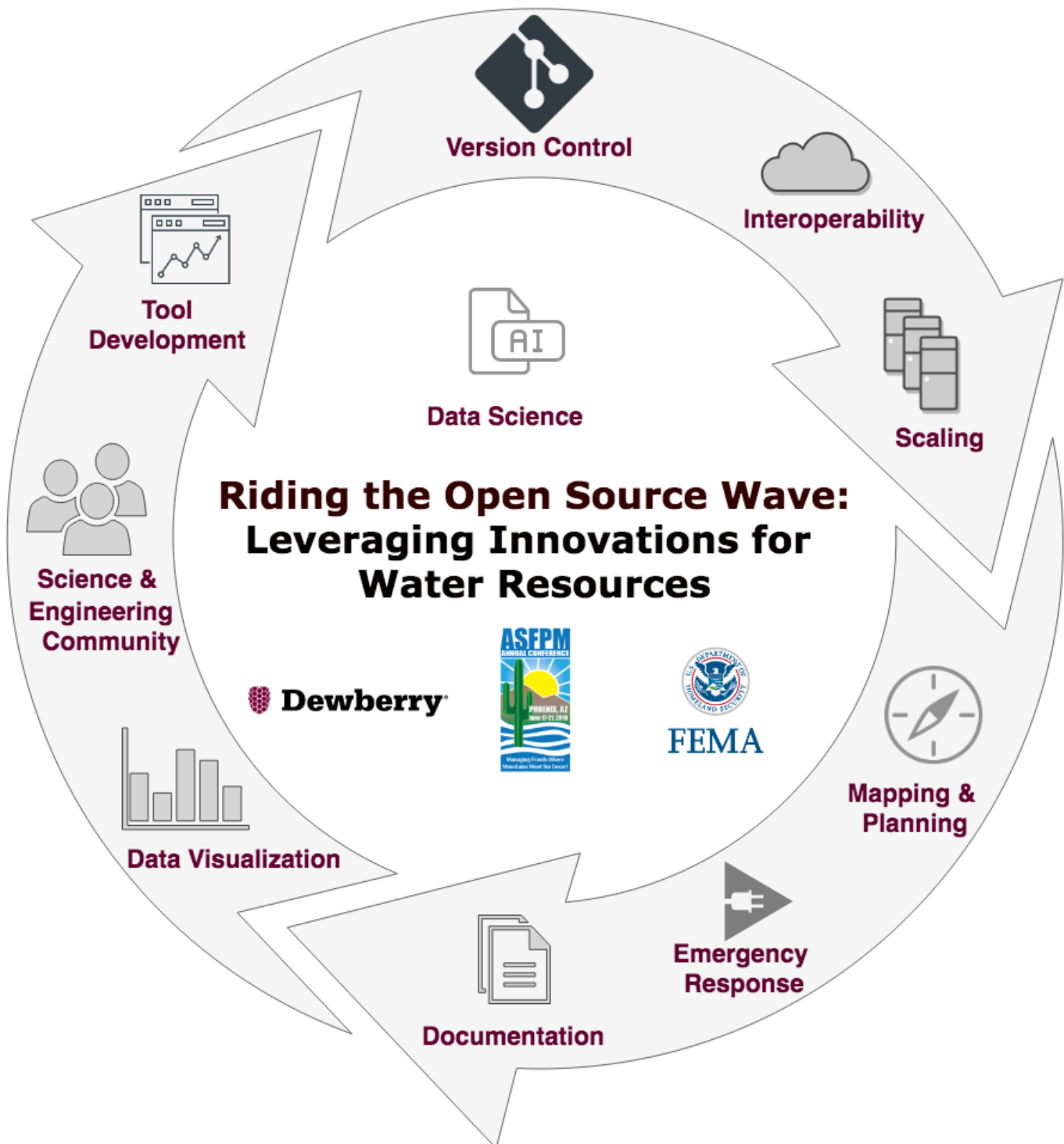# ASFPM 2018: Managing Floods Where Mountains Meet the Desert

Alan Springett, FEMA Region II

Seth Lawler, Dewberry

June 21, 2018

Checkout draw.io for image development (https://about.draw.io/about-us/)

Science & Engineering Community:

Shared challenges, languages, tools and now: a Common Interface

Challenges:

- **Big data**: Volume, Variety, Velocity
- **Computing:** Parallel vs Distributed, CPU vs GPU, cloud vs cluster

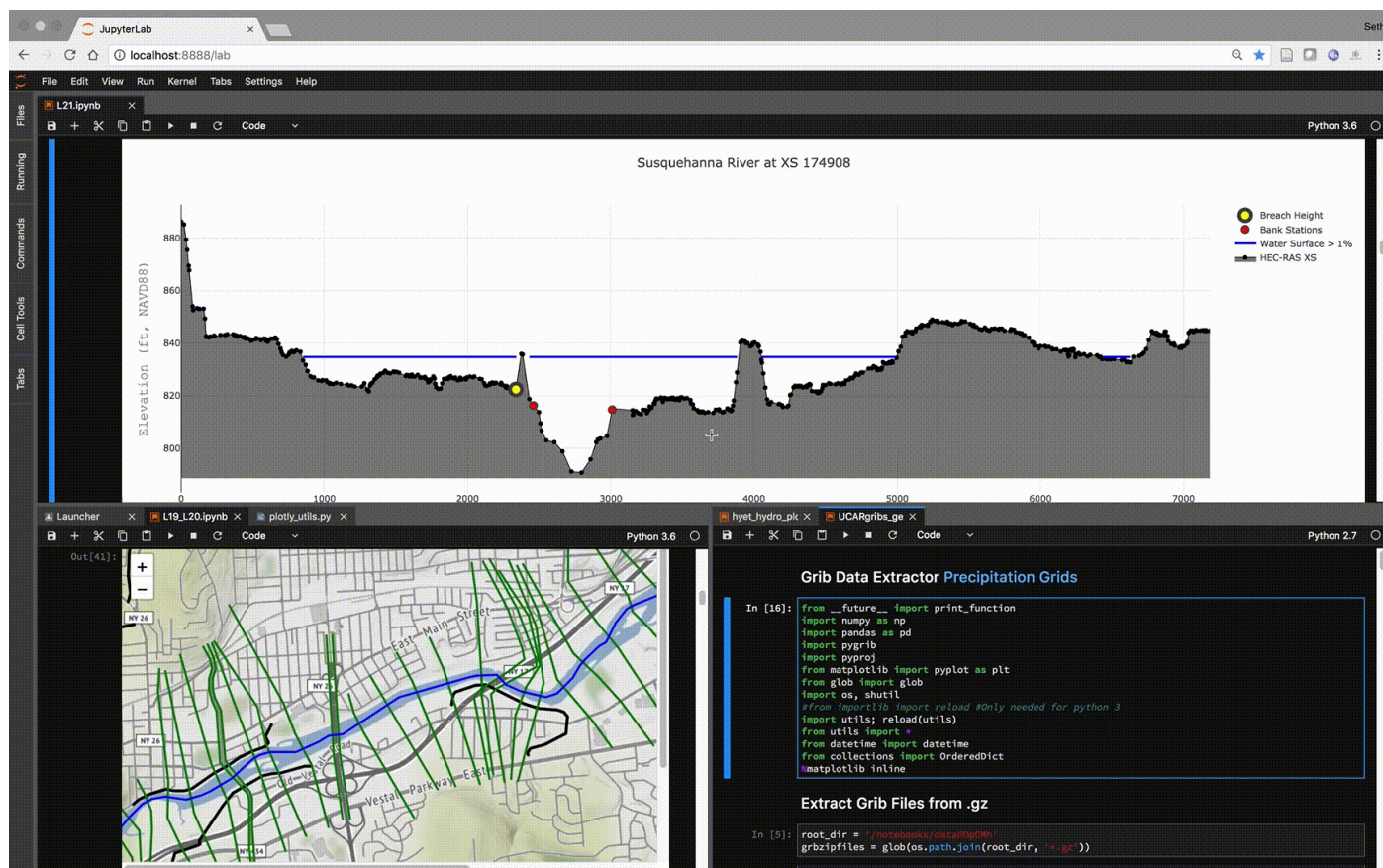## Languages:

- **Python, R, Julia, Perl...**
- **Fortran, C/C++**

Tools:

- **2D & 3D Models**
- **Statistical Methods**
- **Machine Learning & Artificial Intelligence**

A Common Interface:

Project Jupyter exists to develop open-source software, open-standards, and services for interactive computing across dozens of programming languages.

Proof of Concept

Notebook #1. Deep Learning: Developing Building Footprints from raw imagery (html/cnn.html)

An example to illustrate how sharing tools and languages makes leveraging innovations possible: converting a modelling framework created for biomedical research for use in a water resources application.

Mapping and Planning

Notebook #2.0: Data Retrieval & Exploration (html/GageExplorer_functions.html)

An example Notebook using the open source, USGS-developed R-interface to retrieve data from the National Water Information System for use in model development.

Notebook #2.1: Data Analysis & Development (html/HydrographDeveloper.html)

A reproducible, flexible workflow that allows documenting decision points.

Tool Development

Notebook #2.2. NY Levee Breach Tool (html/BreachTool.html)

Automating and documenting a process 'In-Tool' for development of breach hydrographs on multiple levees.

Documentation

Notebook 3.0: Data Development for Puerto Rico Modeling (html/PRWaves_NB1.html)

Notebook 3.1: Statistical Analysis for Puerto Rico Modeling (html/PRWaves_NB3.html)

Developing Initial Conditions for Wave Modeling: Workflow as Documentation

Interoperability & Scaling

- Licensing and Cloud Computing
- Modeling on Clusters

Version Control

- Changes in Software
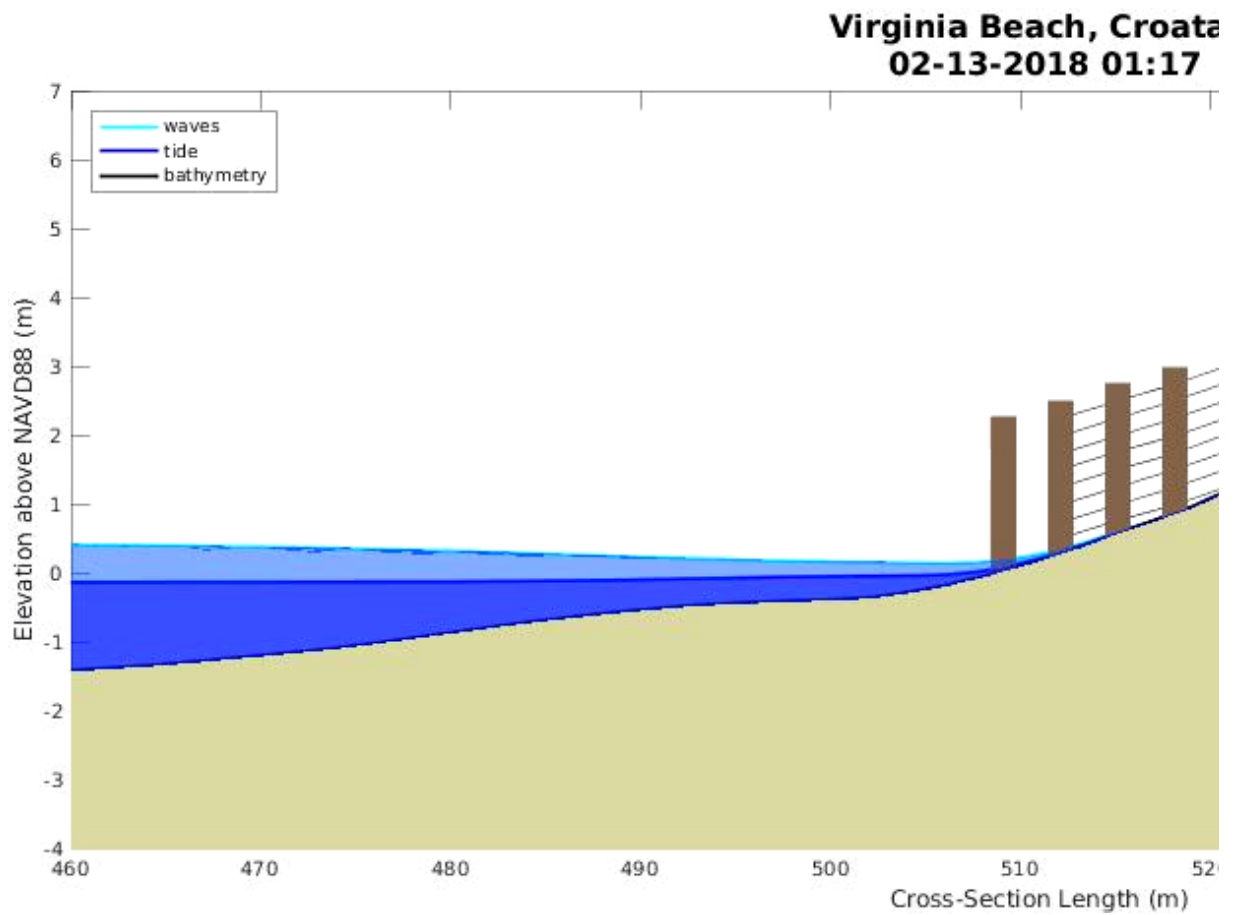- Changes in API
- Changes in Workflow

Data Visualization

Monte Carlo (html/mc_pluvial_MCEast_96hr.html)

- Plotting Early
- Plotting Often

Emergency Response

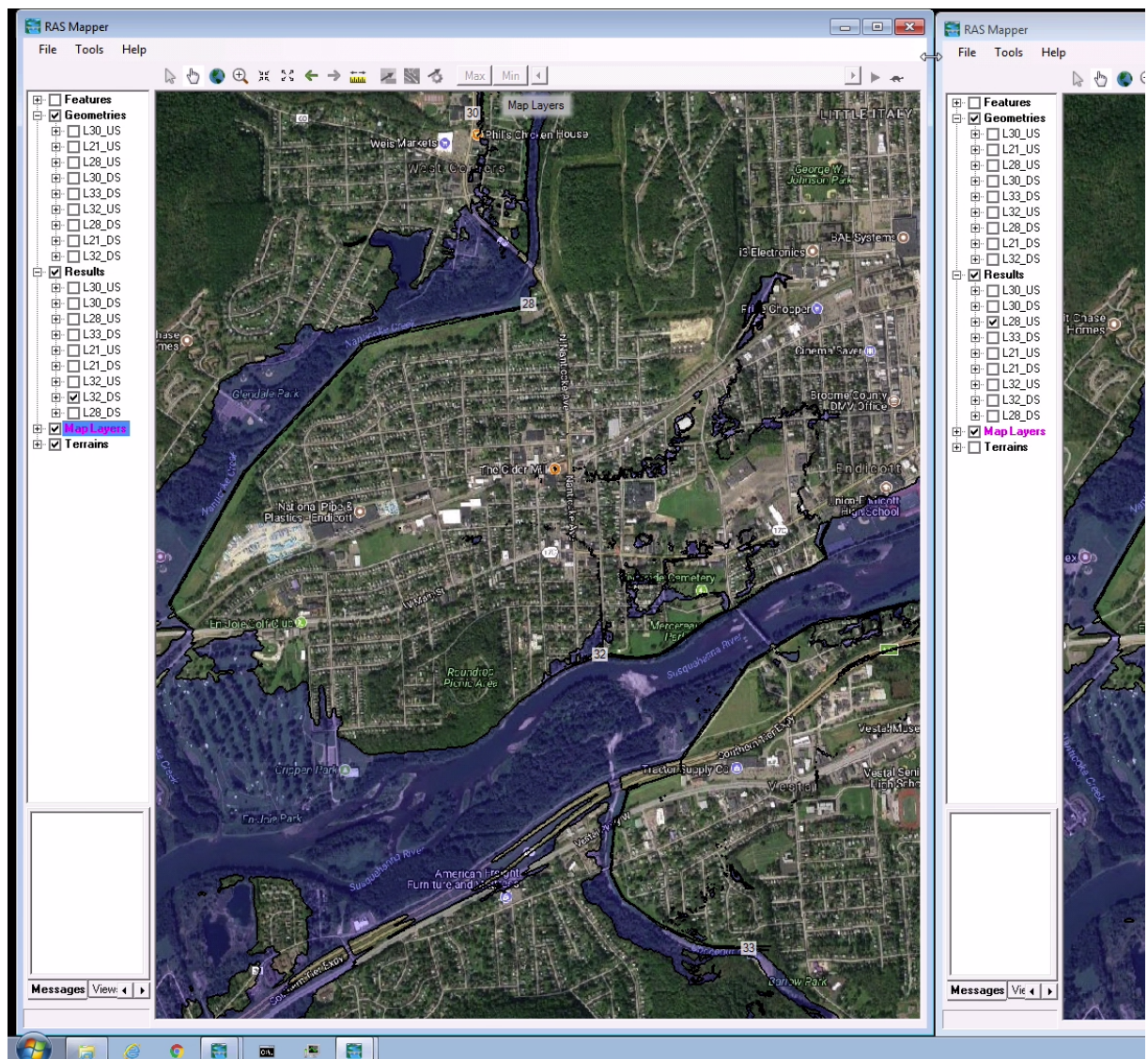In [2]:   *# Helping Models Talk to each other when it matters*

Out[2]:

0:00 / 0:53

In [3]: `# HEC-RAS Built in Modeling Software: Brought to you by the folks at Open Source.`

Out[3]:

0:00 / 1:45

END