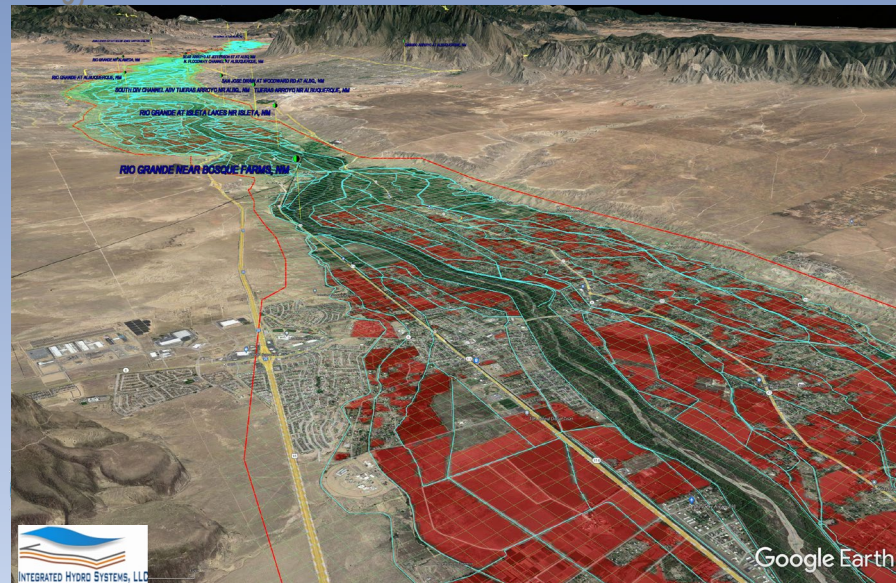


RIO GRANDE HYDROLOGIC MODELING DATA DASHBOARD

Presented at the Western Water Applications Office Annual Meeting
Boulder, Colorado
April 30, 2024

By

Laurel Lacher, PhD, RG
In cooperation with the
New Mexico Interstate Stream Commission



Lacher Hydrological Consulting





New Project, Old Needs

March 2024 Award from WWAO to support the use of NASA data in hydrologic modeling of the Rio Grande Basin

Key Water Management Challenge #3:

a better understanding of water resources



Rio Grande Basin Needs Assessment Workshop Report

Prepared for
NASA Western Water Applications Office
Pasadena, California

Prepared by



6020 Academy NE, Suite 100
Albuquerque, New Mexico 87109
www.dbstephens.com
DB20.1255

July 28, 2022



Middle Rio Grande Complexities

- Rio Grande Compact
- Endangered Species
- Middle Rio Grande Conservancy District
- Municipalities
- Highly engineered system
 - Levees
 - Drains
 - Canals
 - Dams & Diversions



Integrated Model Flow Conceptualizations

Model Domain/Grid

Surface Water Stream 'Hydraulic' Network

Dams

Diversions

Boundary Conditions

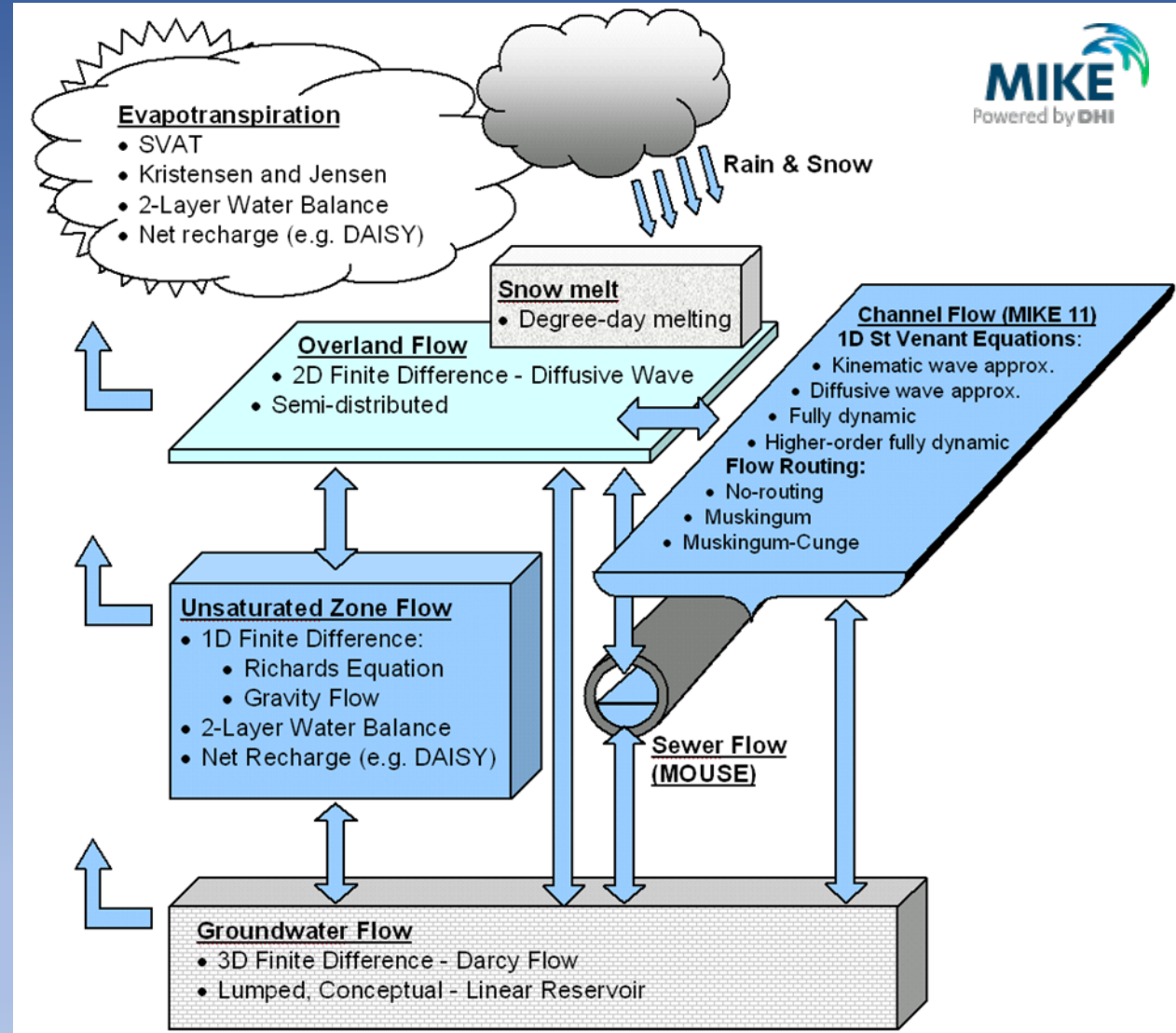
Weather Data

Snowmelt Input

Unsaturated Zone

Saturated Zone

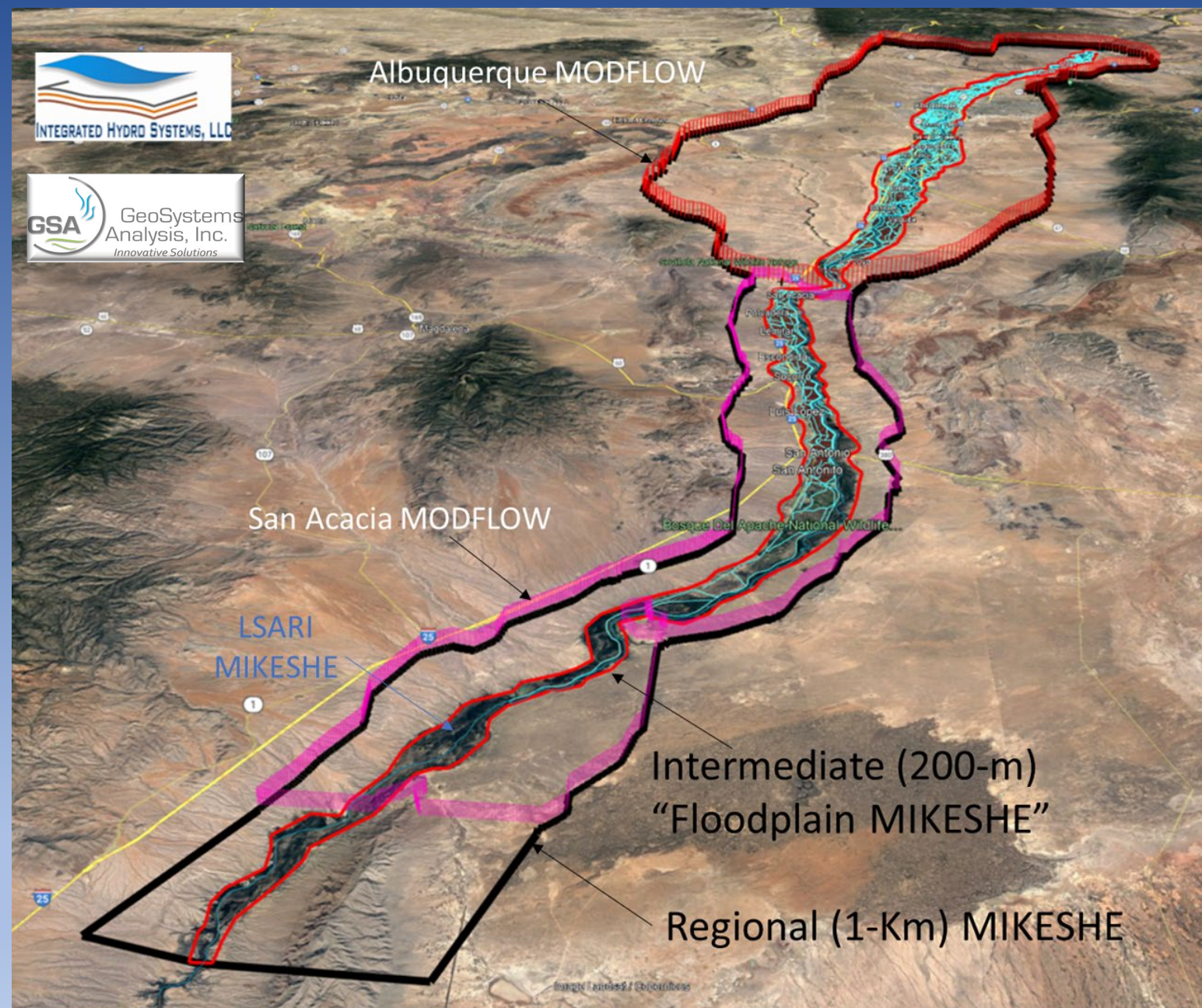
Vegetation



Middle Rio Grande Integrated Modeling With MIKESHE



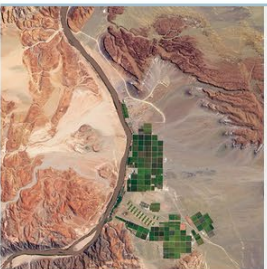

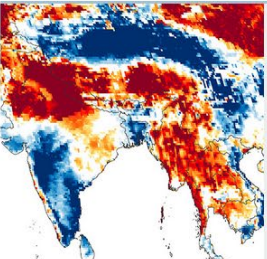
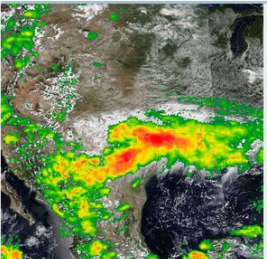
- Multi-scale
- Fully coupled gw & sw
- 15-min to hourly surface flows
- Hourly time-step 2006-2020
- Explicit Actual ET and seepage simulation
- Irrigation network
- Distributed vegetation type & LAI
- Distributed precip, temp, reference ET

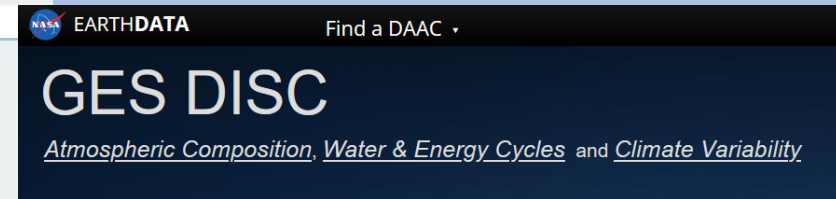


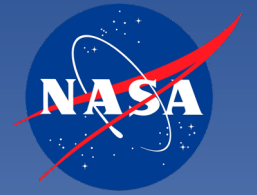
MIKESHE Remotely Sensed Modeling Data Needs

Model Inputs		Model Outputs	Current Satellite-based Calibration Data Source
Current Satellite-based Data Source	Data Type		
NLDAS (NASA)	Precipitation	Snowcover/Snowpack	MODIS (NOAA)
	Air Temperature	Dynamic Surface Water Extent	LANDSAT (USGS)
	Reference ET	Soil Moisture	GRACE (USGS)
MODIS (NASA)	Leaf-area Index (LAI)	Groundwater storage	
GOES (NREL)	Net Solar Radiation	Actual ET	LANDSAT/METRIC-EEFLUX (IDAHO DWR)
LANDSAT (USGS)	Land Use	Water Quality	
LANDFIRE (USFS/USGS)	Vegetation Type/Cover		

Problem: satellite-based datasets are difficult to access and transform into model-friendly format.

	<p>Land Surface Data</p> <ul style="list-style-type: none"> • Surface reflectance • Surface temperature • Topography 		<p>Vegetation Data</p> <ul style="list-style-type: none"> • Vegetation Indices • Evapotranspiration • Land surface reflectance • Land cover/crop extent • Leaf Area Index
	<p>Water Data</p> <ul style="list-style-type: none"> • Soil moisture • Snow cover • Ground water • Runoff • Water reservoirs 		<p>Weather Data</p> <ul style="list-style-type: none"> • Surface Air Temperature • Precipitation • Humidity • Weather Maps





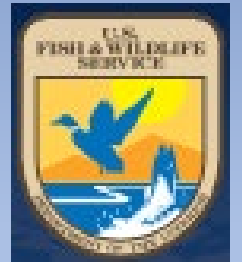
JPL/NASA Funded Hydrologic Modeling Data Dashboard

Purpose:

To develop a data dashboard (web portal) to facilitate access to, and use of, input, calibration, and output datasets related to hydrologic modeling and water management in the Rio Grande Basin of New Mexico.

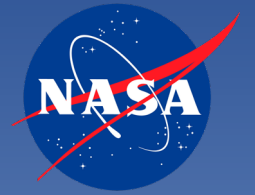
Not just satellite data!

Contributing Agencies:



US Army Corps of Engineers

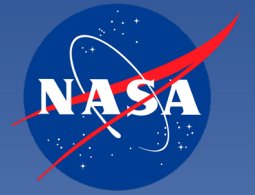




Project Objectives:

- 1) Make NASA and other critical hydrologic modeling-related data accessible to scientists, water managers, and the general public through a web-based data dashboard.
- 2) Facilitate access to Middle Rio Grande MIKESHE model inputs and outputs.
- 3) Produce a flexible, modular, and transferrable product that can be readily updated and also used in other basins with other models.

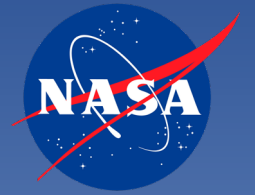




Stakeholder Engagement

- Partners Meeting
Completed April 9, 2024
- Two Stakeholder Workshops in Albuquerque
 - First: May 9, 2024
 - Second: Spring 2025
- Soft Roll-out of Dashboard
Early summer 2025





Expected Outcomes

- ❖ Wider access to, and use of, hydrologic, atmospheric, and land-surface data sets from NASA and other sources by stakeholders in the Rio Grande basin;
- ❖ Broader access to, and use of, the Middle Rio Grande MIKESHE model;
- ❖ Easier development of new models to support water management needs and for research;
- ❖ Easier updates to existing models as new datasets become available.

