SET UP VIC

ERT 474/574

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Overall workflow for running VIC & mizuRoute

ERA5 data: *ERA5.01205500.regrid.**2011_2024**.nc (UB Box)*

1_prep_met_forcing.from_era5.py

Input forcing: *ERA5.01205500.**YEAR**.regrid.nc*

Met forcing | Domain file | Parameter file

Domain file: *namerica_domain.01205500.nc (UB Box)*
Parameter file: *namerica_params.01205500.update.nc (UB Box)*

Specify the path and filenames in the config file

VIC configuration file

Config: modify *basin.template.global (Github)*

VIC
vic_image.exe

OUT_RUNOFF
OUT_BASEFLOW

Output file: *fluxes.1990-01-01.nc*

sum_up_runoff.ipynb
Input: *fluxes.1990-01-01.nc*
Output: *runoff.1990-01-01.nc*

***01205500**: Site ID (USGS)*
***73004474**: HRU ID for the outlet of the basin*

Total Runoff: *runoff.1990-01-01.nc*
Spatial weight: *spatialweights_gly606_01205500_73004474.nc (UB Box)*
River topo: *ntopo_MERIT_Hydro_v0.01205500_73004474.nc (UB Box)*

Total Runoff | Spatial weight

River topo file | *param.nml.default*

Spatial weight, river topo file, and *param.nml.defacult* **MUST** be stored in the same directory

Specify the path and filenames in the config file

mizuRoute
route.exe

mizuRoute configuration file

Streamflow

Step 0: Download all necessary files to local machine

- I would recommend using the desktop
- All input files are shared with you on UB Box (ERT574_Fall25)
  - shp
  - met_data
  - vic_data
  - Mizuroute_ancilliary
- You would only need to download the data for your target domain.

Step 1: Create a model run folder

- **cd** /workspaces/homework_<id>/project_submission
- **mkdir** vic mizuroute
- **cd** vic
- **mkdir** met_data config param state output output/log

Example folder structure

- vic
  - met_data
  - config
  - param
  - state
  - output
    - log
- mizuroute

Step 1-1: Update the .gitignore

Edit this following file:

`/workspaces/homework_yifan/.gitignore`

We will need to add the following line

`project_submissions/vic/met_data/`

```
157   # PyCharm
158   #  JetBrains specific template is maintaine
159   #  be found at https://github.com/github/gi
160   #  and can be added to the global gitignore
161   #  option (not recommended) you can uncomme
162   #.idea/
163
164   project_submissions/vic/met_data/
```

We do not want github to track this file because they are too large!

Step 2: Move files to the targeted folders

- vic/param
  - **namerica_domain.<siteid>.nc**
  - **namerica_params.<siteid>.nc**
- vic/config
  - **basin.template.global**
- vic/met_data
  - **ERA5.<siteid>.2011_2024.nc**

We need to replace the entire string including the bracket with the targeted site ID. For example, for the basin with site ID *01205500*, the domain file would be

namerica_domain.01205500.nc

basin.template.global is located in Github: **CourseMaterials25/ final_project/vic_config_template**

Step 3: Prepare meteorological forcing data

first step aims to calculate the required variables with correct units as VIC input

```
mv
/workspaces/CourseMaterials/final_project/met_prep_python_code/1_prep_met_forcin
g.from_era5.py /workspaces/homework_yifan/project_submissions/vic/met_data
```

- `python` **`1_prep_met_forcing.from_era5.py`** `<#1_site_id> <#2_era5_met_dir> <#3_vic_met_dir>`

In this case, <#2> and <#3> are both

```
/workspaces/homework_yifan/project_submissions/vic/met_data
```

This script is located in Github: **CourseMaterials25/final_project/met_prep_python_code**

Step 4: Prepare configuration file

- `cd /workspaces/homework_yifan/project_submissions/vic/config`
- `cp basin.template.global basin.<siteid>.global`
- `vim basin.<siteid>.global`
  - <STARTYEAR> 2011
  - <ENDYEAR> 2024
  - <SITEID> 01205500
  - <FORCING_DIR> /workspaces/homework_yifan/project_submissions/vic/met_data

Example input values

If you followed the folder structure as I suggested, you only need to modify the four types of placeholders on the left.

Otherwise, you will need to make sure that the configuration file contains the correct path to 1) the domain file and 2) the parameter file.

You may need to replace each type of placeholder multiple times.

`basin.template.global` is located in Github: **CourseMaterials25/ final_project/vic_config_template**

Step 5: Run the model

- `cd /workspaces/homework_yifan/project_submissions/vic/config`
- `/workspaces/VIC/vic/drivers/image/vic_image.exe -g basin.<siteid>.global`

Step 6: Add Surface Runoff and Baseflow

- An example script to add up the runoff and baseflow from the VIC model is available here.
- https://github.com/OS-Hydro-Analytics-Fall-2025/CourseMaterials25/blob/main/final_project/vic_postprocess/sum_up_runoff.ipynb
- You will need to change this script to fit your purposes.

Model spin-up

- The land surface model “spin-up” process is used to generate a reasonable initial state from which the model can proceed.
- For example, if we want to conduct a 10-year model spin-up and our official model run to start from **2010-01-01**. How should we set up?