Selection Grid Ensemble Member by Index

Description

Select a grid ensemble member based on a scalar index.
Use case: Produce a relevant flood map based on the current forecast for e.g. water level. Starting point is a number of pre-computed flood maps for different forecast conditions. In an operational setting, you select the relevant flood map, based on the current forecast (water level, rainfall etc.).

Input

This selection ensemble member by index transformation takes two inputs.

- Grid time series with different ensemble members (variable needs to have read complete forecast as readWriteMode, timeSeriesType can be temporary)
- Scalar time series, with ensemble indices as values

Since the input is both a SCALAR and a GRID, the headers cannot be matched based on location id (as the scalar and grid will have different location ids). Instead of the transformation framework automatically matching input and output (based on identical location id) the transformation matches all possible input headers with the output.
Therefore, **the transformation can only be run using a single location (and not a location set).**

Output

- Grid time series

The output time is determined by the time of the indices input.
The output grid is the grid ensemble member that corresponds to the input index.

Options

Because the time of the output time series is determined by the time of the ensemble member indices, it can happen that the input grids do not have data at the given time.
Therefore, the transformation has an optional parameter:

- matchInputAndOutputGridTimes (default is false)
  - If set to false, and the exact time step is unavailable in the grid input series, the first available grid data of the given ensemble member will be written to the output.
  - If set to true, the output will only be filled if the data is available for the exact time.

Some notes as to behavior

- Missing values in the index time series result in missing values in the output time series.
- Index values for which no matching ensemble member is found result in missing values in the output time series
- inputTimeSeriesGrids requires read complete forecast as readWriteMode

Use case: select a pre-calculated flood map based on a water level forecast

This use case is provided as an example, to inspire your own use and configuration choices.

Preparation steps:

- outside of Delft-FEWS: Create (interpolated) flood maps for the required water level granularity (e.g. every 5cm).
  - Ensure the corresponding water level is in the file name of the flood map (e.g. floodmap_1005cm.nc)
- Import the flood map library in Delft-FEWS as an ensemble
  - Create ensembleMemberIds based on the file name with the option fileNameEnsembleMemberIndexPatter (see Import Module configuration options#fileNameEnsembleMemberIndexPattern)
    In our example the file floodmap_1005cm.nc would get ensembleMemberId 1005
  - You can choose to use importType NETCDF-CF_GRID_REFERENCES (see NETCDF-CF_GRID#Importofmetadataand(OpenDAP) gridreferences(since2019.02))

Operational steps:

- Convert water level forecast to index, using a lookup transformation with a coefficientSetFile (see Simple#Coefficientset)
  - In the example the conversion is a simple as converting a water level forecast of 10.05 (m) to an index of 1005 (-)
- Select the corresponding flood map with this gridEnsembleMemberByIndex selection transformation.
  - In the example the index value of 1005 would select the grid with ensembleMemberId 1005, which is floodmap_1005.nc

XML example

```xml
<transformation id="ensembleLookup">
      <selection>
         <gridEnsembleMemberByIndex>
            <inputEnsembleIndices>
               <variableId>InputIndex</variableId>
            </inputEnsembleIndices>
            <inputTimeSeriesGrids>
               <variableId>InputGrids</variableId>
            </inputTimeSeriesGrids>
            <output>
               <variableId>Output</variableId>
            </output>
            <matchInputAndOutputGridTimes>false</matchInputAndOutputGridTimes>
         </gridEnsembleMemberByIndex>
      </selection>
   </transformation>
</transformationModule>
```