFR (brown), NCEP (green), and UKMO (purple), initialised on 1 December 2016. The coloured and grey lines indicate individual ensemble members and ensemble mean, respectively. The black line corresponds to the NCEP control analysis.

SSW forecasts

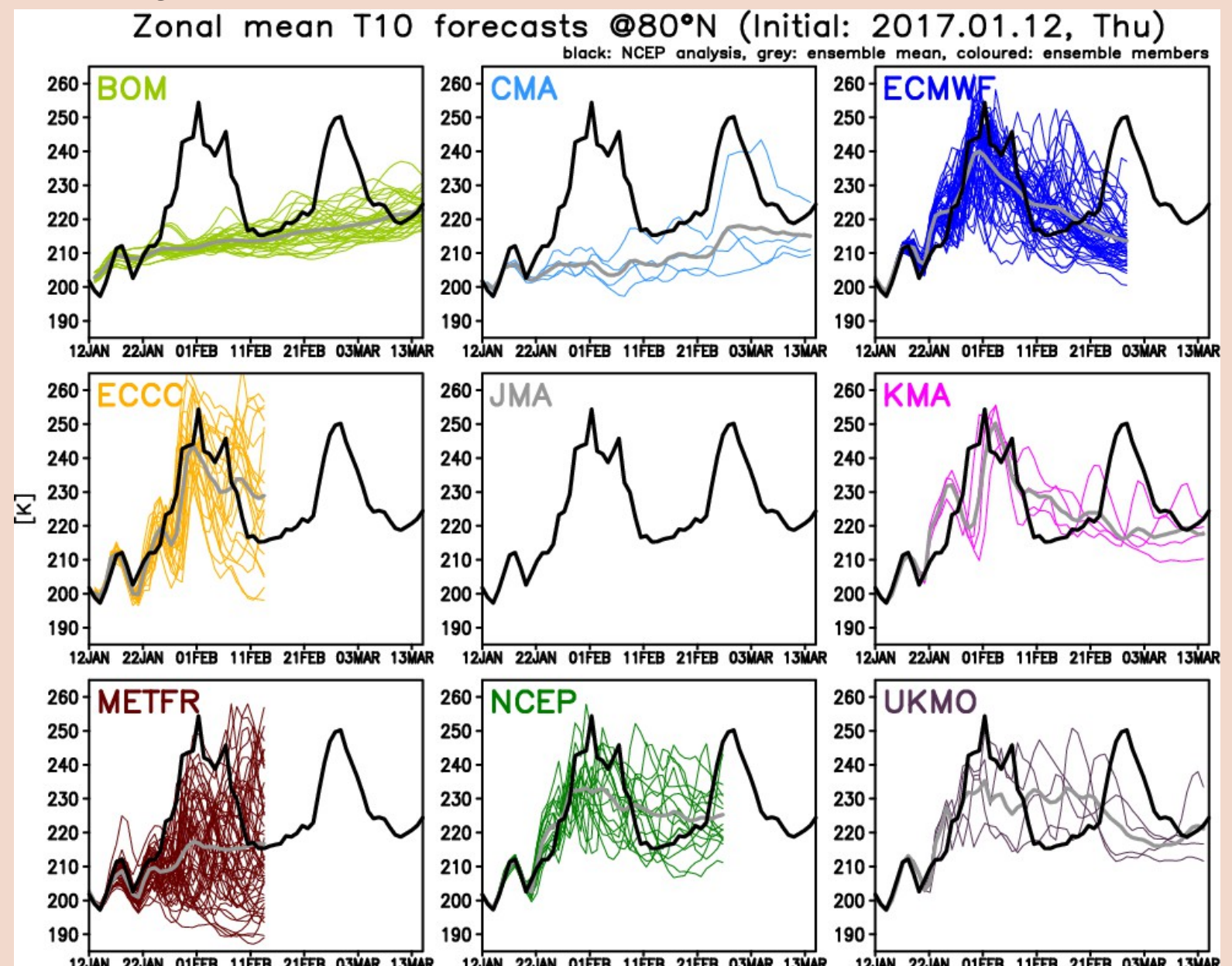
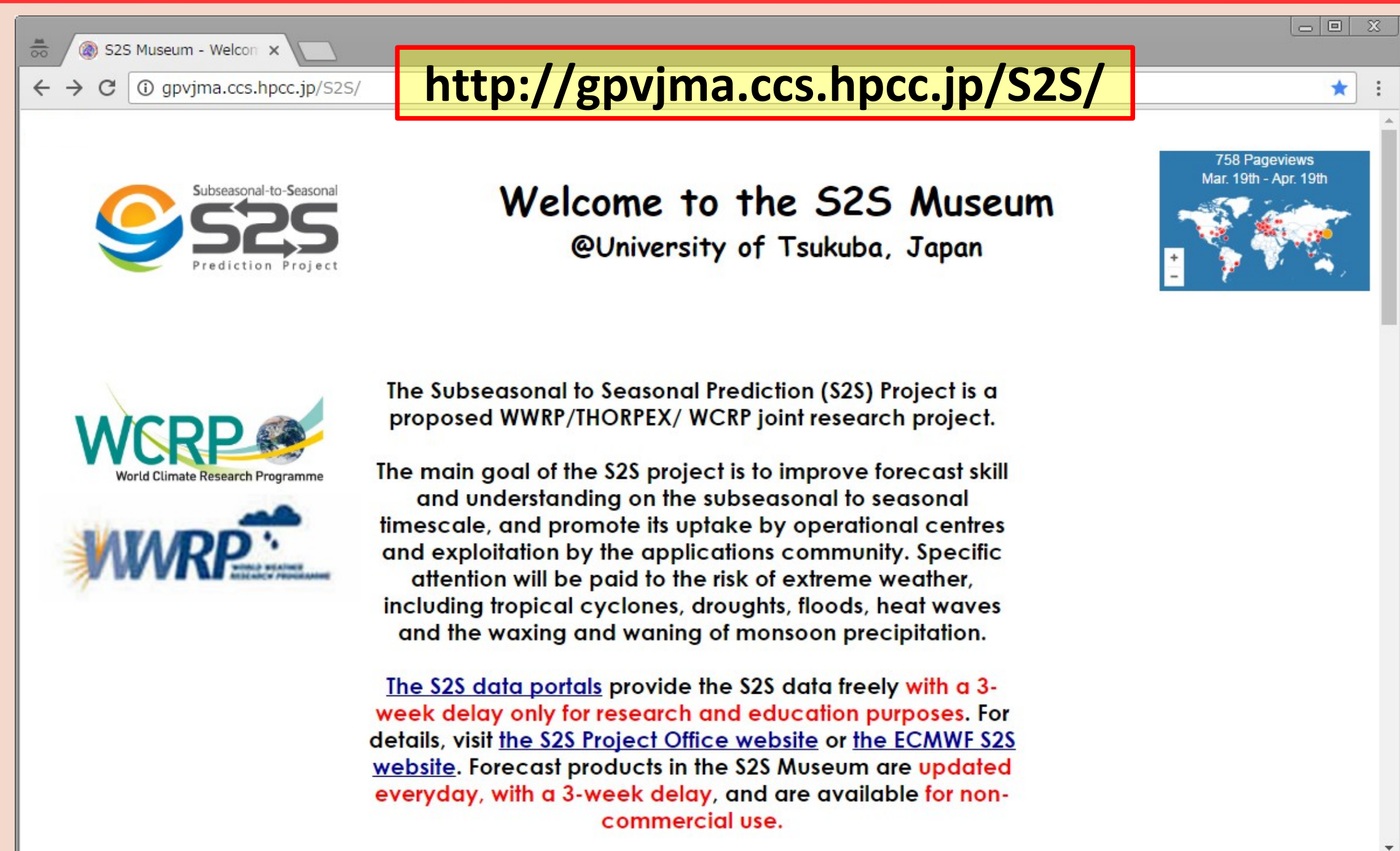


Figure 6: Zonal mean temperature at 10 hPa over 80°N line forecasts by BoM (yellow-green), CMA (aqua), ECMWF (blue), ECCC (yellow), KMA (pink), METFR (brown), NCEP (green), and UKMO (purple), initialised on 12 January 2017. The coloured and grey lines indicate individual ensemble members and ensemble mean, respectively. The black line corresponds to the NCEP control analysis.



List of forecast products

- AO/AAO (Arctic/Antarctic Oscillations) index
- **NAO (North Atlantic Oscillation) index**
- Teleconnection indices (EA, PNA, WA, WP & EU)
- SLP & Z500 anomalies (stamp maps)
- **SSW (Sudden Stratospheric Warming)**
- Temperature at 10 hPa
- Wave Activity Flux at 200 hPa
- **MJO (Madden-Julian Oscillation)**
- **SST (Sea Surface Temperature)**
- **Sea-ice cover**

Data detail of the S2S data (as of March 2017)

	Real time					Rerecast					orig data grid
	forecast length	model resolution	ens. size	forecast freq.	data available period	system (model ver.)	ens. size	rerecast frequency	rerecast period		
BoM (Australia)	D1 – 62 (00UTC)	T47L17	33	Sun Thu	2015.01.01 -	fixed (2014.01.01)	33	1st, 6th, 11th, 16th, 21st, 26th of each month	1981-2013	T47 (144x72)	
CMA (China)	D0 – 60 (00UTC)	T106L40	4	daily	2015.01.01 -	fixed (2014.05.01)	4	daily	1994-2014	1.5x1.5	
ECCC (Canada)	D1 – 32 (00UTC)	0.45° x 0.45° L40 (uncoupled)	21	Thu	2016.01.07 -	on the fly	4	Thu	1995-2014	1.5x1.5	
ECMWF (Europe)	D0 – 46 (00UTC)	Tco639L91(<D10) Tco319L91(>D10)	51	Mon Thu	2015.01.01 -	on the fly	11	Mon Thu	past 20yrs	1.5x1.5	
HMCR (Russia)	D0 – 61 (00UTC)	1.125° x 1.40625° L28 (uncoupled)	20	Wed	2015.01.07 -	on the fly	10	Wed	1985-2010	1.5x1.5	
ISAC-CNR (Italy)	D0 – 31 (00UTC)	0.75° x 0.56° L54 (a 'slab' ocean)	41	A. Mon B. Thu	A. 2015.11.09 - 2016.02.01 B. 2017.01.16 - 2017.01.19	fixed (2015.03.26)	1	every 5 days	1981-2010	1.5x1.5	
JMA (Japan)	D0.5 – 33.5 (12UTC)	TL319L60 (uncoupled)	25	Tue Wed	2015.01.06 -	fixed (2014.03.04)	5	10th, 20th, the last date of each month	1981-2010	1.5x1.5	
KMA (Korea)	D0 – 60 (00UTC)	N216 (0.83° x 0.56°) L85	4	daily	2016.11.01 -	on the fly	3	1st, 9th, 17th, 25th of each month	1991 - 2010	1.5x1.5	
Met. France (France)	A. D0 – 61 B. D0 – 32 (00UTC)	TL255L91	51	A. monthly (1st) B. Thu	A. 2015.05.01 - 2016.02.01 B. 2016.03.03 -	fixed (2014.12.01)	15	1st and 15th of each month	1993-2014	1.5x1.5	
NCEP (US)	D0 – 44 (00UTC)	T126L64	16	daily	2015.01.01 -	fixed (2011.03.01)	4	daily	1999-2010	1.5x1.5	
UKMO (UK)	D0 – 60 (00UTC)	N216 (0.83° x 0.56°) L85	4	daily	2015.12.01 -	on the fly	3	1st, 9th, 17th, 25th of each month	1993-2015	1.5x1.5	

MJO forecasts

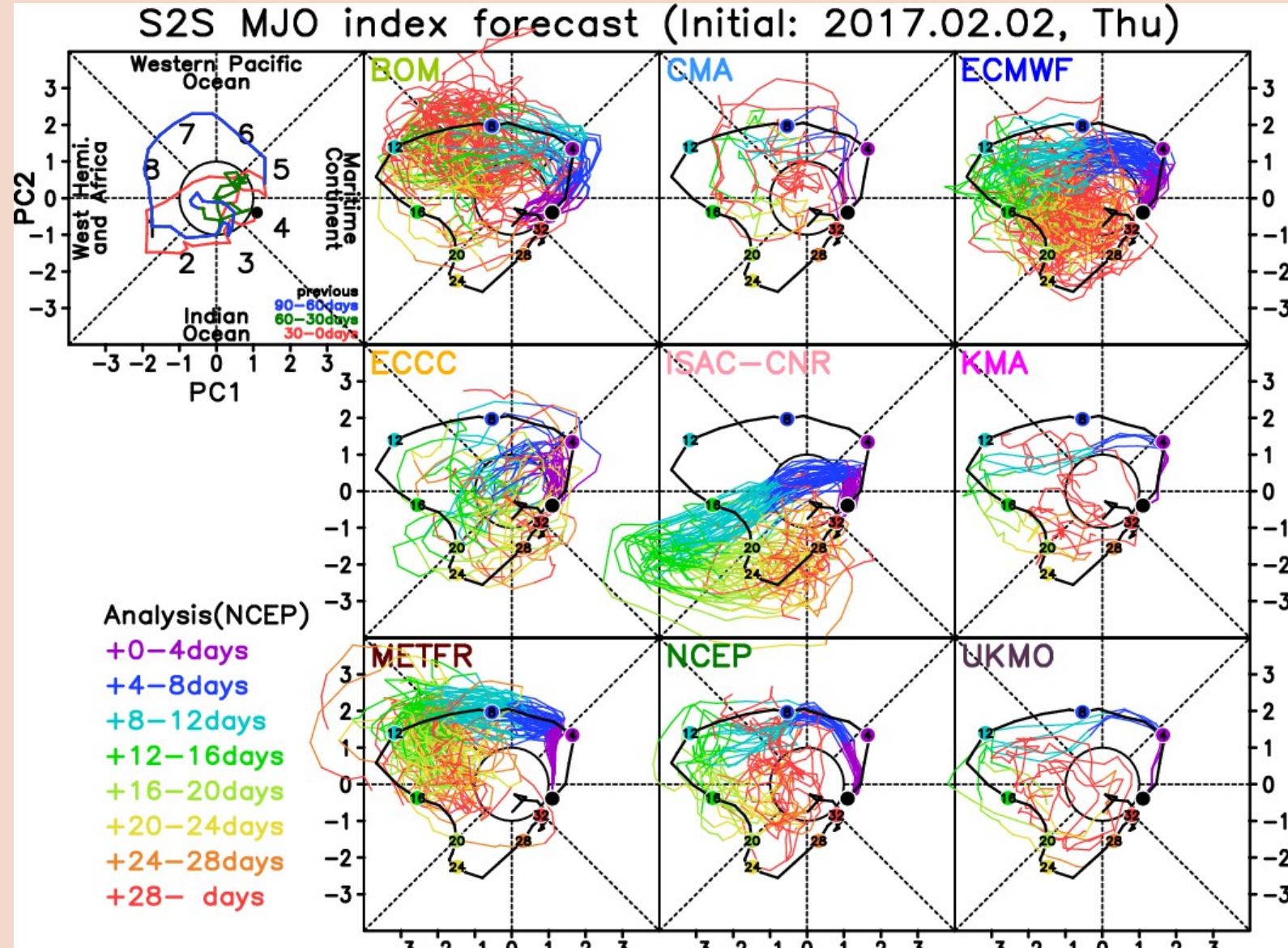


Figure 7: (top left) NCEP control analysis for real-time multivariate MJO index for the 90 days prior to the initial date of the forecast. (right 9 panels) Real-time multivariate MJO index forecasts by BoM, CMA, ECMWF, ECCC, ISAC-CNR, KMA, METFR, NCEP, and UKMO, initialised on 2 February 2017. The black circle and the black line with numbered circles correspond to the NCEP control analysis. The numbers in the coloured circles indicate the number of days from the initial date. The coloured lines indicate ensemble members. The colour changes reflect the lead-time of the forecasts.

SST and sea-ice cover forecasts

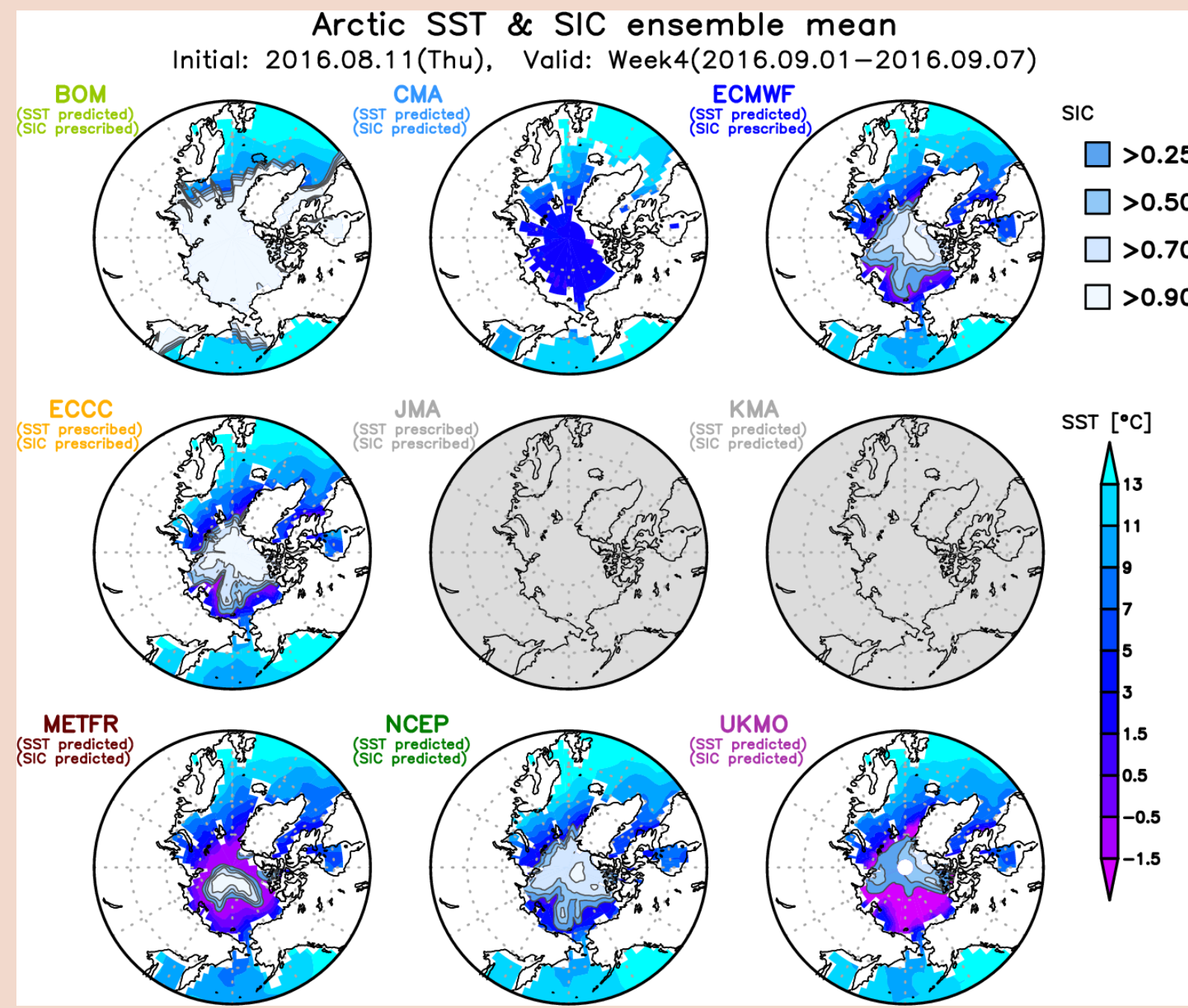


Figure 8: Sea surface temperature (colour bar at the lower-right corner) and sea ice cover (colour bar at the upper-right corner) forecasts by BoM (yellow-green), CMA (aqua), ECMWF (blue), ECCC (yellow), METFR (brown), NCEP (green), and UKMO (purple), initialised on 11 August 2016, valid on 1 – 7 September 2016 (Week 4).