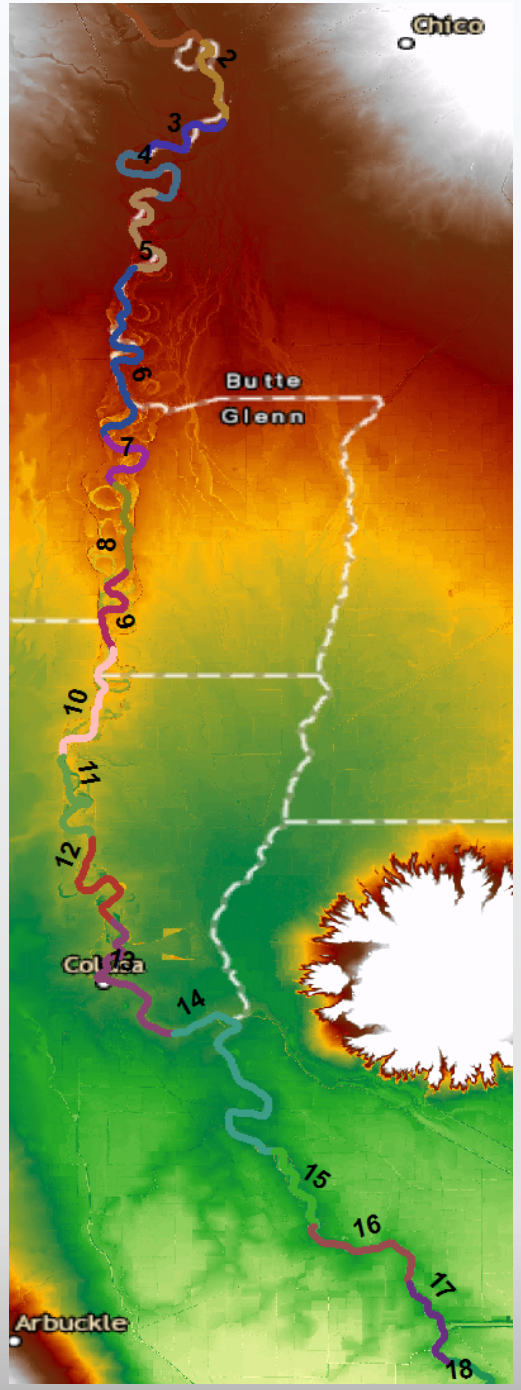


Producing reach-averaged data products

Renato P.M. Frasson, Rui Wei, Michael Durand

Byrd Polar and Climate Research Center
The Ohio State University

First SWOT Science Team meeting – Pasadena, CA. June 13-16 2016

Drawing reach boundaries

- Tributaries, confluences
- Known dams and waterfalls
- SWOT swath edges

Where else?

- Can SWOT reveal location of hydraulic controls?
- If so, can we use SWOT data to refine the definition of the reach boundaries?

Reach definition strategies

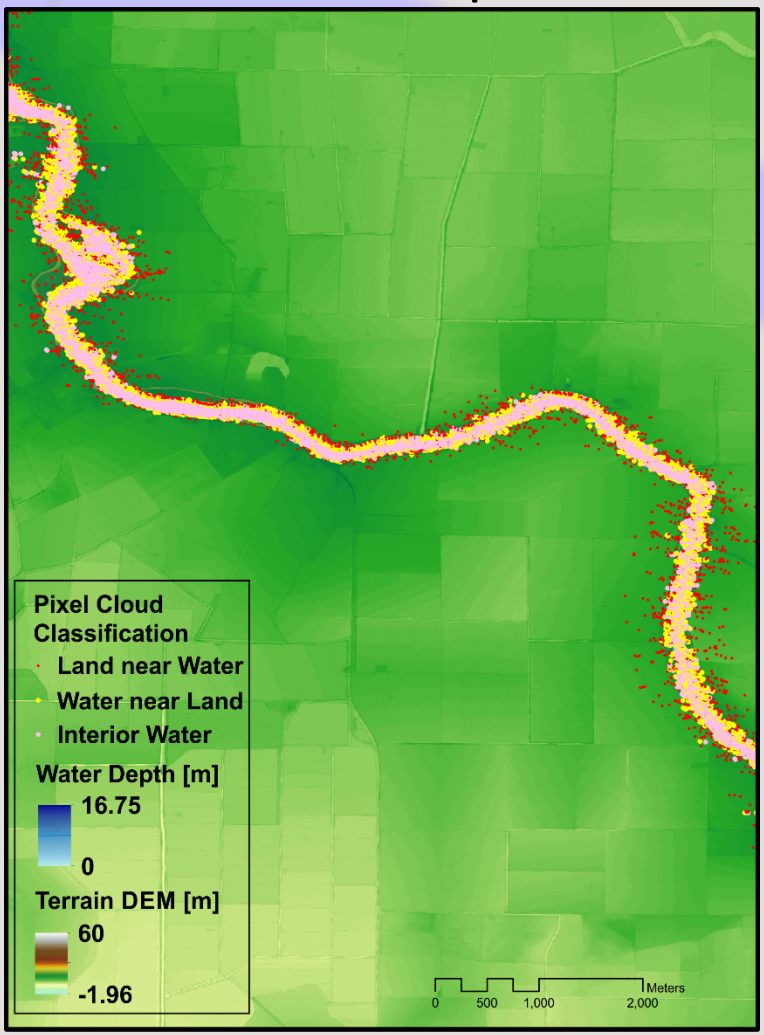
- Arbitrary reach definition:
  - Create reaches of equal length
- Sinuosity
  - Search for regions with similar S

$$S = \frac{\text{Distance along the centerline}}{\text{Euclidian distance between endpoints}}$$

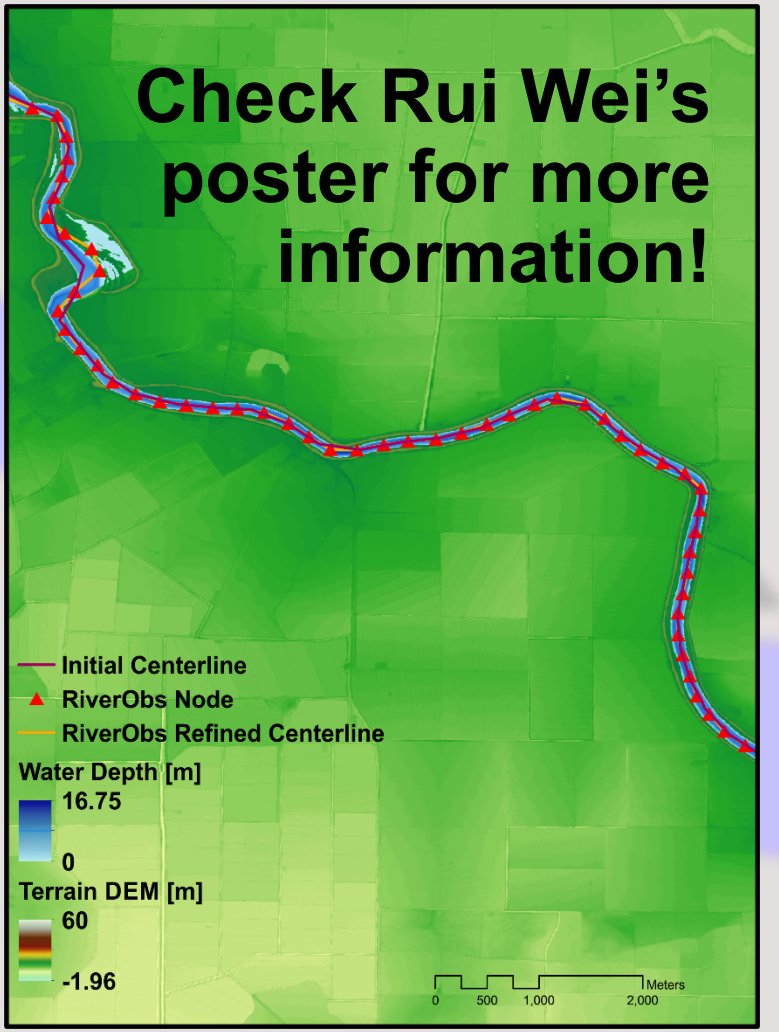
  - Length > Minimum reach length
- Hydraulic controls
  - Identify points that control flow: Inflection points in the water surface profile
  - Length > Minimum reach length

Vectorization of the pixel cloud

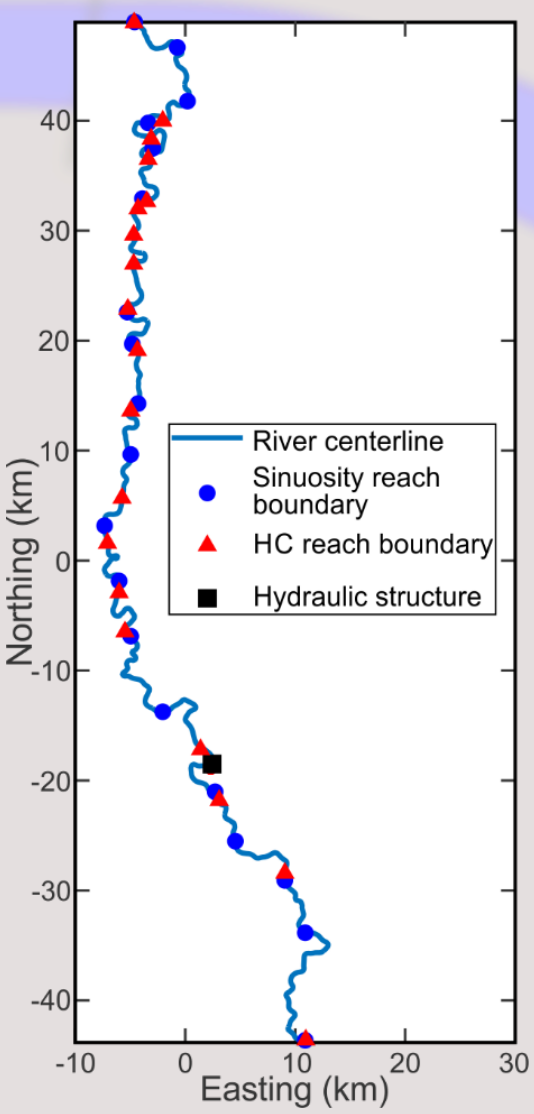
Simulated SWOT pixel cloud

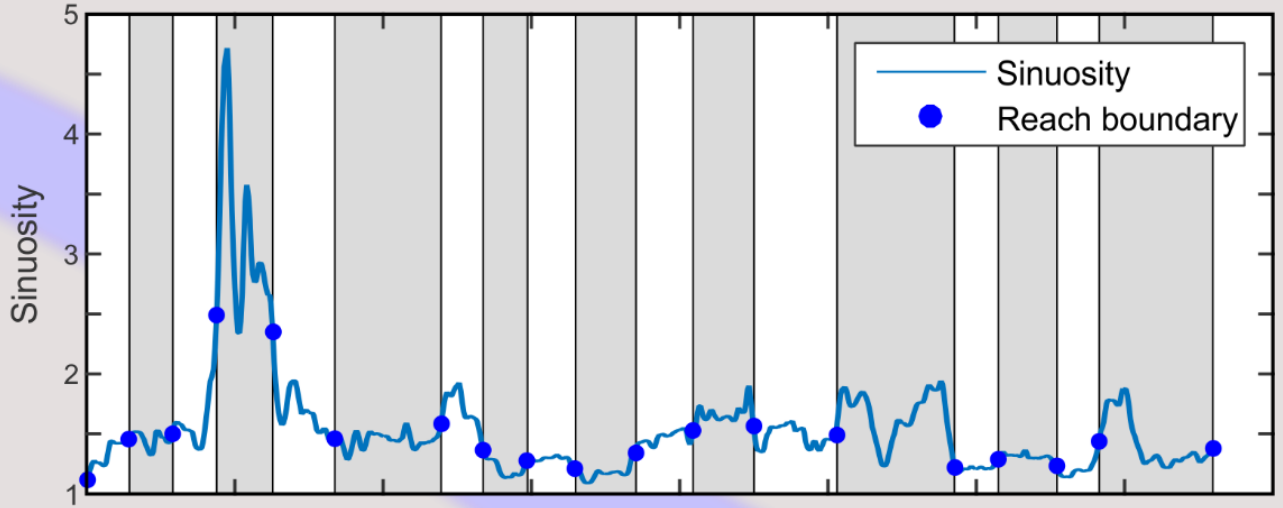


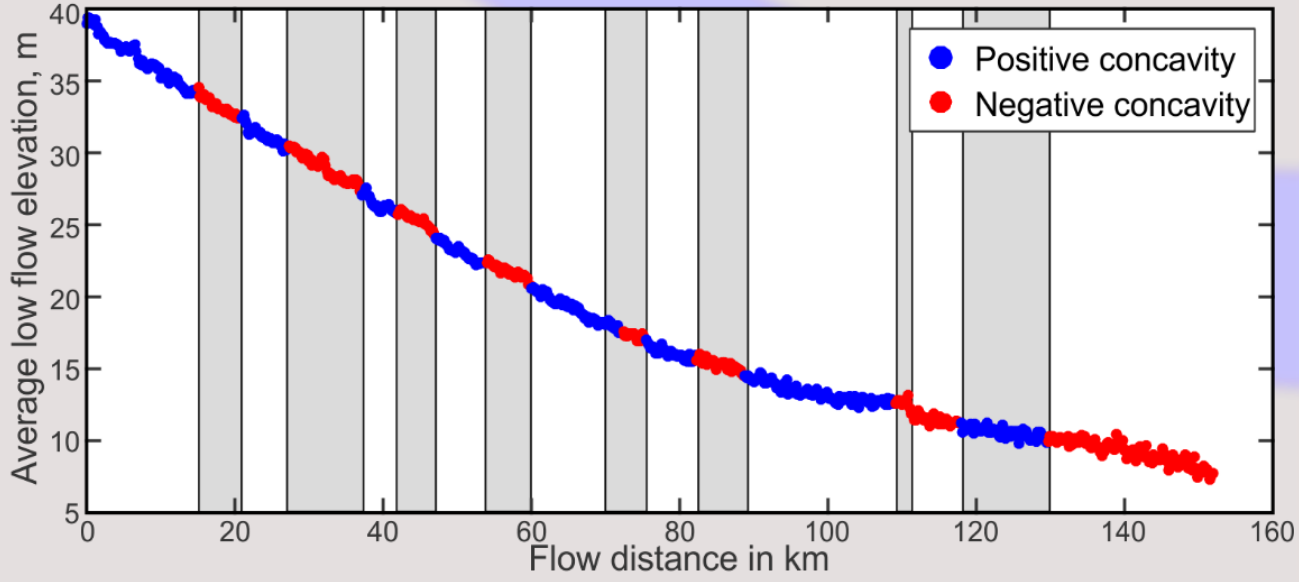
RiverObs nodes:



Reach locations for the Sacramento river





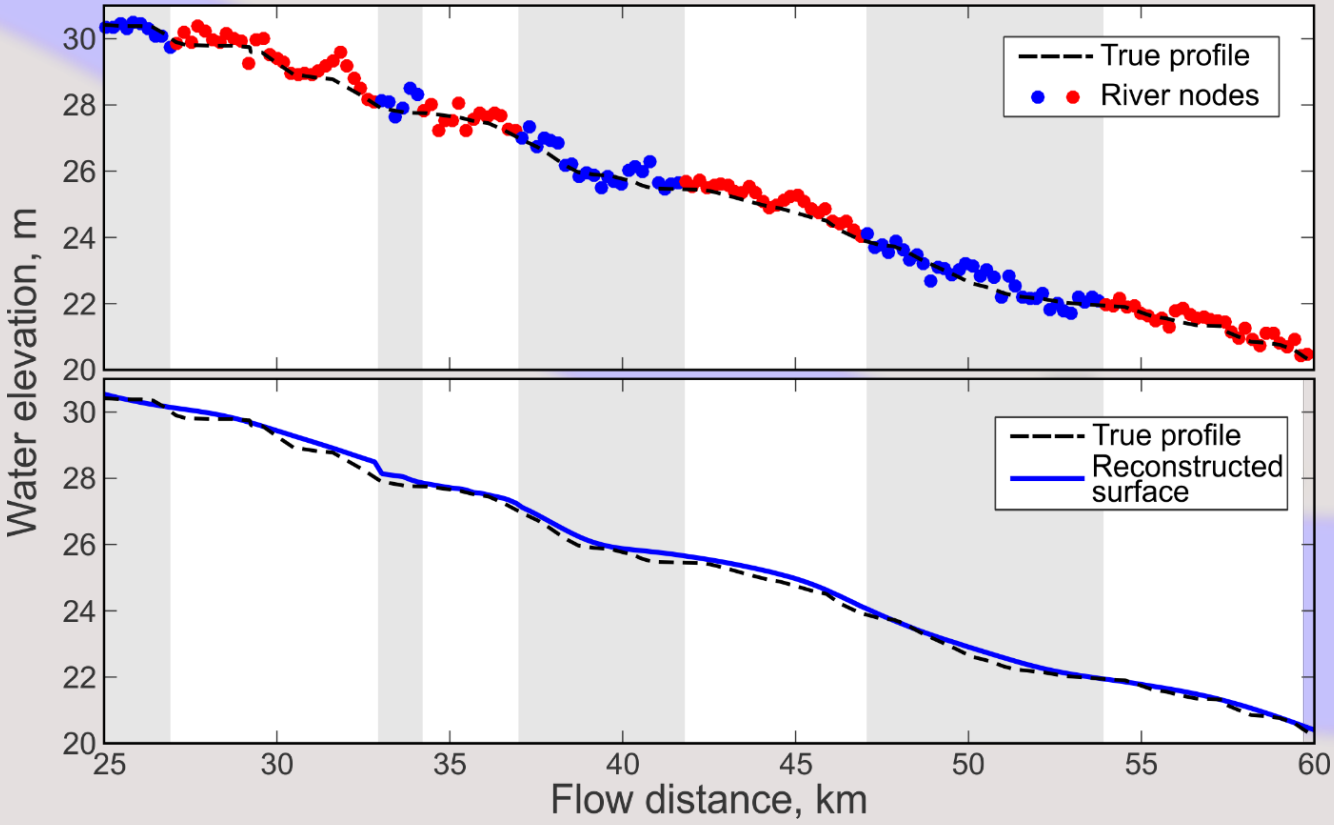


Water surface reconstruction

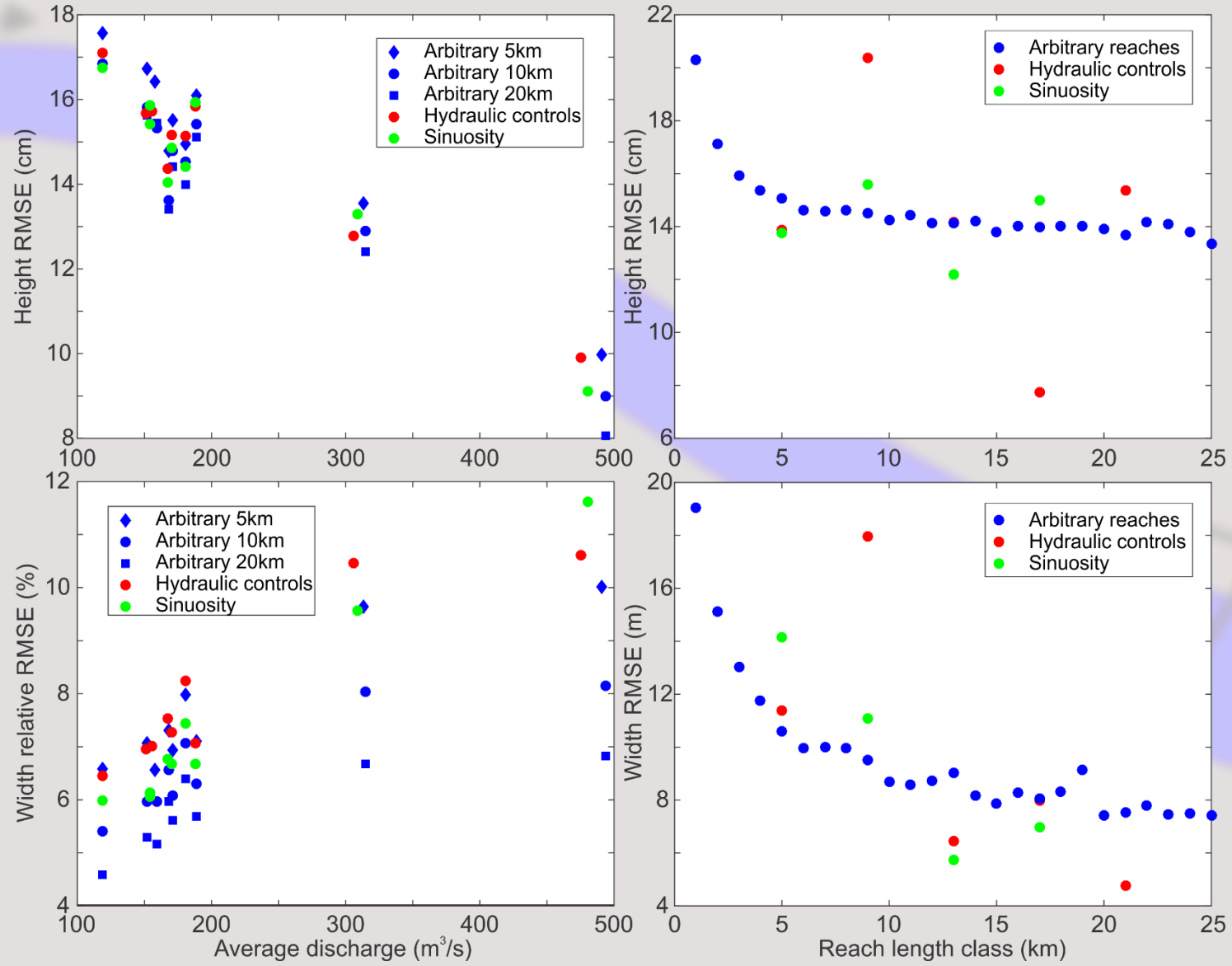
Gaussian window moving averaging:

Adaptive window:

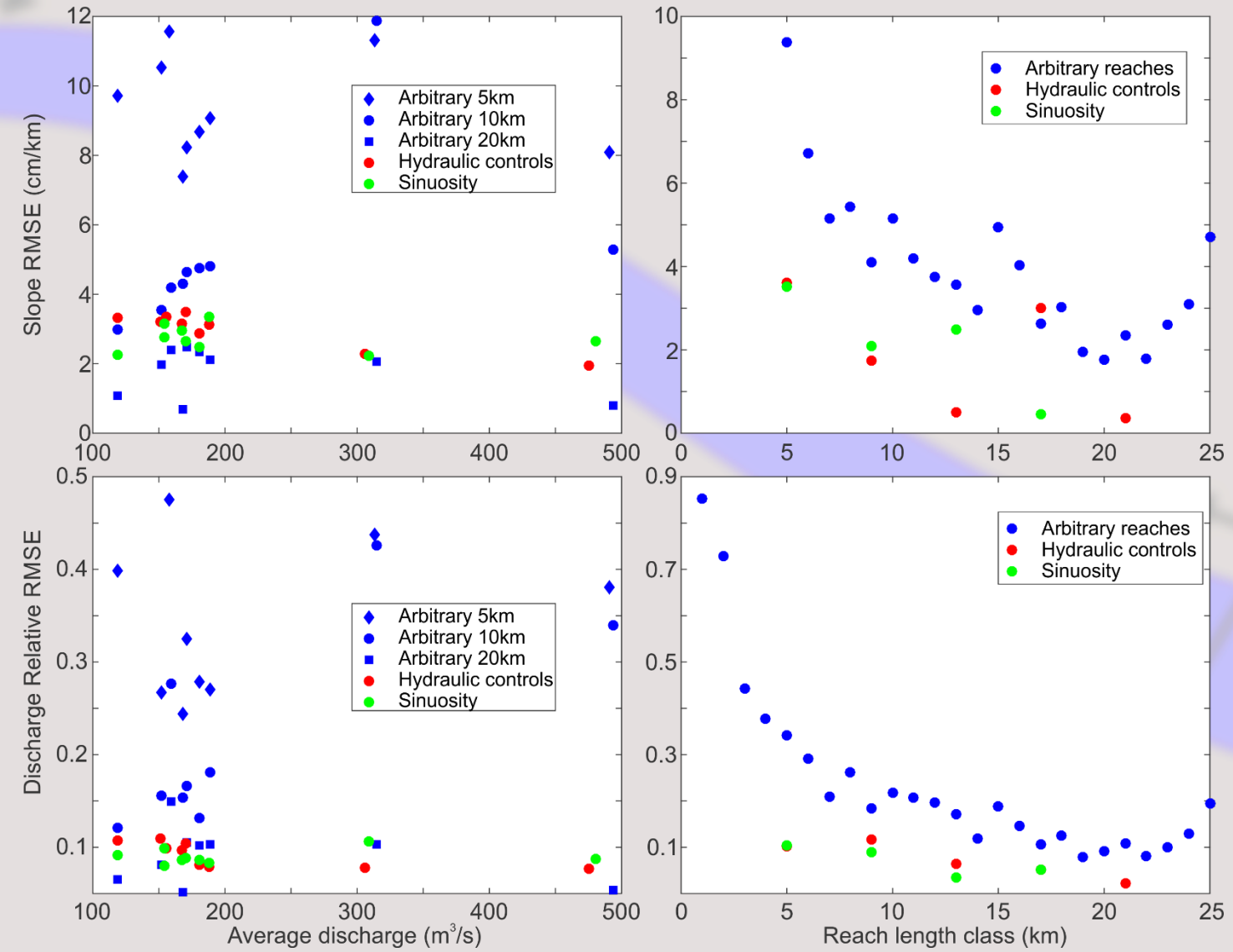
- Width = reach length
- $\sigma = 1/5 \ \mathit{Width}$, minimum σ=1 km



Height and width errors



Slope errors and discharge



Conclusions

- Longer reaches ⇨ better products at the cost of longer reach lengths.
- **"Smart"** reach definition methods ⇨ to better **height**, **slope**, and **discharge** estimates
- **Arbitrary reaches** outperformed sinuosity and hydraulic control reaches for reach averaged **width**

Acknowledgements

Financial support: NASA SWOT Algorithm Definition Team

SWOT simulator support:
- Dr. Brent A. Williams
- Dr. Dani Esteban-Fernandez
- Dr. Eva Peral

RiverObs operational support:
- Dr. Ernesto Rodriguez

Sacramento River mode:
- Dr. Toby Minear