

Outline of some new features for SHOP

ECCC,CMC,CMDE

Luis Morales, Dorothy Dunford

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Overview I

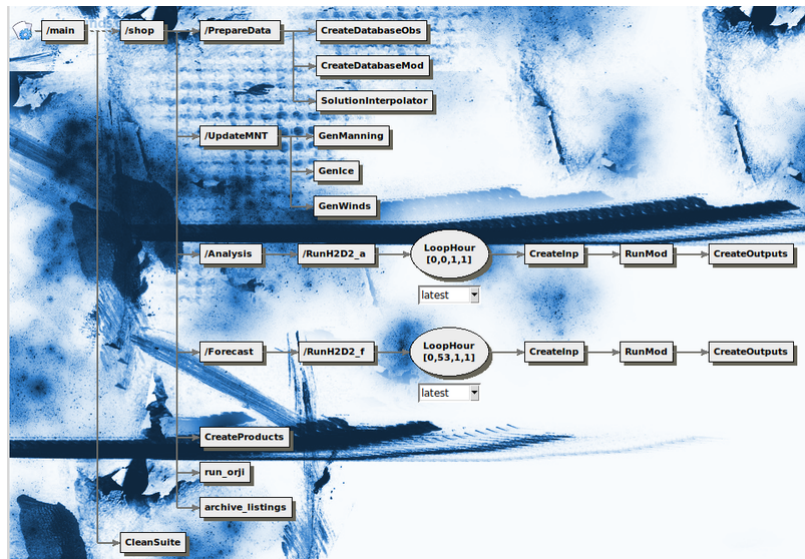
The model has two main components:

- ▶ Analysis cycle:
 - ▶ Launch every 6h (from 00 to 18:00)
 - ▶ Run in steady-state mode. Estimate average hydraulic variables in the last 24h.
 - ▶ Initial conditions: The model is initialized with the average hydraulic variables estimated 24h ago.
 - ▶ Boundary conditions: Used observed hydraulic variables averages in the last 24h. Source of data: hydrometric data (CanHyS); water levels (SJR); wind data (HRDPS)
 - ▶ Domain: St. Lawrence river from Montreal to Trois-Rivieres.

Overview II

- ▶ Forecast cycle:
 - ▶ Launch every 6h
 - ▶ 54h forecast (6h analysis + 48h forecast)
 - ▶ I.C. and B.C. for the 6h analysis, see below (the analysis cycle is embedded in the forecast cycle for a different domain!)
 - ▶ Initial conditions for the 48h forecast: The model is initialized with the output of the previous 6h analysis cycle.
 - ▶ Boundary conditions for the 48h forecast: from: Water Cycle Prediction System, SPINE, and HRDPS (wind fields)
 - ▶ Domain: St. Lawrence river from Carillon and Beauharnois to Saint-Joseph-de-la-Rive.

Maestro's model structure I



Maestro's model structure II

Main Maestro's modules under `/shop` (root module)

- ▶ `/PrepareData:`
 - ▶ `CreateDatabaseObs`
 - ▶ `CreateDatabaseMod`
 - ▶ `SolutionInterpolator`
- ▶ `/UpdateMNT:`
 - ▶ `GenManning`
 - ▶ `Genice`
 - ▶ `GenWinds`
- ▶ `/Analysis`
- ▶ `/Forecast`

both `/Analysis` and `/Forecast` include this module
`/RunH2D2` and these tasks: `LoopHour[]` `CreateInp` `RunMod`
`CreateOutputs`
Other tasks include: `CreateProducts` `CleanSuite`

We propose: I

Organize the code into:

- ▶ Pre-processing (`/PrepareData`, `/UpdateMNT`)
 - ▶ Data clean-up and harmonization
 - ▶ Set boundary conditions
 - ▶ Data extraction system for multiple domains and set-ups.

We propose: II

- ▶ Post-processing (`CreateProducts CleanSuite`)
 - ▶ Data and visualization products.
 - ▶ Conversion of output data (e.g. `NetCDF`)
 - ▶ Data validation and model assessment performance
 - ▶ Output data interpolation into `mgrid`

Currently working on ...

Toolbox design for model validation and assessment of model performance:

- ▶ Collect, clean-up and harmonize observed data (water level, flow velocity, streamflow) at multiple locations.
- ▶ Define performance metrics
- ▶ Assessment of model uncertainty