GeoData.txt

This file contains characteristics of the spatially delineated subbasins in a HYPE model domain. This includes e.g. SUBIDs (subbasin IDs) and SUBIDs of downstream subbasins, fractions of SLC classes (hydrological response units) within each subbasin, different model region (sub-domain) identifiers. As a general rule, information included in *GeoData.txt* is time-invariant within HYPE.

GeoData.txt is a tab-separated file located in the modeldir folder. Subbasins are listed row-wise. The first row contains a column header with variable names. Variable names are not case-sensitive (max. 11 characters, no spaces). Columns with headings unknown to HYPE are skipped while reading the file, but must not longer than eleven characters. Columns containing character strings, e.g. descriptive meta-data, must not exceed a length of 100 characters. The columns may be in any order. A value must exist for every column and row, i.e. empty cells are not allowed.

Subbasins have to be ordered in down-stream sequence in *GeoData.txt*, starting at headwaters and ending at outlet basins. This is because HYPE requires upstream contributions when computing fluxes at each subbasin and subbasin the computation sequence follows *GeoData.txt* rows. Note that bifurcations as given in input file BranchData.txt will create additional upstream areas and the row order in *GeoData.txt* must also take those contributions into account.

Example for a *GeoData.txt* file structure:

```
subid maindown area parreg lakedataid rivlen slc_1 slc_2 slc_3 slc_4 scr_1
...
1     3        5000 1      1          0      0.54  0.23  0.1   0.13  0.1
...
2     3        3000 1      0          0      0.45  0.5   0.05  0
...
3     0        6000 2      2          500    0.45  0     0.25  0.3   0.2
...
...   ...      ...  ...    ...        ...    ...   ...   ...   ...   ...
...
```

All *GeoData.txt* variables are described in the table below. Point source can no longer be given in this file, use input file PointSourceData.txt instead.

Variable ID	Unit	Requirement	Description
area	m^2	mandatory	subbasin area
subid	-	mandatory	id number for subbasins, matched against Qobs.txt and Xobs.txt column headings, integer < 10^7
maindown	-	mandatory	subid of downstream sub-basin, i.e. the one to which the subbasin flows (integer, use 0 for subbasins that don't run to another subbasin, e.g. coastal areas)
latitude	°	optional	latitude in degrees N (-90,90), used for calculation of extraterrestrial radiation in Hargreaves-Samani evapotranspiration model
region	-	optional/mandatory	production region for crops in CropData.txt. All sub-basins must have a non-zero region defined if CropData.txt is used.

Variable ID	Unit	Requirement	Description
parreg	-	optional	region for correction parameters (e.g. evapcorr), integer > 0, default is 1
wqparreg	-	optional	region for water quality correction parameters (e.g. incorr), integer > 0, default is 1
lakeregion	-	optional	lake region for watercourse parameter, integer > 0, default is 1
ilregion	-	optional	lake region for ilake parameters, integer > 0, default is 1
olregion	-	optional	lake region for olake parameters, integer > 0, default is 1
elev_mean	*m*	optional	mean elevation of subbasin
elev_std	*m*	optional	variation (standard deviation) in elevation in a subbasin
slope_mean	*%*	optional/mandatory	slope (>= 0%), mandatory for nutrient modelling
slope_std	*%*	optional	variation (standard deviation) of slope in a subbasin
lake_depth	*m*	optional	water depth from outflow threshold, below which outlet flow ceases, down to mean depth for outlet lake, used for general lake discharge curve. Can also be defined in LakeData.txt or par.txt. Definition in LakeData takes precedence. Must be > 0, or set to -9999 to use general or region parameter value from par.txt.
lakedataid	-	optional	lake or lake basin ID, coupled to *lakedataid* in LakeData.txt, 0 if no such coupling exists
icatch	-	optional	fraction of local runoff that goes through the local lake (ilake), the rests runs directly into the main watercourse. To instead use parameter values (gicatch, ilicatch in par.txt) for a single simulation set value to -9999 in GeoData or remove the column completely.
rivlen	*m*	mandatory	length of main watercourse within subbasin
loc_rivlen	*m*	optional	length of local watercourse within subbasin, default is square root of land area
slc_nn	-	mandatory	soil-type/land-use class number *nn* (soil-landuse-combination class, hydrological response units in HYPE), fraction of the subbasin's area belonging to this class (between 0 and 1). A maximum of 999 SLCs can be defined *nn* matches the first column in GeoClass.txt. Smallest slc fraction allowed is 10^{-7}, i.e. 7 decimals.
scr_nn	-	optional	fraction of SLC class nn's area that is sown with secondary crop (between 0 and 1)
dhslc_nn	*m*	optional	deviation for each class from mean elevation of subbasin (defaults to 0)
grwdown	-	optional	subid for the subbasin to which this subbasin's lateral/regional groundwater flow runs (use 0 for subbasins whose groundwater flow disappears). If column is missing or all zeros it is assumed that the groundwater flows via maindown.

Variable ID	Unit	Requirement	Description
grwolake	-	optional	fraction of groundwater flow from this subbasin that flows to this subbasins olake instead of to subbasin given in grwdown
loc_tp	*mg/l*	optional	concentration of Tot-P from rural households outflow
loc_tn	*mg/l*	optional	concentration of Tot-N from rural households outflow
loc_ts	*mg/l*	optional	concentration of total suspended material from rural households outflow
loc_vol	m^3/d	optional	outflow from rural households
loc_sp	-	optional	fraction of rural household P outlet that is in soluble form
loc_in	-	optional	fraction of rural household N outlet that is inorganic
loc_ss	-	optional	fraction of rural total suspended material outlet that is is suspended material
loc_t1	*µU/L*	optional	concentration of tracer T1 from rural households outflow
loc_t2	*°C*	optional	temperature of rural households outflow (used for T2 simulation)
wetdep_n	*µg/l*	optional	wet deposition of inorganic nitrogen, concentration of precipitation
drydep_n1	$kg/(km^2 d)$	optional	dry deposition of inorganic nitrogen on vegetation type 1 (open)
drydep_n2	$kg/(km^2 d)$	optional	dry deposition of inorganic nitrogen on vegetation type 2 (forest)
drydep_n3	$kg/(km^2 d)$	optional	dry deposition of inorganic nitrogen on “vegetation” type 3 (water)
deploadn1 - deploadn12	$kg/(km^2 d)$	optional	total deposition of inorganic nitrogen on water, January - December
lrwet_area	m^2	optional	area of local river wetland
mrwet_area	m^2	optional	area of main river wetland
lrwet_dep	*m*	optional	mean depth of local river wetland
mrwet_dep	*m*	optional	mean depth of main river wetland
lrwet_part	-	optional	part of local river flow through river wetland
mrwet_part	-	optional	part of main river flow through river wetland
iwetcatch	-	optional	fraction of subbasin area that are catchment area of the internal wetland (iwet)
buffer	-	optional	fraction of watercourse through agricultural land that has a buffer zone (between 0 and 1), mandatory for phosphorus simulation
close_w	-	optional	fraction of agricultural land that lies near watercourse and which leakage therefore is affected by the buffer zone (between 0 and 1), mandatory for phosphorus simulation

Variable ID	Unit	Requirement	Description
petmodel	-	optional	defines with alternative potential evapotranspiration model should be used for each subbasin. Default is temperature dependence or use of observations (0), alternatives are temperature dependent (1), modified Jensen-Haise/McGuinness (2), modified Hargreaves-Samani (3), Priestly-Taylor (4), and FAO Penman-Monteith reference crop evapotranspiration (5). Note: will override petmodel given in info.txt
eroindex	-	optional	erosion index given per subbasin, used for erosion model 1 (defaults to 1)
ws_nn_d		optional	Winstral coefficient for each class number *nn* and direction *d*
mrratck_noi	-	optional	coefficient in rating curve (*k*) for main river water level during no ice conditions ($q=k*(w-w0)^p$)
mrratcp_noi	-	optional	coefficient in rating curve (*p*) for main river water level during no ice conditions ($q=k*(w-w0)^p$)
mrratck_ice	-	optional	coefficient in rating curve (*k*) for main river water level during ice conditions ($q=k*(w-w0)^p$)
mrratcp_ice	-	optional	coefficient in rating curve (*p*) for main river water level during ice conditions ($q=k*(w-w0)^p$)
mrratcw0	*m*	optional	reference water level at zero water level of main river