

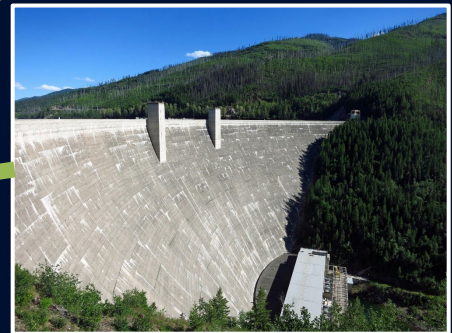
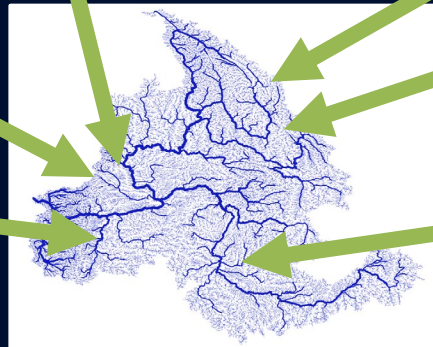
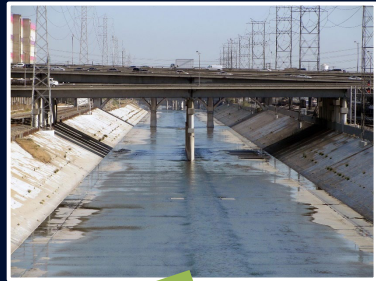
How does it work?

The Discharge Product

Mike Durand



Kevin Larnier



Pierre-Olivier Malaterre

Colin Gleason

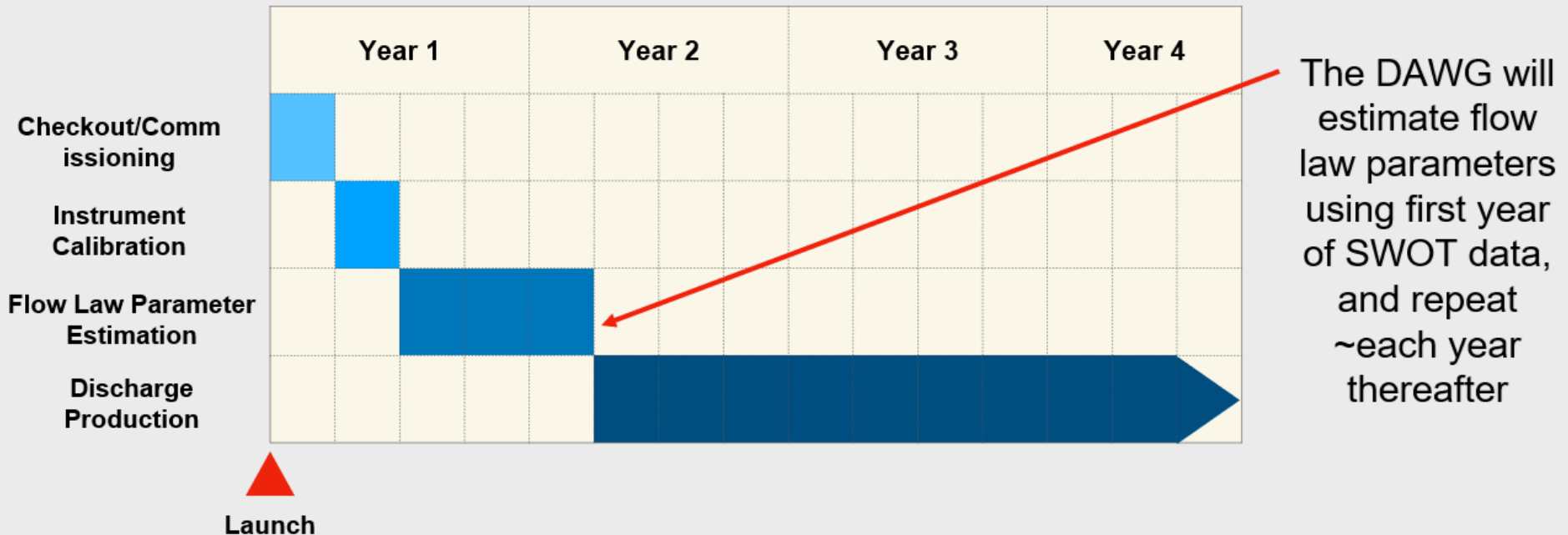
...and many, many, others

How does it work?

The Discharge Product

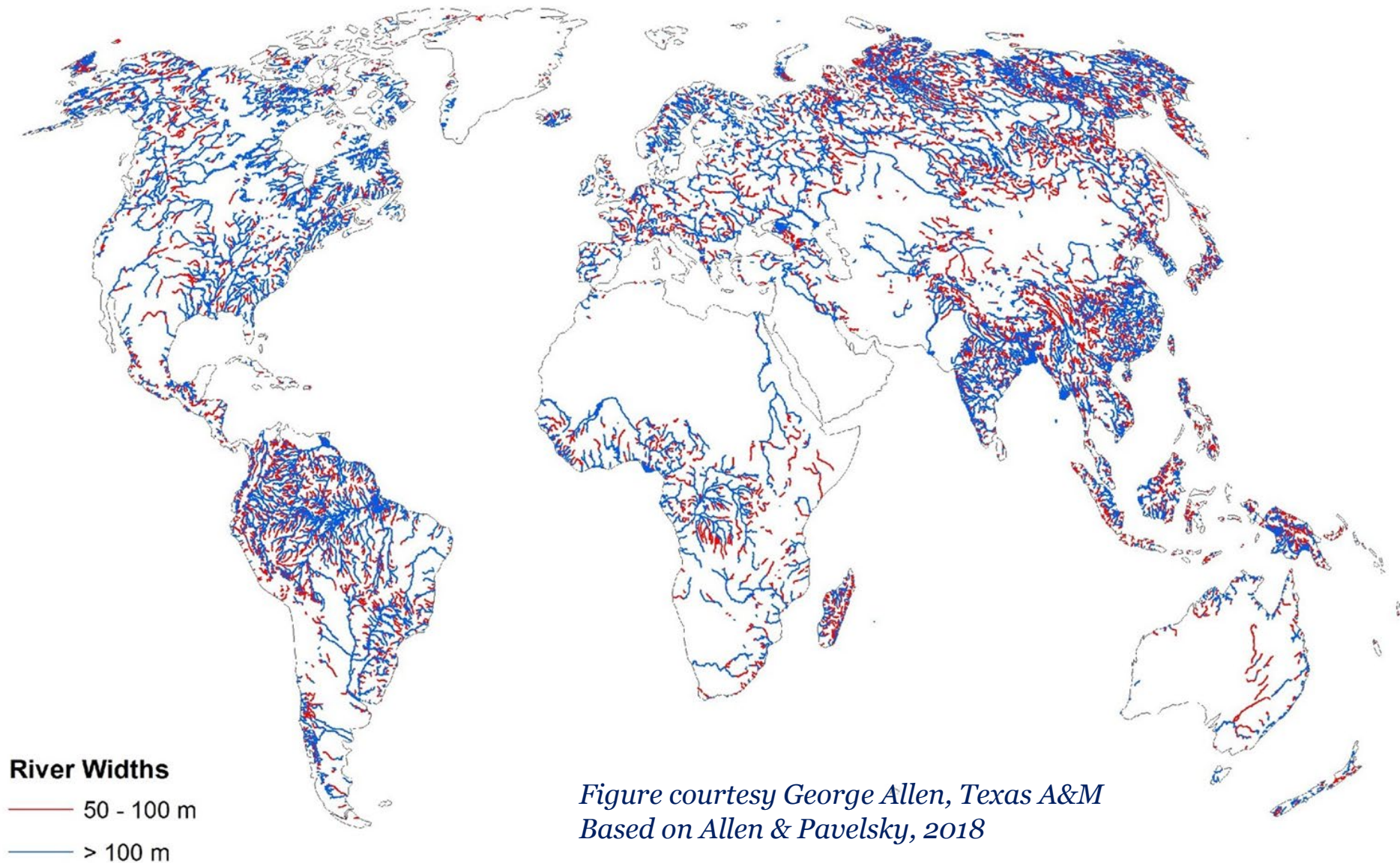
This is about what the DAWG *will do*,
not what it *could do*

What is our timeline?

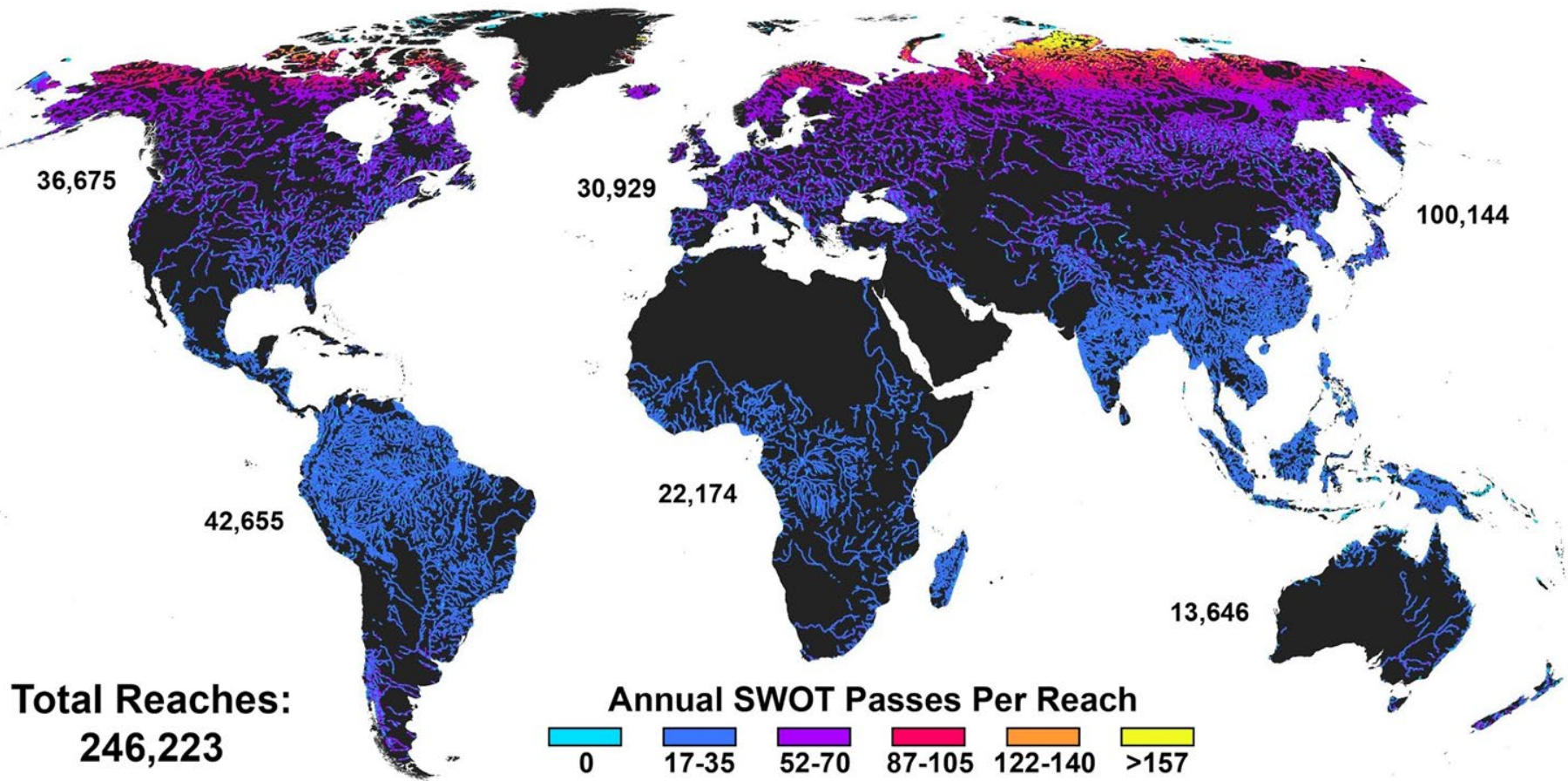


DAWG: Discharge Algorithm Working Group

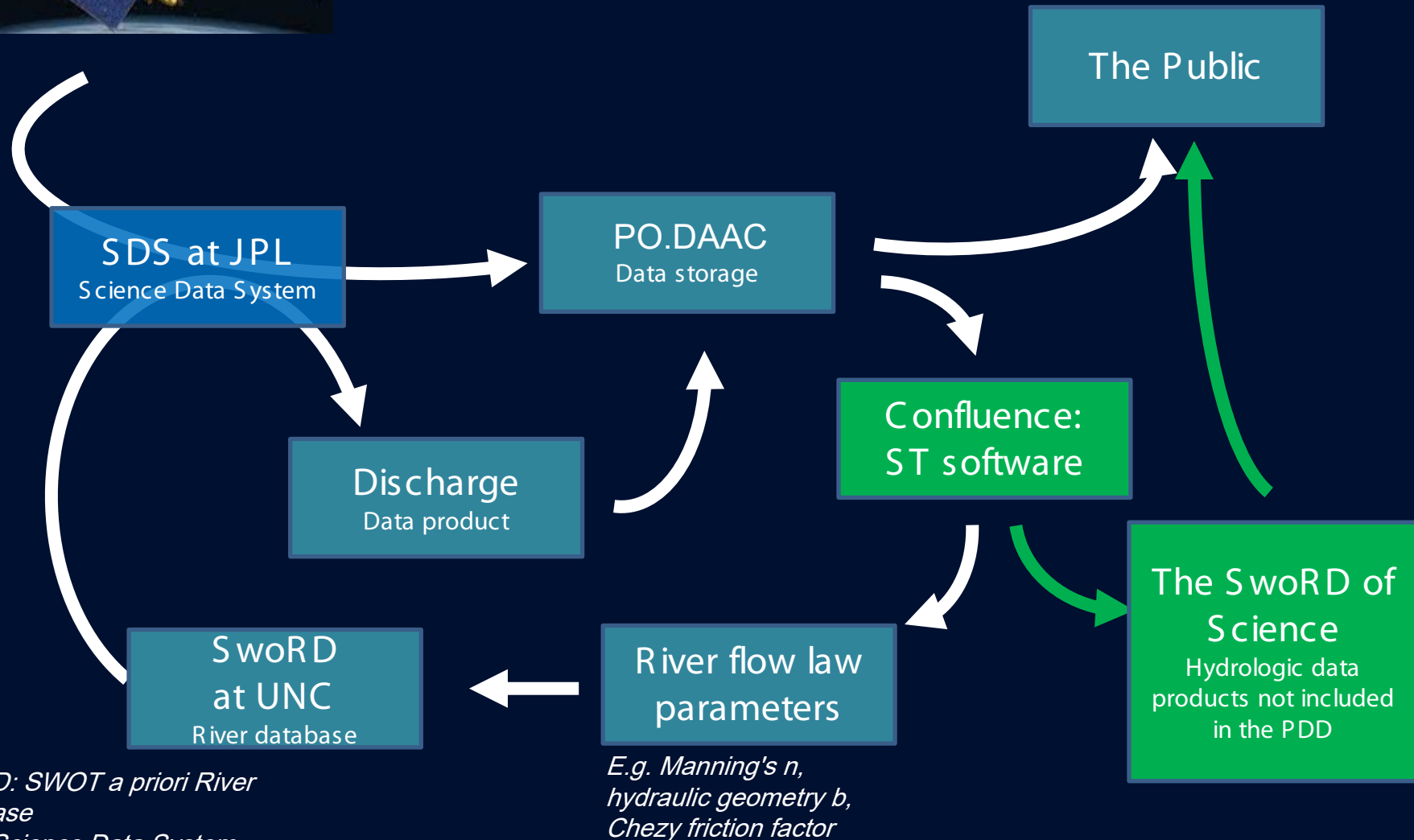
Where do we produce discharge?



How often do we produce discharge?



How do we produce discharge?



SwoRD: SWOT a priori River Database

SDS: Science Data System

ST: Science team

How does it work?

The ST is
responsible!!

Confluence: Module Data Flow

Height, width,
slope, dA, flags,
uncertainty **SWOT Obs**

Pass/cycle
transformed to
time series **Input**

Pull new prior data
and overwrite model
with gaged data **Priors**

Outlier filter, SWOT
flag filter, and missing
data treatment **Prediags**

Compare previous
to current with
realism check
Postdiags

Force mass
conservation and
define uncertainty
Integrator

FLPE
Calculate discharge
parameters and discharge
time series

Postdiags
Integrated vs. FLPE,
realism filter,
previous comparison

SDS discharge
computation and
consensus **Offline**

Compare to gages,
error stats,
hydrographs **Validation**

Store results and
upload to AWS **Output**

SWORD of
Science (SoS)
S3 bucket **SoS**

In the cloud, on
behalf of all the ST

“Confluence”

Confluence: Module Data Flow

Height, width,
slope, dA, flags,
uncertainty **SWOT Obs**

Pass/cycle
transformed to
time series **Input**

Pull new prior data
and overwrite model
with gaged data **Priors**

Outlier filter, SWOT
flag filter, and missing
data treatment **Prediags**

Compare previous
to current with
realism check
Postdiags

Force mass
conservation and
define uncertainty

Integrator

FLPE

Calculate discharge
parameters and discharge
time series

Postdiags
Integrated vs. FLPE,
realism filter,
previous comparison

SDS discharge
computation and
consensus **Offline**

Compare to gages,
error stats,
hydrographs **Validation**

Store results and
upload to AWS **Output**

SWORD of
Science (SoS)
S3 bucket **SoS**

We're behind on
adding other stuff
from e.g.
Jida/George and
Pascal

Algorithm	Theoretical basis	SWOT data	Method
geoBAM	Hydraulic geometry + Manning's eq.	Water surface width (W), slope (S), cross-sectional area anomaly (dA)	Bayes
MetroMan	Manning's eq. w/o Q	Water surface height (H), W, S, dA	Bayes
HiVDI	1D Saint-Venant + Manning's eq.	H, W, S, δA	Assimilation
SAD	Gradually varied flow + Manning's eq. + hydraulic geometry	H, W, S	Assimilation
SIC4DVAR	1D Saint-Venant	H,W,S	Assimilation
MOMMA	Empirical form of Manning's eq.	H, W, S	Calibration

How accurate is it?

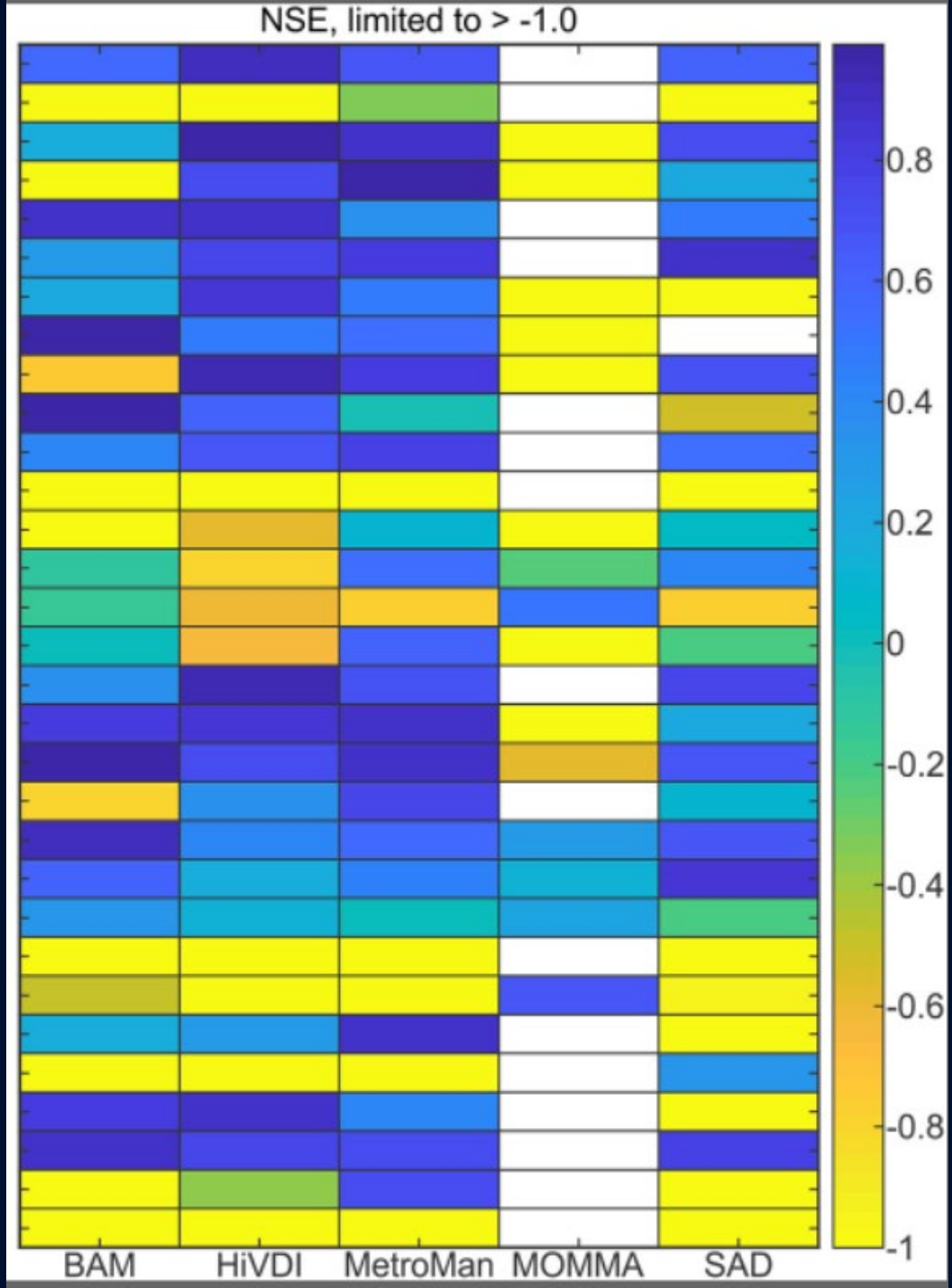
Blue= good

Yellow= not good

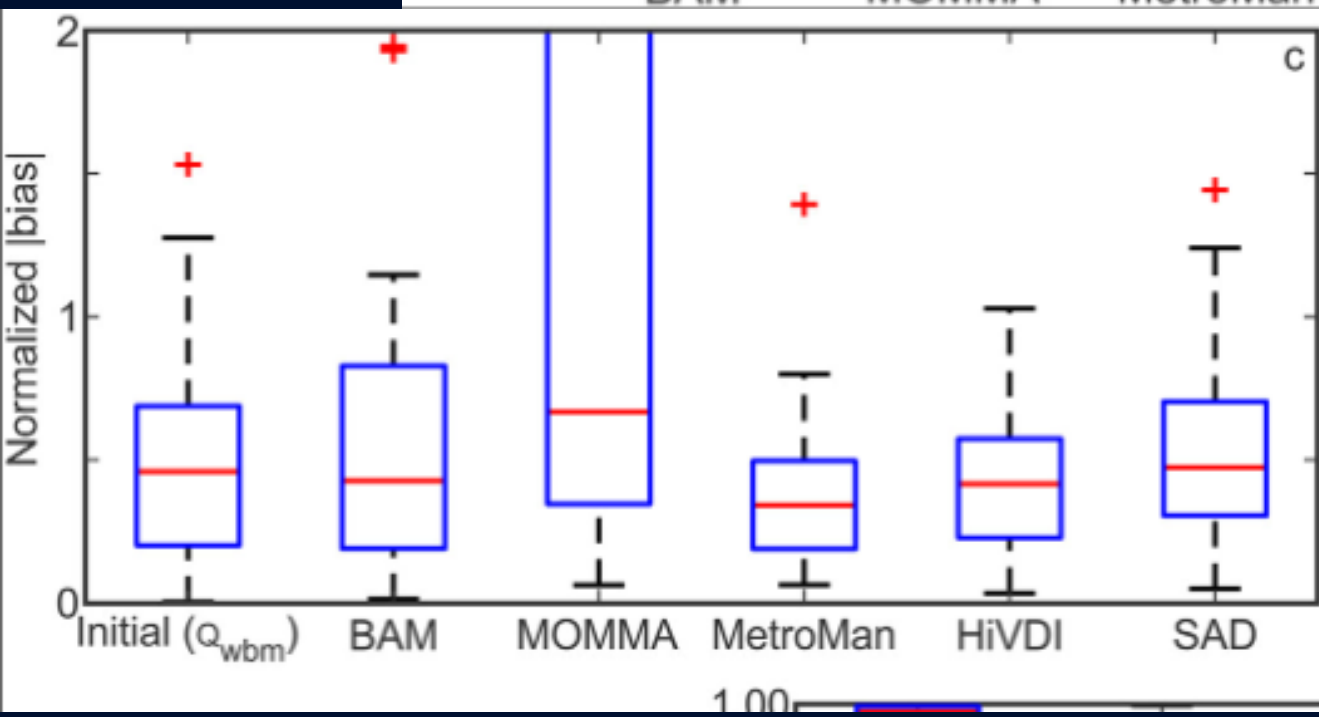
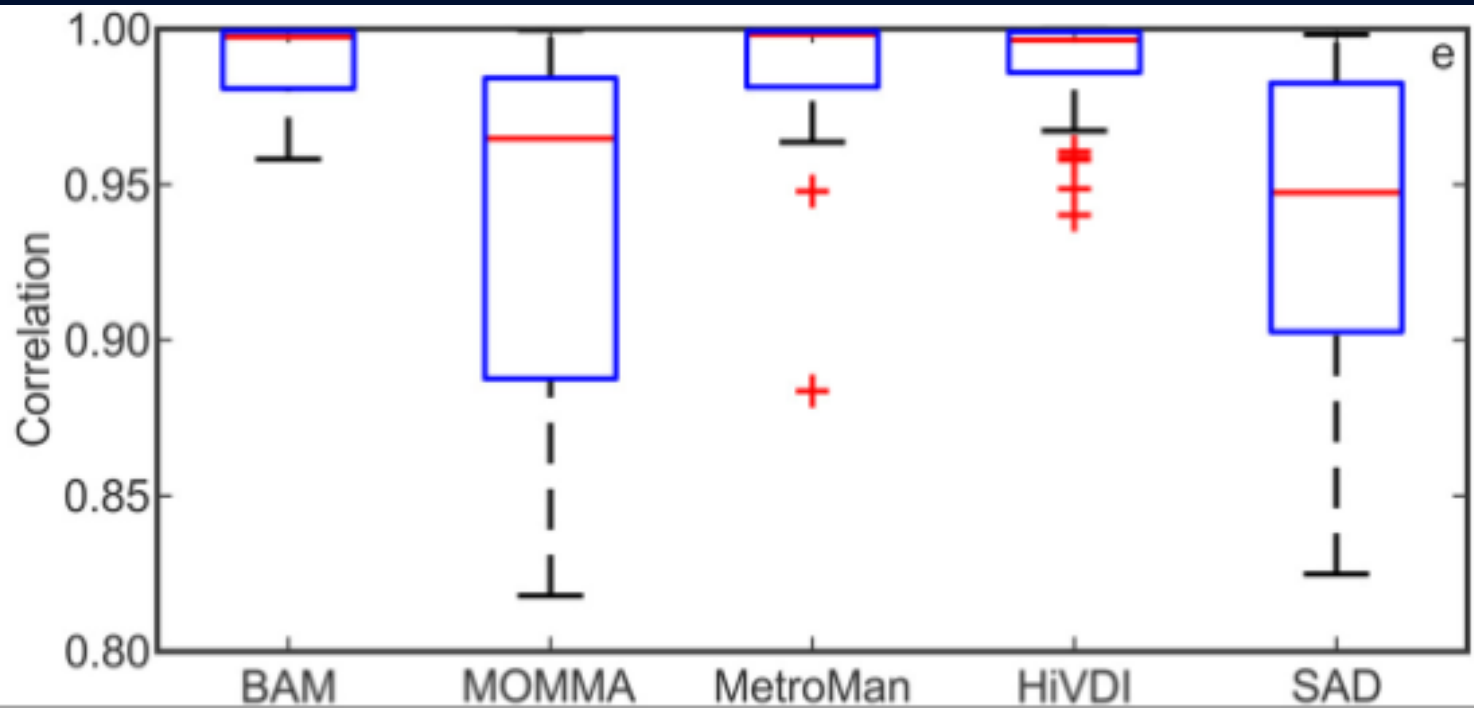
Aqua= literature threshold of 'skill'

Each row is a river

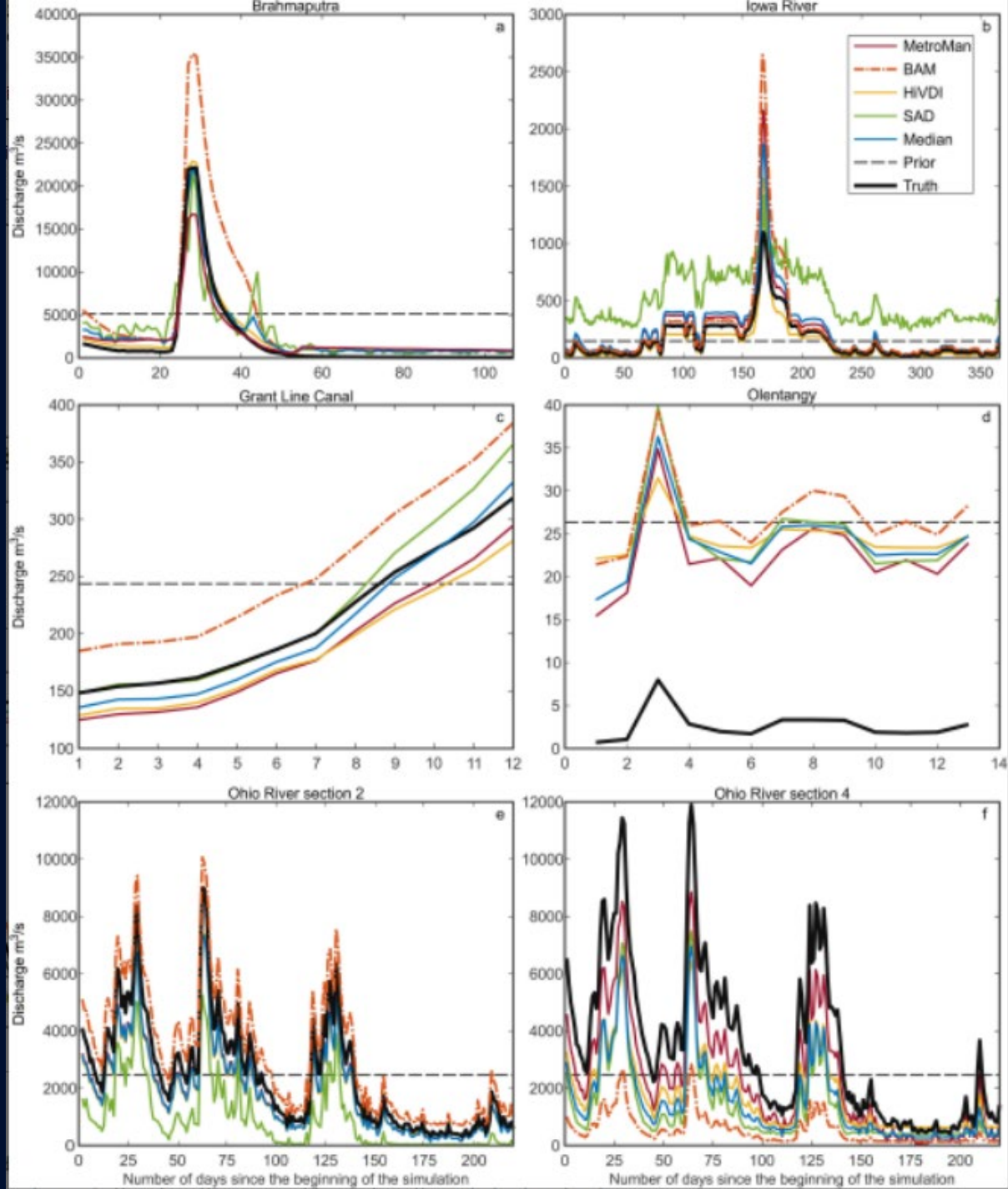
Each column is an algorithm



Dynamics
excellent



Errors come from
bias: an 'offset'

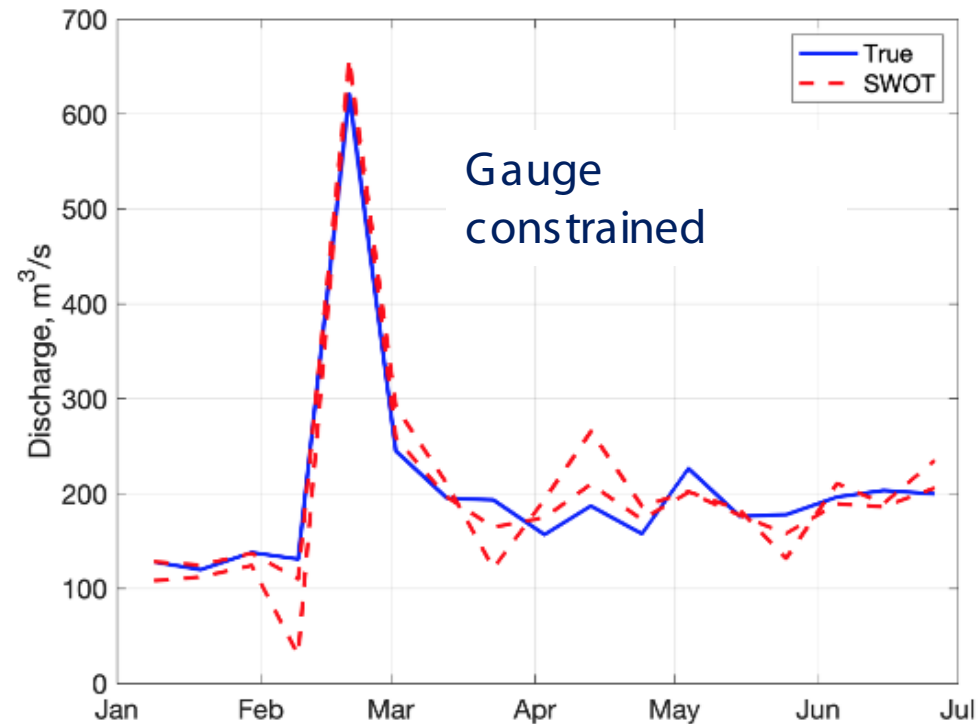
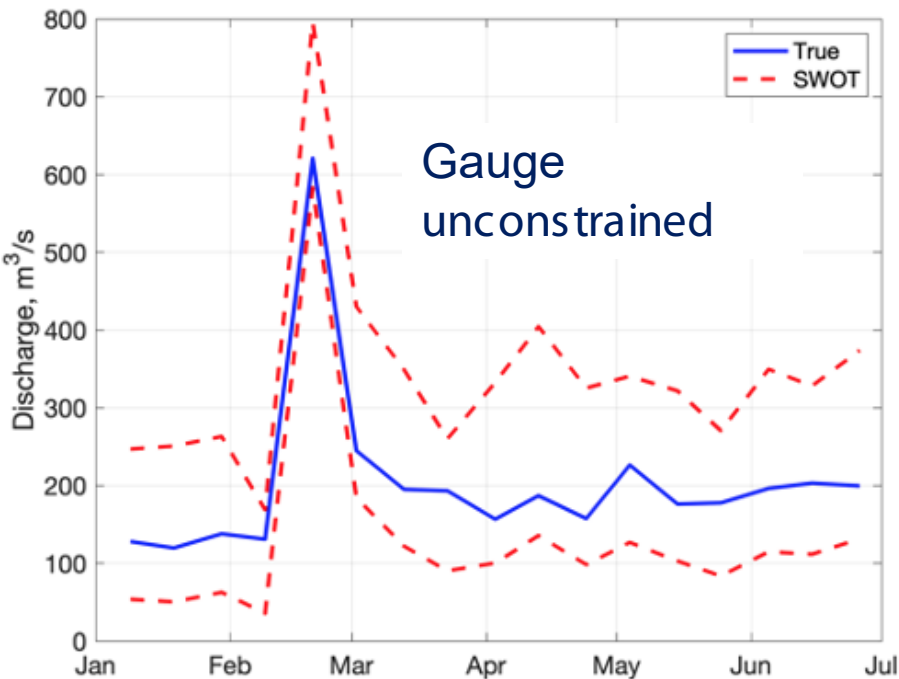


Bias in action

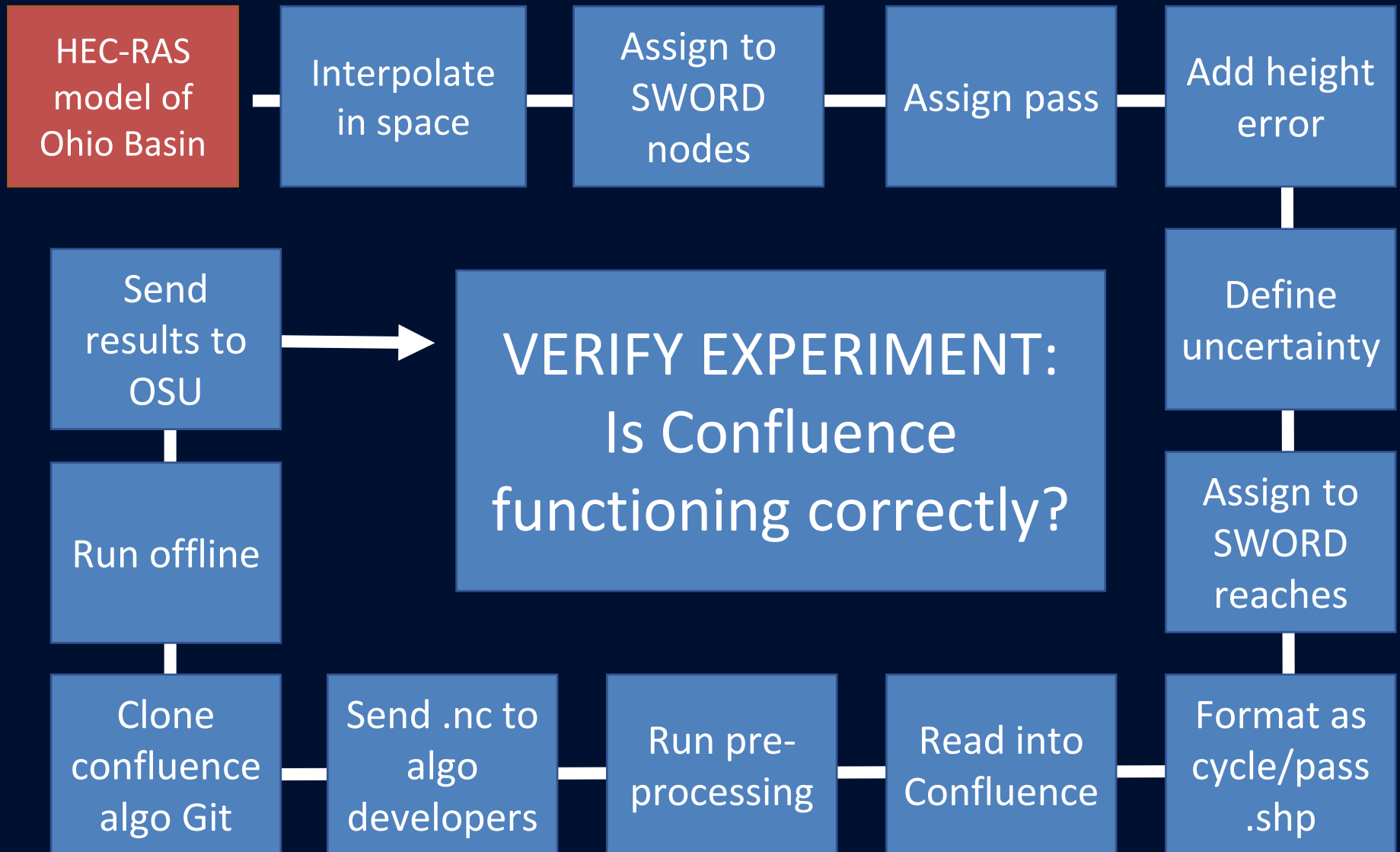
Introducing two flavors of discharge

Constrained- uses what we already know about global rivers to reduce bias, following Lin et al (WRR 2019) GRADES model

Unconstrained- uses a global uncalibrated model (WBM) to provide a more 'SWOT only' discharge



As ready as we can be: Verify Experiment



Summary

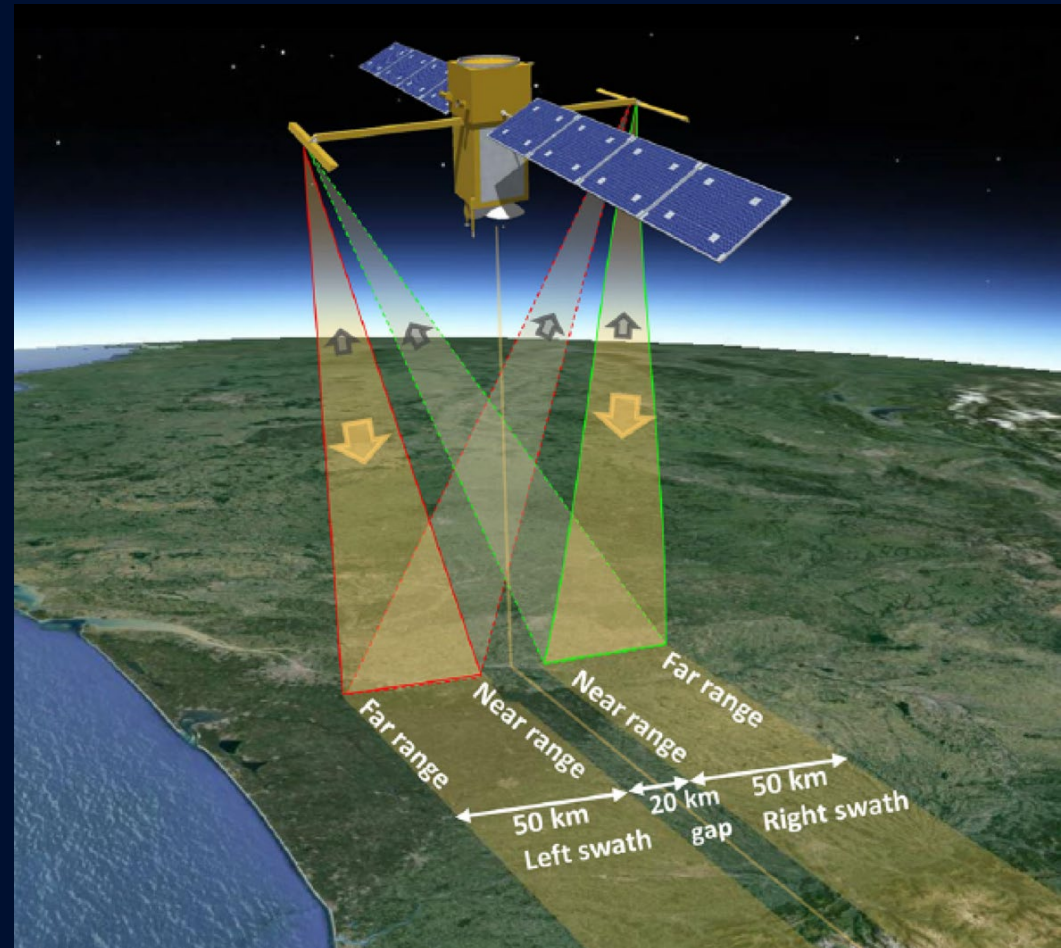
Two river discharge data product “branches” to be produced

Additional data products available 'offline' from the science team

‘SWOT discharge’ is not a monolith

We produce parameters, not discharge ...

... but we also produce discharge



Next, Mike will walk everyone through each step of Confluence

Follow along in your Jupyter notebook, or just listen and watch

If you have tech. questions, raise your hand and we'll come by

go.osu.edu/dawg-st-demo

