NOAA Atlas 15 — Generating National Climate-Informed Precipitation Frequency Estimates

Janel Hanrahan[1], Sanja Perica[1], Ken Kunkel[2], Lynne Trabachino[1], Marcelo Lago[3], Debbie Martin[1], Sandra Pavlovic[4], and Fernando Salas[4]

[1]RTI Center for Water Resources, [2]North Carolina State University, [3]LAGO Consulting & Services, [4]NOAA Office of Water Prediction

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Towards climate-informed precipitation frequency data

Atlas 15 Pilot over Montana - Released for stakeholder review on September 26th, 2024

NOAA Atlas 15

Authoritative National Study
Funded by BIL

Accounts for nonstationarity

Timeline for the Development and Deployment of Updated Authoritative Precipitation Frequency Estimates Nationwide

2022/2023

- **Feb. - Aug 2022** - Published methodology and briefed stakeholders.
- **Sept. 2022** - Distributed Public Notification Statement (PNS) and collect public feedback.
- **Jan. 2023** - Hosted technical workshop with federal partners.
- **Apr. 2023** - Award contracts and grants and initiate product development.

2024

- **Development** - Evolve framework. Create Quality Controlled National Precipitation Database. Evaluate Climate Model Projections.
- **Pilot** - Deliver Atlas 15 Vol. 1 and Vol. 2 pilot over Montana.

  Collect and adjudicate feedback on preliminary estimates and Web dissemination strategies.

2025

- **CONUS** - Initiate 60-day peer review for Atlas 15 Vol. 1 and Vol. 2 for CONUS (lower 48 states).

  Collect feedback and adjudicate comments on product.

2026

- **CONUS** - Complete Atlas 15 Vol. 1 and Vol. 2 and deliver estimates, documentation and supplementary products to stakeholders.
- **oCONUS** - Initiate peer review for oCONUS (e.g. Hawaii, Alaska, Puerto Rico, U.S. Virgin Islands, Guam).

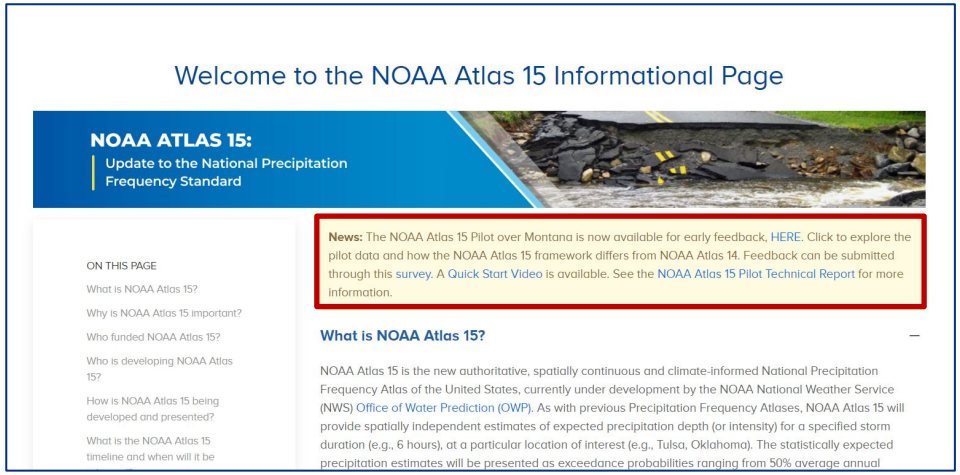
  Collect feedback and adjudicate comments on product.

2027

- **oCONUS** - Complete Atlas 15 Vol. 1 and Vol. 2 and deliver estimates, documentation and supplementary products to stakeholders.

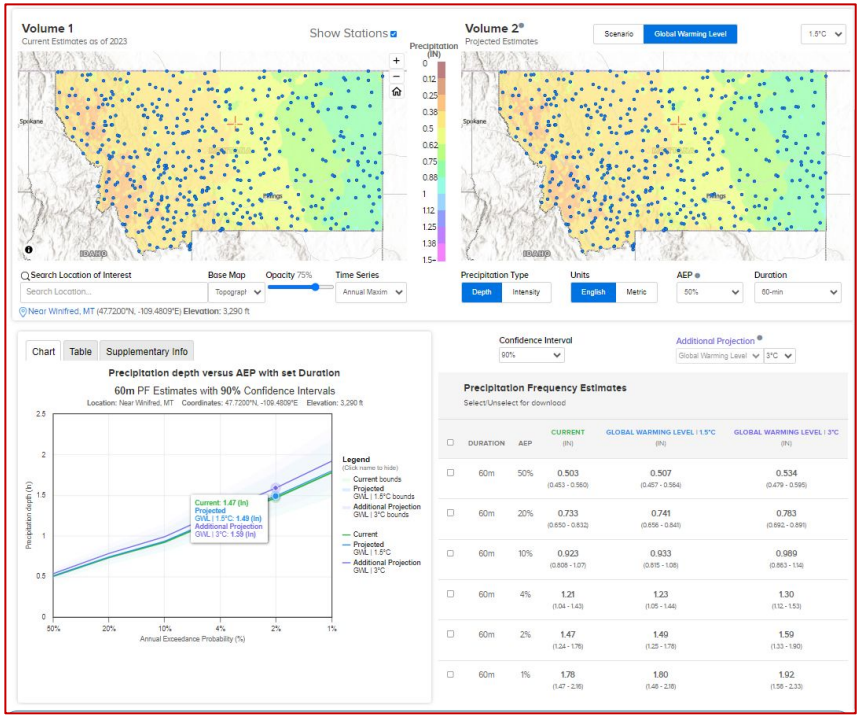
https://water.noaa.gov

NOAA Atlas 15 - Pilot



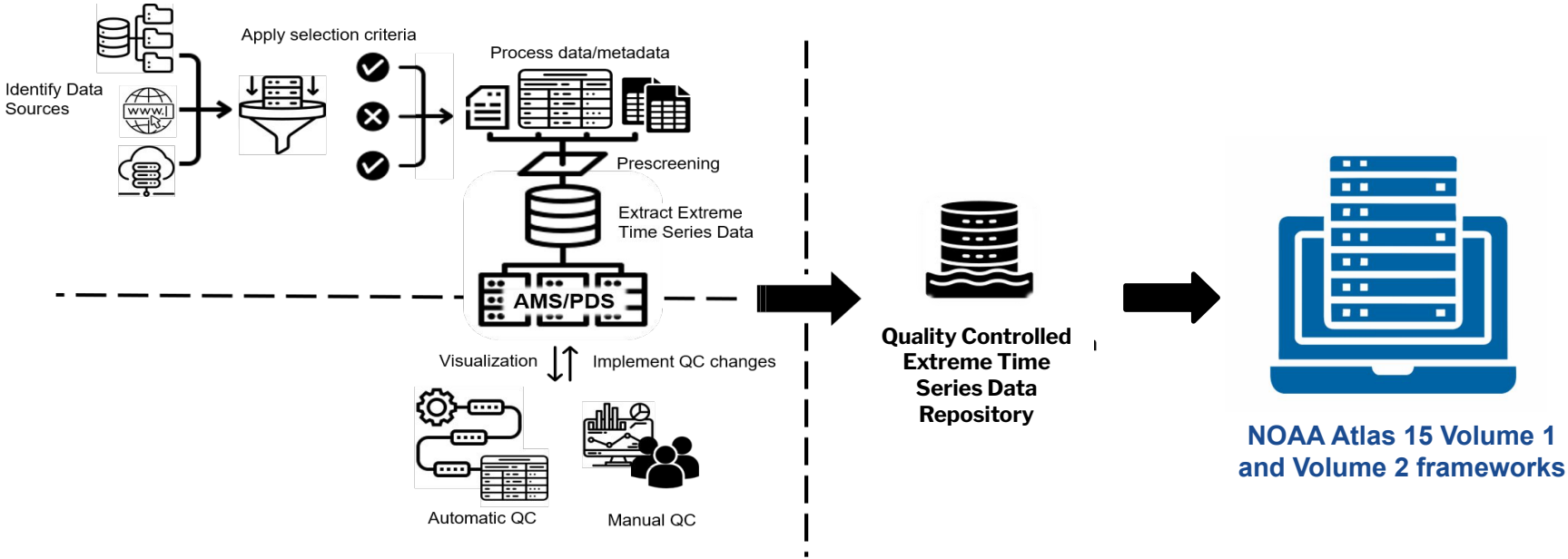
Atlas 15 Informational Page:
https://water.noaa.gov/about/atlas15

Visualization Page
Quick Start Video
Pilot Technical Report
Feedback Google Form



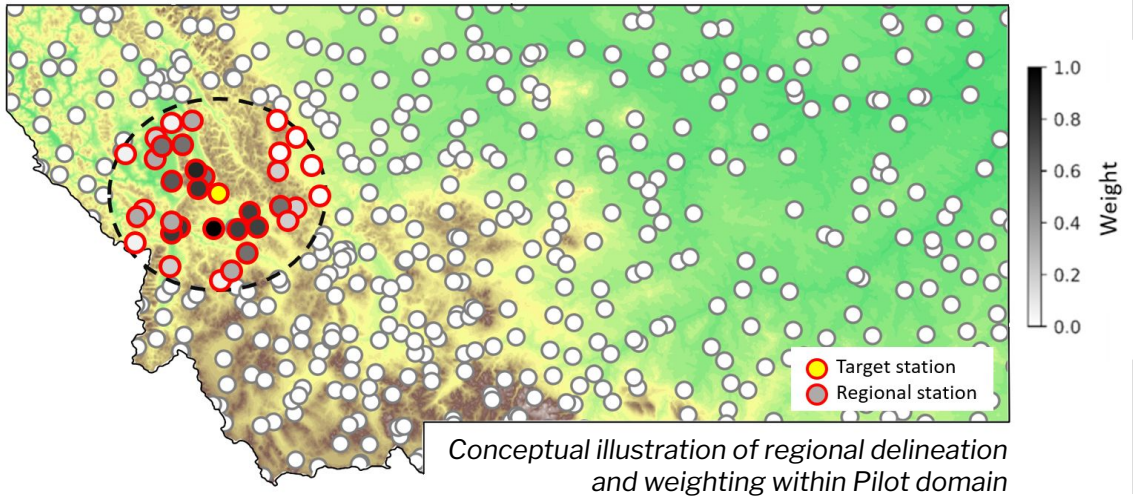
Atlas 15 Visualization Page:
https://water.noaa.gov/precip-frequency/atlas15/pilot

Developing precipitation extreme time series data repository



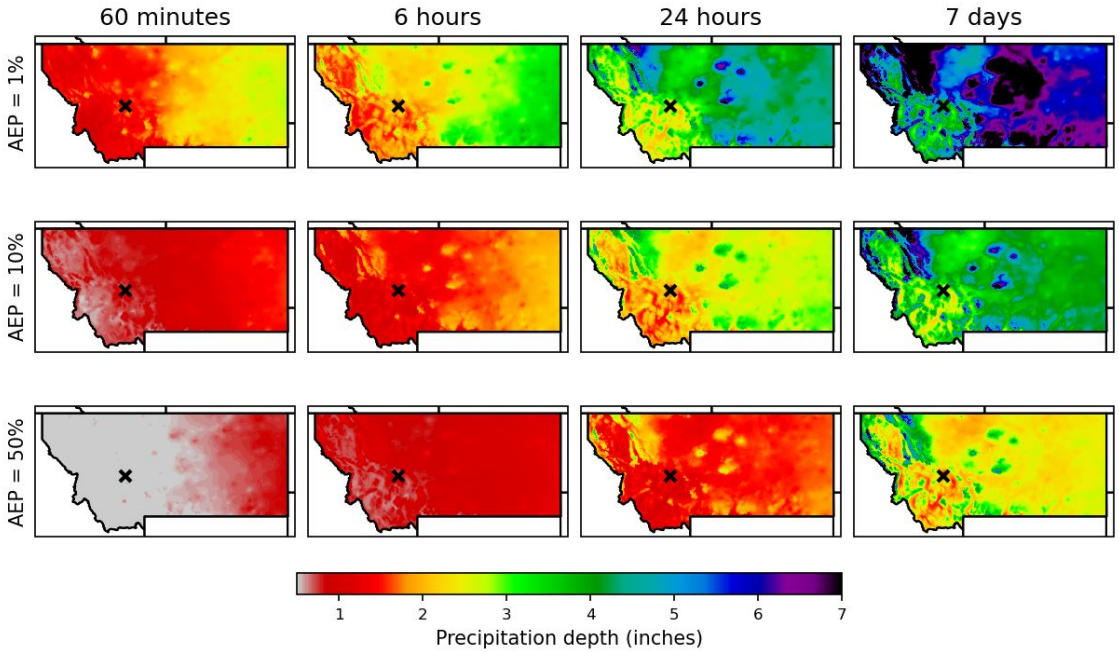
A15 Volume 1

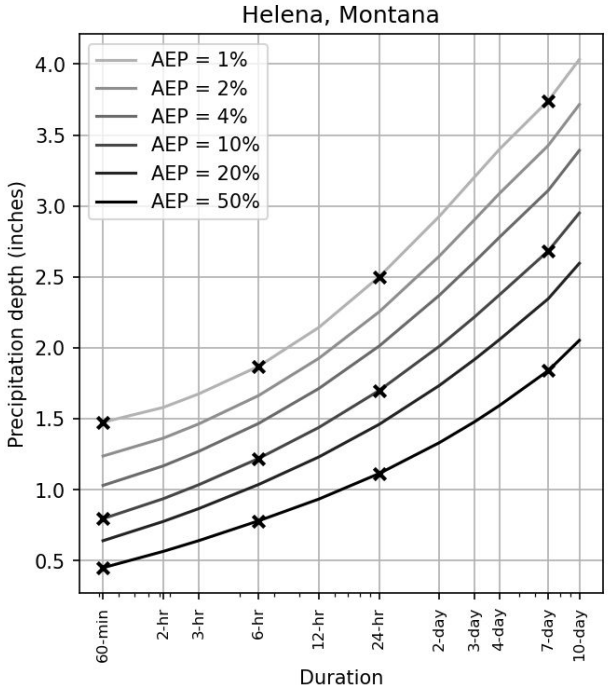
- Regional station data weighted based on geographical and meteorological characteristics
- GEV parameters determined via MLE dependent on:
  - Spatial covariate: Mean annual maximum precipitation (MAM)
  - Temporal covariate: Global warming level (GWL)
- PF estimates generated at each station location, then spatially interpolated to a grid



Conceptual illustration of regional delineation and weighting within Pilot domain

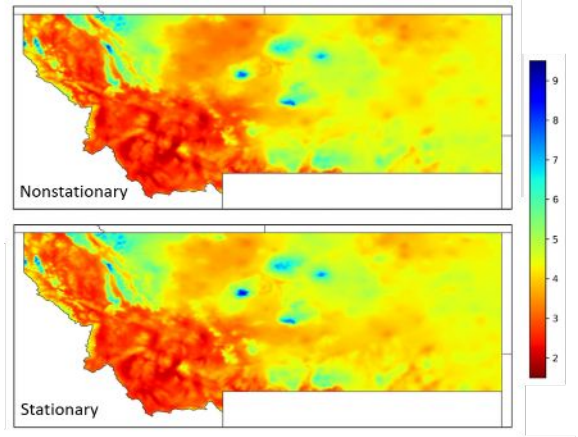
A15 Pilot Volume 1 - estimates



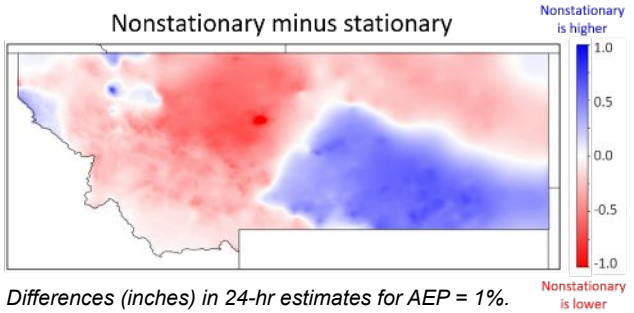


A15 Volume 1 - Nonstationary vs. stationary estimates

- Nonstationary and stationary estimates are similar
- Present-day differences are within ~15% and reflect trends in gauge data

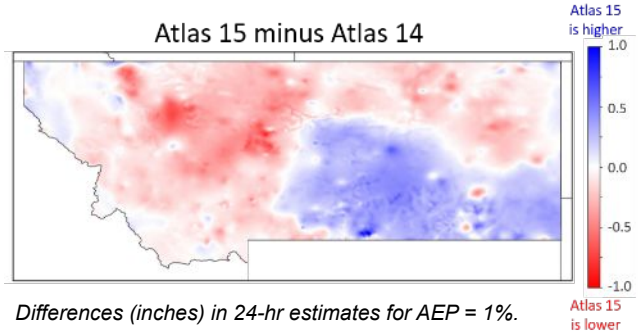


24-hr estimates (inches) for AEP = 1%.



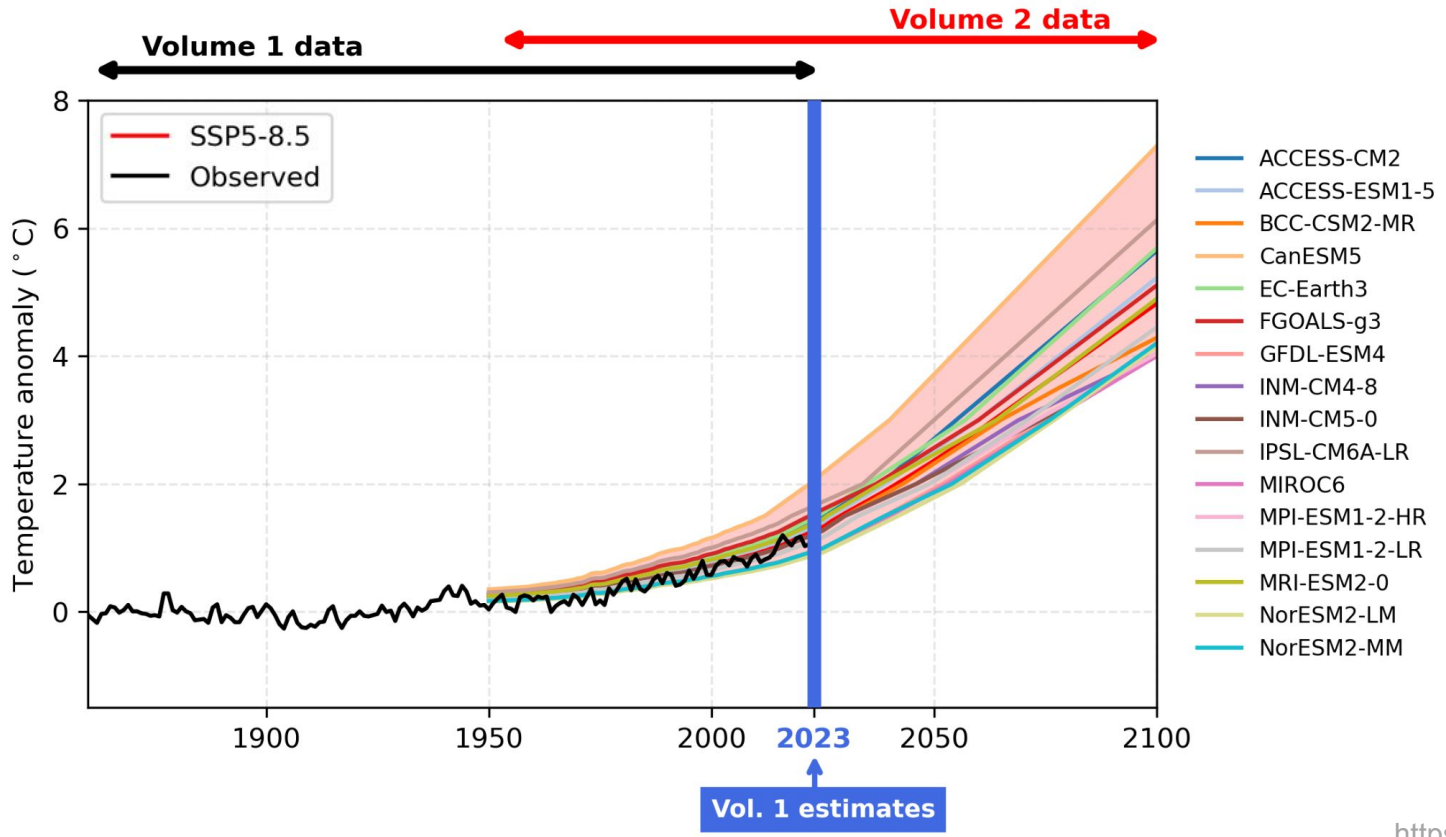
Differences (inches) in 24-hr estimates for AEP = 1%.

- Large-scale differences between A15 and A14 are largely due to the implementation of a nonstationary framework

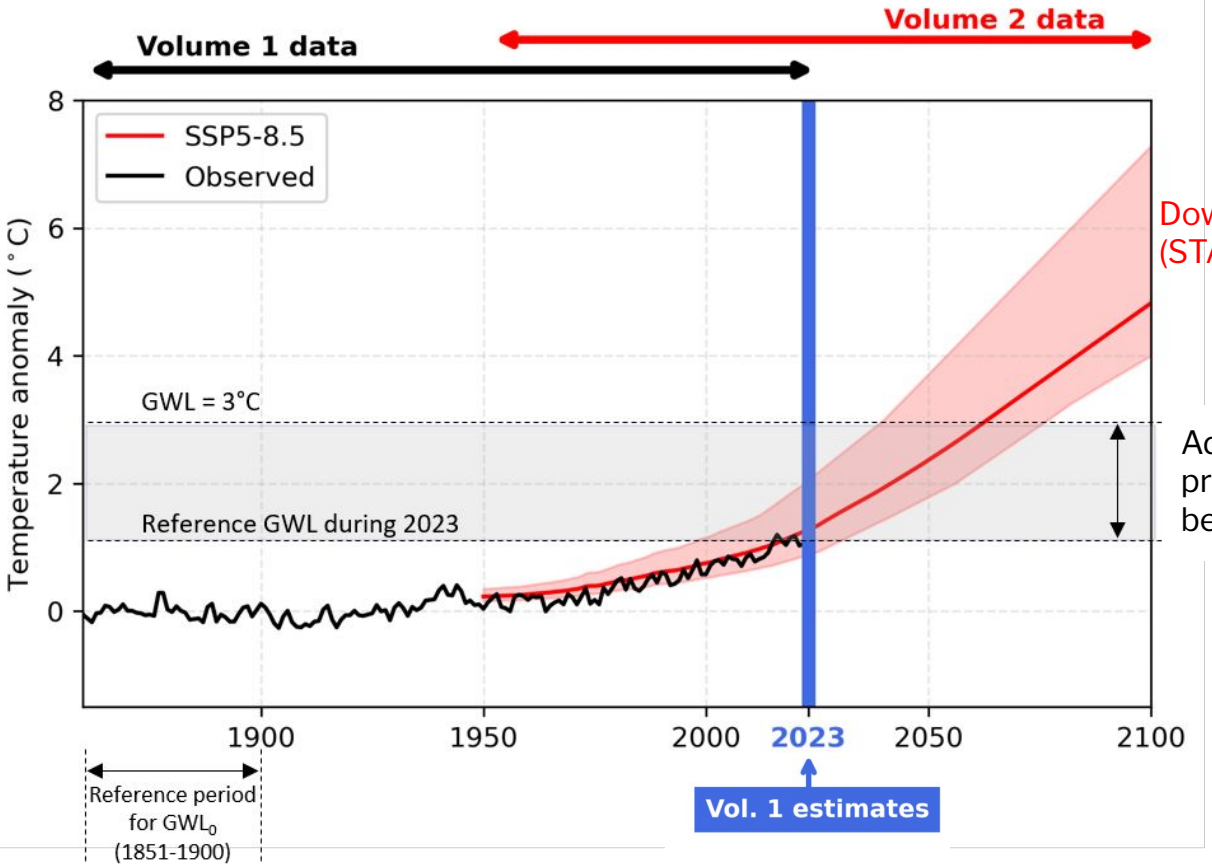


Differences (inches) in 24-hr estimates for AEP = 1%.

A15 Volume 2


Volume 1 data
Volume 2 data
SSP5-8.5
Observed
Temperature anomaly (°C)
8
6
4
2
0
1900
1950
2000
2023
2050
2100
Vol. 1 estimates
ACCESS-CM2
ACCESS-ESM1-5
BCC-CSM2-MR
CanESM5
EC-Earth3
FGOALS-g3
GFDL-ESM4
INM-CM4-8
INM-CM5-0
IPSL-CM6A-LR
MIROC6
MPI-ESM1-2-HR
MPI-ESM1-2-LR
MRI-ESM2-0
NorESM2-LM
NorESM2-MM

A15 Volume 2

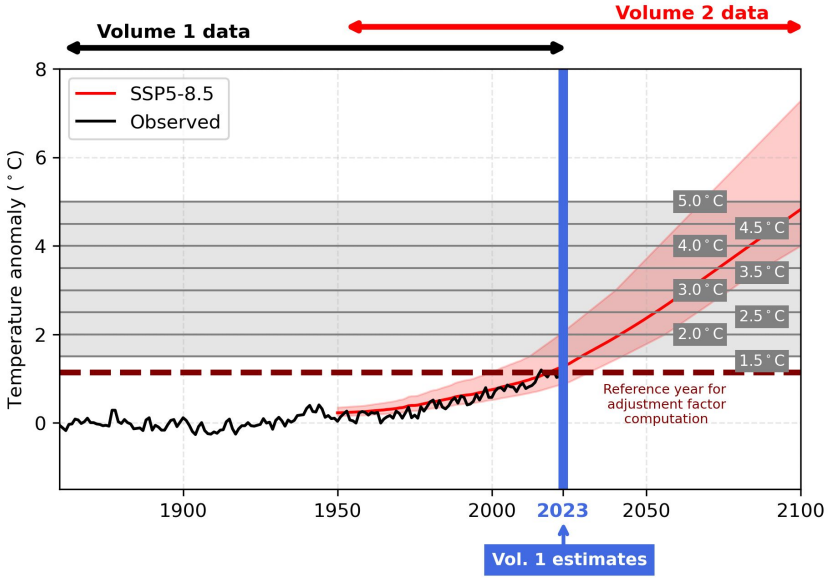


Downscaled precipitation (STAR-ESDM and LOCA2)

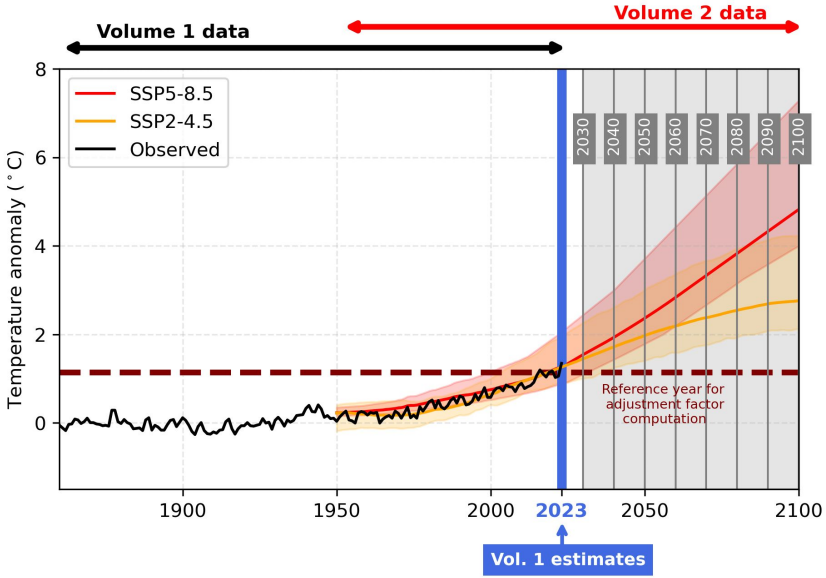
Adjustment factors measure precipitation differences between GWLs

A15 Volume 2

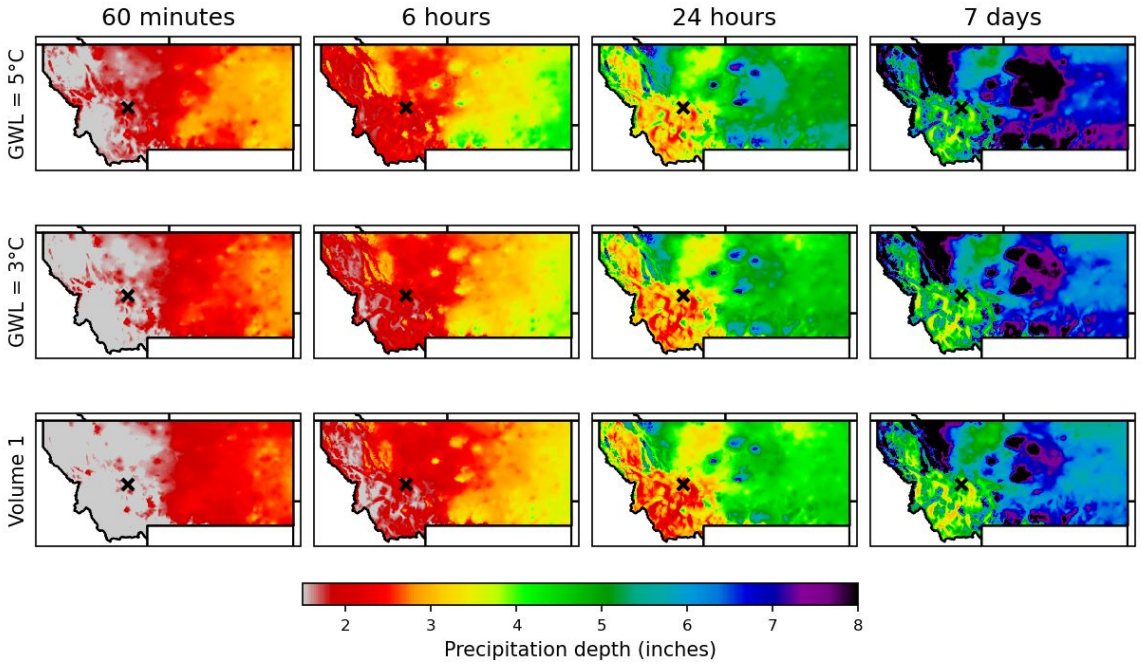
Global warming level framework

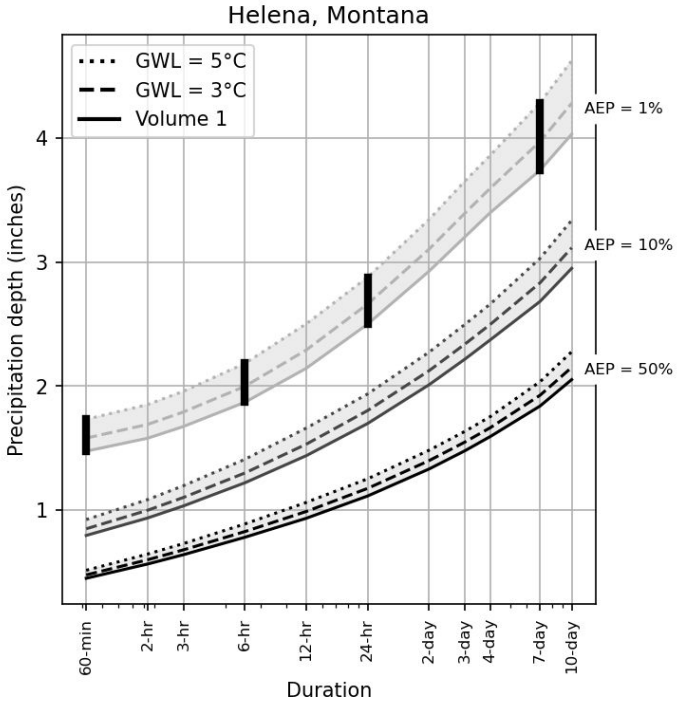


Scenario framework



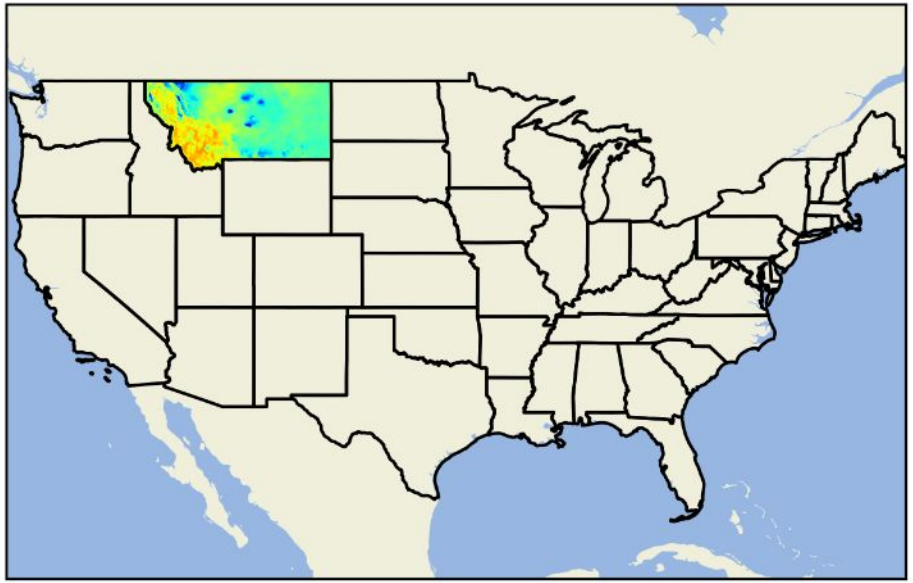
A15 Pilot Volume 2 - estimates





A15 development - Moving on to CONUS (then oCONUS)

- Adapt framework for implementation across CONUS, pending completion of repository and MAM grid development
- Evaluate and integrate additional climate model datasets to address small AEPs and sub-daily durations
- Review and incorporate peer-review feedback



Acknowledgements

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Thank You!

Atlas 15 Pilot Info Page

Janel Hanrahan
janel.hanrahan@noaa.gov

atlas15.info@noaa.gov

https://water.noaa.gov