1 Introduction

This document provides a brief overview of the filenaming convention for the RECA environmental input variables. These include:

1. Climate variables statistics
   (a) derived from monthly AWAP climate data
   (b) derived from daily AWAP climate data
2. substrate and geographical variable

The coordinate reference for all spatial files is GDA94 lat long.

2 Climate variable names, descriptions, statistics and filenaming conventions

2.1 Monthly AWAP variables

Table 1: Variable descriptions for montly AWAP variables

Variable	Description	Units
SolarMJ	incident solar radiation	MJ $m^{-2}d^{-1}$
TempMax	Daily maximum temperature	$^{\circ}C$
TempMin	Daily minimum temperature	$^{\circ}C$
Precip	Precipitation	m d^{-1}
WRel1	Relative Soil Moisture (Upper Layer)	Fraction (0-1)
WRel1End	Relative Soil Moisture (Upper Layer) at end of aggregation period	Fraction (0-1)
WRel2	Relative Soil Moisture (Lower Layer)	Fraction (0-1)
WRel2End	Relative Soil Moisture (Lower Layer) at end of aggregation period	Fraction (0-1)
FWE	Total Evaporation (Soil + Vegetation)	m d^{-1}
FWTra	Total Transpiration	m d^{-1}
FWsoil	Soil Evaporation	m d^{-1}
FWPT	Potential Evaporation	m d^{-1}
FWDis	Local Discharge (Runoff + Deep Drainage)	m d^{-1}
FWRun	Surface Runoff	m d^{-1}
FWWater	Open Water Evaporation ('pan' equivalent)	m d^{-1}
FWLch2	Deep Drainage	m d^{-1}
PhiH	Daily Sensible Heat Flux	W m^{-2}
PhiE	Daily Latent Heat Flux	W m^{-2}
TempRange	Temperature range (ie TempMax - TempMin)	$^{\circ}C$

2.1.1 Summary statistics for specific time period statistics

The summary statistics for specific time period statistics provide statistics as maximums, minimums and means of the summary statistics for the period. For example, the mean maximum temperature within the period or the maximum of the total yearly rainfall within the period The filename convention is <variable>_<statisticforperiod>_<statisticforyear>_<startyear>_<endyear>.<ext>, with extension denoting the ESRI float format file extension (ie flt - raster float file and hdr - raster header file) , with the

- <statistic for period> including max, min, mean, denoting the summary statistisc over the period for the yearly summary statistics
- <statistics for year> denoting the yearly summary statistics max, mean, min, total, and range,
- <startyear>_<endyear> providing the time period indicated by periodstart and periodendt year, and

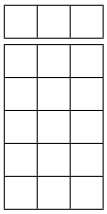
- <ext> are file extension associated with ESRI hdr float files (ie. ".flt",".hdr").

For example, "FWDis_min_max_1933_1947.flt" contains the minimum value over the period for the yearly FWDis maximum (ie. Local Discharge (Runoff + Deep Drainage maximum) for in the (15year) time period from 1933 to 1947 at each gridpoint in ESRI float format.

Table 2: The summary statistics for specific time periods statistics

Period statistic	Yearly statistic	Details	File name example	Additional information
Min	Min	For each yearly minimum value calculate the minimum for the period: $min(min_{y=1_{m=1}}^{y=p_{m=1}^{m=12}})$	FWDis_min_min_2003_2017.flt	
	Max	For each yearly maximum value calculate the minimum for the period: $min(max_{y=1_{m=1}}^{y=p_{m=1}^{m=12}})$	FWDis_min_max_2003_2017.flt	It is questionable if the minimum of the maxium values makes ecological sense and these variables may not be useful in building a GDM
	Mean	For each yearly mean value calculate the minimum for the period: $min(mean_{y=1_{m=1}}^{y=p_{m=1}^{m=12}})$	FWDis_min_mea_2003_2017.flt	
	Range	For each yearly range value calculate the minimum for the period: $min(range_{y=1_{m=1}}^{y=p_{m=1}^{m=12}})$	FWDis_min_range_2003_2017.flt	
	Totals	For each yearly total value calculate the minimum for the period: $min(sum_{y=1_{m=1}}^{y=p_{m=1}^{m=12}})$	FWDis_min_total_2003_2017.flt	Only for some variables the totals provide a sensible measure as for example for precipitation. Total temperature values for the period would be less useful or sensible
Max	Min	For each yearly minimum value calculate the maximum for the period: $max(min_{y=1_{m=1}}^{y=p_{m=1}^{m=12}})$	FWDis_max_min_2003_2017.flt	It is questionable if the maximum of the minimum values makes ecological sense and these variables may not be useful in building a GDM
	Max	For each yearly maximum value calculate the maximum for the period: $max(max_{y=1_{m=1}}^{y=p_{m=1}^{m=12}})$	FWDis_max_max_2003_2017.flt	
	Mean	For each yearly mean value calculate the maximum for the period: $max(mean_{y=1_{m=1}}^{y=p_{m=1}^{m=12}})$	FWDis_max_mean_2003_2017.flt	
	Range	For each yearly range value calculate the maximum for the period: $max(range_{y=1_{m=1}}^{y=p_{m=1}^{m=12}})$	FWDis_max_range_2003_2017.flt	
	Totals	For each yearly total value calculate the maximum for the period: $max(sum_{y=1_{m=1}}^{y=p_{m=1}^{m=12}})$	FWDis_max_total_2003_2017.flt	Only for some variables the totals provide a sensible measure as for example for precipitation. Total temperature values for the period would be less useful or sensible
Mean	Min	For each yearly minimum value calculate the mean for the period: $mean(min_{y=1_{m=1}}^{y=p_{m=1}^{m=12}})$	FWDis_mean_min_2003_2017.flt	
	Max	For each yearly maximum value calculate the mean for the period: $mean(max_{y=1_{m=1}}^{y=p_{m=1}^{m=12}})$	FWDis_mean_max_2003_2017.flt	
	Mean	For each yearly mean value calculate the mean for the period: $mean(mean_{y=1_{m=1}}^{y=p_{m=1}^{m=12}})$	FWDis_mean_mean_2003_2017.flt	
	Range	For each yearly range value calculate the mean for the period: $mean(range_{y=1_{m=1}}^{y=p_{m=1}^{m=12}})$	FWDis_mean_range_2003_2017.flt	
	Totals	For each yearly total value calculate the mean for the period: $mean(sum_{y=1_{m=1}}^{y=p_{m=1}^{m=12}})$	FWDis_mean_total_2003_2017.flt	Only for some variables the totals provide a sensible measure as for example for precipitation. Total temperature values for the period would be less useful or sensible

Table 3: Daily AWAP variables summary statistics



2.2 Daily AWAP variables

3 Environmental variables

Landform and soil variables are 9sec aggreates of the 3 sec grid files of landform and soil environmental variables. Their zip file locations are in file://osm-23-cdc.it.csiro.au/OSM_CBR_LW_DEE_work/products/DAP/9sSubstrate under the folder "DATA" and documentation including metdata is in the folder "DOCS". The national soil attribute maps (subfolder "Soil") are an aggregate product of the 3 sec Soil and Landscape Grid of Australia data attributes (see http://www.clw.csiro.au/aclep/soilandlandscapegrid/index.html using cumulative distribution functions to calculate the (weighted) final values from the aggregated gridcell as percentiles. The origin of the a set of landform grids is the 1 sec SRTM data, which formed to input to various geographic analyses and resulted in several landform attributes.

GDM modelling further identified a set of 19 of these 9 sec grids to take forward in future GDM analyses. Details about the substrate variables are located in the associated links. These variables are

1. Landform (seven variables):
    - CONAREA - contributing area https://doi.org/10.4225/08/57511C42603DF,
    - ELVR1000 - elevation focal range within 1000m moving window https://doi.org/10.4225/08/56E9C8DDD664D,
    - PLANCURVE - plan curvaturehttps://doi.org/10.4225/08/56DE806D91E44,
    - PROFCURV - profile curvature https://doi.org/10.4225/08/56E9DEBF65706,
    - SLOPEDEG - slope https://doi.org/10.4225/08/57511C42603DF ,
    - SLOPEFM300 - Median of Percent Slope over 300 m https://doi.org/10.4225/08/57511C42603DF,
    - TWI3s - topographic wetness index https://doi.org/10.4225/08/57511C42603DF, and,
2. Soil (12 variables):
    - AWC – Available Water Capacity http://doi.org/10.4225/08/546ED604ADD8A,
    - BDW – Bulk Density (Whole Earth) http://doi.org/10.4225/08/546EE212B0048,
    - CLY – Clay http://doi.org/10.4225/08/546EEE35164BF,
    - DER – Depth of Regolith http://doi.org/10.4225/08/55C9472F05295,
    - DES – Depth of Soil http://doi.org/10.4225/08/546F540FE10AA
    - ECE – Effective Cation Exchange Capacity http://doi.org/10.4225/08/546F091C11777,
    - NTO – Total Nitrogen http://doi.org/10.4225/08/546F564AE11F98,
    - PHC – pH CaCl2 http://doi.org/10.4225/08/546F17EC6AB6E,
    - PTO – Total Phosphorus http://doi.org/10.4225/08/546F617719CAF,
    - SLT – Silt http://doi.org/10.4225/08/546F48D6A6D48,
    - SND – Sand http://doi.org/10.4225/08/546F29646877E,
    - SOC – Organic Carbon http://doi.org/10.4225/08/547523BB0801A.

Table 4: Gdal_warp aggregation statistics used for the 0.05 degree substrate variable grids

Resampling statistic	Details
average	average resampling, computes the average of all non-NODATA contributing pixels.
mode	mode resampling, selects the value which appears most often of all the sampled points
max	maximum resampling, selects the maximum value from all non-NODATA contributing pixels
min	minimum resampling, selects the minimum value from all non-NODATA contributing pixels
med	median resampling, selects the median value of all non-NODATA contributing pixels
q1	first quartile resampling, selects the first quartile value of all non-NODATA contributing pixels
q3	third quartile resampling, selects the third quartile value of all non-NODATA contributing pixels

The directory file://ces-10-cdc/OSM_CDC_GISDATA_work/_DEV/her134/SUBS contains the input files (directory "IN"), output location for processed files (directory "out"), R program codes (directory "Rcodes") , an input mask to align these grids with the climate data (directory "mask"). This document is in the subdirectory "documentation". The filenames in the output loaction follow the pattern <variablecode>_<aggregation statistic>.<extension> with variable code as per the previous section, aggregation statistic based on gdal aggregation options and extension being related to the ESRI hdr grid format (flt, hdr, prj). For example the files AWC_average.flt in file://ces-10-cdc/OSM_CDC_GISDATA_work/_DEV/her134/SUBS/out provides the average of 20 neighboring grid cells from the Available Water Capacity 9sec grid aggregated to 0.05 degrees (3 min). The "images" sub-directory contains plots of various aggregate statistics for each variable.

The aggregation procedure is based on the gdal_warp provided resampling methods (see Table 4) using the ESRI.hdr labelled output format (http://www.gdal.org/formats_list.html) and aligning with the (0.05 degree) climate grid resolution and location.

References

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