

# Disseminating CONUS National Water Model Simulation Data at Watershed Scales to Engage a Broad Community of Water Scientists

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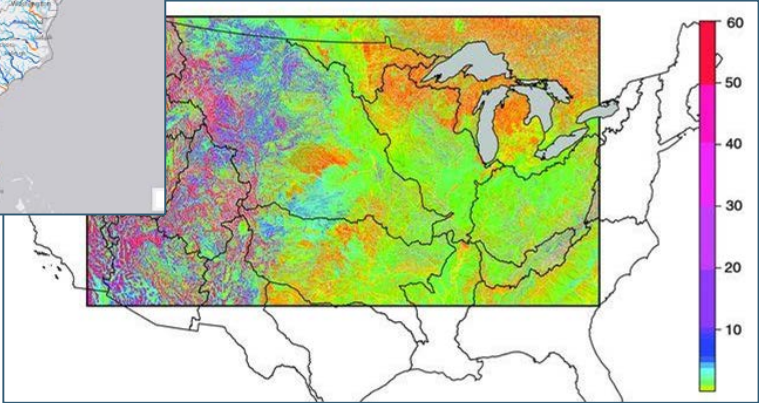
# CONUS Models

## OWP/NOAA National Water Model



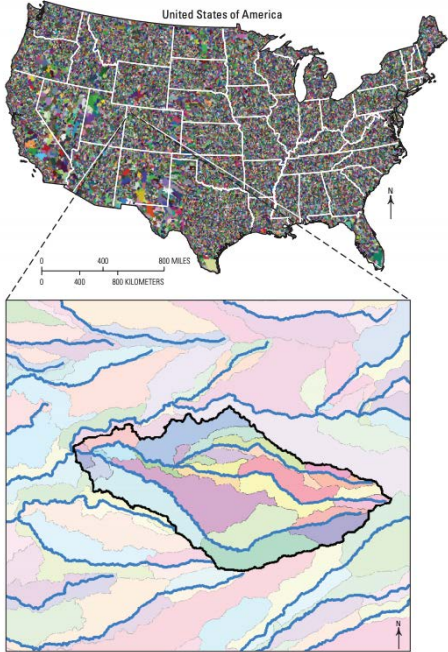
*water.noaa.gov*

## ParFlow-CONUS



*Maxwell & Condon, 2016*

## USGS National Hydrologic Model



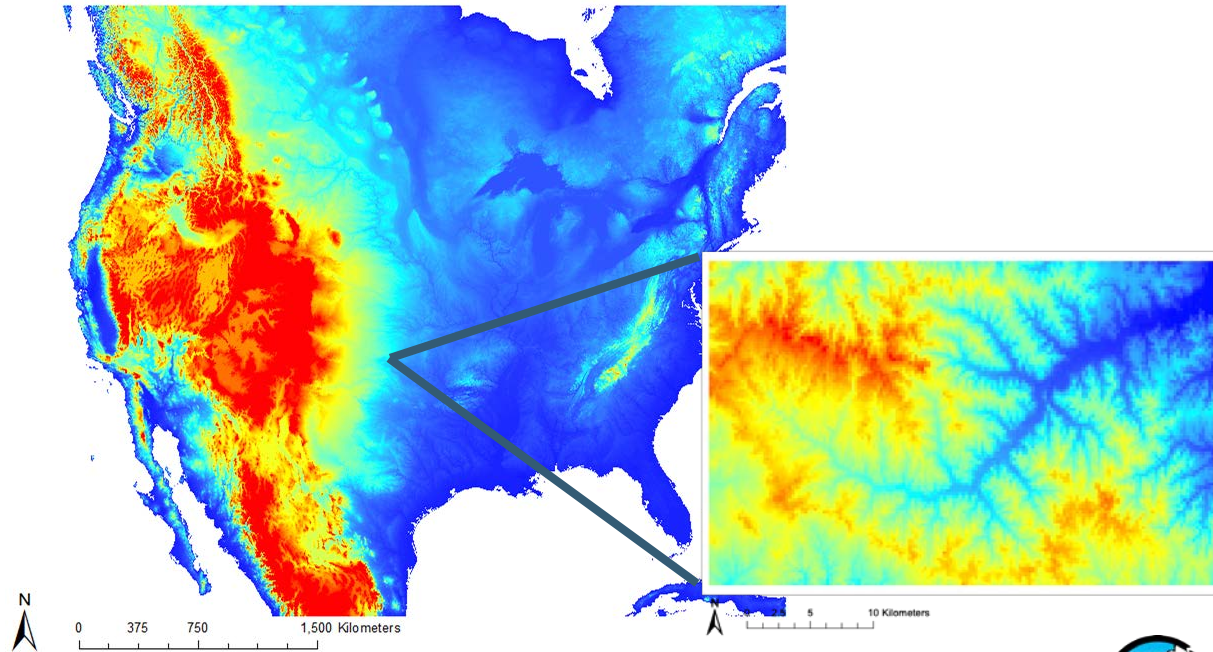
*Regan et al., 2018*



# Project Goal

## Improve community access to CONUS-scale model domains

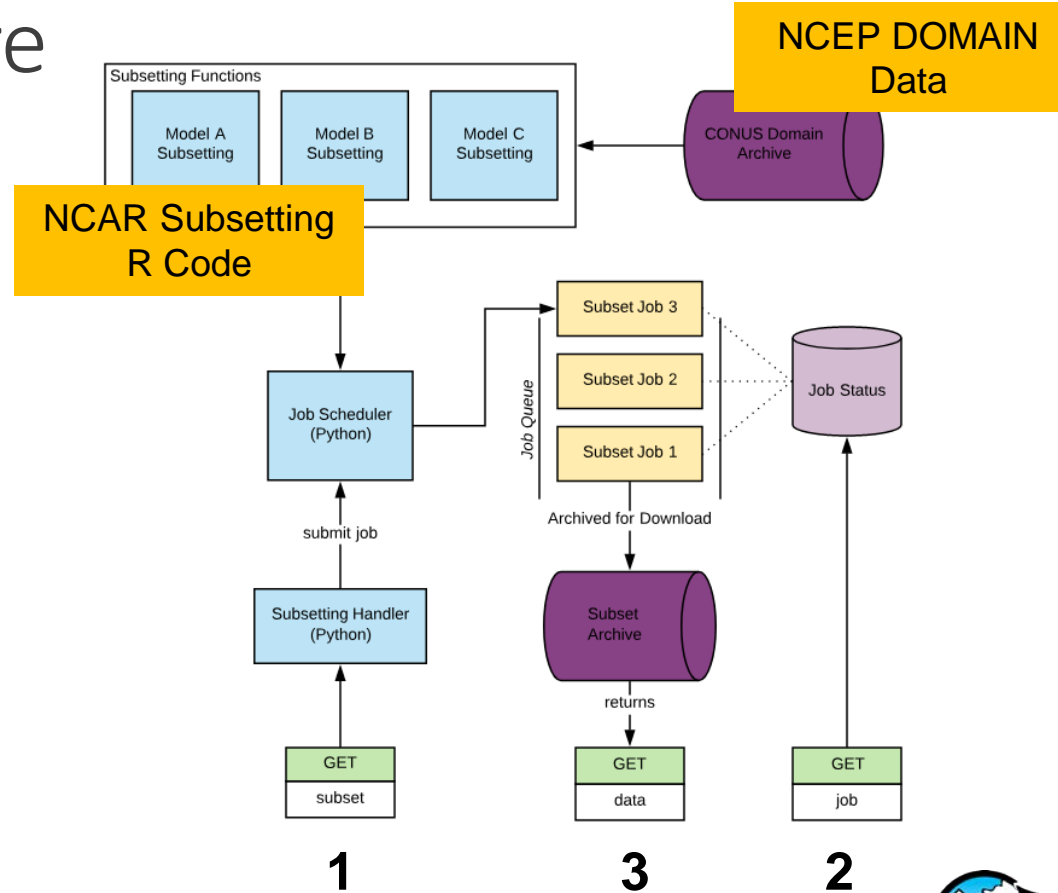
- Subset at watershed scales
- Supporting multiple models
- Community contribution



# Software Architecture

## Web Service Methods

1. Domain Subset
  - Version
  - Model Name
  - Bounding Box
2. Job Status
  - Job ID
3. Data Download
  1. Job ID



# Software Implementation

Domain Subsetter: NWM v1.2.2

⋮

⚠ BETA

Your data can be downloaded using the following URL:

<http://subset.cuahsi.org:8080/data/494d240a9a5ea6d3cdd150d2058b8ed91d905eb2.tar.gz>

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## DOMAIN files we provide

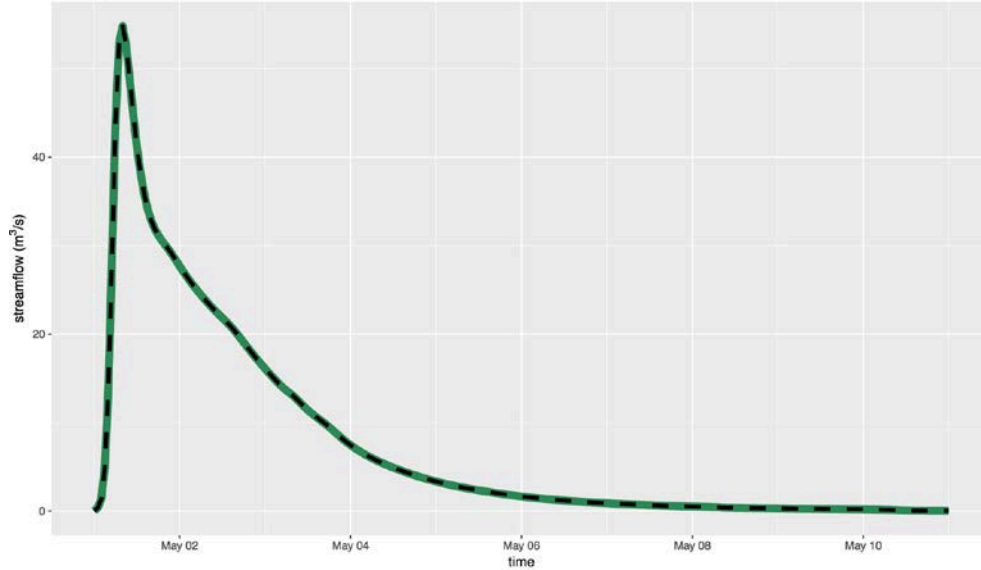
```
707db5e2e0045957eda4c14d44e587888a4c85db
├── Fulldom_hires.nc
├── GEOGRID_LDASOUT_Spatial_Metadata.nc
├── GWBUCKPARAM.nc
├── README.md
├── Route_Link.nc
├── geo_em.d01.nc
├── hydro2dtbl.nc
├── params.txt
├── script_forcing_subset.txt
├── soil_properties.nc
├── spatialweights.nc
└── wrfinput_d01.nc
```

```
├── example_run
│   ├── CHANPARAM.TBL
│   ├── DOMAIN
│   ├── FORCING
│   ├── GENPARAM.TBL
│   ├── hydro.namelist
│   ├── HYDRO.TBL
│   ├── MPTABLE.TBL
│   ├── namelist.hrlas
│   ├── SOILPARAM.TBL
│   └── wrf_hydro.exe ->
```

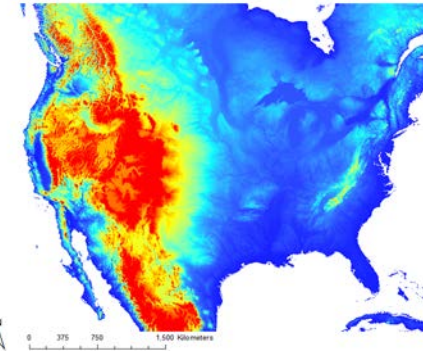


# Testing and Validation

NWM CONUS vs Subset – Little Washita  
Cold Start Run, WRF-Hydro v5.0.3  
COMID: 687397

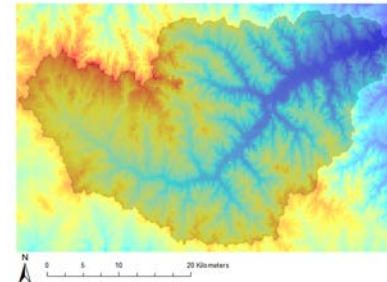


## NWM CONUS



x = 4608 km  
y = 3840 km  
~ 30 Gb

## Little Washita



x = 160 km  
y = 104 km  
~ 70 Mb



# Real-world Use Case - Zhiyu “Drew” Li (BYU)

- Is it possible to reproduce operational analysis results?
- Subsetting DOMAIN and archived FORCING
- Implemented in the HydroShare NWM Viewer

```
707db5e2e0045957eda4c14d44e587888a4c85db
├── Fulldom_hires.nc
├── GEOGRID_LDASOUT_1_Metadata.nc
├── GWBUCKPARAM.nc
├── README.md
├── Route_List
├── geo_em
├── hydr
├── pa
├── ...ng_subset.txt
├── ...rties.nc
├── sp...eights.nc
├── wrfinput_d01.nc
```

**DOMAIN**

```
2017120100.LDASIN_DOMAIN1
2017120101.LDASIN_DOMAIN1
2017120102.LDASIN_DOMAIN1
2017120103.LDASIN_DOMAIN1
2017120104.LDASIN_DOMAIN1
2017120105.LDASIN_DOMAIN1
2017120106.LDASIN_DOMAIN1
2017120107.LDASIN_DOMAIN1
2017120108.LDASIN_DOMAIN1
2017120109.LDASIN_DOMAIN1
2017120110.LDASIN_DOMAIN1
2017120111.LDASIN_DOMAIN1
2017120112.LDASIN_DOMAIN1
```

**FORCING**

```
└─ example_run
  ├── CHANPARAM.TBL
  ├── DOMAIN
  ├── FORCING
  ├── GENPARAM.T
  ├── hydro.r
  ├── HYDR
  ├── MPT
  ├── ...rldas
  ├── ...TBL
  └── ...dro.exe ->
```

**RUN DIR**



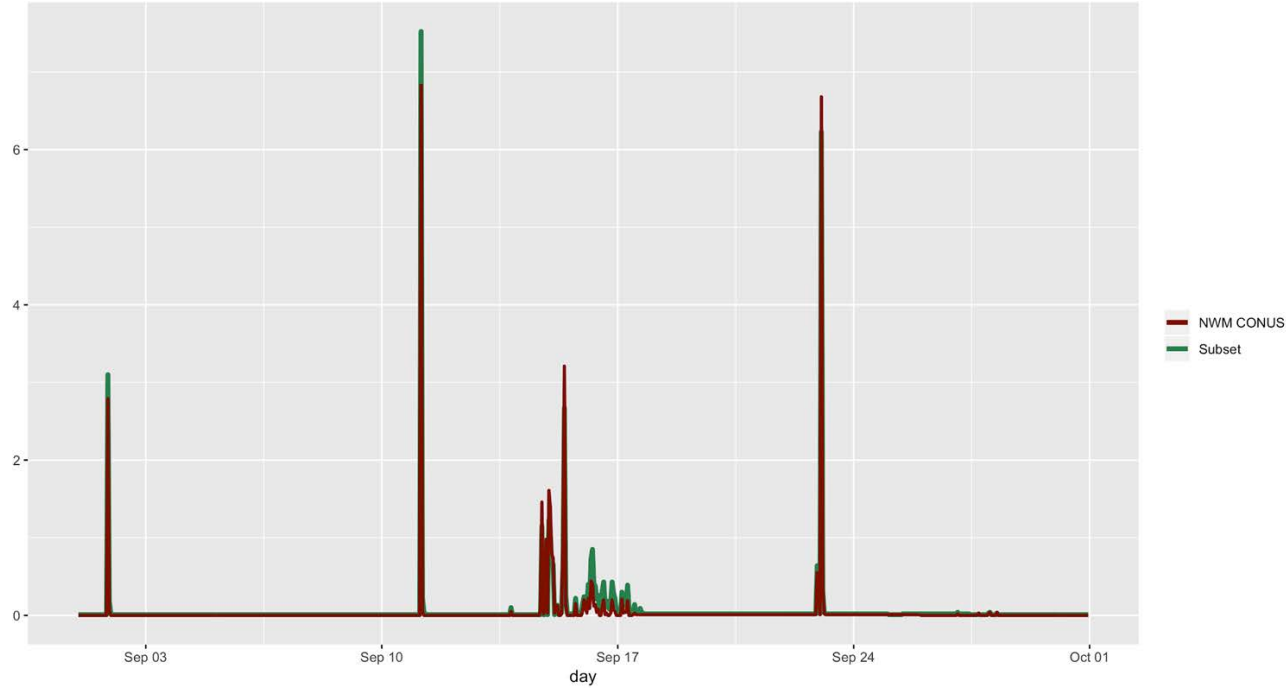
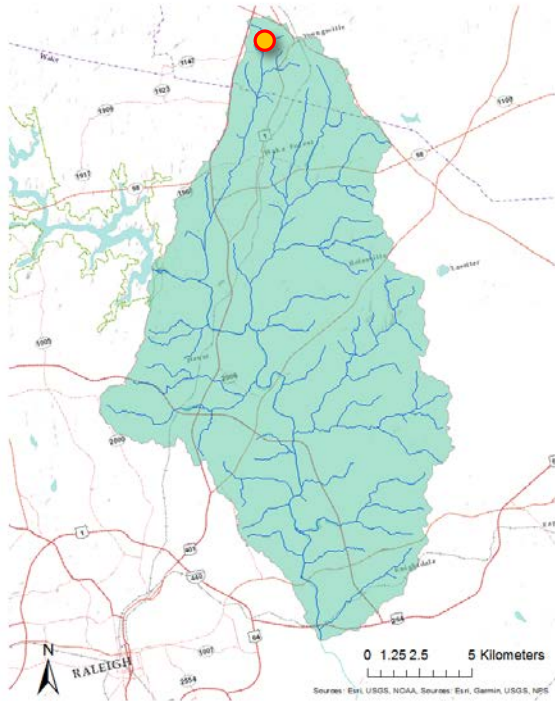
<https://hub.docker.com/r/wrfhydro/dev/>

[https://github.com/NCAR/wrf\\_hydro\\_nwm\\_public](https://github.com/NCAR/wrf_hydro_nwm_public)



# Milburnie, NC - Headwater

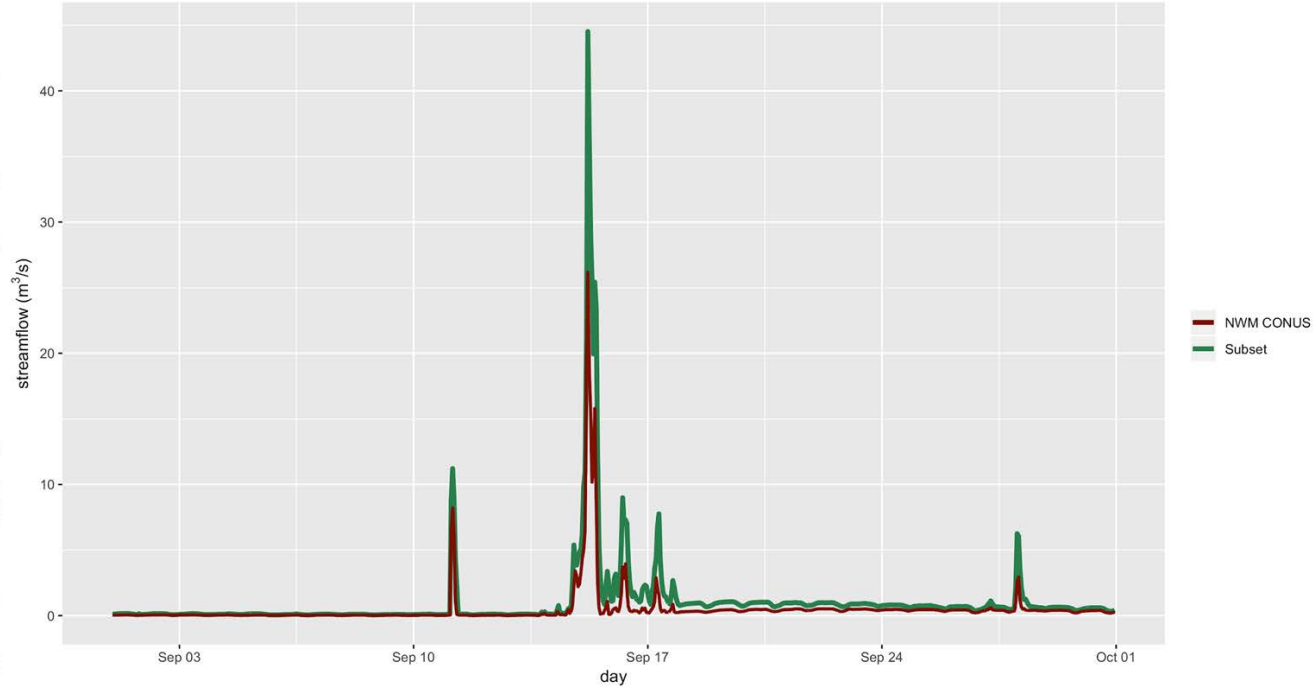
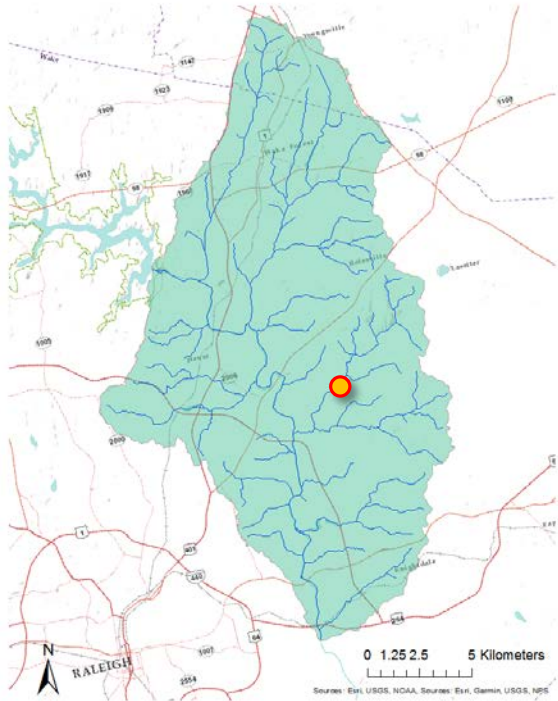
Operational NWM vs Subset - Hurricane Florence, Headwaters  
subset run with WRF-Hydro v5.0.3  
COMID: 8778051





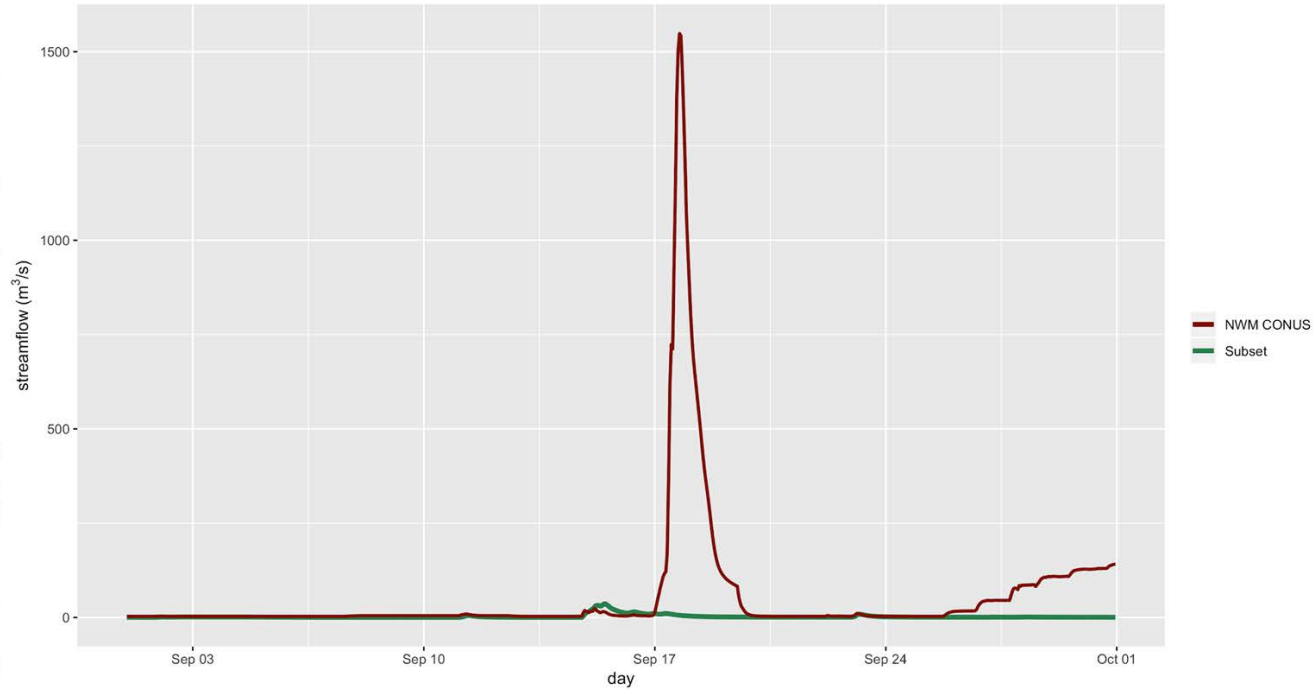
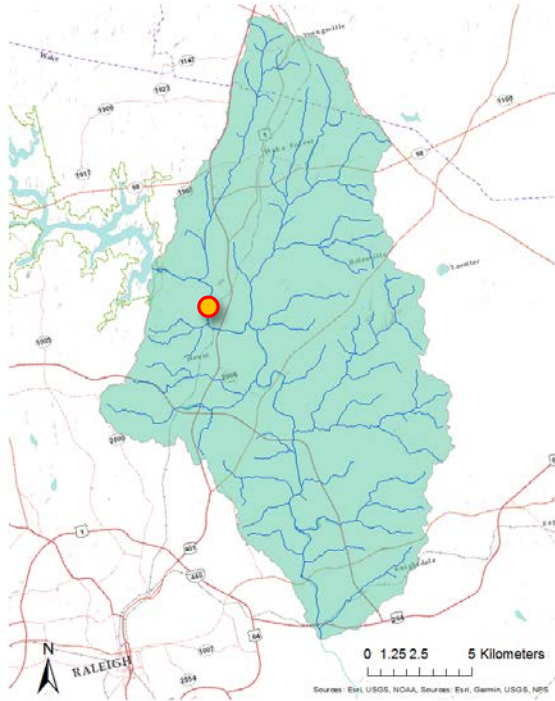
# Milburnie, NC – Lower Catchment

Operational NWM vs Subset - Hurricane Florence, Lower Reach of Headwaters  
subset run with WRF-Hydro v5.0.3  
COMID: 8786143



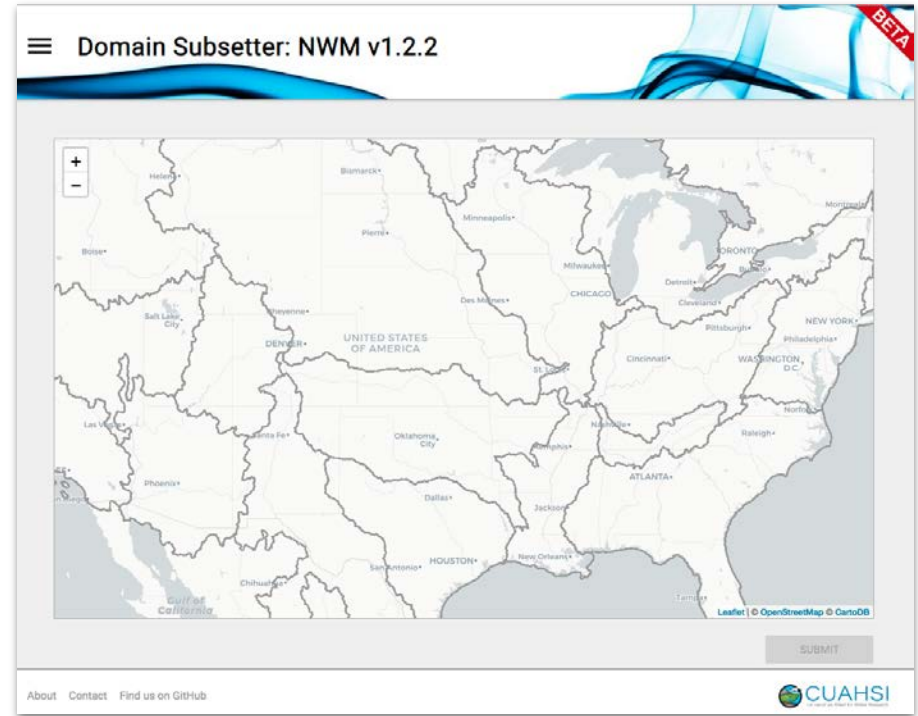
# Milburnie, NC - Upstream

Operational NWM vs Subset - Hurricane Florence, with upstream features  
subset run with WRF-Hydro v5.0.3  
COMID: 8782813



# Conclusions

- Publicly available service to make CONUS domains more accessible
- Designed to use pre-existing subsetting scripts
- Currently being integrated into other web applications, e.g. HydroShare NWM viewer
- Undergoing benchmarking and validation testing
- Extendable to other CONUS models



<http://subset.cuahsi.org:8080>



# Thank You

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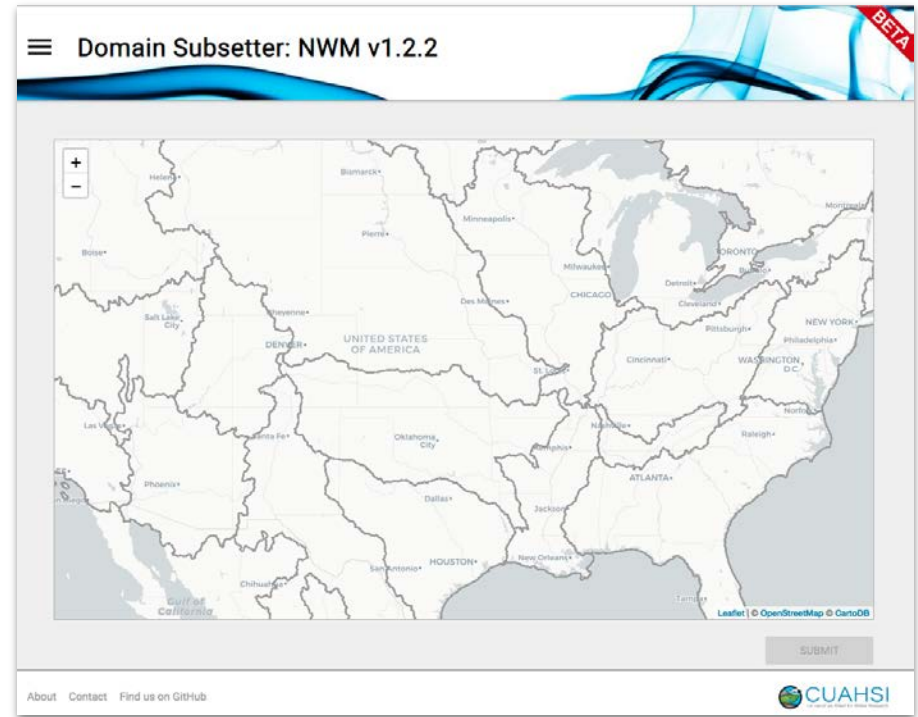
Arezoo Rafieeiniasab

Joe Mills

David Gochis



Zhiyu Li, IN41D-0865: Building Web Applications to Support the Execution of NWM at Watershed Scales (Thursday 8:00am-12:20am)



<http://subset.cuahsi.org:8080>

