PRECIS regional climate model output for the West African Monsoon Modelling and Evaluation project WAMME (Phase I)

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ACKNOWLEDGEMENTS:

Please include the following acknowledgement (or similar) in any papers that use this data:

"Data from the HadRM3P or PRECIS regional climate model were provided by the Hadley Centre, and funded by the Global Environment Facility (GEF) and the UK Department for Environment, Food and Rural Affairs."

OBJECTIVES:
This Readme file describes the WAMME outputs provided by the Hadley Centre regional climate model HadRM3P also known as PRECIS (Providing Regional Climates for Impact Studies). It documents the different simulations conducted, the output frequencies and the file naming convention.

1. SPATIAL COVERAGE:
Data cover the area between 35.2W-34.76E longitude and 19.8S-35.20N latitude of grid box edges, which corresponds to the model interior domain i.e. the model domain without an 8-point rim.

2. TEMPORAL COVERAGE:
Model outputs are provided at three different timescales: hourly, daily and monthly.

3. FORMAT:
Data are provided in netcdf CF1.0 format, which we believe would be easier to handle by users than the model native binary format.

4. EXPERIMENTAL DESIGN
13 PRECIS simulations were completed during the phase I of WAMME, but only 8 out of 13 are sent. These simulations can be divided in two different sets depending on the lateral boundary conditions (LBCs) used to drive the regional climate model (RCM).

4.1. Simulations driven by NCEP/R2 reanalysis
The first set of simulation used the 6-hourly quasi-observed data from NCEP/R2 reanalysis as initial and boundary conditions (LBCs) to drive PRECIS. The RCM is integrated from **01 April through 31 October in 2000, 2003, 2004, 2005, and 2006**. The outputs for April represent the model spinup and are discarded from the analysis. The oceanic surface boundary conditions are prescribed from the monthly timescale HadiSST dataset and fulfil the Karl Taylor adjustment procedure. This ensures that monthly averaged values of the SST remain the same after the interpolation to daily values. They were also forced by time-varying concentrations of well-mixed greenhouse gases including CO2, CH4, N2O, CFCs, HCFCs, tropospheric ozone and stratospheric ozone. The RCM interior domain covers the area between 35.2W-34.76E and 19.8S-35N with a horizontal resolution of 0.44 degree or 50km. In practice, the effective domain has 176x142 grid points, including the rim, and covers the region [38.84W; 38.24E; 23.48S; 38.83N].

Balanced soil moisture initial conditions
Due to the uncertainties of soil moisture in the reanalysis and the possible importance of ensuring its initial state in balance with the model's climatology caused by its long spinup time, we did not use directly the initial soil moisture conditions from the reanalysis. Instead, the initial soil moisture conditions were derived from an 8-year continuous simulation of PRECIS driven by the NCEPR2 reanalysis. The simulation was integrated from 01 December 1997 through 31 December 2005. We have then **extracted the soil moisture conditions for April 01 2000, 2003, 2004,2005, and**

2006 and transplanted them into the corresponding initial conditions used to conduct the WAMME 7-month long simulations.

Run identifier: hadr3p-ncepR2
Where "hadr3p" and "ncepR2" are respectively the Hadley Centre Regional climate model and 6-hourly LBCs used by the RCM.

4.2. Simulations driven by HadAM3 (afoif)

The second set of simulations uses initial and 6-hourly lateral boundary conditions from the first ensemble member of HadAM3 extended C20C simulations, namely "**afoif".** For these simulations, the domain, simulation length (7 months), and oceanic surface boundary conditions are identical to those used in PRECIS simulations driven by NCEPR2. However, here the initial soil moisture conditions are taken directly from HadAM3. There is not a long continuous run of PRECIS driven by HadAM3.

Run identifier: hadr3p-c20c

The names "hadr3p" and "c20c" are respectively the Hadley Centre Regional climate model and the 6-hourly lateral boundary conditions used by the RCM.

4.3 FILE NAMING CONVENTION:

{RUNID}. {Variable}.{Timescale}. {MON} {YR}.nc

Where

{RUNID} is the run identifier;

{Variable} is the name of the meteorological variable as specified in the WAMME output list (http://wamme.geog.ucla.edu/output.html).

{Timescale} is the timescale of the averaged variables, i.e. Monthly, daily or hourly.

{MON} are the first three letters for a given month, ie. jan, feb, mar, apr, may, jun .. etc.

{YR} represents the year of the simulation.

Examples:
- The file "hadam3-ncepR2.pr.daily.may2005.nc" contains PRECIS (driven by NCEPR2 reanalysis) daily mean precipitation for May 2005;

- The file "hadam3-ncepR2.pr.monthly.may2005.nc" contains PRECIS monthly mean precipitation for May 2005;

- The file "hadam3-ncepR2.pr.hourly.may2005.nc" contains PRECIS hourly mean large scale precipitation for May 2005;

5. OUTPUT LIST

5.1. Monthly mean 3D variables (over the interior domain)

List of pressure level **(20)**: To the 12 requested levels; we have added 8 standard PRECIS pressure levels in order to facilitate the comparisons with other PRECIS results over West Africa. The pressure levels used for the WAMME simulations are as follow: 1000, 950, 925, 900, 850, 800, 700, 600, 500, 400, 300, 250, 200, 150,100, 70, 50,30,20,10.

1) Temperature	(K)	ta
2) Zonal wind	(m/s)	ua
3) Meridional wind	(m/s)	va
4) Specific humidity	(g/kg)	hus
5) Relative humidity	(%)	hur
6) Geopotential height	(gpm)	zg
7) Vertical wind	**(m/s)**	**Wa**

Missing fields (2): Total cloud fraction (cl) and total diabatic heating. We only provide the cloud fraction as a 2D field (i.e. variable clt).

5.2. Monthly and daily mean 2D variables (over the interior domain)

1) Sea level pressure	(hPa)	psl
2) Precipitation	(mm/day)	pr
3) Large scale precipitation	(mm/day)	lspre
4) Convective precipitation	(mm/day)	conpre
5) Surface air temperature (2m)	(K)	tas
6) Surface air specific humidity (2m)	(g/kg)	huss
7) Zonal surface wind speed (10m)	(m/s)	uas
8) Meridional surface wind speed (10m)	(m/s)	vas
9) Surface latent heat flux	(W/m^2)	hfls
10) Vegetation interception loss	(W/m^2)	evap
11) Transpiration	(W/m^2)	etv
12) Soil evaporation	(W/m^2)	esoil
13) Surface sensible heat flux	(W/m^2)	hfss
14) Surface ground heat flux	(W/m^2)	hfgs
15) Surface downwelling LW radiation	(W/m^2)	hfgs
16) Surface upwelling LW radiation	(W/m^2)	rlus
17) Surface downwelling SW radiation	(W/m^2)	rsds
18) Surface upwelling SW radiation	(W/m^2)	rsus
19) SW upwelling radiative flux at TOA	(W/m^2)	rsut
20) LW upwelling radiative flux at TOA	(W/m^2)	rlut
21) Available soil water content	(m)	tsw
22) Surface runoff rate	(kg/m2/s)	mrros
23) Total cloud cover fraction		clt
24) Geopotential height at 500mb	(gpm)	z500

25) Geopotential height at 850mb	(gpm)	z850
26) Boundary layer height	(m)	zmla
27) Surface pressure	(Pa)	ps
28) Specif humidity at all model levels (replace ipw)	(g/kg)	ipw
29) Subsurface runoff	(kg/m2/s)	8235
30) Surface temperature	(K)	ts
31) Geopotential height at 700mb	(gpm)	z700
32) Geopotential height at 925mb	(gpm)	z925
33) Zonal wind at 850mb and 700mb	(m/s)	ua
34) Meridional wind at 850mb and 700mb	(m/s)	va
35) Temperature at 850mb and 700mb	(K)	ta
36) Specific humidity at 850mb and 700mb	(g/kg)	hus
37) Relative humidity at 850mb and 700mb	(%)	hur

Missing fields (8): SW downwelling radiative flux at TAO (rsdt), total precipitable water (iwp), soil wetness at first soil layer and rooting zone (ssw, srw), integrated convective heating (q1), convective available potential energy (cape), convective inhibition (cin) and aerosol optical depth (aod).

Note: In replacement to ssw and srw, we have provided the soil moisture content for each soil layer (variable 8223). In replacement to total precipitable water, we have provided the specifi humidity at all the model levels. The variables defined as mrros, clt, z500 and z850 are respectively runoff (roff), total cloud cover fraction (cl), geopotential height at 500 and 850 hPa as defined by the netcdf IPCC standard convention. In addition, we have added the following useful model outputs for the West African monsoon system:
zmla - boundary layer depth (m);
zg – Geopotential for all pressure level (gpm);
1210 – Clear-sky down surface SW flux(W/m²);
8235 – Subsurface runoff (kg/m2/s);
tmax – Maximum of daily surface temperature (K);
tmin – Minimum of daily surface temperature (K).

5.3. Hourly mean variables (over the interior domain)

1) Precipitation	(mm/day)	pr
2) Surface air temperature (2m, or T at canopy air space)	(K)	tas
3) Latent heat flux	(W/m^2)	hfls
4) Sensible heat flux	(W/m^2)	hfss
5) Boundary layer height	(m)	zmla

Missing fields (2): aerosol optical depth (aerosdiur) and cloud top height (cthdiur).

Note: At hourly timescale, we have also provided most of the 2D fields' available at daily and monthly timescales.

5.4. 6-Hourly mean variables

We do not provide data at this timescale

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