

NMOC Operations Bulletin No.79

Operational Updates to the Daily OCF system 15 July 2009

1. Introduction

The Daily OCF (Operational Consensus Forecasts) conducts a statistical correction of model output at selected sites followed by a performance weighted average consensus on a daily basis. It generates forecasts for day 0 to day 7 of screen-level temperature maxima and minima, ground-level temperature minima, evaporation, sunshine hours, and rainfall and its probability above 0.2mm. The methodology has been described in NMOC (National Meteorological and Oceanographic Centre) Operations Bulletin No 60 (Operational Consensus Forecasts)

<http://www.bom.gov.au/nmoc/bulletins/60/apob60.shtml>. This system was originally developed by Frank Woodcock and Chermelle Engel (CAWCR, Centre for Australian Weather and Climate Research) and later upgraded by Wenming Lu and Frank Woodcock (CAWCR). Since the system became operational in NMOC on 8 March 2005, it has provided very useful guidance and become the primary tool for the forecasters in the Australia regional weather forecasting centres. The initial system was run twice daily in the NMOC Scheduler and produced the 00Z and 12Z OCF forecasts, which usually finish at around 2:10pm and 2:30am Australian eastern local time. The 00Z run includes most of the current day 00Z limited area runs and previous day 12Z overseas model runs while the 12Z run contains most of the current day 12Z limited area runs and 00Z overseas model runs. In 2008, two extra runs were introduced, which produce later OCF forecasts than the initial 00Z and 12Z runs and thus enable most of latest overseas models to be incorporated. The two extra runs are timely for the Western Australia official forecast issues, and the inclusion of latest ECSP (European Centre for Medium-Range Weather Forecasting) hires forecasts were thought to be particularly useful in strengthening the longer range OCF forecasts. The two extra runs were named as 06Z and 18Z and became operational in NMOC in June and September in 2008 respectively. Additionally, the ECSP hires model was included in the OCF forecast in 2007 and the CMC (Canadian Meteorological Centre) model was included in 2008.

2. System descriptions

a. Observation data

The daily OCF stations are selected from the national AIFS (Australia Integrated Forecasting System) station dictionary. The selection depends on whether there are sufficient observations data to generate OCF forecasts for those locations. OCF forecasts can be generated once observations for 15 or more days in the previous 30-day period are available. The dictionary is updated every Tuesday. Currently around 780 stations across Australia are available in the daily OCF system.

The system obtains daily screen maximum temperatures, screen minimum temperatures, ground minimum temperatures, evaporation, rainfall and sunshine at 00UTC each day and contain values for the previous 24 hours. Ground minima, sunshine hours and evaporation observation have less dense distribution and are typically only available for agricultural research and some Bureau permanently staffed observing stations.

b. Model configuration

In the current setup in NMOC, there are 10 component models whose forecasts are used in DMO (Direct Model Output) form: LAPS375, LAPS125, LAPS050, MALAPS, GASP, ECSP, JMAGSM, UKGC, USAVM and CMC GEM (refer to Section 4 for a definition of these models). As the models are available at varying resolution and fields, their descriptions are shown in Table 1.

Table 1. Configurations of the component models for the daily OCF system

Model	Spatial resolution (deg)	Temporal resolution (hrs)	Maximum Forecast days	Fields contribution
LAPS375	0.75	3	3	air_temp, prcp, ttl_cld, ltnt_heat_flux, skn_temp_bl
LAPS125	0.25	3	2	air_temp, prcp, ttl_cld, ltnt_heat_flux, skn_temp_bl
LAPS050	0.05	1	1.5	air_temp, prcp, ttl_cld, ltnt_heat_flux, skn_temp_bl
MALAPS	0.10	1	2	air_temp, prcp, ttl_cld, ltnt_heat_flux, skn_temp_bl
GASP	1	3	8	air_temp, prcp
Lores ECSP	1.5	12	10	prcp, max_air_temp, min_air_temp
Hires ECSP	0.5	6	8	prcp, ttl_cld, max_air_temp, min_air_temp
JMAGSM	1.25	6	3	air_temp, prcp
UKGC	1.25	6	2	air_temp, prcp
USAVM	0.5	3	7.5	air_temp, prcp
CMCGEM	0.6	3	6	air_temp, prcp

Where,

air_temp: 2m air temperature;

ttl_cld: total cloud;

prcp: precipitation;

ltnt_heat_flux: latent heat flux;

skn_temp_bl: skin temperature of boundary layer

The ttl_cld, ltnt_heat_flux and skn_temp_bl fields are used to compute sunshine hours, evaporation and ground minimum temperatures respectively.

All DMO components are updated twice a day except for ECSP lores model which is updated only once daily at 12Z.

Because rainfall is discontinuous, it is not possible to undertake bias-correction and performance weighting based on the last 30 days. Hence, rainfall is a simple average of DMO rains and probability of rain is based on the percentage of the models predicting more than 0.2mm.

c. Upgrades to daily OCF in NMOC

In mid 2008, two extra runs of the daily OCF operational system were implemented: an 06Z run was added on 16 June 2008 and an 18Z run was added on 4 September 2008. MALAPS, hires ECSP and the CMC model were also included and GASP was extended from 6 to 8 days. The details of the 4 runs are summarised in Table 2.

Table 2. Description of the upgraded daily OCF system

OCF runs	Component models	Deadlines (UTC) to run
00Z	Current day 00Z LAPS375, LAPS125 and LAPS050 and previous day 12Z run for other models	03:10UTC (Daylight saving) / 04:10UTC (Non-daylight saving)
06Z	Previous day 12Z GASP and lores ECSP models and current day 00Z for the other models	06:50UTC
12Z	Previous day 12Z lores ECSP and current day 12Z LAPS375, LAPS125 and LAPS050 and current day 00Z run for other models	15:30UTC (Daylight saving) / 16:30UTC (Non-daylight saving)
18Z	Previous day 12Z lores ECSP and current day 00Z GASP and JMA models and current day 12Z for the other models	18:50UTC

The start times of the hourly OCF processing depend on the availability of the NWP data, but will be no later than the aforementioned deadlines. The composite process takes about 2 minutes to run. If one of the expected models is not available and the deadline is reached, the suite will start to run and the issued times will be approximately 03:12UTC (Daylight saving) / 04:12UTC (Non-daylight saving) for 00Z, 06:52UTC for 06Z, 15:32UTC (Daylight saving) / 16:32UTC (Non-daylight saving) for 12Z and 18:52UTC for 18Z.

In the previous composite scheme before the 2 extra runs were implemented in the operational system, if a desired model was not available when the composite started to run, this model would be dropped from the forecast completely. In the current composite scheme, if a desired model is not available when the composite starts to run, the previous run of that model will be used in the composite forecast. For example, the 06Z OCF should include with the latest 00Z USA model. If the 00Z USAVM is not available at the time of the OCF run, the previous 12Z forecast will be included in the composite scheme.

3. Output Products

The daily OCF products are freely available to the public for download by anonymous ftp at: <ftp://ftp2.bom.gov.au/anon/gen/fwo/>. A description of this product is available at <ftp://ftp2.bom.gov.au/anon/gen/fwo/IDY02126.decode.pdf>. Instructions on accessing data via ftp are available at: <http://www.bom.gov.au/other/Ftp.shtml>.

4. Definition of the models

LAPS

Limited Area Prediction System (Australian Bureau of Meteorology)

LAPS375, LAPS125 and LAPS050 have different spatial and temporal resolutions

MALAPS

Mesoscale Assimilation Limited Prediction System (Australian Bureau of Meteorology)

GASP

Global Assimilation and Prediction Model (Australian Bureau of Meteorology)

ECSP

European Centre Spectral Prognosis (European Centre for Medium-Range Weather Forecasting)

JMAGSM

Japan Meteorological Agency Global Spectral Model (Japan Meteorological Agency)

UKGC

United Kingdom Grid Code (United Kingdom Met Office)

USAVM

United States Aviation Model (National Centers for Environmental Prediction (NCEP), USA)

CMCGEM

Canadian Meteorological Centre Global Environmental Multiscale model (Canadian Meteorological Centre)

5. Future Developments

Enhancements to the current operational configuration are expected in the near future. They include:

- Quality check for incoming DMO data
- Replace the Australian models with the new ACCESS (Australian Community Climate Earth System Simulator) model, based on the UKMO Unified Model assimilation and prediction code.
- Incorporate JMA hires model into the system
- GOCF (Gridded OCF) ozone/UV forecasts
- Wave OCF

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Please send your comments to Xiaoxi Wu (x.wu@bom.gov.au)

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