

Deliverable D4.1.2 Concerted Approach V2

Appendix 1: Back-back end documentation: rainfall and air quality

Revision history			
Version	Date	Modified by	Comments
0.1	2011-05-31	Lars Örtegren	Initial version – back-back end service documentation
0.2	2011-07-06	Lars Örtegren	Added Rainfall Downscaling
0.3	2011-08-08	Lars Örtegren	Added Air Quality Downscaling
0.4	2011-08-17	Mihai Bartha	Changes in Rainfall Downscaling.
0.5	2011-08-22	Lars Örtegren	Minor changes
0.6	2011-10-12	Lars Örtegren	RFD and AQD updates.
0.7	2011-11-02	Lars Örtegren	Added IDF downscaling.
0.8	2011-11-18	Lars Örtegren	Restructured document

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1. Common Services – Back-back end RF & AQ

This section describes the so called back-back end of the common services, i.e. the abstraction layer that handles the interface between the SOS/T-SPS back end and the underlying implementation. For the common services PE (Pan European climate scenario data) and AQ (Air Quality downscaling), the underlying system is Airviro. For the RF (Rainfall downscaling) and the DSG (Design Storm Generator), these are independent models but using climate scenario data from Airviro (Figure 1).

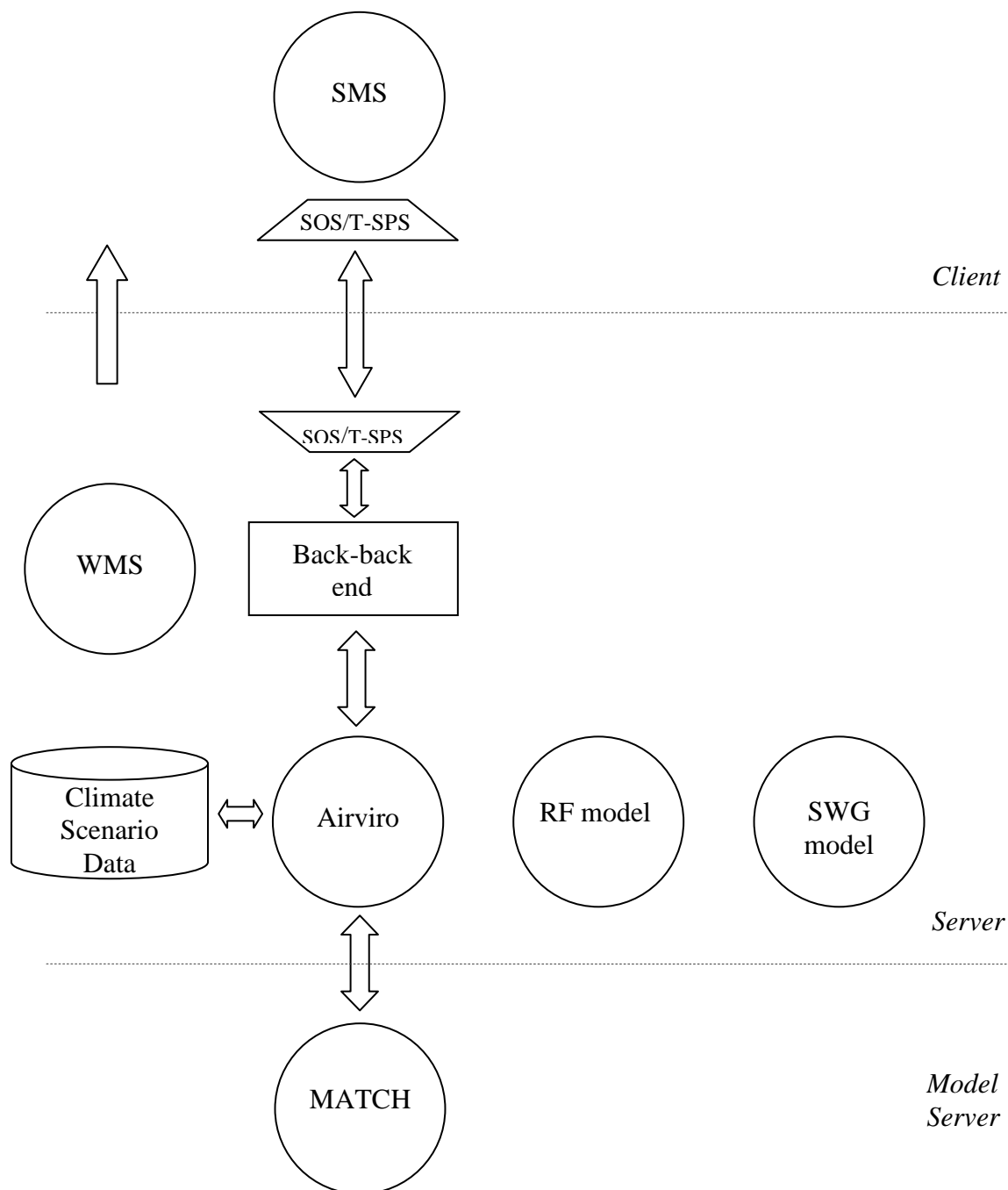


Figure 1 General architecture for the Rainfall and Air Quality downscaling

1.1 General – Process Control

Process status

Service name: **sudplan_proc_status** <procid>

Description: This service returns the current state of the process (model run).

Input:

Parameter	Type	Range
ProcId	String	Identifier as returned by rfd_start , idfd_start or aqd_start .

Output: Status.

#STATUS <status> [<message>]

Status	Description
NOTSTARTED	Model has not been started. This should normally not happen.
PERC <perc>	Reports the progress of the model run. Percentage is an integer between 0 and 100.
COMPLETED	Model run has finished successfully.
CANCELLED	Model run was aborted by the user or an administrator.
ERROR <message>	Model terminated with an error. Error message contains more information about the error.

Example:

```
sudplan_proc_status prc:prc_Z76543
#STATUS PERC 76
```

Process terminate

Service name: **sudplan_proc_terminate** <procid>

Description: This service stops the process (model run).

Input:

Parameter	Type	Range
ProcId	String	Identifier as returned by rfd_start , idfd_start or aqd_start .

Output: -

Example: `sudplan_proc_terminate prc:prc_Z76543`

List Processes

Service name: **sudplan_proc_listids**

Description: This service lists the available processes that have been successfully executed by the model.

Input: -

Output: List of id:s of the processes. List entries are separated by newlines.

<procid1>

<procid2>

...

<procidn>

Field	Type	Range
ProcId	String	Identifier as returned by rfd_start , idfd_start or aqd_start .

Example:

```
sudplan_proc_listids
prc:prc_Z76543
```

Process result

Service name: **sudplan_proc_result** *<procid>*

Description: This service returns a list of results from the model run.

Input:

Parameter	Type	Range
ProcId	String	Identifier as returned by rfd_start , idfd_start or aqd_start .

Output:

List of id:s, specified time resolution and description of time resolution. List entries are separated by newlines and separator between fields is a vertical bar.

```
<id1>|<type1>|<desc1>
<id2>|<type2>|<desc2>
...
<idn>|<typen>|<descn>
```

Field	Type	Range
Id	String	Identifier without spaces: 0-9,A-Z,a-z,_,:. Specifies uniquely a data set on the server..
Type	String	Specifies the type of result: ts, fld, tbl or idf.
Desc	String	Brief description of result.

Example:

```
sudplan_proc_result prc:prc_Z76543
tsf:tsf_o23456|ts|Historical original resolution
tsf:tsf_X24333|ts|Historical daily resolution
tsf:tsf_j24347|ts|Downscaled original resolution
tsf:tsf_K24361|ts|Downscaled daily resolution
tbl:tbl_A39844|tbl|Downscaling statistics
```

Field Description

Service name: **sudplan_result_describe** <tsid>

Description: This service lists the meta data for the specified result.

Input:

Parameter	Type	Range
TsId	String	Identifier as returned by

		sudplan_proc_result.
--	--	----------------------

Output: List of meta data. Each meta data entry is preceded by a tag identifying the information and then the meta data value.

```
<tag1> <value1>
<tag2> <value2>
...
<tagn> <valuen>
```

Tag	Value	Description
#COORD_SYS	EPSG:<epsgnr>	The EPSG number of the projection used.
#SPATIAL	<xmin> <ymin> <xmax> <ymax>	Specifies the bounding rectangle in the given projection.
#GRID	<nx> <ny>	Dimension of the grid. Number of grid squares in x and y.
#TEMPORAL	<starttime> <endtime>	Time for first and last field. Time format is YYYYmmddTHHMMSS .
#TIMERES	<tres>	Specifies the time resolution. A number followed by a single letter. The letter indicates time unit and can be one of the following: s Seconds m Minute h Hour d Day M Month Y Year
#FEATURE	<feature>	Feature of interest in double quotes.
#DESC	<description>	Descriptive text in double quotes.
#UOM	<unit>	Unit of measurement in double quotes.

Example:

```
sudplan_describe_result tsf:tsf_j24347
```

```
#COORD_SYS EPSG:4326
#SPATIAL 5.77 49.08 5.77 49.08
#GRID 1 1
#TEMPORAL 19700101T000000 20371231T233000
#TIMERES 1800s
#FEATURE Europe
#DESC ECHAM5_A1B_3 - Precipitation 30-min
#UOM mm
```


1.2 PE – Pan European Climate Scenario

1.2.1 PE work flow

```

sudplan_listenvfac
sudplan_listscenario
sudplan_listvar
sudplan_listtimeres
sudplan_result_describe or sudplan_describefld
sudplan_getfld or sudplan_getts
    
```

Environmental factors

Service name: **sudplan_listenvfac**

Description: This service lists the environmental factors that is covered by the loaded climate scenario data.

Input: -

Output: List of id:s and names of environmental factors. List entries are separated by newlines and separator between fields is a vertical bar.

```

<envfacid1>|<name1>
<envfacid2>|<name2>
...
<envfacidn>|<namen>
    
```

Field	Type	Range
EnvFacId	String	Identifier without spaces: 0-9,A-Z,a-z,_
Name	String	Name of environmental factor. May contain spaces.

Example:

```

sudplan_listenvfac
climate|Climate
airquality|Air Quality
    
```

Climate Scenarios

Service name: **sudplan_listscenario** <envfacid>

Description: This service lists the available scenarios covering the selected environmental factor.

Input:

Parameter	Type	Range
EnvFacId	String	Identifier as returned by listenvfac .

Output: List of id:s and names of scenarios. List entries are separated by newlines and separator between fields is a vertical bar.

```
<scenid1>|<name1>
<scenid2>|<name2>
...
<scenidn>|<namen>
```

Field	Type	Range
ScenId	String	Identifier without spaces: 0-9,A-Z,a-z,_
Name	String	Name of scenario. May contain spaces.

Example:

```
sudplan_listscenario climate
echam5a1b3|ECHAM5 A1B 3
```

Variables

Service name: **sudplan_listvar** <envfacid> <scenid>

Description: This service lists the available variables for the selected scenario and environmental factor.

Input:

Parameter	Type	Range
-----------	------	-------

EnvFacId	String	Identifier as returned by listenvfac .
ScenId	String	Identifier as returned by listscenario .

Output: List of id:s and names of variables. List entries are separated by newlines and separator between fields is a vertical bar.

```
<varid1>|<name1>
<varid2>|<name2>
...
<varidn>|<namen>
```

Field	Type	Range
VarId	String	Identifier without spaces: 0-9,A-Z,a-z,_
Name	String	Name of variables. May contain spaces.

Example:

```
sudplan_var climate echam5a1b3
prec|Precipitation
```

Time resolutions

Service name: **sudplan_listtimeres** <envfacid> <scenid> <varid>

Description: This service lists the available time resolutions for the selected variable, scenario and environmental factor.

Input:

Parameter	Type	Range
EnvFacId	String	Identifier as returned by listenvfac .
ScenId	String	Identifier as returned by listscenario .
VarId	String	Identifier as returned by listvar .

Output: List of id:s, specified time resolution and description of time resolution. List entries are separated by newlines and separator between fields is a vertical bar.

```
<fldid1>|<tres1>|<desc1>
<fldid2>|<tres2>|<desc2>
...
<fldidn>|<tresn>|<descn>
```

Field	Type	Range
FldId	String	Identifier without spaces: 0-9,A-Z,a-z,_. Specifies uniquely a time series of fields.
Timeres	String	Specifies the time resolution. A number followed by a single letter. The letter indicates time unit and can be one of the following: s Seconds m Minute h Hour d Day M Month Y Year
Name	String	Name of variables. May contain spaces.

Example:

```
sudplan_listtimeres climate echam5alb3 prec
climate_echam5alb3_prec_30m|1800s|30-min
climate_echam5alb3_prec_10Y|10Y|10-year
```

Field Description

Service name: **sudplan_describefld** <fldid>

Description: This service lists the meta data for the specified field.

Input:

Parameter	Type	Range
FldId	String	Identifier as returned by listtimeres .

Output: List of meta data. Each meta data entry is preceded by a tag identifying the information and then the meta data value.

<tag1> <value1>
 <tag2> <value2>
 ...
 <tagn> <valuen>

Tag	Value	Description
#COORD_SYS	EPSG:<epsgnr>	The EPSG number of the projection used.
#SPATIAL	<xmin> <ymin> <xmax> <ymax>	Specifies the bounding rectangle in the given projection.
#GRID	<nx> <ny>	Dimension of the grid. Number of grid squares in x and y.
#TEMPORAL	<starttime> <endtime>	Time for first and last field. Time format is YYYYmmddTHHMMSS .
#TIMERES	<tres>	Specifies the time resolution. A number followed by a single letter. The letter indicates time unit and can be one of the following: s Seconds m Minute h Hour d Day M Month Y Year
#FEATURE	<feature>	Feature of interest in double quotes.
#DESC	<description>	Descriptive text in double quotes.
#UOM	<unit>	Unit of measurement in double quotes.

Example:

```

sudplan_describefld climate_echam5a1b3_prec_30m
#COORD_SYS EPSG:4326
#SPATIAL -12.25 32.75 35.25 71.25
#GRID 95 77
#TEMPORAL 19700101T000000 20371231T233000
#TIMERES 1800s
#FEATURE Europe
#DESC ECHAM5_A1B_3 - Precipitation 30-min
#UOM mm
  
```

List fields in time series

Service name: **sudplan_listfldtimes** <fldid>

Description: This service lists time stamps for all fields in the time series.

Input:

Parameter	Type	Range
FldId	String	Identifier as returned by listtimeres .

Output: List of time stamps separated by newline.

```
<time1>
<time2>
...
<timen>
```

Field	Type	Range
Time	Time	Format YYYYmmddTHHMMSS

Example:

```
sudplan_listfldtimes climate_echam5a1b3_prec_30m
19700101T000000
19700101T003000
19700101T010000
19700101T013000
19700101T020000
19700101T023000
19700101T030000
...
```

Get field data

Service name: **sudplan_getfld** <fldid> <starttime> [<endtime> [<xmin> <ymin> <xmax> <ymax>]]

Description: This service extracts one or more fields from the time series of fields specified. Temporal as well as spatial filtering is available. If spatial filtering is used, the returned field will contain the whole grid cells that contain the specified area, i.e. the returned area might not be exactly as requested.

Input:

Parameter	Type	Range
FldId	String	Identifier as returned by listtimeres.
StartTime	Time	Time for first field to extract. Format YYYYmmddTHHMMSS
EndTime	Time	Time for last field to extract. If omitted, only one field will be returned. Format YYYYmmddTHHMMSS
Xmin	Float	West boundary coordinate.
Ymin	Float	South boundary coordinate.
Xmax	Float	East boundary coordinate.
Ymax	Float	North boundary coordinate.

Output: Header information followed by field data. Each field is then preceded by one header line.

```
#SPATIAL <xmin> <ymin><xmax><ymax>
#EXTFILE <ext> <flddim> <storage> <flddesc>
#EXTGRID <ext> <nx> <ny> <time>
<val 1,1> <val 2,1> ... <val nx,1>
<val 1,2> <val 2,2> ... <val nx,2>
...
<val 1,ny> <val 2,ny> ... <val nx,ny>
```

Field	Type	Range
Xmin	Float	West boundary coordinate.
Ymin	Float	South boundary coordinate.
Xmax	Float	East boundary coordinate.
Ymax	Float	North boundary coordinate.
FldDim	String	scalar
Storage	String	longtimeser
FldDesc	String	Full name of field.

Ext	String	Internal field identifier
Nx	Integer	Number of grid cells in east-west direction.
Ny	Integer	Number of grid cells in south-north direction.
Time	Time	Format YYYYmmddTHHMMSS
Value	Float	Value in grid cell. The first line of data represents the northern border of the area. The first value on the first line is the northwest corner of the field.

Example:

```
sudplan_getfld climate_echam5alb3_prec_30m 19750527T120000
#SPATIAL -12.25 32.75 35.25 71.25
#EXTFILE RAs scalar longtimeser Precipitation 30-min
#EXTGRID RAs 95 77 19750527T120000
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 ...
0 0 0 0 0.01 0.02 0.02 0.03 0.03 0.04 0.04 0.04 0.04 ...
...
```

Get time series data from one point in field

Service name: **sudplan_getts** <fldid> <starttime> <endtime> <x> <y>

Description: This service extracts time series data from the time series of fields for the specified point.

Input:

Parameter	Type	Range
FldId	String	Identifier as returned by listtimeres .
StartTime	Time	Time for first data to extract. Format YYYYmmddTHHMMSS
EndTime	Time	Time for last data to extract. Format YYYYmmddTHHMMSS
X	Float	X-coordinate for point within field.
Y	Float	Y-coordinate for point within field.

Output: Header information (not yet) followed by time series data.

```
<time1> <val1>
<time2> <val2>
...
<timen> <valn>
```

Field	Type	Range
Time	Time	Format YYYYmmddTHHMMSS
Value	Float	Value. The value is calculated using bi-linear interpolation from the four grid points that makes a rectangle that encloses the specified point.

Example:

```
sudplan_getts climate_echam5a1b3_prec_30m 9750527T120000 -7.2 55.6
19750527T120000 0.0056
19750527T123000 0.0056
19750527T130000 0.02
19750527T133000 0.0208001
19750527T140000 0.0156
19750527T143000 0.0136
19750527T150000 0.012
19750527T153000 0.00680001
19750527T160000 0.0016
```

SOS naming conventions

TimeSeriesAPI DataHandler filter properties resemble the SOS GetObservation filter properties.

ts:offering shall be composed of the *environmental factor*, *scenario*, *variable* and *temporal resolution* separated by underscore “_”. In terms of O&M/SOS information model equivalent scenario name ⇔ procedure short name, variable ⇔ observed property

Examples:

```
"airquality_echam5a1b3rcp4.5_no2_10Y"
"airquality_echam5a1b3rcp4.5_no2_1M"
"airquality_echam5a1b3rcp4.5_no2_1Y"
"airquality_echam5a1b3rcp4.5_no2_1d"
"airquality_echam5a1b3rcp4.5_ozone_10Y"
"airquality_echam5a1b3rcp4.5_ozone_1M"
"airquality_echam5a1b3rcp4.5_ozone_1Y"
"airquality_echam5a1b3rcp4.5_ozone_1d"
"airquality_echam5a1b3rcp4.5_sia_10Y"
"airquality_echam5a1b3rcp4.5_sia_1M"
"airquality_echam5a1b3rcp4.5_sia_1Y"
"airquality_echam5a1b3rcp4.5_sia_1d"
"airquality_echam5a1b3rcp4.5_so2_10Y"
"airquality_echam5a1b3rcp4.5_so2_1M"
"airquality_echam5a1b3rcp4.5_so2_1Y"
"airquality_echam5a1b3rcp4.5_so2_1d"
"climate_echam5a1b3_prec_10Y" "climate_echam5a1b3_prec_30m"
```

ts:observed_property shall have the root *urn:ogc:def:property:OGC:* followed by the name short name of the observed property.

Examples:

```
"urn:ogc:def:property:OGC:no2" "urn:ogc:def:property:OGC:ozone"
"urn:ogc:def:property:OGC:prec" "urn:ogc:def:property:OGC:sia"
"urn:ogc:def:property:OGC:so2"
```

ts:feature_of_interest shall have the root name *urn:SMHI:feature:* followed by the short name of the feature:

Example:

```
"urn:SMHI:feature:Europe"
```

ts:procedure shall have the root name *urn:ogc:object:* followed by the *scenario name*, *observed property short name* and the *timeseries temporal resolution* separated by “:”

Example:

```
"urn:ogc:object:echam5a1b3:prec:10Y"
"urn:ogc:object:echam5a1b3:prec:1800s"
"urn:ogc:object:echam5a1b3rcp4.5:no2:10Y"
"urn:ogc:object:echam5a1b3rcp4.5:no2:1M"
"urn:ogc:object:echam5a1b3rcp4.5:no2:1Y"
"urn:ogc:object:echam5a1b3rcp4.5:no2:86400s"
"urn:ogc:object:echam5a1b3rcp4.5:ozone:10Y"
"urn:ogc:object:echam5a1b3rcp4.5:ozone:1M"
"urn:ogc:object:echam5a1b3rcp4.5:ozone:1Y"
```

"urn:ogc:object:echam5a1b3rcp4.5:ozone:86400s"
"urn:ogc:object:echam5a1b3rcp4.5:sia:10Y"
"urn:ogc:object:echam5a1b3rcp4.5:sia:1M"
"urn:ogc:object:echam5a1b3rcp4.5:sia:1Y"
"urn:ogc:object:echam5a1b3rcp4.5:sia:86400s"
"urn:ogc:object:echam5a1b3rcp4.5:so2:10Y"
"urn:ogc:object:echam5a1b3rcp4.5:so2:1M"
"urn:ogc:object:echam5a1b3rcp4.5:so2:1Y"
"urn:ogc:object:echam5a1b3rcp4.5:so2:86400s"

Encoding for Temporal resolution

For conversion reasons the temporal resolution will be specified in M (Month), Y (Years), and s (Second).

Examples: 10Y, 1M, 86400s (1 day)

1.3 RF – Rainfall downscaling

RFD work flow

```

sudplan_inputts_register
while data to upload
    sudplan_inputts_upload
sudplan_rfd_start
while still running
    sudplan_proc_status
sudplan_proc_result
sudplan_result_describe
sudplan_getts
    
```

Generate upload space

Service name: **sudplan_inputts_register**

Description: This service receives a description of the time series (historical rainfall data) and stores it on the server for later use by the rainfall downscaling model. The description is a string containing the description of the timeseries (process that generated the timeseries e.g. SensorML document).

Input:

Parameter	Type	Range
description	String	String containing the SensorML document describing the process generating of the timeseries.

Output: Returns an id for the uploaded time series.

<tsid>

Field	Type	Range
TsId	String	Identifier without spaces: 0-9,A-Z,a-Z,_,:

Upload historical rainfall time series

Service name: **sudplan_inputts_upload** <tsid>

Description: This service receives a time series of historical rainfall data and stores it on the server for later use by the rainfall downscaling model. The time series can be of any time resolution (even asynchronous). The service allows multiple calls to create a long time series by appending shorter ones. The header should only be sent on the first call.

Input:

Parameter	Type	Range
TsId	String	Identifier as returned by sudplan_inputts_register referring to the observed historical time series.

Header information followed by time series data with time stamps:

```
#COORD_SYS EPSG:<epsgnr>
#SPATIAL <x> <y> <x> <y>
#UOM <unit>
<time1> <val1>
<time2> <val2>
...
<timen> <valn>
```

Tag/Field	Value/Type	Description
#COORD_SYS	EPSG:<epsgnr>	The EPSG number of the projection used.
#SPATIAL	<x> <y> <x> <y>	Specifies the (area) location associated with the historical data. Note that both coordinate pairs should be identical since this data refers to a single point.
#UOM	<i>Unit</i>	Unit of measurement. Only mm is valid as input to Rainfall Downscaling model.

Time	<i>Time</i>	Time stamp for data in time series. Format YYYYmmddTHHMMSS
Value	<i>Float</i>	Rainfall in mm.

Output: Returns the number of inserted observations.

<count>

Field	Type	Range
Count	Number	Number of observations >= 0.

Example:

```
cat ts.dat | sudplan_inputts_upload tsf:tsf_o23456
1
```

List existing historical rainfall time series

Service name: **sudplan_inputts_list**

Description: This service lists the available input timeseries that have been uploaded.

Input: -

Output: List of tsid's of the uploaded timeseries. List entries are separated by newlines.

<tsid1>

<tsid2>

...

<tsidn>

Field	Type	Range
TsId	String	Identifier as returned by sudplan_inputts_register

Example:

```
sudplan_inputts_list
tsf:tsf_o23456
```

...

Field Description

Service name: **sudplan_inputs_describe** *<tsid>*

Description: This service lists the meta data for the specified input timeseries.

Input:

Parameter	Type	Range
TsId	String	Identifier as returned by sudplan_inputs_list

Output: List of meta data. Each meta data entry is preceded by a tag identifying the information and then the meta data value.

<tag1> <value1>

<tag2> <value2>

...

<tagn> <valuen>

Tag	Value	Description
#COORD_SYS	EPSG: <i><epsgnr></i>	The EPSG number of the projection used.
#SPATIAL	<i><x> <y> <x> <y></i>	Specifies the bounding rectangle in the given projection. Note that this should be two identical pairs of x,y since it specified a point.
#GRID	<i><nx> <ny></i>	Dimension of the grid. Number of grid squares in x and y. This should be 1 1 since this refers to a single point.
#TEMPORAL	<i><starttime></i> <i><endtime></i>	Time for first and last field. Time format is YYYYmmddTHHMMSS .
#TIMERES	<i><tres></i>	Specifies the time resolution. A number followed by a single letter. The letter indicates time unit and can be one of the following: s Seconds

		m Minute h Hour d Day M Month Y Year
#FEATURE	<feature>	Feature of interest in double quotes.
#DESC	<description>	Descriptive text in double quotes.
#UOM	<unit>	Unit of measurement in double quotes.

Example:

```

sudplan_inputts_describe tsf:tsf_j24347
#COORD_SYS EPSG:4326
#SPATIAL 5.77 49.08 5.77 49.08
#GRID 1 1
#TEMPORAL 19700101T000000 20371231T233000
#TIMERES 1800s
#FEATURE Europe
#DESC ECHAM5_A1B_3 - Precipitation 30-min
#UOM mm
    
```

Retrieve description of time series

Service name: **sudplan_inputts_getsml** <tsid>

Description: This service retrieves the description of the time series, e.g. the SensorML document.

Input:

Parameter	Type	Range
TsId	String	Identifier as returned by sudplan_inputts_register referring to the observed historical time series.

Output: Returns the description of the time series.

```

Example:
sudplan_inputts_getsml tsf:tsf_o23456
This is a time series just uploaded by a user.
    
```


Start – Rainfall Timeseries Downscaling model

Service name: **sudplan_rfd_start** <fldid> <tsid> <year>

Description: This service starts the rainfall downscaling model.

Input:

Parameter	Type	Range
FldId	String	Identifier as returned by listtimeres referring to the climate scenario to use for rainfall downscaling.
TsId	String	Identifier as returned by uploadts referring to the observed historical time series.
Year	Time	Year for the center of the downscaled time series. Format YYYY .

Output: A process id.

<procid>

Field	Type	Range
ProcId	String	Identifier without spaces: 0-9,A-Z,a-z,_,:

Example:

```
sudplan_rfd_start climate_echam5a1b3_prec_30m tsf:tsf_o23456 2070
prc:prc_Z76543
```

Result - Rainfall Timeseries Downscaling

Output: Output from RFD model is the original time series, three new time series and a table with statistics:

- Historical time series in original time resolution.
- Historical time series but aggregated to daily values.
- Downscaled time series in original time resolution..
- Downscaled time series but aggregated to daily values.

- Statistical table:

	Total (%)	Max (%)	Frequency (%)
Winter (dec-feb)	20.1	9.8	6.7
Spring (mar-may)	5.0	12.2	1.4
Summer (jun-aug)	-14.6	21.9	-14.2
Autumn (sep-nov)	7.6	27.5	-1.8

Example:

sudplan_proc_result prc:prc_Z76543

tsf:tsf_o23456|ts|Historical original resolution

tsf:tsf_X24333|ts|Historical daily resolution

tsf:tsf_j24347|ts|Downscaled original resolution

tsf:tsf_K24361|ts|Downscaled daily resolution

tbl:tbl_A39844|tbl|Downscaling statistics

sudplan_getts tbl:tbl_A39844

20.15269	9.84334	6.78611
5.04516	12.15240	1.39563
-14.59302	21.86825	-14.24695
7.61608	27.47465	-1.81422

IDF Downscaling work flow

```

sudplan_idfd_start
while still running
    sudplan_proc_status
sudplan_proc_result
sudplan_result_describe
sudplan_getidf
    
```

Start - IDF Downscaling model

Service name: **sudplan_idfd_start** <fldid> <histyear> <futyyear> <coordsys> <x> <y>
 <dur₁>:<dur₂>:...:<dur_n>
 <frq₁>:<frq₂>:...:<frq_n>
 <int₁>:<int₂>:...:<int_n>

Description: This service starts the IDF downscaling model.

Input:

Parameter	Type	Range
FldId	String	Identifier as returned by listtimeres referring to the climate scenario to use for IDF downscaling.
HistYear	Time	Year that the historical IDF curve represents. Format YYYY .
FutYear	Time	Year that the future IDF curve will be calculated for.
CoordSys	EPSG:<epsgnr>	The EPSG number of the projection used.
X	Float	X-coordinate
Y	Float	Y-coordinate
Duration:...	Float:...	Duration column of the IDF table. Values are given in minutes. Range [30..?]
Frequency:...	Float:...	Frequency column of the IDF table. Values are given in years.
Intensity:...	Float:...	Intensity column of the IDF table. Values are given in mm/h.

Output: A process id.

<procid>

Field	Type	Range
ProcId	String	Identifier without spaces: 0-9,A-Z,a-z,_,:

Example:

```
sudplan_idfd_start climate_echam5a1b3_prec_30m 1971 2065 EPSG:4326 3.3 44.6
30:30:60:60 10:100:10:100 122:165:81:114
prc:prc_Z76543
```

Result – IDF Downscaling

Output: Output from IDFD model is a new IDF curve.

Get IDF table

Service name: **sudplan_getidf** <idfid>

Description: This service extracts an IDF table.

Input:

Parameter	Type	Range
Idfid	String	Identifier as returned by proc_result .

Output:

```
#COORD_SYS EPSG:<epsgnr>
#SPATIAL <xmin> <ymin> <xmax> <ymax>
#TEMPORAL <year>
#DESC <description>
#COLS <column headers>
#UOM <units of measurement>
<dur1> <frq1> <int1>
<dur2> <frq2> <int2>
...
<durn> <frqn> <intn>
```

Tag/Field	Value/Type	Range
#COORD_SYS	EPSG:<epsgnr>	The EPSG number of the projection used.
#SPATIAL	<xmin> <ymin> <xmax> <ymax>	Specifies the location that the IDF curve represents.
#TEMPORAL	<year>	The year that the IDF curve represents. Format YYYY .
#DESC	<description>	Description.
#COLS	Duration;ReturnPeriod; Intensity	Column headers separated by “;”.
#UOM	<unit ₁ >;<unit ₂ >;<unit ₃ >	Units for columns, separated by “;”.
Duration	Float	
Frequency	Float	

Intensity	Float	
-----------	-------	--

```

Example:      sudplan_getidf idf:idf_c19637
#COORD_SYS  EPSG:4326
#SPATIAL 3.3 44.6 3.3 44.6
#TEMPORAL 2056
#DESC Downscaled IDF
#COLS Duration;ReturnPeriod;Intensity
#UOM minute;year;mm/h
  30    10    151.8
  30   100    203.8
  60    10    100.5
  60   100    140.4
    
```

1.4 SWG –Storm Water Generator

(to be completed in V3)

1.5 AQ –Air Quality downscaling

AQD work flow

```

sudplan_listscenario airquality
sudplan_listemscenario
sudplan_aqd_start
while still running
    sudplan_proc_status
sudplan_proc_result
sudplan_result_describe or sudplan_describefld
sudplan_getfld or sudplan_getts
    
```

List emission scenarios

Service name: **sudplan_listemscenario**

Description: This service lists the available emission scenarios.

Input: -

Output: List of id:s and names of emission scenarios. List entries are separated by newlines and separator between fields is a vertical bar.

```
<emscenid1>|<name1>
<emscenid2>|<name2>
...
<emscenidn>|<namen>
```

Field	Type	Range
EmScenId	String	Identifier without spaces: 0-9,A-Z,a-z,_
Name	String	Name of emission scenario. May contain spaces.

Example: `sudplan_listemscenario`

```
s07|Sthlm 2007
```

Start air quality downscaling model

Service name: **sudplan_aqd_start** <scenid> <starttime> <endtime> <xmin> <ymin>
<xmax> <ymin> <nx> <ny> <emscenid>

Description: This service starts the rainfall downscaling model.

Input:

Parameter	Type	Range
ScenId	String	Identifier without spaces: 0-9,A-Z,a-z,_ as returned from listscenario .
StartTime	Time	Start time for air quality downscaling model run. Format YYYYmmddTHHMMSS
EndTime	Time	End time for air quality downscaling model run. Format YYYYmmddTHHMMSS
Xmin	Float	West boundary coordinate for downscaling area.
Ymin	Float	South boundary coordinate for downscaling area..

Xmax	Float	East boundary coordinate for downscaling area.
Ymax	Float	North boundary coordinate for downscaling area.
Nx	Integer	Number of grid cells in east-west direction for downscaling model run.
Ny	Integer	Number of grid cells in south-north direction for downscaling model run..
EmScenId	String	Identifier as returned by listemscenario referring to the emission scenario to use for air quality downscaling.

Output: A process id.

<procid>

Field	Type	Range
ProcId	String	Identifier without spaces: 0-9,A-Z,a-z,_,:

Example: sudplan_aqd_start echam5a1b3 20550501T000000
 20550601T000000 1552000 6484000 1736000 6754000 92 135
 s07

prc:prc_z76543