9.6 Coupling WaSiM-ETH to an external model

A new model component allowing the online data exchange to an external groundwater model has been integrated into WaSiM-ETH. At the moment the functionality of the coupling module is limited to the data exchange with the groundwater model PCGEOFIM (**P**rogramsystem for **C**omputation of **GEOFI**l-tration and geo**M**igration; see http://www.ibgw-leipzig.de/) but it might be relatively simple to adapt this coupling module to other external models. The WaSiM-ETH coupling module can be run with or without activation of the internal groundwater module.

The online data exchange between WaSiM-ETH and the external model can be carried out at the end of each simulation time step or at predefind simulation intervals. The parametrization scheme of the coupling module is shown below (new section in the WaSiM-ETH control file):

```
[ExternalCoupling]
1
$exchngpath//wasim.inf
100
D
1440
1
$exchngpath//gwtable.grd GWTableExtern 1 0
#$exchngpath//bh.grd     gw_boundary_fix_h_1 0 0
2
$exchngpath//gwn.grd groundwater recharge
$exchngpath//balance.grd Balance SumTotal_MY
#$exchngpath//gwstand.grd groundwater_distance
2
$exchngpath//qdir.tab
$exchngpath//qifl.tab
$exchngpath//geofim.inf
geofim
```

The line-by-line entries denote:

```
Line
1       activate / deactivate the external coupling module; 0 = no coupling, 1 = coupling
2       path and name of semaphore (or synchronization) file provided by the external model
3       wait interval for scanning the exchange directory for the new semaphore file [ms]
4       Coupling mode: I = each interval, H = each hour, D = each Day, M = each month, Y = each year
5       time interval used by the external model [min]
6       number of grids provided by the external model; the file names must be available once the semaphore
        file was written. Each following row (1..n) will contain a symbolic name.
7       first parameter: path and file name, second parameter: internal grid name, third parameter: "fillMiss-
        ing" parameter (0 = no fill, 1 = fill with nearest neighbors value), fourth parameter: re-
        name(1)/delete(0) parameter
8       here labelled (#) as comment; in general additional files of the external model could be defined here
        for providing them WaSiM-ETH
9       number of grids provided by WaSiM-ETH before next synchronisation can be done
10      first parameter: path and name of the groundwater recharge grid, second parameter: internal grid name
11      first parameter: path and name of the balance grid (Due to the exchange of groundwater tables WaSiM-
        ETH has to adapt the internally calculated soil water content to the new condition. The cumulated
        amount of adaptation water is balanced by the balance grid.), second parameter: internal grid name,
        third parameter: writecode (D = daily sum grids, M = monthly sum grids, Y = annual sum grids; other
        options e.g. MY = both monthly and annual sum grids)
12      here labelled (#) as comment; in general additional files of WaSiM-ETH could be defined here
13      number of subbasin correlated statistics (mean values) which should be written as table (in ASCII-
        Format)
14      first parameter: path and name of the file with direct flow per subbasin/zone [mm/Δt]; second parame-
        ter: internal file name
15      first parameter: path and name of the file with interflow per subbasin/zone [mm/Δt]; second parameter:
        internal file name
16      path and name of semaphore file provided by WaSiM-ETH after all of the output above was written
17      content of the semaphore file written by WaSiM-ETH
```

The exchange data containing the routed direct runoff and interflow (per subbasin) are provided by WaSiM-ETH as Ascii tables with the following format:

```
direct discharge [mm per Zone] (QD) unsatzon model; 4 zones
1       0.128897
2       1.3298
3       4.5257
4       2.14858
```