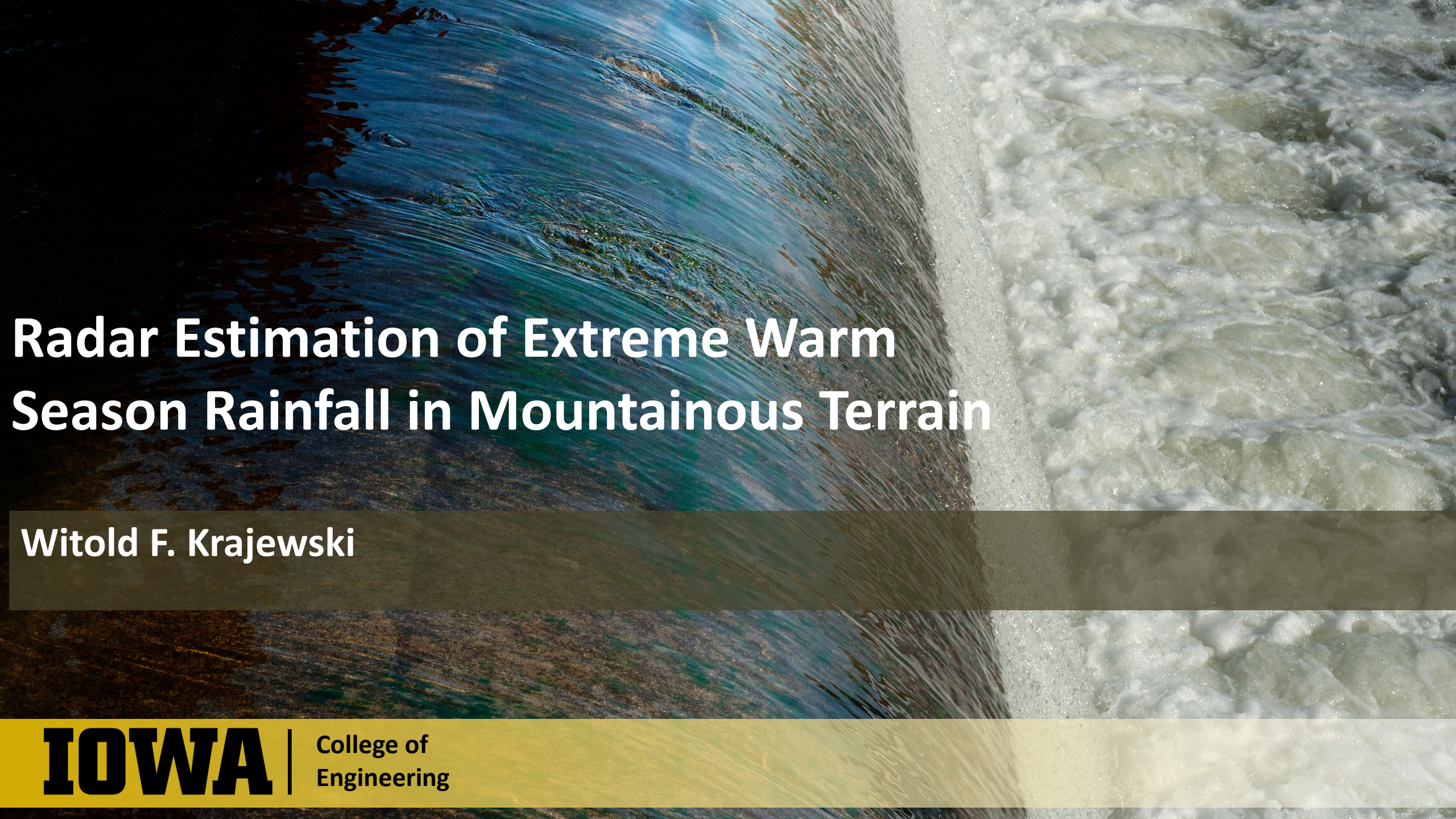
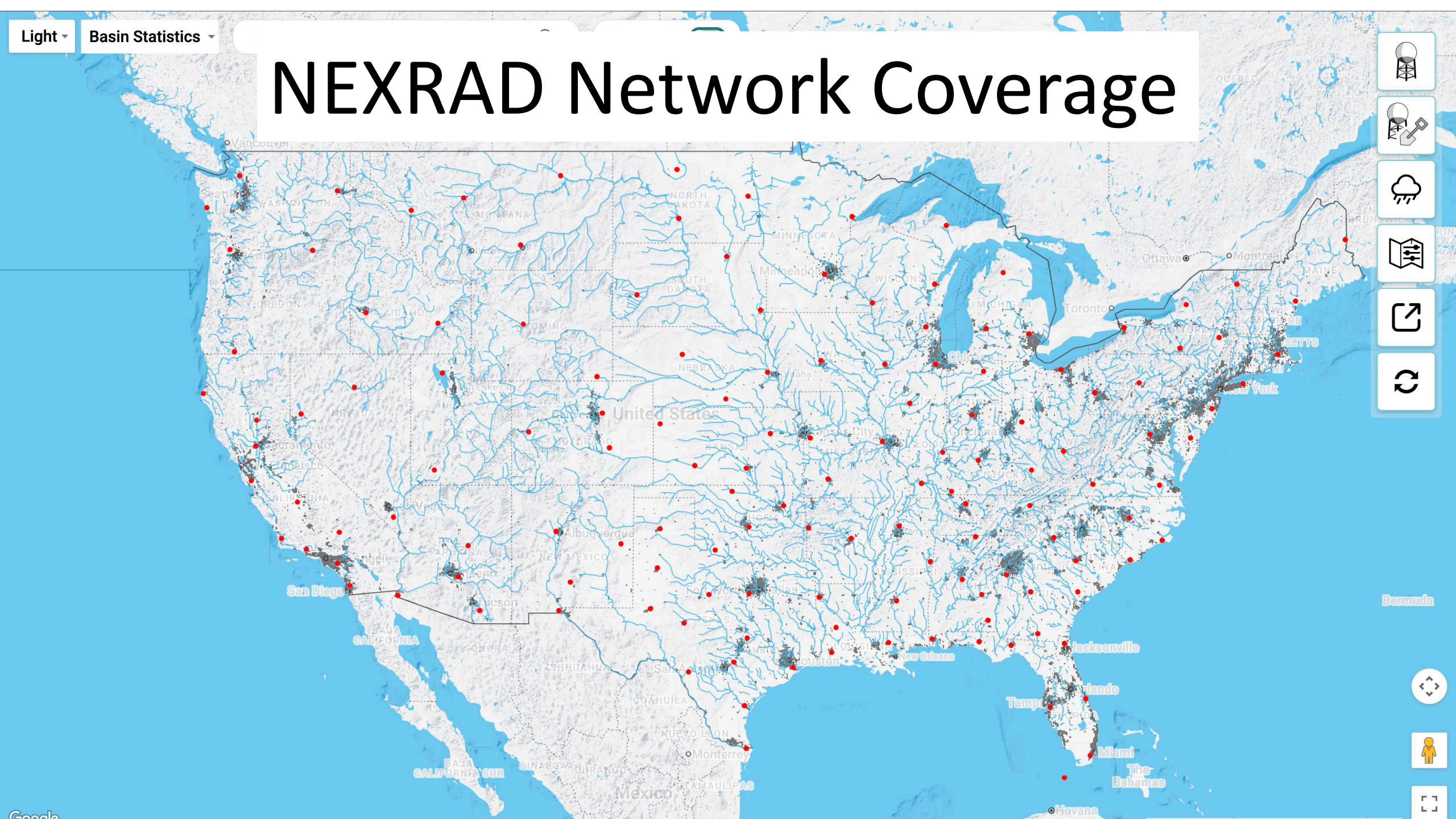
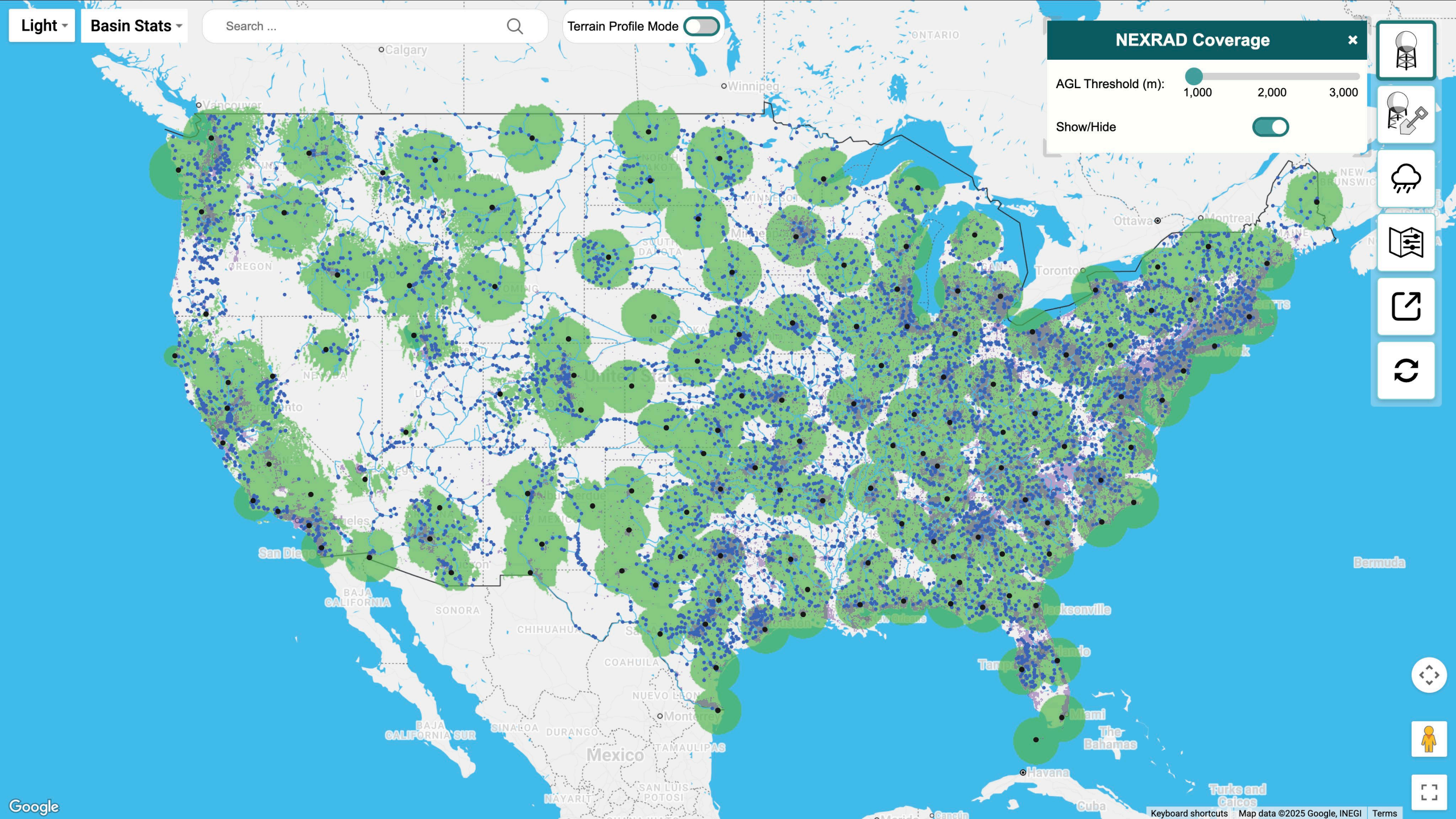


Radar Estimation of Extreme Warm Season Rainfall in Mountainous Terrain

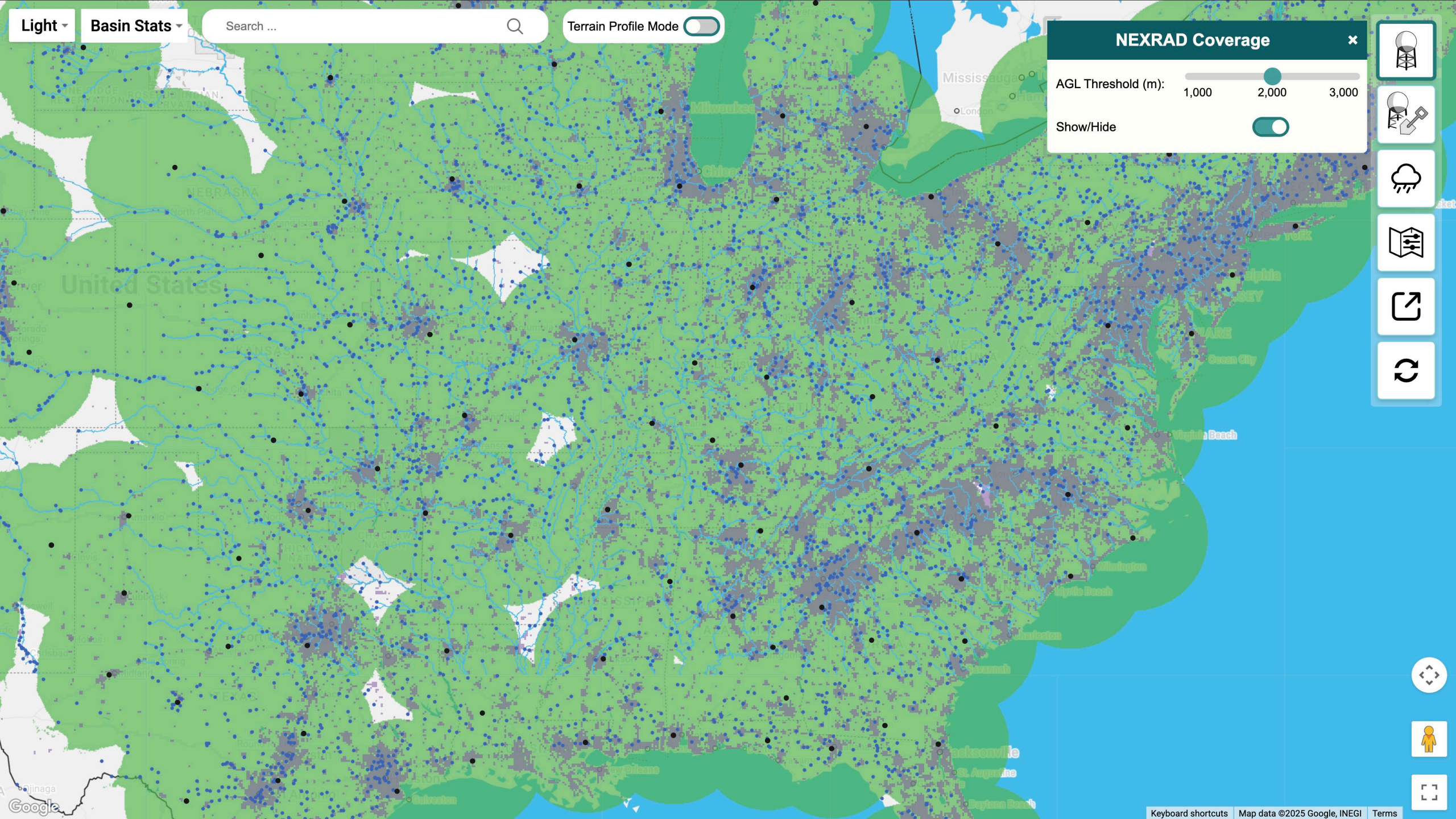
Witold F. Krajewski

IOWA | College of Engineering


Light
Basin Statistics
NEXRAD Network Coverage
Vancouver
Seattle
Minneapolis
Toronto
Ottawa
Montreal
Albuquerque
San Diego
New Orleans
Jacksonville
Miami
The Bahamas
Bermuda
Monterrey
Mexico
Havana
Google


Light
Basin Stats
Search ...
Terrain Profile Mode
NEXRAD Coverage
AGL Threshold (m):
1,000
2,000
3,000
Show/Hide
Calgary
Winnipeg
Vancouver
Ottawa
Montreal
Toronto
Bermuda
Jacksonville
Miami
The Bahamas
Havana
Mexico
Monterrey
Google
Keyboard shortcuts
Map data ©2025 Google, INEGI
Terms


Light
Basin Stats
Search ...
Terrain Profile Mode
NEXRAD Coverage
AGL Threshold (m):
1,000
2,000
3,000
Show/Hide
United States
Mississauga
London
Virginia Beach
Charleston
Jacksonville
St. Augustine
Daytona Beach
Google
Keyboard shortcuts
Map data ©2025 Google, INEGI
Terms


Light
Basin Stats
Search ...
Terrain Profile Mode
NEXRAD Coverage
AGL Threshold (m):
1,000
2,000
3,000
Show/Hide
United States
NEBRASKA
Milwaukee
Chicago
Mississauga
London
Virginia Beach
Wilmington
Myrtle Beach
Charleston
Savannah
Jacksonville
St. Augustine
Daytona Beach
New Orleans
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Keyboard shortcuts
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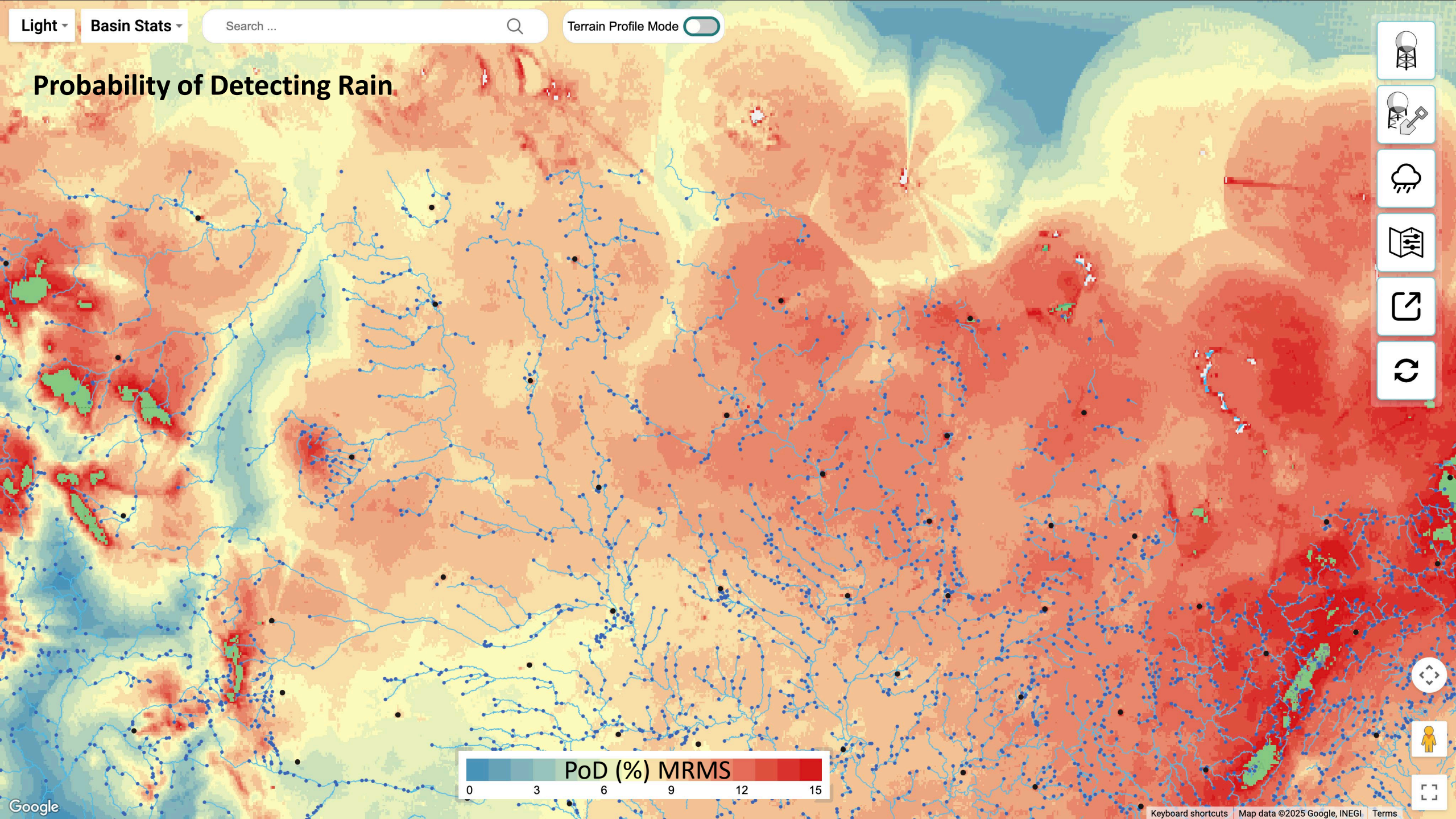
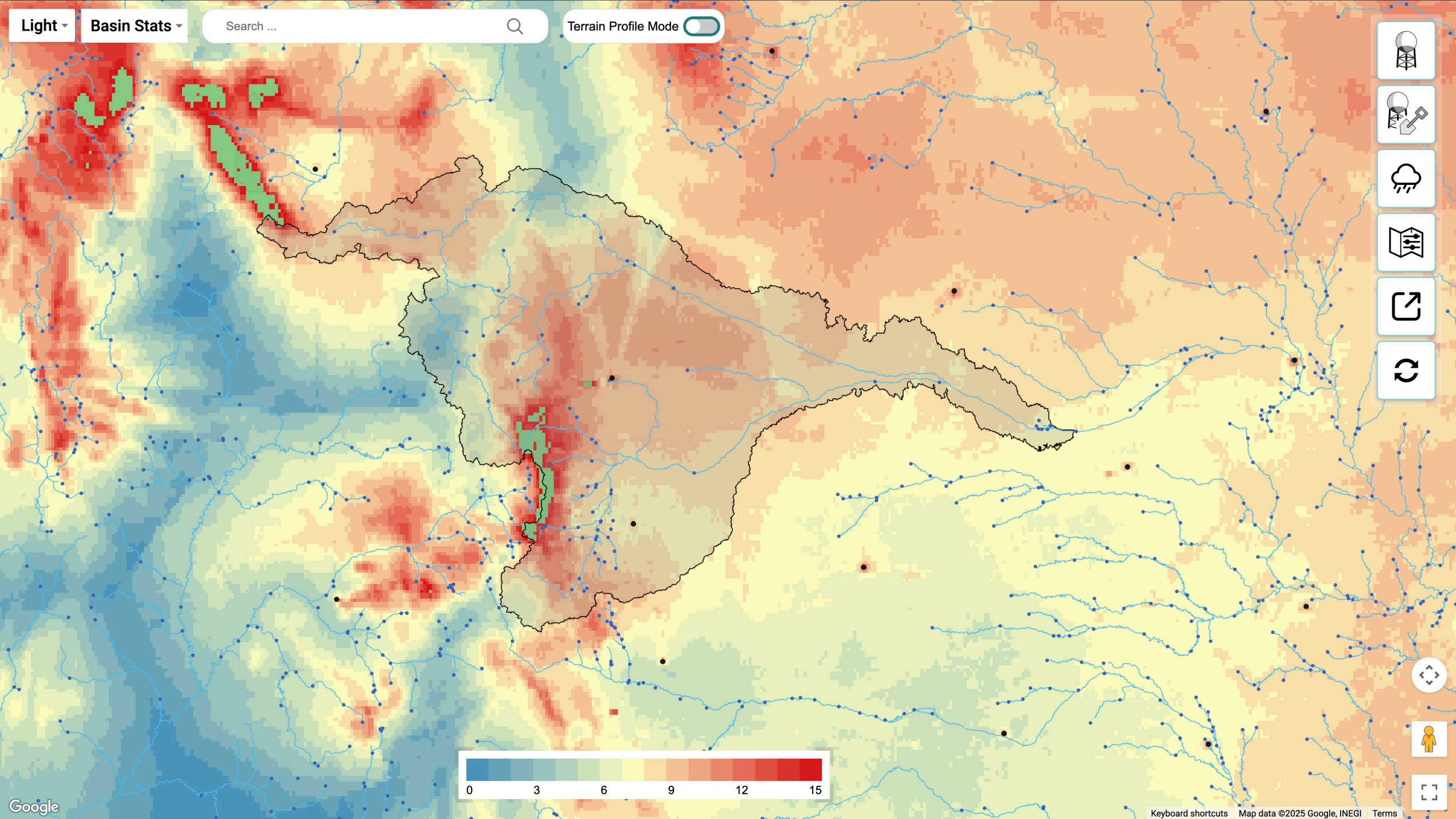
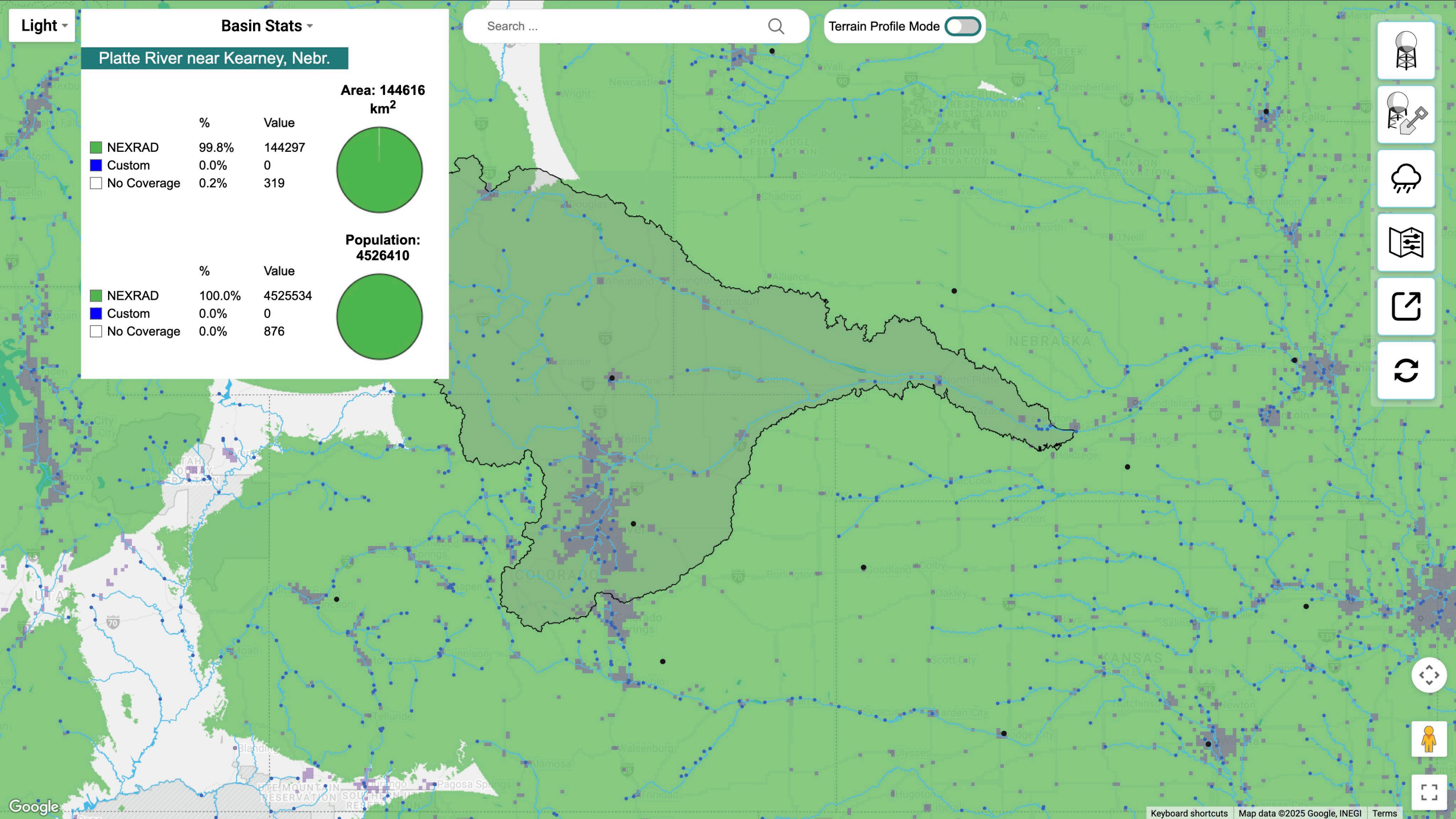
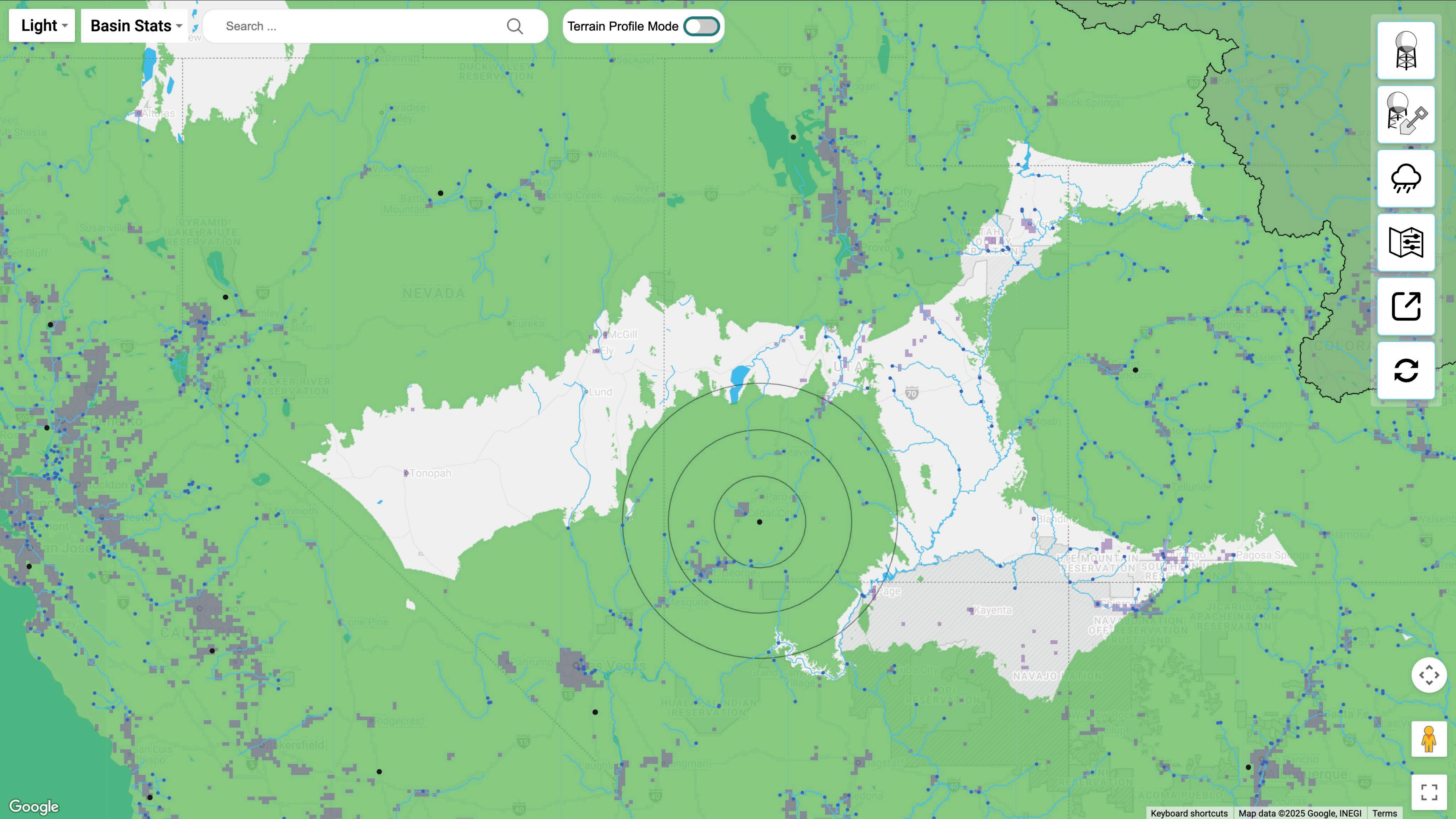
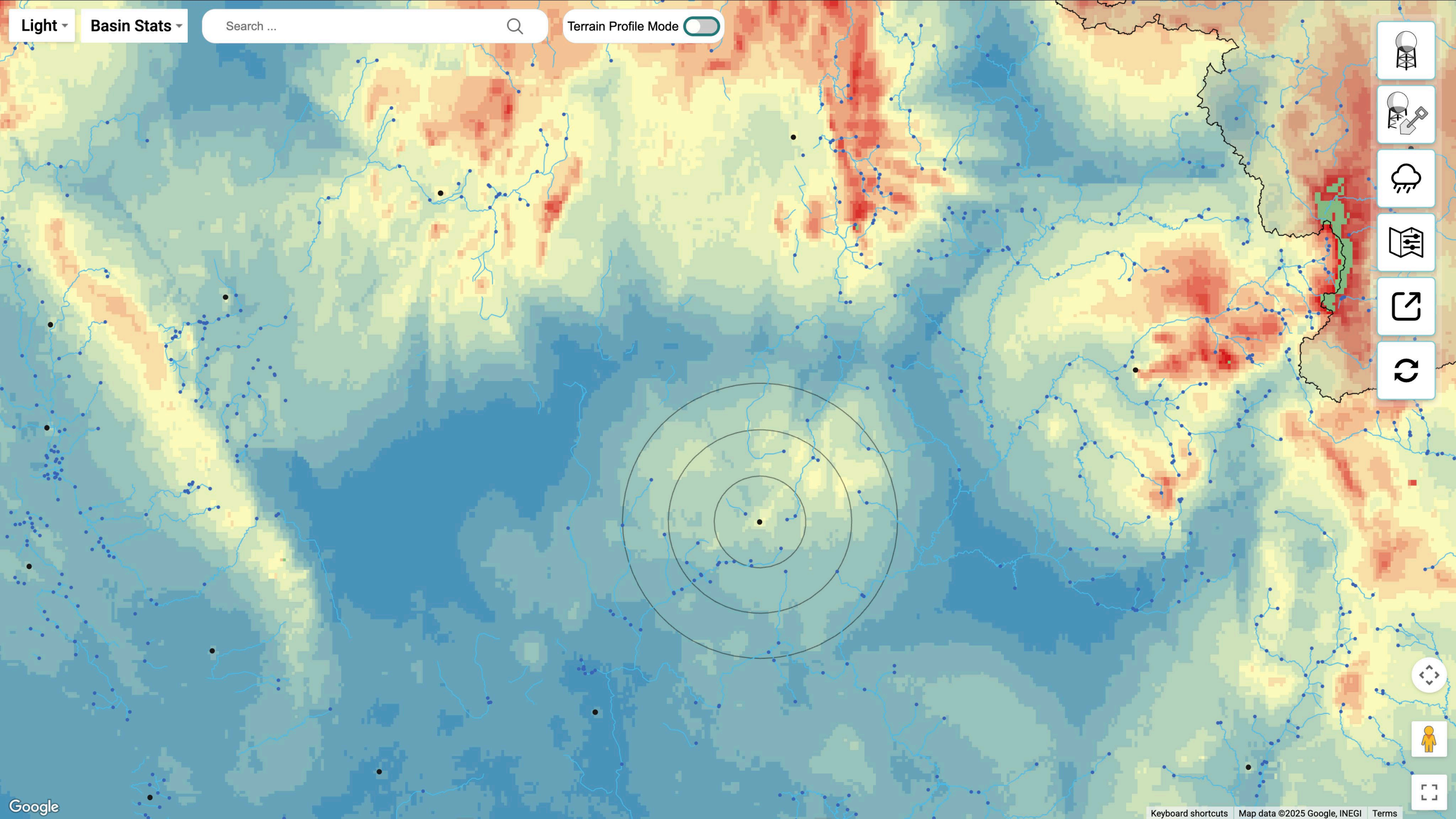
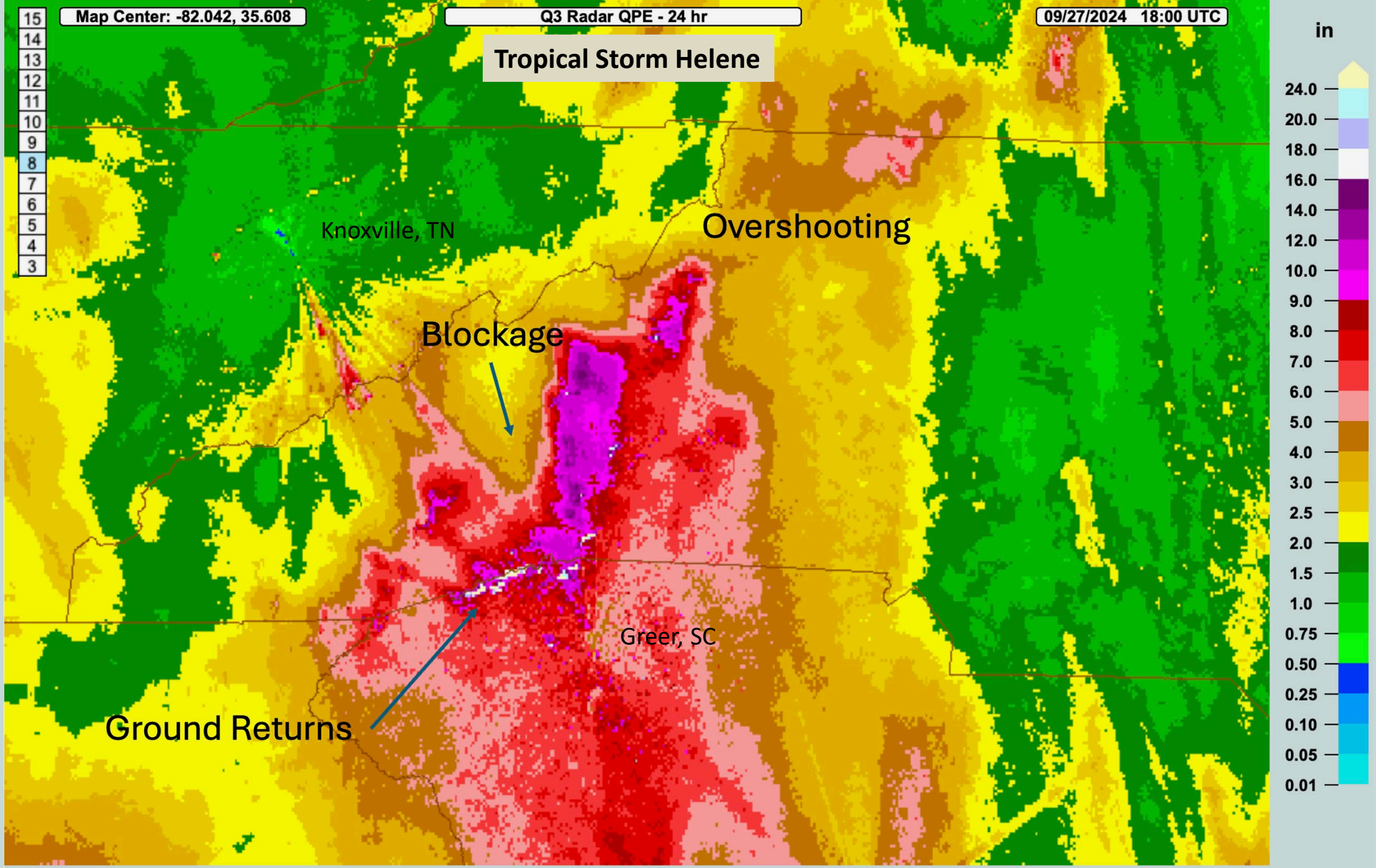

Light
Basin Stats
Search ...
Terrain Profile Mode
Probability of Detecting Rain
PoD (%) MRMS
0
3
6
9
12
15
Google
Keyboard shortcuts
Map data ©2025 Google, INEGI
Terms

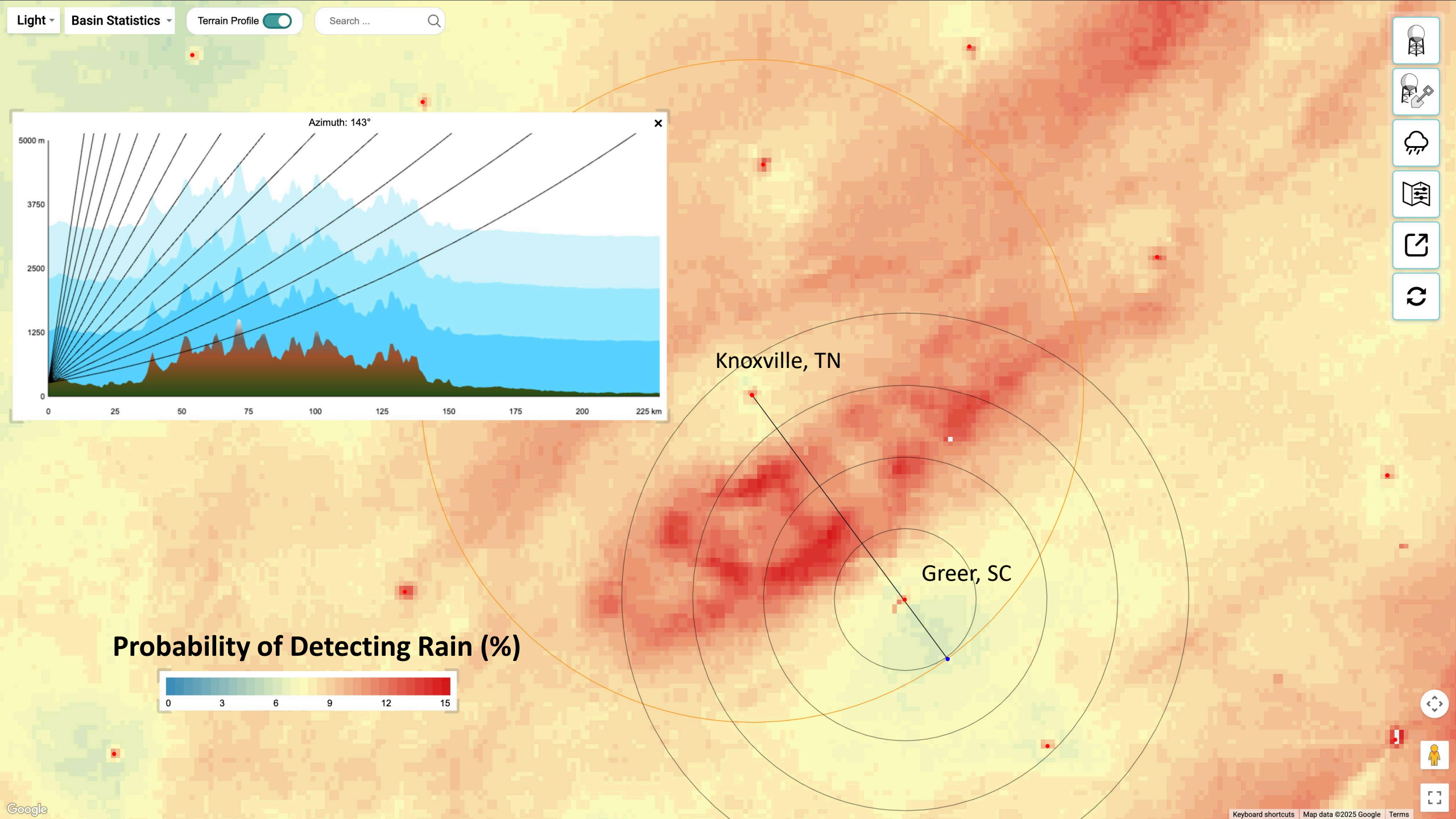

Light
Basin Stats
Search ...
Terrain Profile Mode
0
3
6
9
12
15
Google
Keyboard shortcuts
Map data ©2025 Google, INEGI
Terms

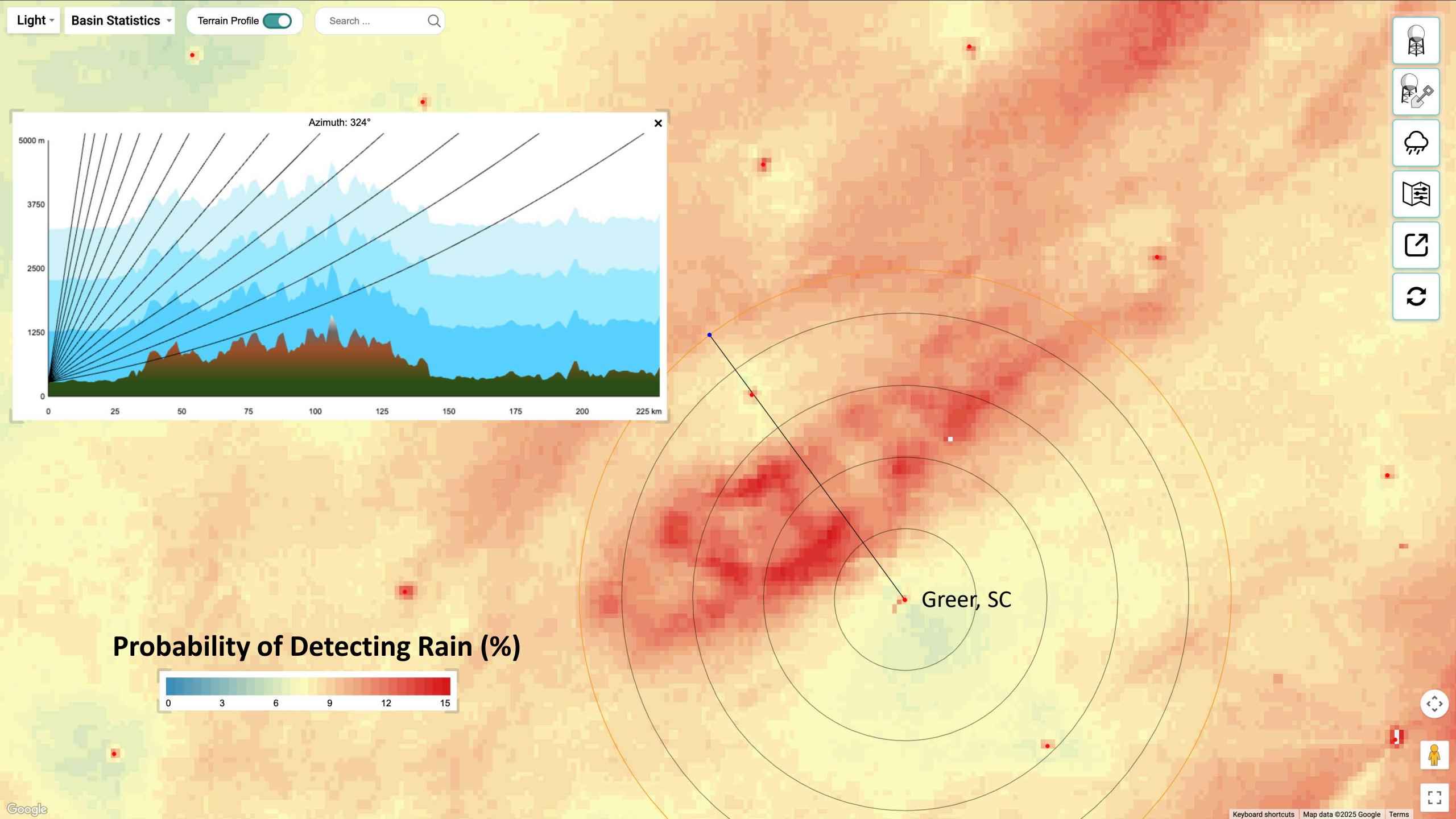

Light
Basin Stats
Platte River near Kearney, Nebr.
Area: 144616 km²
% Value
NEXRAD 99.8% 144297
Custom 0.0% 0
No Coverage 0.2% 319
Population: 4526410
% Value
NEXRAD 100.0% 4525534
Custom 0.0% 0
No Coverage 0.0% 876
Search ...
Terrain Profile Mode
NEBRASKA
COLORADO
KANSAS
UTAH
Google
Keyboard shortcuts
Map data ©2025 Google, INEGI
Terms


Light
Basin Stats
Search ...
Terrain Profile Mode
NEVADA
Tonopah
McGill
Ely
Lund
Eureka
Page
Kayenta
NAVAJO NATION
Pagosa Springs
Google
Keyboard shortcuts
Map data ©2025 Google, INEGI
Terms


Light
Basin Stats
Search ...
Terrain Profile Mode
Google
Keyboard shortcuts
Map data ©2025 Google, INEGI
Terms


Map Center: -82.042, 35.608
Q3 Radar QPE - 24 hr
09/27/2024 18:00 UTC
Tropical Storm Helene
Knoxville, TN
Overshooting
Blockage
Greer, SC
Ground Returns
in
24.0
20.0
18.0
16.0
14.0
12.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.5
2.0
1.5
1.0
0.75
0.50
0.25
0.10
0.05
0.01


Light
Basin Statistics
Terrain Profile
Search ...
Azimuth: 143°
5000 m
3750
2500
1250
0
0
25
50
75
100
125
150
175
200
225 km
Knoxville, TN
Greer, SC
Probability of Detecting Rain (%)
0
3
6
9
12
15
Google
Keyboard shortcuts
Map data ©2025 Google
Terms

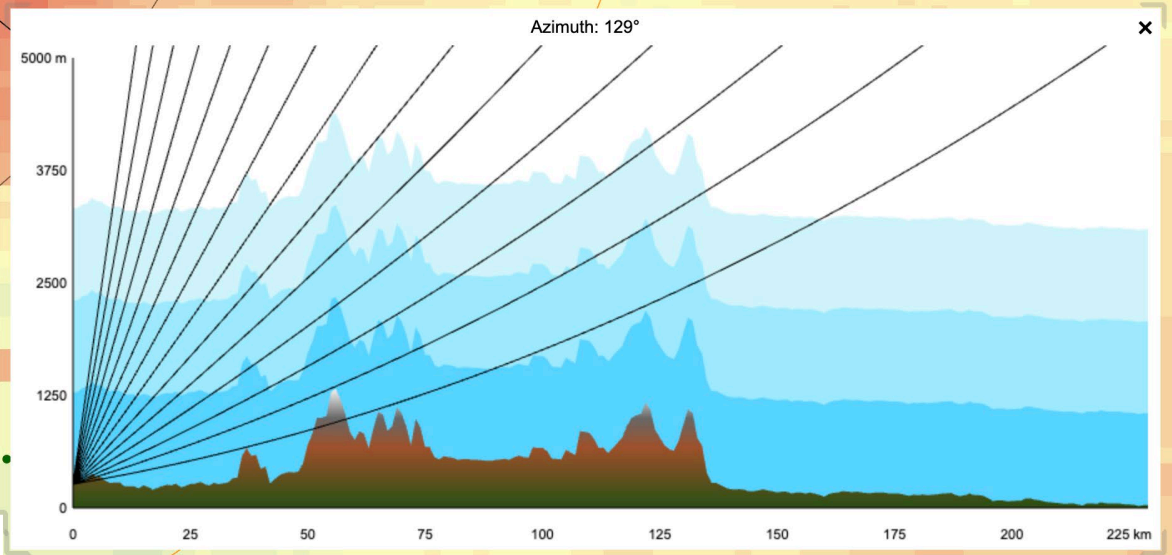

Light
Basin Statistics
Terrain Profile
Search ...
Azimuth: 324°
5000 m
3750
2500
1250
0
0
25
50
75
100
125
150
175
200
225 km
Greer, SC
Probability of Detecting Rain (%)
0
3
6
9
12
15
Google
Keyboard shortcuts
Map data ©2025 Google
Terms

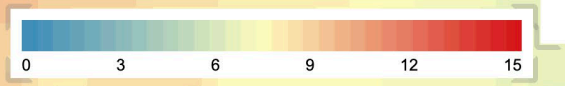
Light | Basin Statistics | Terrain Profile | Search ...

Probability of Detecting Rain (%)

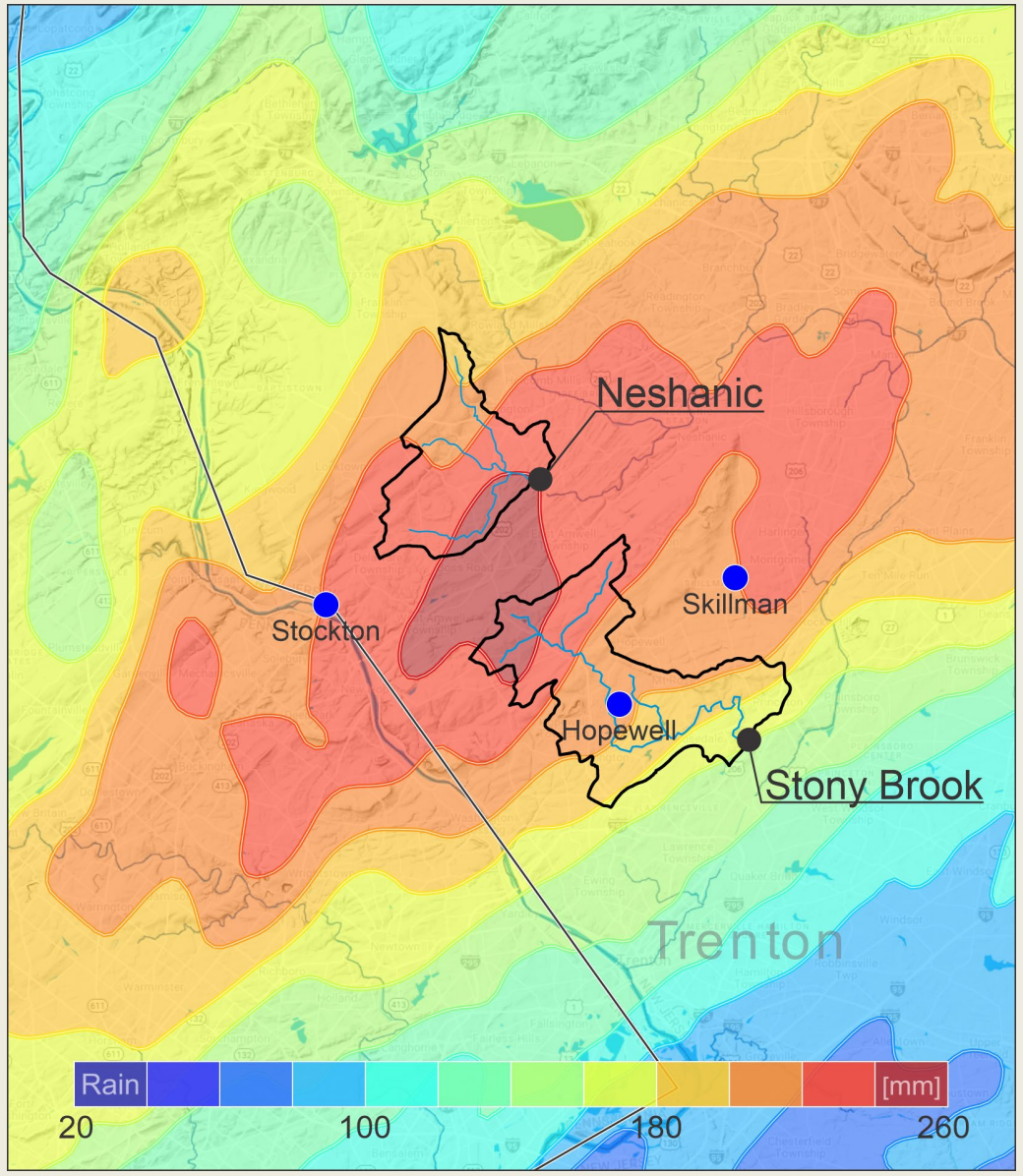
Knoxville, TN

Ashville, NC

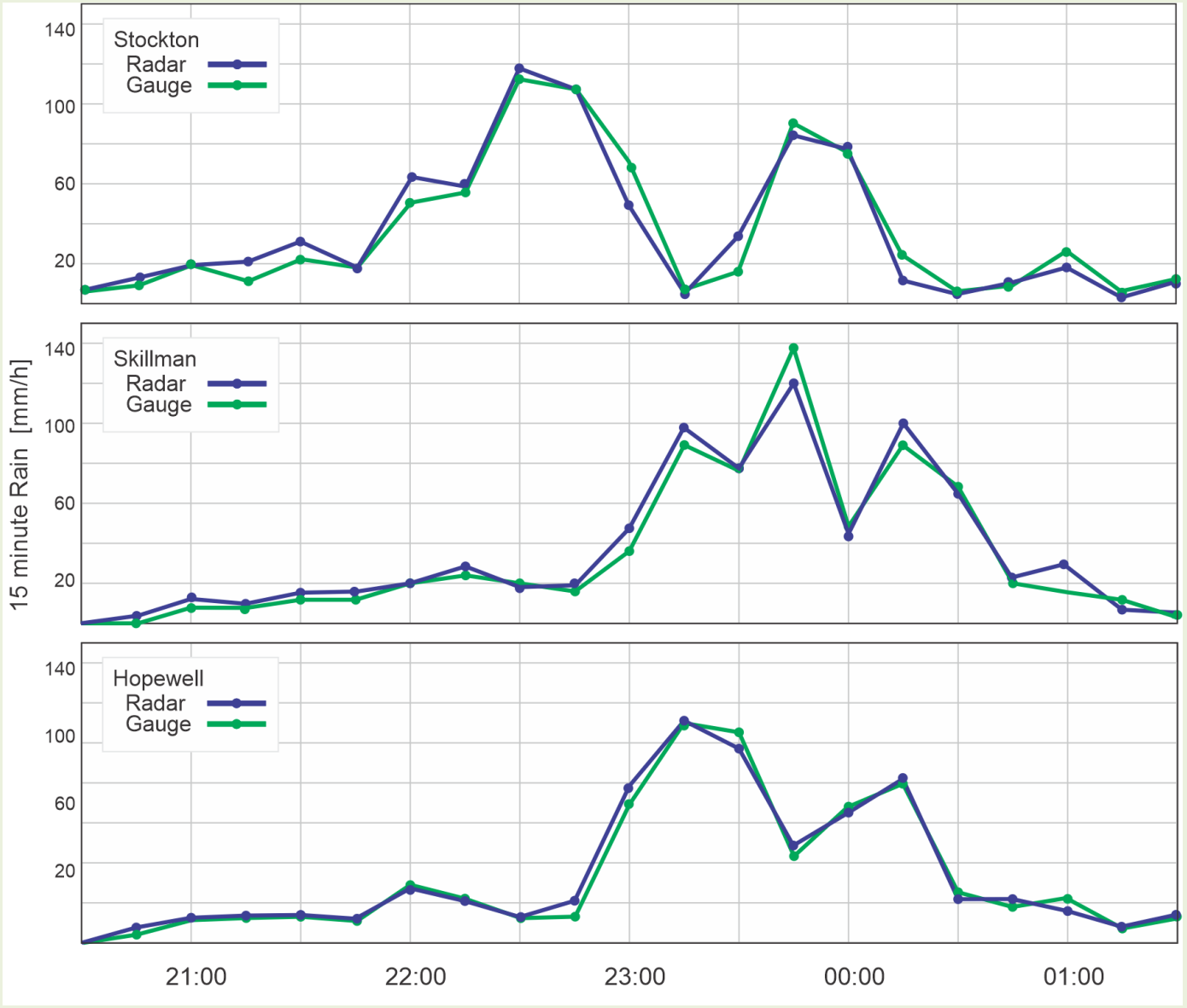




Extreme rainfall accumulation (Hurricane Ida, September 2021)

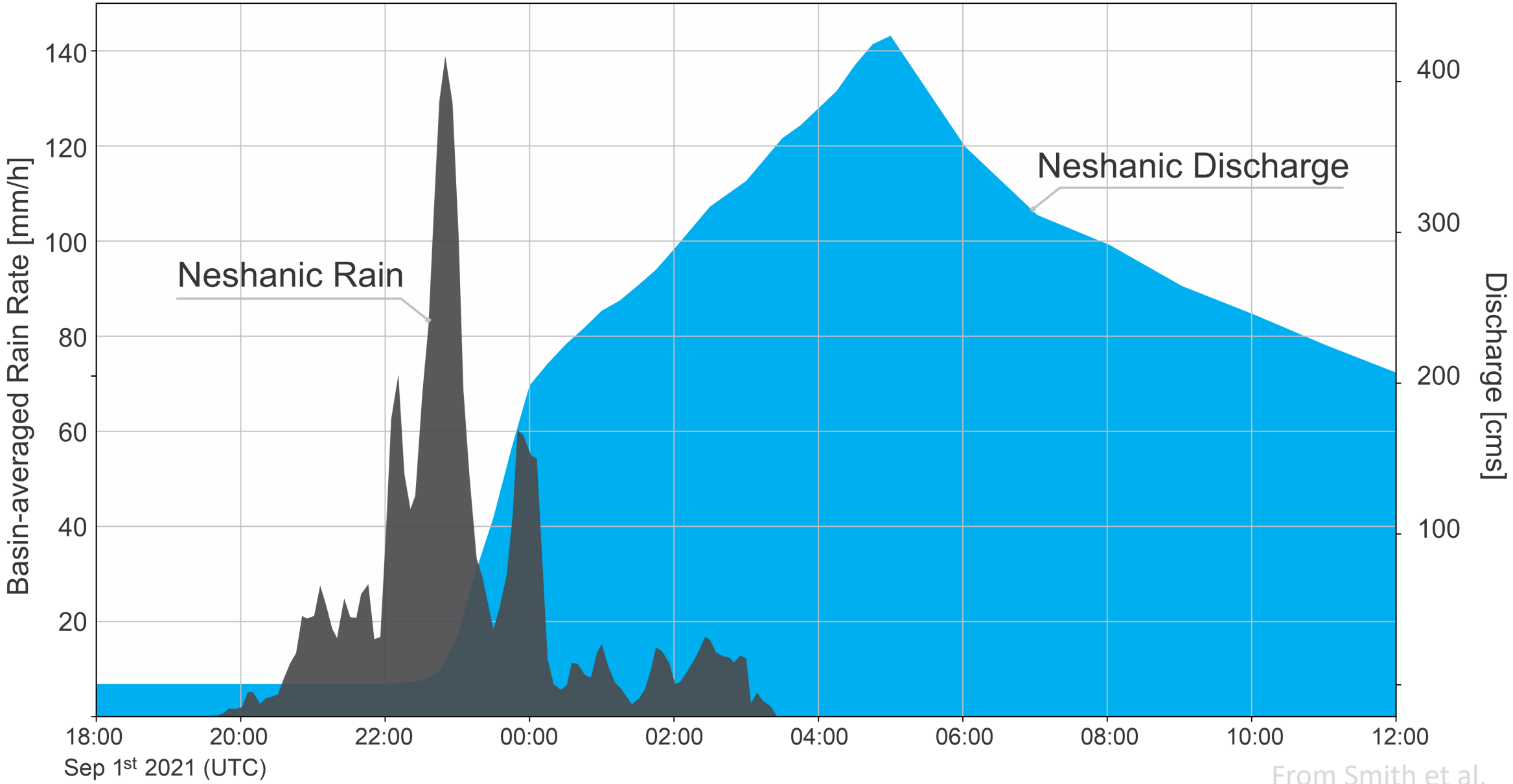


Excellent agreement between radar and rain gauges



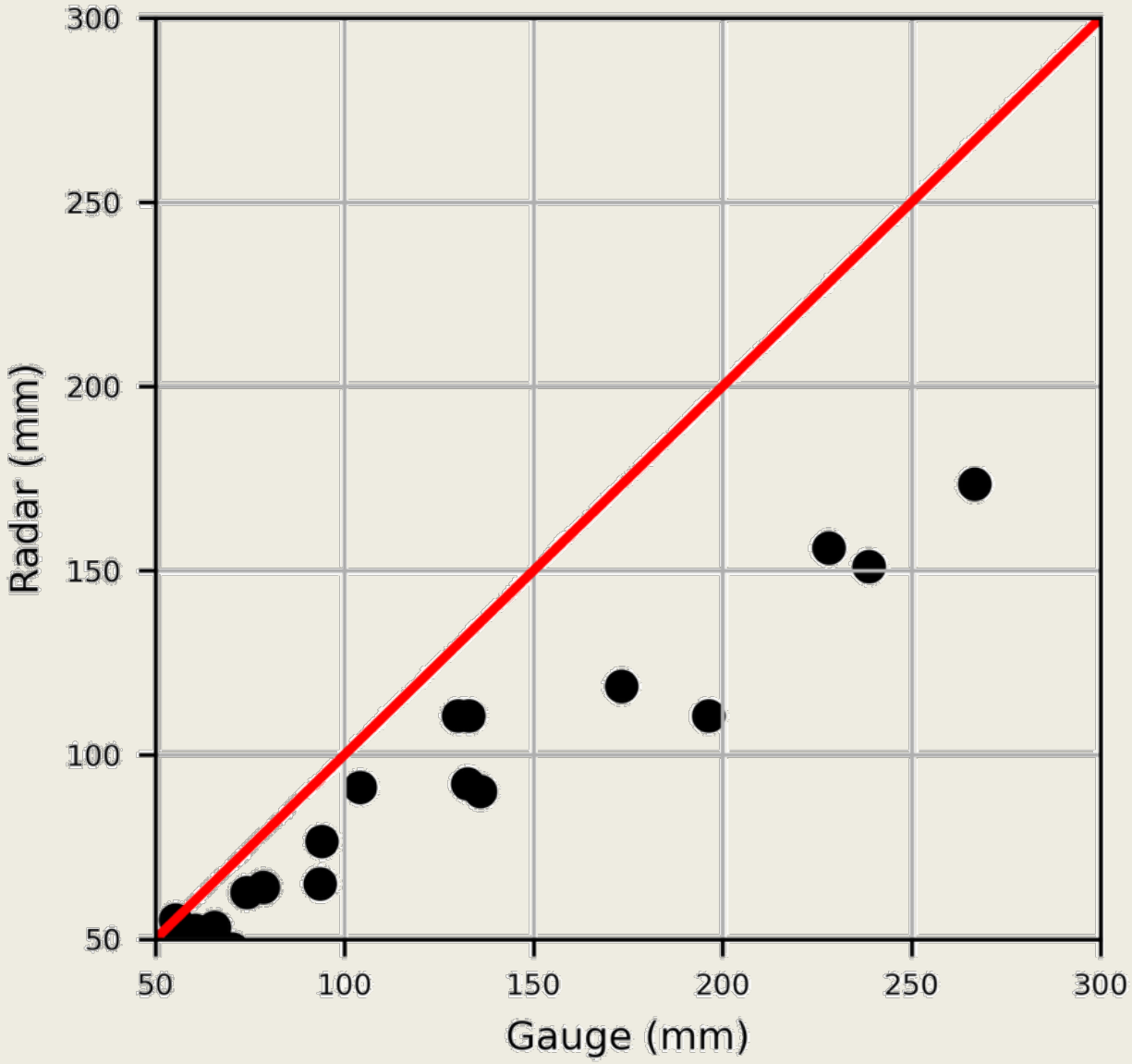
From Smith et al. 2023

Basin response



From Smith et al.

Typically, daily rainfall accumulations show significant conditional bias



Key points:

- Beam blockage and gaps in radar coverage create significant challenges for estimation of extreme warm season rainfall in mountainous terrain, but polarimetric radar provides a critical resource for assessing model performance in the extensive mountainous regions of the US with good radar coverage.
- Advances in polarimetric rainfall estimation algorithms combined with developing radar-rainfall reanalysis are needed for estimating rainfall extremes and their uncertainties, especially for PMP-magnitude events.

Thank You!