

Tatum Coefficient Routing (TATUM) Model

1. Description of Algorithm

<https://vlab.ncep.noaa.gov/documents/207461/1893022/24tatum.pdf>

2. Model Parameters

TATUM uses an XML representation of model parameters where each parameter is captured within a separate XML tag. The tags are closely related to the NWSRFS definition of TATUM defined at:

<https://vlab.ncep.noaa.gov/documents/207461/1893022/533tatum.pdf>

The table below shows the available parameter tags. The sequence of parameters in the table below or in the xml file has no any significance.

Name	Type	Required [Yes/No]	Comment
GENERAL_INFO	String	Yes	General heading information for this Operation
TS_INFLOW_ID	String	Yes	Internal identifier for the inflow time series
TS_INFLOW_TYPE	Integer	Yes	Data type code for the inflow time series
TS_INFLOW_TIME STEP	Integer	Yes	Data time interval for the inflow time series
TS_OUTFLOW_ID	String	Yes	Internal identifier for the outflow time series (blank if routing at a point)
TS_OUTFLOW_TYPE	String	Yes	Data type code for the outflow time series (blank if routing at a point)
TS_OUTFLOW_TIMESTEP	Integer	Yes	Data time interval for the outflow time series (blank if routing at a point)
NUMBER_OF_LAYERS	Double	Yes	Number of layers
LAYER_COEFFICIENTS	Table	Yes	Number of Tatum coefficients for each layer

LAYER_COEFFICIENTS_#	Table	Yes	# represent the layer number for instance 1, 2, LAYER_COEFFICIENTS_1, LAYER_COEFFICIENTS_2
LAYER_UPPER_LIMIT_FLOW	Table	Yes	Upper limit of flow for each layer beginning with the bottom layer (CMS)

Sample Parameters xml file:

```

<parameter id="TS_OUTFLOW_TIMESTEP">
  <intValue>6</intValue>
</parameter>
<parameter id="TS_INFLOW_ID">
  <stringValue>DARNC</stringValue>
</parameter>
<parameter id="TS_OUTFLOW_ID">
  <stringValue>DARNCRTD</stringValue>
</parameter>
<parameter id="NUMBER_OF_LAYERS">
  <intValue>1</intValue>
</parameter>
<parameter id="LAYER_COEFFICIENTS_1">
  <table>
    <columnTypes A="double"/>
    <row A="0.0"/>
    <row A="0.3"/>
    <row A="0.5"/>
    <row A="0.2"/>
    <row A="0.0"/>
  </table>
</parameter>
<parameter id="LAYER_COEFFICIENTS">
  <table>
    <columnTypes A="double"/>
    <row A="5.01"/>
  </table>
</parameter>
<parameter id="TS_INFLOW_TIMESTEP">
  <intValue>6</intValue>

```

```

</parameter>
<parameter id="GENERAL_INFO">
  <stringValue>ROUTE DARNC TO RESV</stringValue>
</parameter>
<parameter id="CARRYOVER_FLAG">
  <intValue>1</intValue>
</parameter>
<parameter id="TS_OUTFLOW_TYPE">
  <stringValue>SQIN</stringValue>
</parameter>
<parameter id="TS_INFLOW_TYPE">
  <stringValue>QINE</stringValue>
</parameter>

```

3. Model States

TATUM model states are defined in a property file format. An example is shown below. The model state property names are:

Property Name	Description
LAYER1 ¹ _FLOW#0 ²	Initial carryover for a layer (CMS).
UNIT	Units for State Variables (always METRIC)

An example is shown below.

```

LAYER1_FLOW#0=100.000000
LAYER1_FLOW#1=100.000000
LAYER1_FLOW#2=100.000000
LAYER1_FLOW#3=100.000000
UNIT=METRIC

```

4. Model Time Series

TATUM requires 1 input time series and 1 output time series

Time Series Type	Internal Model Units	Time Step	Input or Output	Missing Values Allowed	Required [Yes or No]
Inflow	CMS	any	Input	No	Yes
Outflow	CMS	<u>1</u>	Output	Yes	Yes

1/ Must be greater than or equal to the data time interval of inflow time series.

¹ Flow values for each layer are represented using the keyword "LAYERX_FLOW" (where X corresponds to the layer number) and an index.

² The indices start from 0, and increment by 1 for each coefficient (where the number after the '#' represents the coefficient number)

5. Notes about configuring Model in FEWS workflow

Examples:

Module Configuration File

[ModuleConfigFiles\TATUM_OTMI4_EDYRTD_Forecast.xml](#)

Module Parameter File

[ModuleParFiles\TATUM_OTMI4_EDYRTD_UpdateStates.xml](#)

6. FEWS Adapter Used

The Tatum model uses the OHDFewsadapter to communicate. Information about this adapter can be found at [OHDFewsadapter](#).