WGNE Surface Flux Intercomparison Protocol (Phase 1)

15 February, 2019

Motivation: Biases in surface fluxes were identified as an important and widespread issue in weather and climate models during the WGNE Workshop on Systematic Errors 2017 in Montreal in June 2017 and the PAN-WRCP and WGNE32 meeting in Exeter in October 2017. Recommendations from WGNE WSE-2017 included setting up a group to look at surface flux errors, and considering a cross weather-climate group looking at initial tendency analysis of common biases in surface fluxes. As such, WGNE is initiating a surface flux inter-comparison project. We welcome input from all operational and/or research centers from global forecast models. Climate model output is also welcome if the climate forecasts can be run from analyses for the period of interest.

Deadline for Phase 1 input has been extended to July 1st 2019. Please direct questions to François Bouyssel (Francois.Bouyssel@meteo.fr) and/or Carolyn Reynolds (carolyn.reynolds@nrlmry.navy.mil or jddcar2@gmail.com).

1. Grid

All fields must be provided on a regular latitude – longitude grid at a grid spacing of 0.25° x 0.25°. CF compliant NetCDF format (http://cfconventions.org/) is recommended, but GRIB format is also accepted. In this first phase we will consider global models. A second phase may include regional models.

2. Initial time and forecast ranges

The aim is to compare surface fluxes in operational forecasts. Operational forecasts must start at 00 UTC.

The forecasts should be provided for July 2018 and January 2019 with the current operational model version. It is also possible to provide additional data from an experimental suite.

For accumulated values (where the accumulation starts at the 0-h forecast) and for instantaneous values (which are valid at the given forecast range) the following forecast ranges have to be provided:

+6h, +12h, +18h, +24h and every 6 hours to +120h

Each forecast range has to be in a separate file.

3. List of constant fields (to be provided only for the 0-h forecast range)

Name	Variable	Unit
ORO	Model orography (geometric height above mean seal level)	m
LSM	Land sea mask (1: land, 0: water/sea ice)	Fraction

4. List of instantaneous variables

Name	Variable	Unit
SEAICE	Sea ice concentration (1: sea ice, 0: open water)	Fraction
T_Skin	Sea surface temperature or land surface temperature	K
W_SNOW	Water equivalent of accumulated snow depth	kg/m^2
U_10M	Zonal wind component at 10 m above surface	m/s
V_10M	Meridional wind component at 10 m above surface	m/s
T_2M	Temperature at 2 m above surface	K
Q_2M	Specific humidity at 2 m above surface	kg/kg
TD_2M	Dew point temperature at 2m above surface	K

5. List of accumulated variables (since start of the forecast)

Name	Variable	Unit
LS_PREC	Cumulative large-scale precipitation (total) flux at surface	kg/m^2
CO_PREC	Cumulative convective precipitation (total) flux at surface	kg/m^2
LS_SNOW	Cumulative large-scale snowfall (solid) flux at surface if available	kg/m^2
CO_SNOW	Cumulative convective snowfall (solid) flux at surface if available	kg/m^2
EVAP	Cumulative total evaporation flux at surface	kg/m^2
SO_DOWN	Cumulative downward short-wave radiation flux at surface	$W\ m^{-2}\ s$
SO_NET	Cumulative net short-wave radiation flux at surface	$W\ m^{-2}\ s$
SO_NET_CS	Cumulative net short-wave clear sky radiation flux at surface if available	$W\ m^{-2}\ s$
TH_DOWN	Cumulative downward long-wave radiation flux at the surface	$W\ m^{-2}\ s$
TH_NET	Cumulative net long-wave radiation flux at the surface	$W\ m^{-2}\ s$
TH_NET_CS	Cumulative net long-wave clear sky radiation flux at the surface if available	$W\ m^{-2}\ s$

SH	Cumulative surface sensible heat flux	W m^{-2} s
LH	Cumulative surface latent heat flux	W m^{-2} s
U_MOM_FL	Zonal cumulative momentum flux (sum of all parameterized fluxes)	kg/m/s
V_MOM_FL	Meridional cumulative momentum flux (sum of all parameterized fluxes)	kg/m/s

ATTENTION
Sign convention for the fluxes of radiation or other quantities: **Positive** if **downward!**
Net fluxes are the sum of upward and downward fluxes.

6. File names

The following naming convention for the files containing the data is proposed:

CENT_YYYYMMDDGG_xx

where CENT is the center identifier, e.g. ECMWF,

YYYYMMDDGG is the initial time of the forecast (YYYY: year, MM: month, DD: day, GG: time, i.e. 00 (UTC))

xx: forecast range in hours.

7. Meta-data

Additional information are required to interpret the data, such as the main characteristics of the NWP system: spatial resolutions (with lowest model level), physical parameterizations with more details on the parameterization of surface fluxes over open water, etc.

It is also important to describe the algorithm used to interpolate data from the model native grid to the regular lat-lon grid at 0.25° x 0.25°.

A document describing this meta-data should be uploaded along with the model forecast data as described below in Section 8.

8. Collection of data

The data will be collected and archived at Météo-France. Each participant willing to provide data will be given a personal login/passwd to connect and upload its data in a specific directory. Please contact François Bouyssel (Francois.Bouyssel@meteo.fr) to establish your personal login/password and directory.