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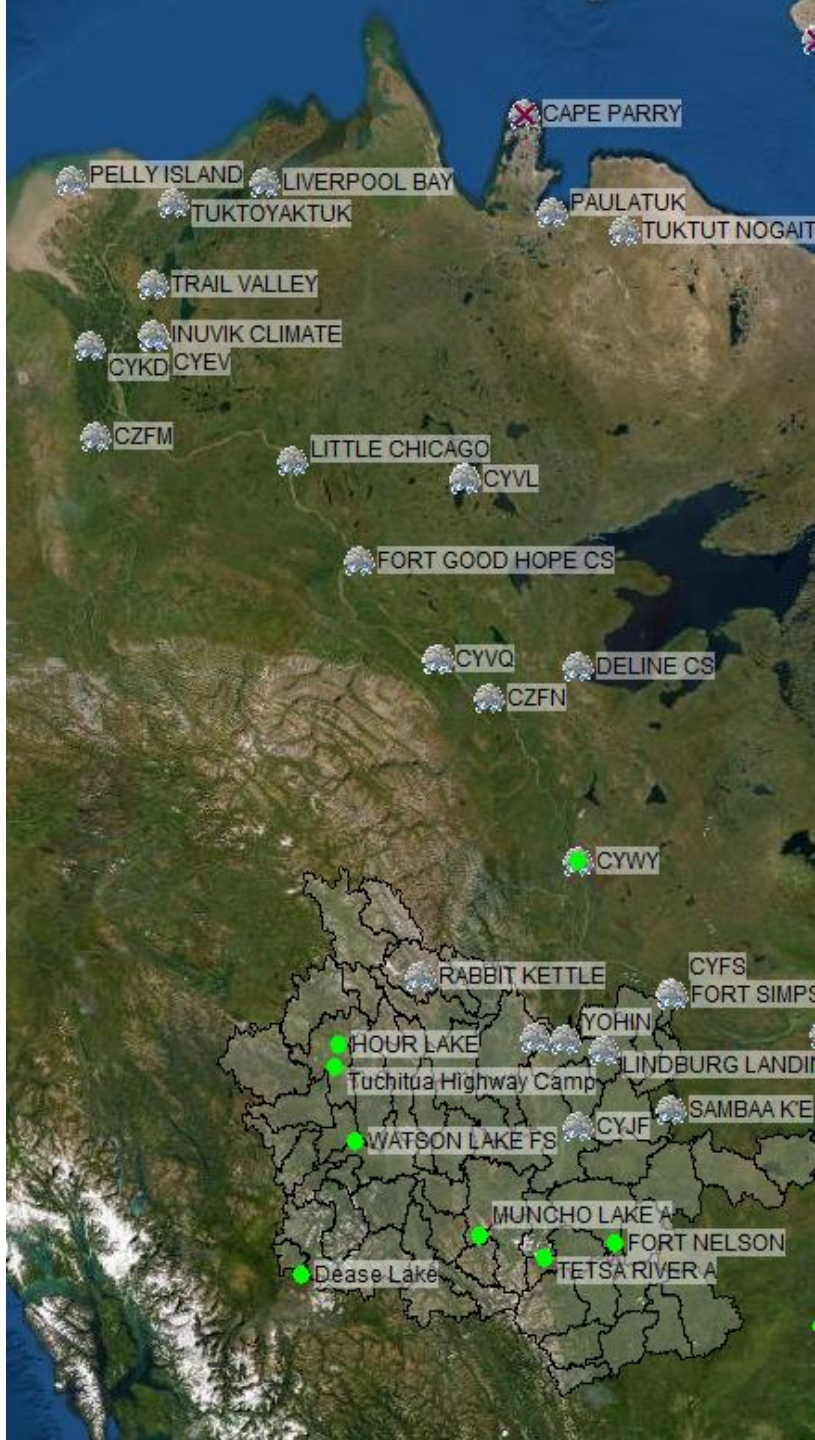
Delft-FEWS

Basic Configuration Course

Module : Location and Parameters

Module Motivation

- Delft-FEWS is a Location oriented system.
- Locations can be defined intelligently in Delft-FEWS using existing csv or shapefiles.
- Defined parameters help us to properly identify our data (and avoid mistakes).
- Locations and Location Sets are used to partition data and make great displays – it is very useful and not difficult!



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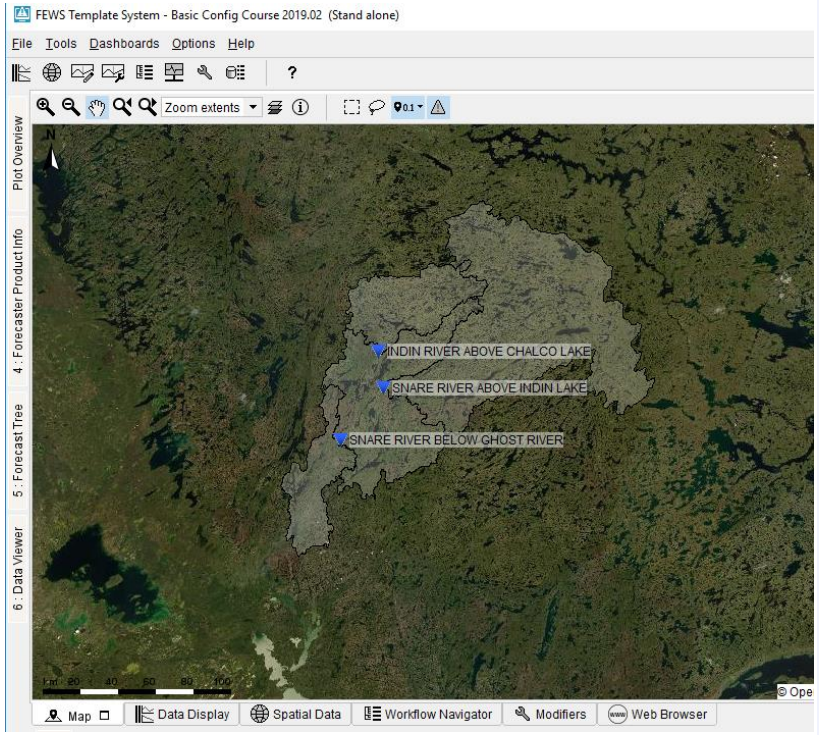
Learning Objectives

By the end of this module, you will have met the following learning objectives:

1) Understand how Locations and LocationSets are defined in Delft-FEWS
2) Recognize how LocationSets can be built from underling csv and shapefiles
3) Knowledge of how and where parameters are defined.

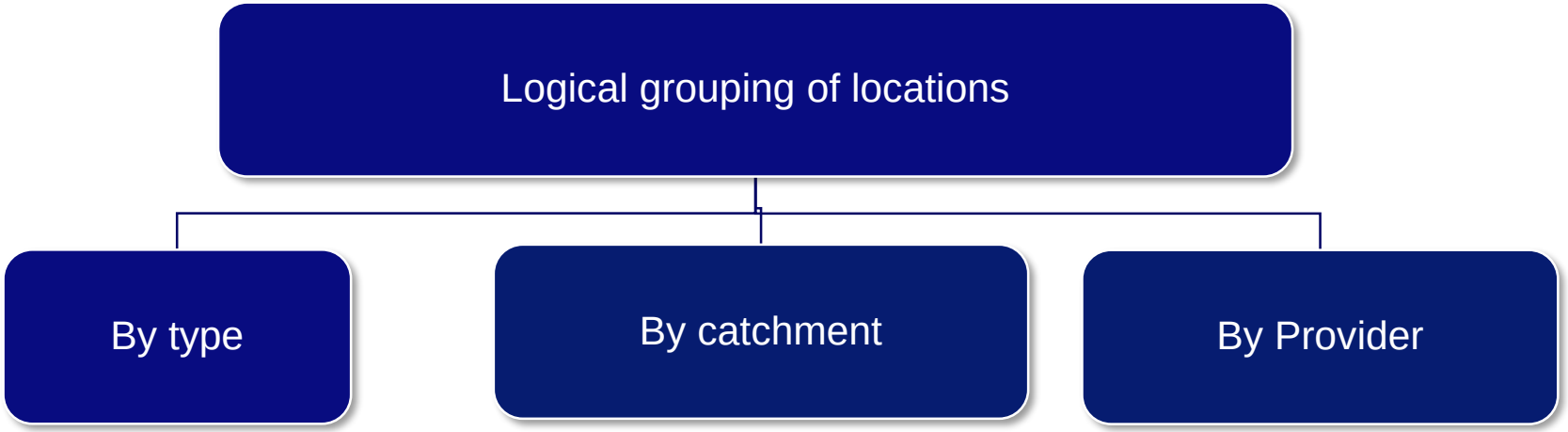
Locations in Delft-FEWS

- All time series data must be referenced to a (geographic) location.
- Locations can be plotted on the map
- Locations have at least:
  - Identifier (primary key in time series)
  - X-coordinate
  - Y-coordinate
- Locations are generally built from csv or shapefiles.
- Locations configuration file: *RegionConfigFiles\Locations.xml*



LocationSets

- A locationSet may include either locations or locationSets or both
- Built off existing files and defined using attributes (meta data)
- Configuration file: *\RegionConfigFiles\LocationSets.xml*

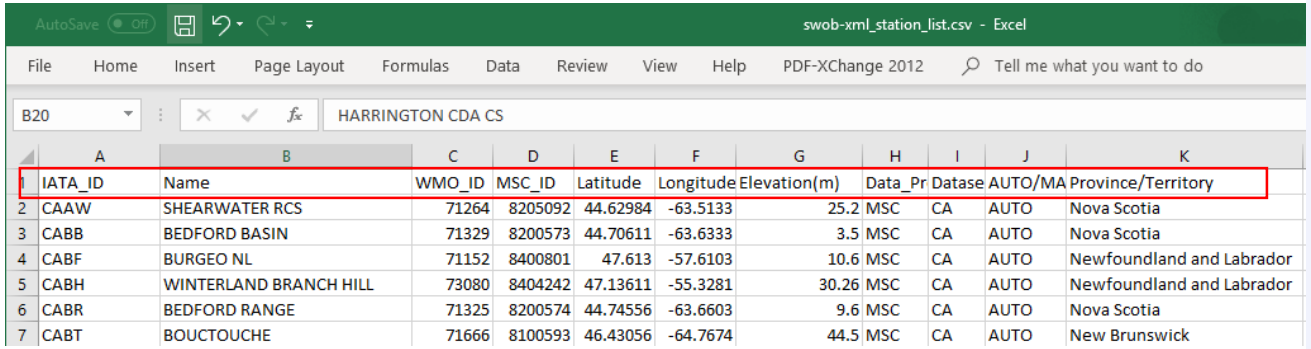


LocationSets from csv

LocationsSets.xml Definition

```
<!-- ECCC Meteo Stations - Available at https://dd.weather.gc.ca/hydrometric/doc/ -->
<locationSet id="ECCCStations">
        <csvFile>
                <file>swob-xml_station_list.csv</file>
                <geoDatum>WGS 1984</geoDatum>
                <id>%MSC_ID%</id>
                <name>%Name%</name>
                <x>%Longitude%</x>
                <y>%Latitude%</y>
                <z>%Elevation(m)%</z>
                <attribute id="ID" name="Station Code">
                        <text>%MSC_ID%</text>
                </attribute>
                <attribute id="Region" name="Region">
                        <text>%Province/Territory%</text>
                </attribute>
        </csvFile>
</locationSet>
```

csv file



	A	B	C	D	E	F	G	H	I	J	K
1	IATA_ID	Name	WMO_ID	MSC_ID	Latitude	Longitude	Elevation(m)	Data_Pr	Datase	AUTO/MA	Province/Territory
2	CAAW	SHEARWATER RCS	71264	8205092	44.62984	-63.5133	25.2	MSC	CA	AUTO	Nova Scotia
3	CABB	BEDFORD BASIN	71329	8200573	44.70611	-63.6333	3.5	MSC	CA	AUTO	Nova Scotia
4	CABF	BURGEO NL	71152	8400801	47.613	-57.6103	10.6	MSC	CA	AUTO	Newfoundland and Labrador
5	CABH	WINTERLAND BRANCH HILL	73080	8404242	47.13611	-55.3281	30.26	MSC	CA	AUTO	Newfoundland and Labrador
6	CABR	BEDFORD RANGE	71325	8200574	44.74556	-63.6603	9.6	MSC	CA	AUTO	Nova Scotia
7	CABT	BOUCTOUCHE	71666	8100593	46.43056	-64.7674	44.5	MSC	CA	AUTO	New Brunswick

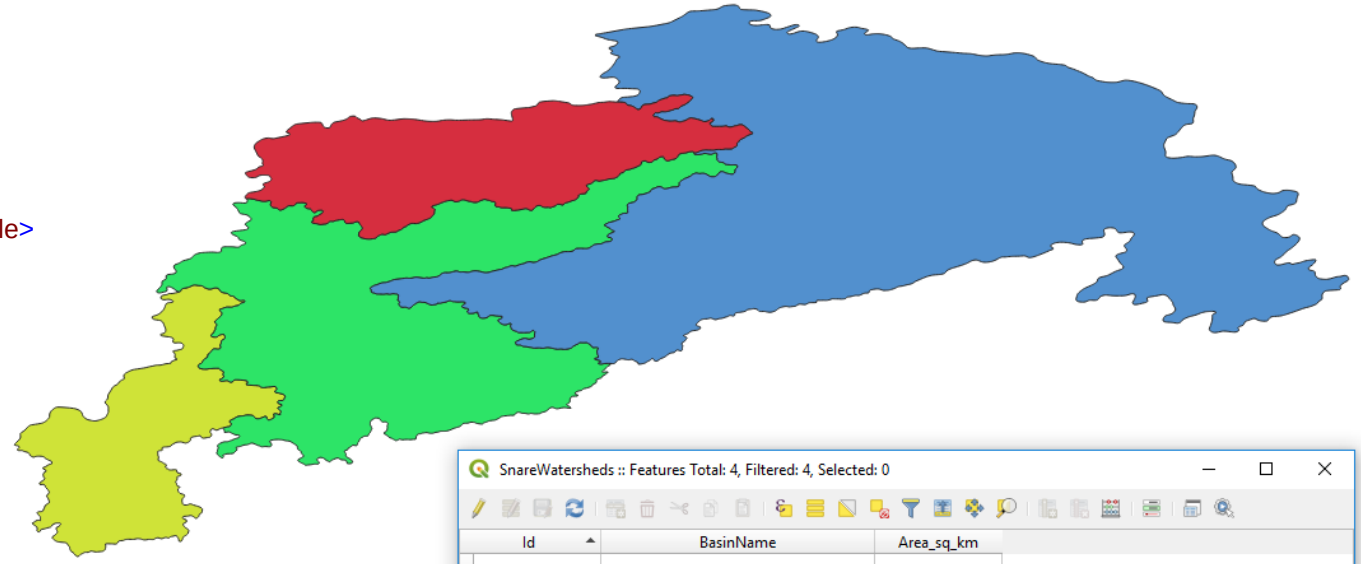
Note the links between the two files

LocationSets from Shapefiles

LocationsSets.xml Definition

```
<!--LocationSets built from ShapeFiles-->
<!--ShapeFiles for $MODELNAME1$-->
<locationSet id="$MODELNAME1$SubBasins">
        <esriShapeFile>
                <file>$MODELNAME1$Watersheds.shp</file>
                <id>%BasinName%</id>
                <name>%BasinName%</name>
        </esriShapeFile>
</locationSet>
```

Shapefile (and attribute table)



SnareWatersheds :: Features Total: 4, Filtered: 4, Selected: 0

	Id	BasinName	Area_sq_km
1	1	Snare Rapids Subbasin	1507.55
2	2	Snare Below Ghost River Subbasin	3681.55
3	3	Snare Above Indin Lake	8004.10
4	4	Indin River Above Chalco Lake	1885.55

Show All Features

BasinName is used to define the location

The attribute table is stored in the dbf file

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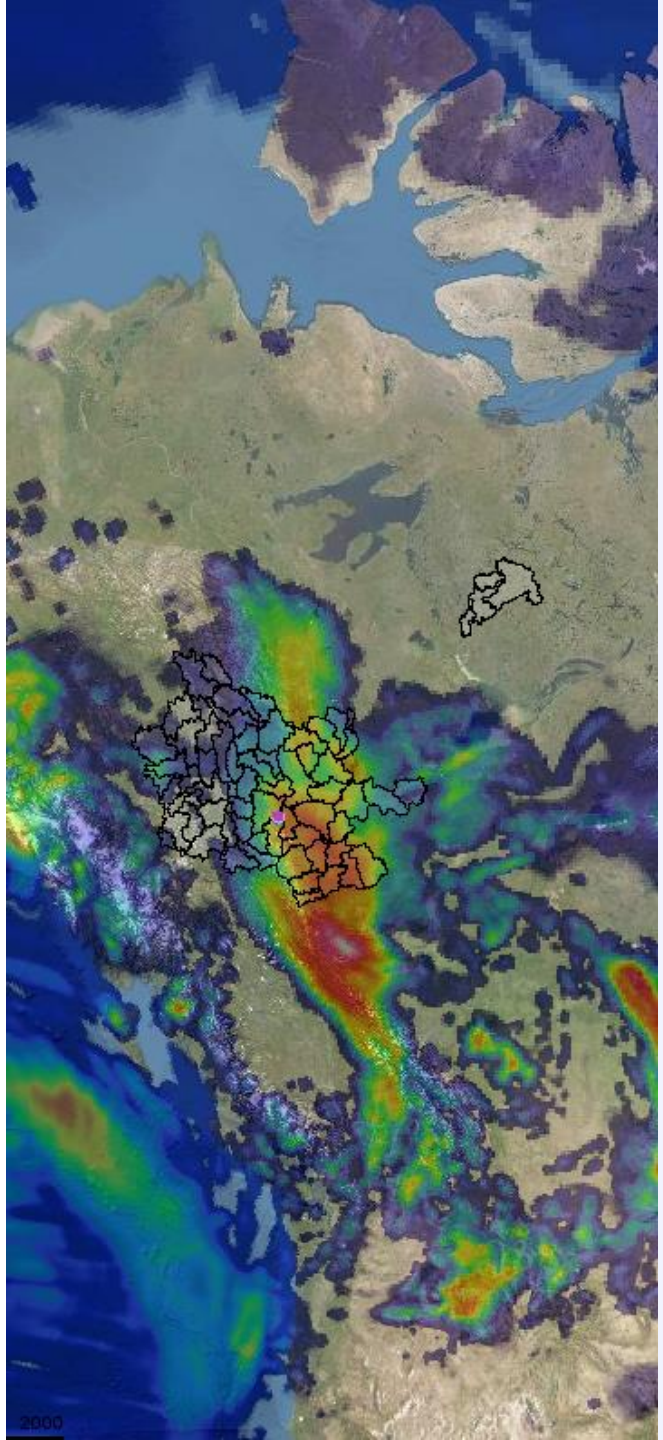
Grids are locations in Delft-FEWS

- Grid time series are 2D
- A grid location should be listed in *Locations.xml* and in *Grids.xml*
- The *Grids.xml* configuration file includes meta-information of a grid
- Gridded time series can be processed by most of the Delft-FEWS modules
- The Spatial Display can visualize gridded time series
- Grid definitions can be copied directly from NetCDF and Grib2 files.



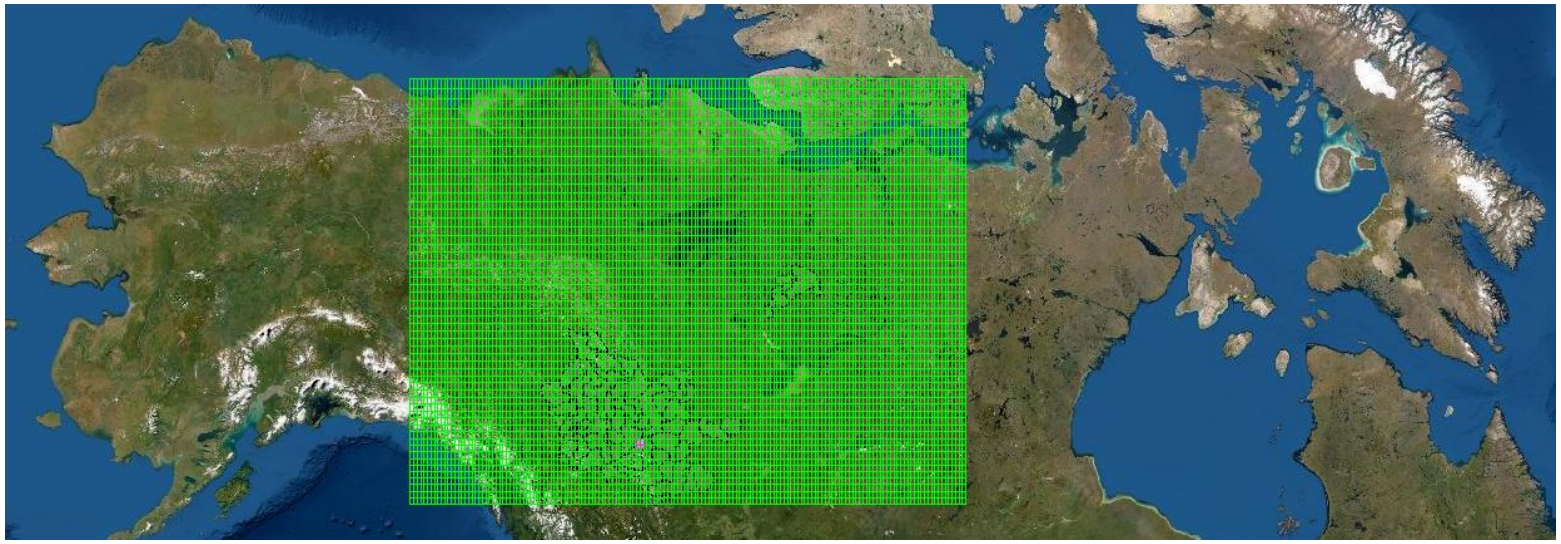
Example of Grid Definition

Locations.xml Definition

```
<location id="GDPS" name="Global Deterministic Prediction System (25 km)">
                <shortName>GDPS</shortName>
                <x>-180</x>
                <y>-90</y>
</location>
```

Grids.xml Definition

```
<regular locationId="GDPS">
      <rows>54</rows>
      <columns>162</columns>
      <geoDatum>WGS 1984</geoDatum>
      <firstCellCenter>
         <x>-140.87962962962962</x>
         <y>69.87962962962963</y>
         <z>0.0</z>
      </firstCellCenter>
      <xCellSize>0.24074074</xCellSize>
      <yCellSize>0.24074074</yCellSize>
   </regular>
```



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Location data – Location Icons

- Icons for locations can be easily configured
- Location icons are configured for locationSets: *SystemConfigFiles\LocationIcons.xml*
- Delft-FEWS comes with a pre-defined set of icons: *IconFiles*\

```
<locationIcons xmlns="http://www.wldelft.nl/fews" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://www.wldelft.nl/fews
http://fews.wldelft.nl/schemas/version1.0/locationIcons.xsd">
        <rootDir>icons</rootDir>
        <locationIcon>
                <description>Meteo Stations</description>
                <iconId>rain.png</iconId>
                <locationSetId>ECCCStations</locationSetId>
        </locationIcon>
        <locationIcon>
                <description>Hydro Stations</description>
                <iconId>hydro_site_data</iconId>
                <locationSetId>WSCStations</locationSetId>
        </locationIcon>
</locationIcons>
```

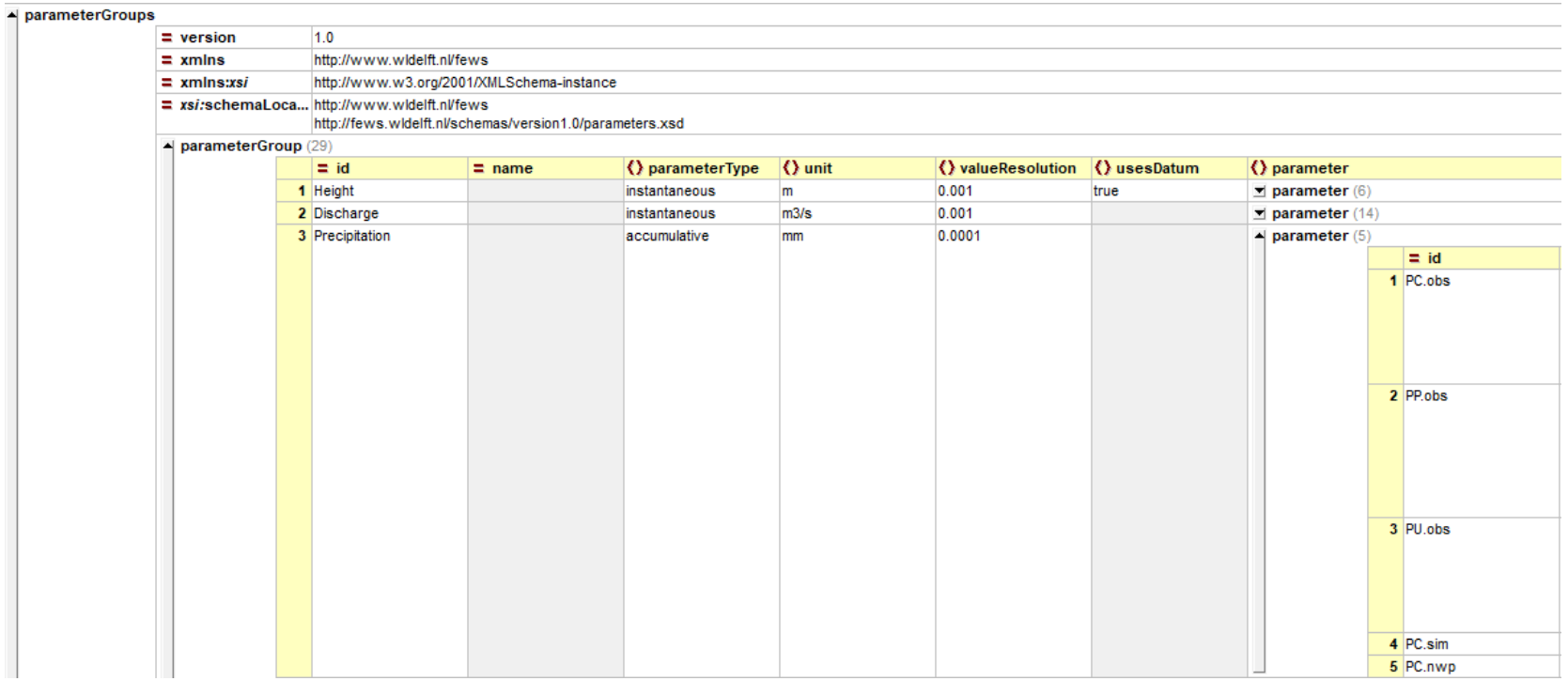
Parameters in Delft-FEWS

- The **parameterId** is a primary key in the time series of Delft-FEWS
- Parameters have a unique id and a name
- Organised into parameter groups
  - unique id
  - type (accumulative, instantaneous)
  - unit
  - value resolution (→ affects data compression)

```
<parameterGroup id="Height">
        <parameterType>instantaneous</parameterType>
        <unit>m</unit>
        <valueResolution>0.001</valueResolution>
        <usesDatum>true</usesDatum>
        <parameter id="HF.obs" name="HF.obs">
                <shortName>HF.obs</shortName>
                <description>Height, stage, elevation of the water surface within the forebay of a generating station above a datum</description>
        </parameter>
        <parameter id="HG.obs" name="HG.obs">
                <shortName>HG.obs</shortName>
                <description>Height, stage, elevation of the water surface at a specified station above a datum</description>
        </parameter>
```

Parameters.xml

- All Parameters are explicitly defined in Parameters.xml
- They are grouped in Parameter Groups
- Try to follow known standards, for example the SHEF - Standard Hydrometeorological Exchange Format codes



parameterGroups

version	1.0
xmlns	http://www.wldelft.nl/fews
xmlns:xsi	http://www.w3.org/2001/XMLSchema-instance
xsi:schemaLoca...	http://www.wldelft.nl/fews http://fews.wldelft.nl/schemas/version1.0/parameters.xsd

parameterGroup (29)

	id	name	parameterType	unit	valueResolution	usesDatum	parameter
1	Height		instantaneous	m	0.001	true	parameter (6)
2	Discharge		instantaneous	m3/s	0.001		parameter (14)
3	Precipitation		accumulative	mm	0.0001		parameter (5)

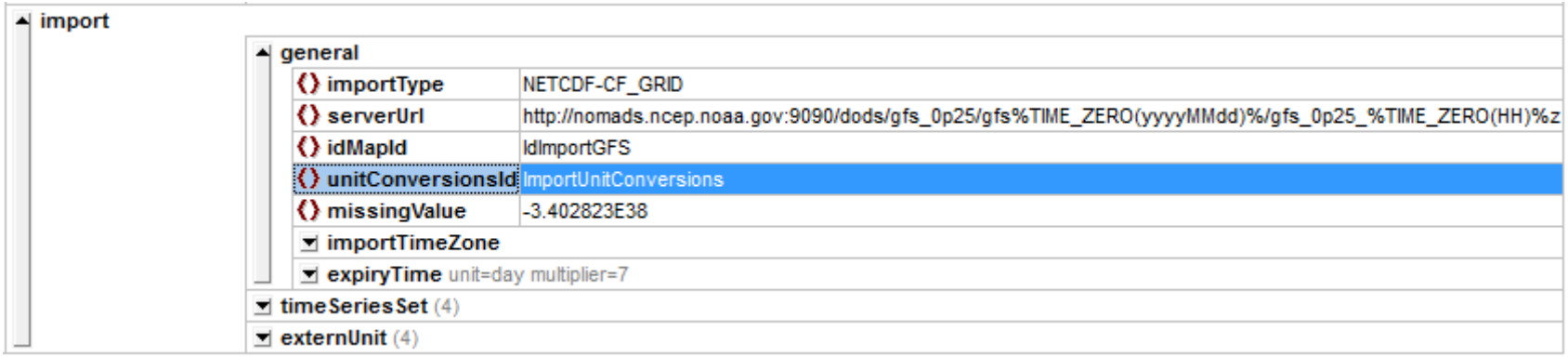
	id
1	PC.obs
2	PP.obs
3	PU.obs
4	PC.sim
5	PC.nwp

Parameters - Unit Conversion

- Units are a property of a parameter group
- While importing or exporting time series, units can be converted

- Unit conversion files are stored in the folder: *\Config\UnitConversionsFiles*
- One Delft-FEWS application can have multiple unit conversion files
- A module instance configuration file can reference a UnitConversion file

	inputUnitType	outputUnitType	multiplier	incrementer	convertDatum
1	mAOD	m	1	0	true
2	deg C	oC	1	0	
3	deg F	oC	0.5556	-17.7778	
4	K	oC	1	-273.15	
5	in	m	0.0254	0	



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Module Summary

- Locations are key in Delft-FEWS, to tie data to a specific location
- We create LocationSets to define groups of Locations, to process or display them together.
- The LocationSets are often built from csv and shapefiles, and can be further defined using the attribute metadata.
- Parameters are defined and registered in the Parameters.xml
- If you ever use a Location or Parameter defined, you'll immediately get an error. This is very useful for debugging.

Additional Resources

- Google “Delft-FEWS WIKI”
- Google “Delft-FEWS Configuration Guide”
- Google “Delft-FEWS Forum”
- Email fews-pm@Deltares.nl

Next Steps

- In this module, we learned Locations and Parameters are essential for identifying data.
- In the coming module, we'll look at the complete Timeseries Definition
- These timeseries are the identifiers for data in Delft-FEWS
- When you learn how to use them, you can identify, process and display data.
- Or send it to your model!