

HYPE file reference

This part of the HYPE documentation is a reference guide to all mandatory and optional HYPE files. HYPE works with plain text files for model setup, data input/output, and calibration.

The tables in the following sections contain file names and short descriptions of mandatory and optional input and output files for HYPE, grouped by content type. More detailed descriptions on file content, format and requirements are found in the section of each file.

Input files marked *mandatory* in the tables below must exist for a basic HYPE setup. Other files are required only for optional model components, e.g. glaciers, or for specific model tasks, e.g. parameter calibration.

As a shortcut, here are three links to frequently used references when running an existing HYPE setup:

- [info.txt](#), which is the main instruction file of HYPE where all options are specified for a model simulation
- [par.txt](#), which holds the values of model parameters
- [HYPE variables](#), a list of variable names used for HYPE inputs and outputs

Setup files

Setup files contain information about a HYPE model domain, model parameters, model options (model choice and simulation settings).

File name	Requirement	Description
filedir.txt	optional	provides location of info.txt
info.txt	mandatory	model options and simulation settings
AssimInfo.txt	optional/mandatory	settings for data assimilation simulation
pmsf.txt	optional	partial model setup, defines part of model domain to simulate
update.txt	optional	for updating of model variables with observations
GeoClass.txt	mandatory	SLC class definition (HRUs)
ClassData.txt	optional	SLC class definition (HRUs), replaces GeoClass.txt for traveltime soil model
GeoData.txt	mandatory	subcatchment characteristics and flow connections between them
BranchData.txt	optional	bifurcations in the flow network
LakeData.txt	optional	properties of specific lakes (including regulated dams)
DamData.txt	optional	properties of specific regulated lakes, extends LakeData.txt
CropData.txt	optional	information about crops and vegetation

File name	Requirement	Description
PointSourceData.txt	optional	information about point sources and water abstraction
PSTIMESeries.txt	optional	daily, monthly or yearly time-series of point sources and water abstractions
MgmtData.txt	optional	information about irrigation and water transfer
AquiferData.txt	optional	information about regional aquifers
FloodData.txt	optional	information about floodplain
GlacierData.txt	optional	information about glaciers
par.txt	mandatory	model parameters, some is calibrated
state_save	optional	files containing saved model states for model initialisation
reg_par.txt	optional	file containing regional regression coefficients, for parameter regionalization method
CatchDes.txt	optional	list of catchment descriptors, for parameter regionalization method
CatchGroup.txt	optional	list of catchment group membership of all subbasins, for parameter regionalization method
Outregions.txt	optional	information about output regions
ForcKey.txt	optional	link list between subcatchment IDs and forcing data IDs, as well as temperature observation elevations
LeakageData.txt	optional	soil leakage concentrations to replace subbasin runoff concentrations
LeakNN_SLCNNN.txt	optional	soil leakage concentrations from root zone
LoadNN_SLCNNN.txt	optional	soil leakage loads for travel time soil model
RiverRatingCurveData.txt	optional	rating curves for main river
AtmdepData.txt	optional	atmospheric deposition
nnnnnn_yyyymmdd[HHMM].bin	optional	files containing an ensemble of saved model states and variables for data assimilation
ensXstates_yyyymmdd[HHMM].bin	optional	files containing an ensemble of saved model states for data assimilation
ensFstates_yyyymmdd[HHMM].bin	optional	files containing an ensemble of saved forcing variables for data assimilation
ensAstates_yyyymmdd[HHMM].bin	optional	files containing an ensemble of saved auxiliary variables for data assimilation

Observation data files

Observation data files are HYPE input files which contain time series, both forcing data and evaluation data. Observation files are in the form of text files. Forcing data in the form of netcdf files, see [NNobs.nc](#).

All HYPE variable IDs are described in the [complete HYPE variable list](#), while HYPE variable IDs useable in Xobs.txt are also described in the [Xobs.txt](#) section.

Files for meteorological forcing data (found in `forcingdir`):

File name	Requirement	Description
Pobs.txt	mandatory	precipitation forcing (HYPER variable ID: prec)
Tobs.txt	mandatory	air temperature forcing (HYPER variable ID: temp)
RHobs.txt	optional	relative humidity forcing
SFobs.txt	optional	snowfall fraction of precipitation forcing
SWobs.txt	optional	shortwave radiation forcing
TMINobs.txt	optional	daily minimum air temperature forcing
TMAXobs.txt	optional	daily maximum air temperature forcing
Uobs.txt	optional	wind speed forcing
UWobs.txt	optional	u-component of wind forcing
VWobs.txt	optional	v-component of wind forcing
NNobs.nc	optional	forcing data of all kinds

Files for other observations for evaluation (found in `otherobsdir`, or if not set in `forcingdir`). Observations in the form of netcdf files are optional, but all observations files must have the same file format (set in `info.txt`).

File name	Requirement	Description
Qobs.txt	optional	discharge observations (HYPER variable ID: rout)
Xobs.txt	optional	observations of evaluation variables for subbasins, e.g. nutrient concentrations, lake water stage
Wobs.txt	optional	observations of lake water stage (alternative to <code>Xobs.txt</code> for HYPER variable ID: wstr)
Xoregobs.txt	optional	observations of evaluation variables for output regions, e.g. snow
Xcgobs_cgname.txt	optional	observations of evaluation variables for classgroup with name <code>cgname</code> for subbasins
XobsXOMn.txt	optional	observations of evaluation variables, one per file (HYPER variable ID: xom0-xom9)
XobsXOSn.txt	optional	observations of evaluation variables, one per file (HYPER variable ID: xos0-xos9)
Qobs.nc	optional	discharge observations (HYPER variable ID: rout)
NNNNobs.nc	optional	observations of evaluation variables for subbasins (HYPER variable ID: nnnn)
RGNNNobs.nc	optional	observations of evaluation variables for output regions (HYPER variable ID: nnnn)
NNNNobs_cgname.nc	optional	observations of evaluation variables for classgroup with name <code>cgname</code> for subbasins (HYPER variable ID: nnnn)

Output files

Output files contain model results. This includes time series of simulations and observations (for each time step or averaged/summed over a longer period) as well as model performance results.

All HYPER variable IDs used in HYPER output files are described in the [complete HYPER variable list](#).

File name	Requirement	Description
hyss_seqnr_yymmdd_HHMM.log	automatic	log file, created for each model run
tests_seqnr_yymmdd_HHMM.log	automatic	log file, created for model tests
XXXXXXX.txt	optional	basin output file, several output variables for one subbasin (subid=XXXXXXX)
XXXXXXX.txt (regional)	optional	region output file, several output variables for one output region (outregid=XXXXXXX)
timeXXXX.txt	optional	time output file, output of single variable (HYPE variable ID=XXXX) for all subbasins
mapXXXX.txt	optional	map output file, output of single variable (HYPE variable ID=XXXX) for all subbasins, formatted for GIS
XXXXXXX.txt or timeXXXX.txt (class)	optional	class output files, several output variables for a single subbasin or output of single variable for all subbasins, both file variants for a single class or class group
timeXXXX.nc	optional	time output file in netcdf format, output of single variable (HYPE variable ID=XXXX) for all subbasins
subassX.txt	optional	subbasin assessment, performance criteria for subbasins
simass.txt	optional	simulation assessment, summarising performance criteria over model domain
yyyy_ss.txt	optional	result files with annual nutrient transports per subbasin and source
Wbf_xxx.txt	optional	water balance: flows per subbasin and day
Wbff_xxx.txt	optional	water balance: floodplain related flows per subbasin and day
Wbfs_xxx.txt	optional	water balance: irrigation flows per subbasin and day
Wbs_xxx.txt	optional	water balance: storage per subbasin and day
state_saveyyyymmdd[HHMM]	optional	files containing saved model states for model initialisation
reset_state_save.txt	optional	file initial state values of solid nutrient soil states (eg. fastN,humusN).
nnnnnn_yyyyymmdd[HHMM].bin	optional	files containing an ensemble of saved model states and variables for data assimilation (one file per variable)
ensXstates_yyyyymmdd[HHMM].bin	optional	files containing an ensemble of saved model states for data assimilation
ensFstates_yyyyymmdd[HHMM].bin	optional	files containing an ensemble of saved forcing variables for data assimilation
ensAstates_yyyyymmdd[HHMM].bin	optional	files containing an ensemble of saved auxiliary variables for data assimilation

Calibration files

Calibration files are files related to the parameter calibration model option in HYPE, both for setup and results. Additional calibration information is given in [info.txt](#) where the objective function for the optimization (see [performance criteria](#)) is set and calibration turned on.

All HYPE variable IDs used in HYPE calibration files are described in the [complete HYPE variable list](#).

File name	Requirement	Description
optpar.txt	optional (mandatory for calibration)	calibration simulation settings including parameter ranges
qNstartpar.txt	optional	starting values for parameter optimization using quasiNewton methods (including Brent)
respar.txt	optional	optimal parameter values of calibration
bestsims.txt	optional	best performance criteria and parameter values of calibration
allsim.txt	optional	performance results (criteria and parameter values) of all runs during calibration
calibration.log	automatic	calibration log file

Data assimilation files

Data assimilation files are files related to setup and results. Additional data assimilation information is given in [info.txt](#).

All HYPE variable IDs used in HYPE assimilation files are described in the [complete HYPE variable list](#).

File name	Requirement	Description
AssimInfo.txt	optional (mandatory for data assimilation)	data assimilation simulation settings
nnnnnn_yyyymmdd[HHMM].bin	optional	files containing an ensemble of saved model states and variables for data assimilation (one file per variable)
ensXstates_yyyymmdd[HHMM].bin	optional	files containing an ensemble of saved model states for data assimilation
ensFstates_yyyymmdd[HHMM].bin	optional	files containing an ensemble of saved forcing variables for data assimilation
ensAstates_yyyymmdd[HHMM].bin	optional	files containing an ensemble of saved auxiliary variables for data assimilation

Water balance files

A set of output files giving subbasin water balance. The water balance is calculated for each time step and subbasin, and one file holds one flow or store.

File prefix	Type	Unit	Description
WBs	store	m^3	water volume in each store for each time step for all subbasins or for selected subbasins (irrigation, floodplains) or for aquifers
WBf	flow	$m^3 \text{ ts}^{-1}$	horizontal flows between subbasins and regional groundwater flows
WBf	flow	$m^3 \text{ ts}^{-1}$	vertical or horizontal flows within subbasin
WBfs/WBf	flow	$m^3 \text{ ts}^{-1}$	water management flows; irrigation (WBfs) for selected subbasins, water transfer flow (WBf) and point sources (WBf) for all subbasins

File prefix	Type	Unit	Description
WBff	flow	$m^3\,ts^{-1}$	floodplain related flows

A description of the water balance files can be downloaded ([HYPE water balance](#)).