**Characteristics of the sub-seasonal and seasonal forecast systems operational and under development at ECMWF, JMA, UKMO, Météo France, NCEP, MSC, BMRC, KMA ,CMA, CPTEC, SAWS and Hydrometeorological Centre of Russia .**

| | Current systems spanning the sub-seasonal (blue) and seasonal (red) time ranges | Known planned changes for 2011-12 |
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| **ECMWF:** | • **d0-d32: ECMWF EPS/monthly (twice a week: every Mondays and Thursdays)** $T_L$639 (d0-10) v319 (d10-32) L62, TOA 5hPa, 50+1 members. Persisted SST up to d10 and coupled to HOPE (1:1/3 degree resolution, L40) ocean model from day 10. Initial uncertainties simulated using $T_L$399L91EDA- and T42L62SV-based perturbations Model uncertainties simulated using SPPT and BS stochastic schemes. Re-forecast suite with 5 members run on the fly once a week for 18 years. <br><br> • **m0-7/13: ECMWF S3 (once a month to m7 and every quarter to m13)** 41 members with $T_L$159L40 resolution, with coupled HOPE (1:1/3 degree resolution, L29) ocean model. Frozen model cycle (cy31r1). Reforecast suite with 11 members run the 1st of each month. | • d0-d32: ECMWF-EPS Increase in vertical resolution to about L95 in 2012. <br><br> Use of NEMO (ORCA1 with tripolar grid, i.e. 1:1/3 degree resolution, L42) instead of HOPE ocean model by the end of 2011. <br><br> • **m0-7/13: ECMWF-S4** 51 members with $T_L$255L91 resolution, with coupled NEMO (ORCA1, i.e. 1-1/3 degree resolution, L42) ocean model. Frozen model cycle (cy36r4). Re-forecast: 15 ensemble members the 1st of each month 1981-2010. |
| **JMA:** | • **d0-34: JMA monthly system (once a week)** $T_L$159L60 resolution (AGCM) with 50 members runs 25 from Wed and 25 from Thu ICs. Supplemental 2-week forecasts with the same system, 50 members runs 25 from Sun. and 25 from Mon. ICs. Initial uncertainties simulated using bred vectors. Uncoupled. <br><br> All reforecasts are done before system updates. Five-member runs start from 10th, 20th and the end of calendar month during more than 30 years (currently 1979-2009). http://ds.data.jma.go.jp/tcc/tcc/products/model/outline/index.html <br><br> • **m0-3/6: JMA seasonal system (once a month to m3 and every semester to m7)** $T_L$95L40, 51 members run in lagged mode (9 members run every 5 days), with coupled JMA/MRI ocean model (1:0.3 degree horizontal | • d0-34: increase resolution to $T_L$319L100(L80?) in 2013. <br><br><br><br><br><br><br><br><br><br><br><br> • m0-3/6: increase resolution to $T_L$159L60(L80?) coupled to a higher resolution 0.5-1 degree ocean (tripolar grid), L53. Coupling with sea-ice |

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| | resolution, L50, 75°N-75°S), with flux adjustment. http://ds.data.jma.go.jp/tcc/tcc/products/model/outline/longrange.html<br><br>Initial perturbations for ocean and atmosphere with an atmospheric bred vector. (atmospheric perturbations are used for parallel ocean analysis. )<br><br>Reforecast<br>Five-member ensembles twice a month during 1979-2008. | | will be tested. |
| **UKMO:** | • **d0-60: UKMO monthly system (run daily - issued once a week)**<br>It is part of the UKMO seasonal system. N96 (~120km resolution) L85 with coupled NEMO ocean model (ORCA1, i.e. 1:1/3 degree resolution, L75 resolution). 28 members run in lagged mode (4 members per day for the last 7 days).<br>• **m0-7: UKMO seasonal system (run daily – issued once a week/month)**<br>N96 (~120km resolution) L85 with coupled NEMO ocean model (ORCA1L75 resolution). 42 members run in lagged mode (2 members per day for the last 3 weeks).<br>Reforecast suite with 42 members spanning 14 years (1989-2003) run in real time. Start dates $1^{st}$, $9^{th}$, $17^{th}$ and $25^{th}$ of each month | | • The configuration of the UKMO EPS and seasonal systems are under continuous development.<br><br>• Monthly and Seasonal: increase resolution to N216 in 2012. |
| **Météo France:** | • **m0-7: MF seasonal system T63L91 (once a month)**<br>Arpege (the atmospheric component) has 91 vertical levels and a spatial resolution of about 300Km. OPA with ORCA2 (with tripolar grid, i.e. 2:1/3 degree resolution, L42). The ocean initial conditions are prepared by MERCATOR in Toulouse. | | |
| **NCEP:** | • **d0-45: NCEP monthly system**<br>T126L64 resolution, 16 members run per day (4 members run four times a day at 00, 06, 12 and 18). Coupled ocean model.<br>Re-forecast: 4 members/day from 1999 to 2010<br><br>• **m0-9: NCEP seasonal system (4 runs a day)**<br>T126L64 atmosphere resolution, MOM4 (MOM is the Modular Ocean Model developed by GFLD) ocean model (0.5 to 0.25 degree resolution, L40), with interactive sea-ice model.<br>Re-forecasts: 4 members run every fifth day for the past 29 years (1982-2010). | | |

| EC: | • d0-30: MSC monthly (twice a month)<br>The current operational monthly forecasting is the first month of the MSC multi-model seasonal system.<br><br>• m0-4: MSC seasonal system (once a month)<br>Multi-model system with 4 models: GEM 2°x2°L50, AGCM2 T32L10, AGCM3 T63L32 and SEF T95L27. 40 members (10 run with each model). Uncoupled (persisted SST anomaly). | • **d0-35: MSC GEPS (once a week)**<br>GEM 0.6°x 0.6°L40 uncoupled (persisted SST anomaly). 21 member ensemble. Initialised with Kalman Filter. Re-Forecast of 4 members once a week on the fly over the past 15 years.<br>In operation early 2012.<br><br>• **m0-12: MSC seasonal system (once a month)**<br>Multi-model system with 2 coupled models: CanCM3 T63L31 and CanCM4 T63L35. 20 members (10 run with each model). Re-forecast: 10 ensemble members for each model initialised on the 1st of each month 1981-2010.<br>In operation by the end of 2011. |
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| **CAWCR:** | • **d0-120: POAMA2 T47L17** multiweek **(once-a-week)**<br>Based on the BMRC (old) spectral model (T47L17) coupled to MOM2 (2x0.5 tropical res). 33 member ensemble initialized on 00Z every Thu (3 model versions x 11 members each). Perturbations from a coupled breeding cycle based on nudging to a previously assimilated ocean and atmosphere analysis.<br><br>Re-forecast: Monthly/multi-week set consisting of 33-member ensemble on 1st, 11th and 21st of the month from 1989 to 2010 run for 120 days.<br><br>• **m0-9: POAMA2 T47L17** SeasonL **(twice-a-month)**<br>Based on the BMRC (old) spectral model (T47L17) coupled to MOM2 (2x0.5 tropical res). 30-member ensemble initialized on 00Z the 1st and 15th of each month (3 model versions x 10 members each). Ocean perturbations only directly from ensemble ocean assimilation).<br>Re-forecast: Seasonal set consisting of 30-member ensemble starting the 1st of each month from 1960 to 2010. | • Extend d0-120 POAMA2 multiweek re-forecast set back to 1980<br>• POAMA3 Experimental forecasts d0-45 by end 2012 using N144L80 (UM7) uncoupled.<br>• POAMA3 Post 2012: d0-120 N144L80 (UM7) coupled to MOM4 (1x.3 tropical res). Initial conditions and perturbations from a coupled assimilation system. |

| KMA | • **d 0-30: GDAPS T106L21 (three times a month)**<br>Same system as for seasonal forecasting. The atmospheric model runs 3 times a month (3$^{rd}$, 13$^{th}$ and 23$^{rd}$ of each month) . The ensemble size is 20 members using a lagged average method with about a 15-day forecast lead time . The atmospheric model is forced by predicted SST anomalies.<br><br>Re-forecast: Monthly set consisting of 20-member ensemble starting the 3$^{rd}$, 13$^{th}$ and 23$^{rd}$ of the month from 1979 to 2010 run for 230 days<br><br>• **m 0-3 (once a month) and m0-6 (4 times a year)**<br>The atmospheric model runs for 3 months every 23$^{rd}$ of the month and for 6 months the 23$^{rd}$ of Feb/May/Aug/Nov with 20 ensemble members (lagged average method with about a 15-day forecast lead time). The atmospheric model is forced by predicted SST anomalies.<br><br>Re-forecast: Seasonal/6 months set consisting of 20-member ensemble starting the 23$^{rd}$ of the month from 1979 to 2010 run for 230 days | • Replace this extended range forecasting system with UM based climate model (HadGEM3 or GloSea4) by 2013 |
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| CMA | • **D 0-45: BCC_AGCM1.0 (6 times a month)**<br>The atmospheric model is integrated for 45 days at T63L16 resolution forced by persisted SST anomalies (persistence of the previous weekly SST anomalies). The starting dates are the 1$^{st}$, 6$^{th}$, 11$^{th}$, 16$^{th}$, 21th and 26$^{th}$ of each month. There are 40 ensemble members. Half of them are generated with lagged-average-forecast (LAF) method, the other half with singular-vector-decomposition (SVD) method.<br>Re-Forecasts: 1982-now<br>• **m 0-3: BCC_CGCM1 (once a month)**<br>The coupled ocean-atmosphere model is integrated for 90 days at T63L16 resolution. There are 48 ensemble members.<br>Re-Forecasts: 1982-now | • Use of the new generation BCC_CSM model at a T106 resolution. ocean resolution is about 1/3-1°. Intra-seasonal forecasts will use the atmosphere-only version of this model. This new system will be operational at the beginning of 2012. |

| CPTEC | • **D 0-30: CGCM T126L28 (experimental)** <br> The coupled ocean-atmosphere model is integrated for 30 days at T126L28 resolution. There is 1 ensemble member per day. <br> No reforecasts <br><br> • **m 0-7: AGCM T62L28 (once a month)** <br> The atmospheric model is integrated for 7 months at T62L28 resolution forced by persisted SST anomalies from NCEP(Reynolds SST OI v2) of the previous month of lead 0. There are 15 ensemble members per month (lagged approach). <br> Re-Forecasts: 1979-2001 | |
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| SAWS | • **m 0-5: T42L19 (once a month)** <br> The atmospheric model is integrated for 5 months at T42L19 resolution forced by predicted SSTs. There are 6 ensemble members per month (lagged approach). <br> Re-Forecasts: 1981-2001 | |
| **Hydro meteorologic al Centre of Russia** | • **m 0-4: 1.1x1.4 L28 (once a month)** <br> The atmospheric model is integrated for 4 months at 1.1x1.4 degree L28 resolution forced by persisted SST anomalies. There are 10 ensemble members per month (lagged approach). <br> Re-Forecasts: 1979-2003 | |