

Meteorological Data for Dispersion Models

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Meteorological data workgroup

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- George Bridgers (OAQPS)
- Roger Brode (OAQPS)
- Randy Robinson (Region 5)
- Andy Hawkins (Region 7)
- Rebecca Matichuk (Region 8)



Acknowledgments

- Kali Frost (Indiana Department of Environmental Management)
 - Provided Gibson AERMOD inputs and observations for MMIF evaluations
- Missouri Department of Natural Resources, Andy Hawkins, R7
 - Herculaneum inputs
- Andy Hawkins, Kirk Baker (OAPQS), Roger Brode
 - Martins Creek WRF/MMIF output
- Rebecca Matichuk, R8
 - Meteorological analysis of sites in R8



Meteorological data in the proposed *Guideline*

Section 8.4

- AERMINUTE
 - Introduced in 2011
 - Calculates hourly average of winds from 2-minute winds for ASOS stations
 - March 2013 memorandum issued regarding use of ASOS data and AERMINUTE in AERMOD
 - http://www.epa.gov/ttn/scram/guidance/clarification/20130308_Met_Data_Clarification.pdf
 - Should be routinely used when available
- Prognostic meteorological data
 - No representative NWS station and infeasible to collect site-specific data
 - No fewer than 3-years of data
 - Mesoscale Model Interface Program (MMIF) developed to read prognostic data (i.e., WRF) to create data for input into AERMET and AERMOD, as well as other dispersion models



Prognostic Meteorological Data Guidance

- Number of years: Minimum of 3 years
- Follow Ozone, PM_{2.5}, and Regional Haze modeling guidance for developing meteorological fields¹
- Evaluation procedures
- Link:
 - http://www.epa.gov/ttn/scram/11thmodconf/Draft_MMIF_Guidance.pdf

1. http://www.epa.gov/ttn/scram/guidance/guide/Draft_O3-PM-RH_Modeling_Guidance-2014.pdf



Prognostic Meteorological Data Guidance

- Guidance for running MMIF for AERMOD
 - Regulatory applications: MMIF to AERMET
 - AERMET regulatory meteorological pre-processor for AERMOD
 - Take advantage of options in AERMET (u^* adjustment)
 - All others: MMIF to AERMET or MMIF to AERMOD
- Grid resolution
 - Dependent upon location (complex terrain; complex meteorology)
- Representative grid cell
 - Most cases, grid cell of facility of interest
- Other recommendations



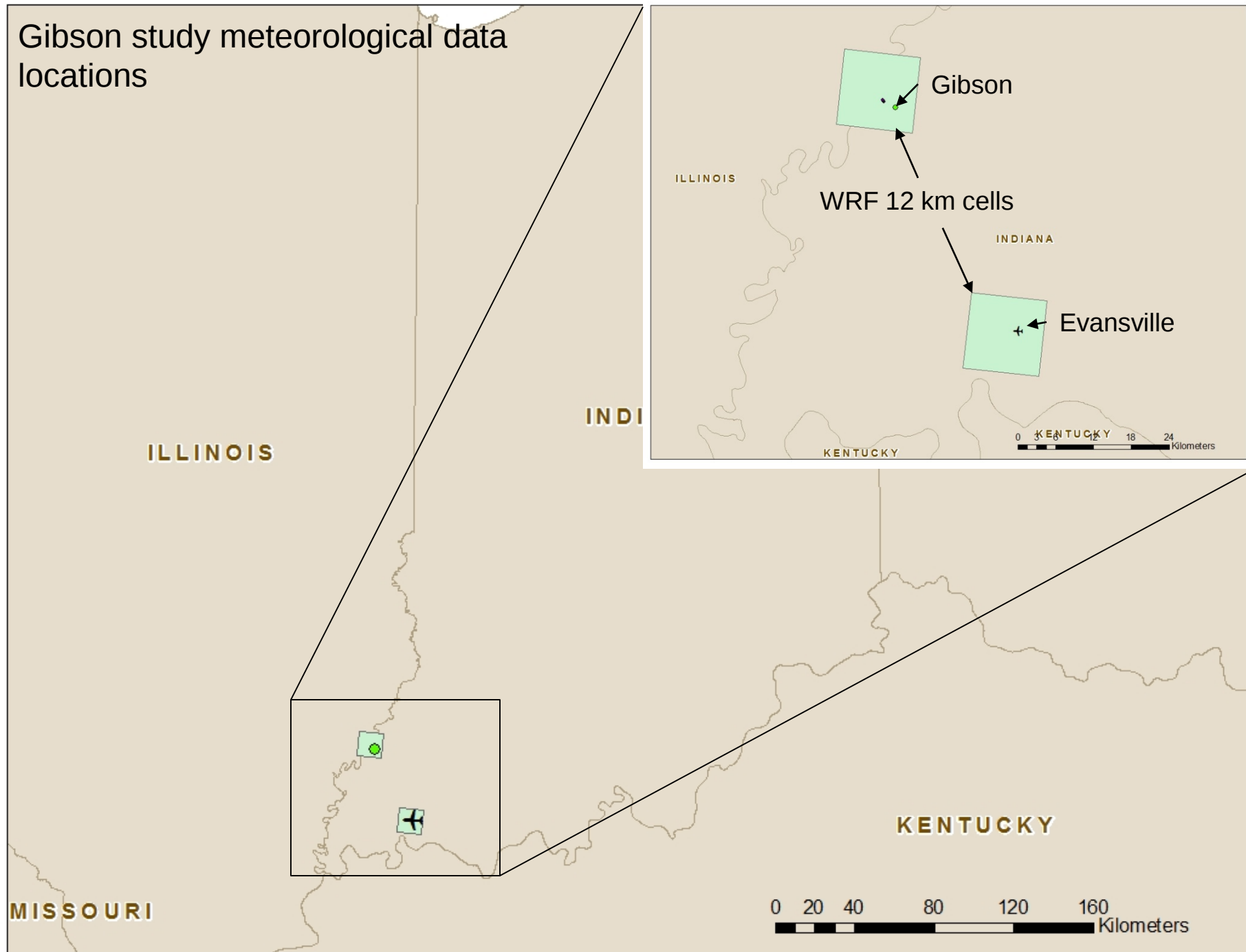
Prognostic Data Evaluation

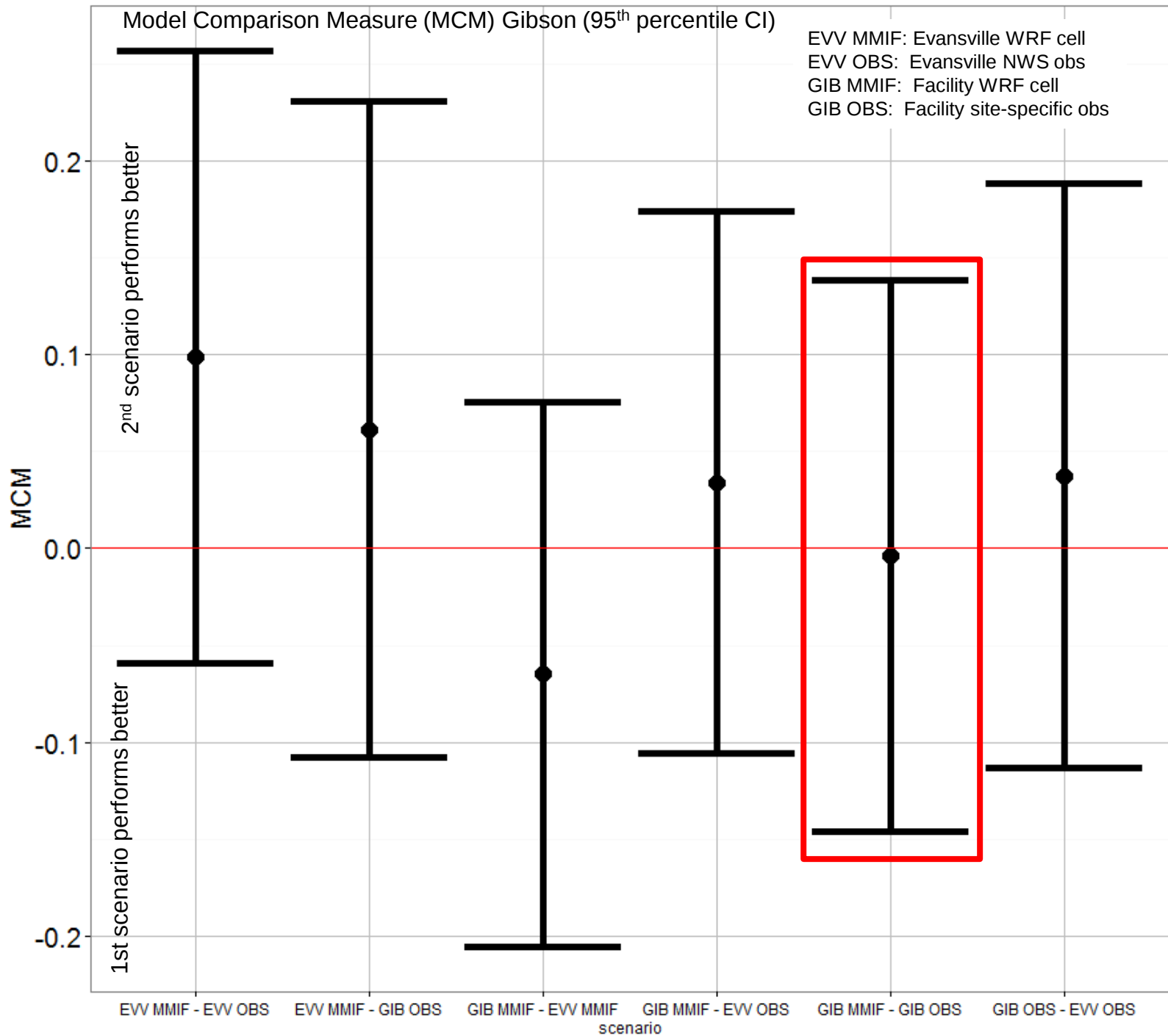
- Three case studies
 - Gibson, IN (SO_2)
 - Martins Creek, PA (SO_2)
 - Herculaneum, MO (Pb)
- Meteorological evaluations
- AERMOD evaluations
(EPA protocol for determining best performing model)



http://www.epa.gov/ttn/scram/11thmodconf/MMIF_Evaluation_TSD.pdf

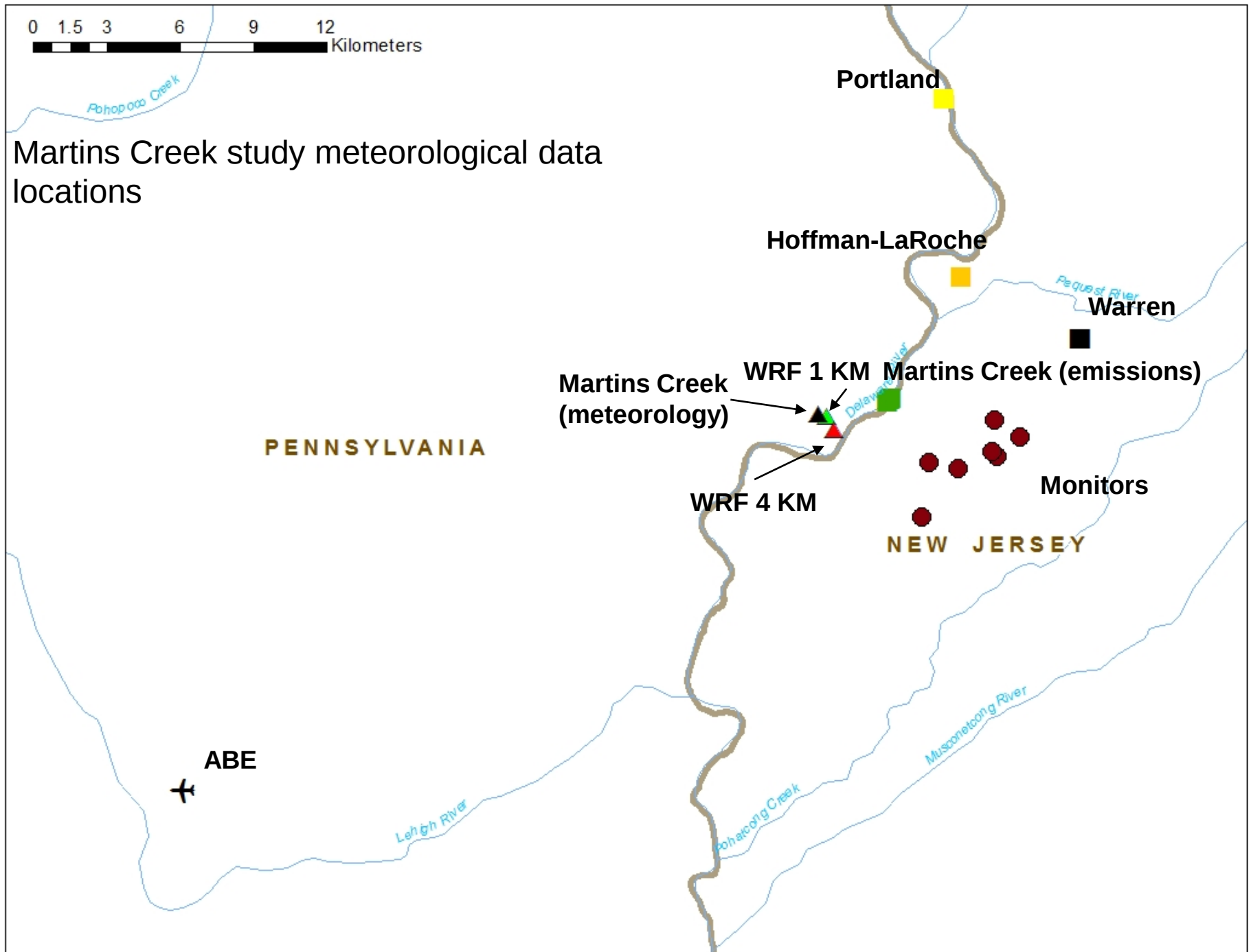
Gibson study meteorological data locations



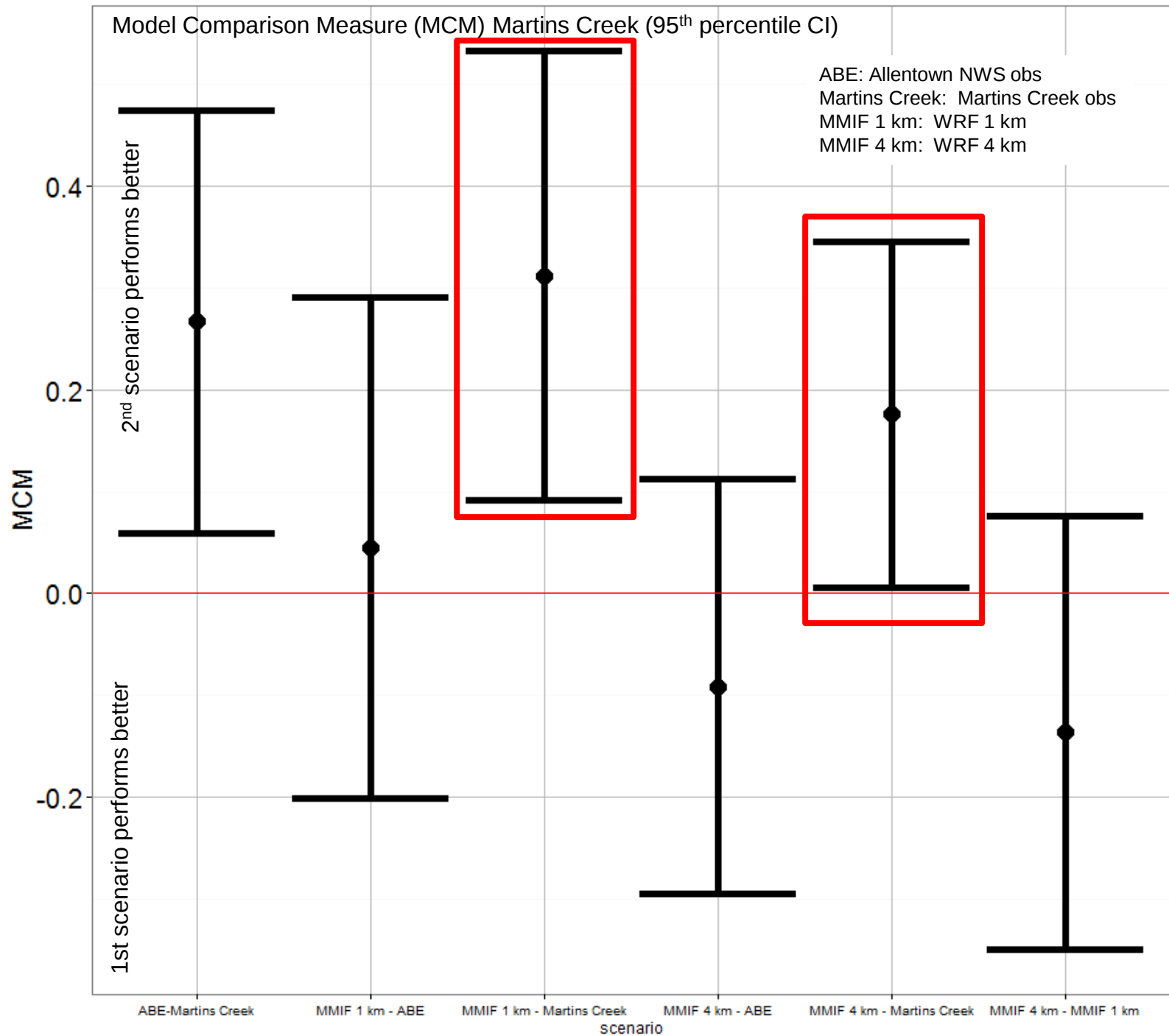


0 1.5 3 6 9 12 Kilometers

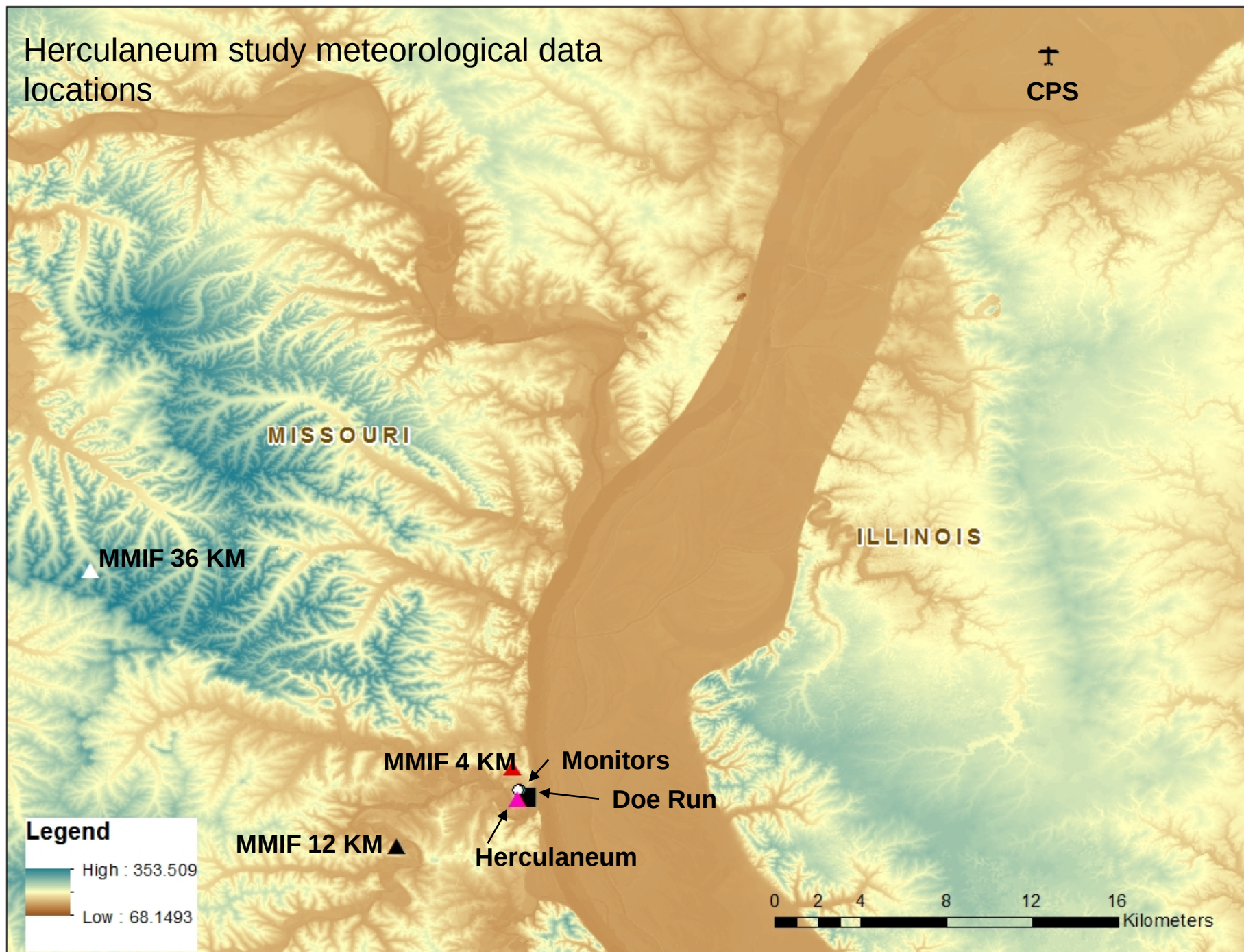
Martins Creek study meteorological data locations

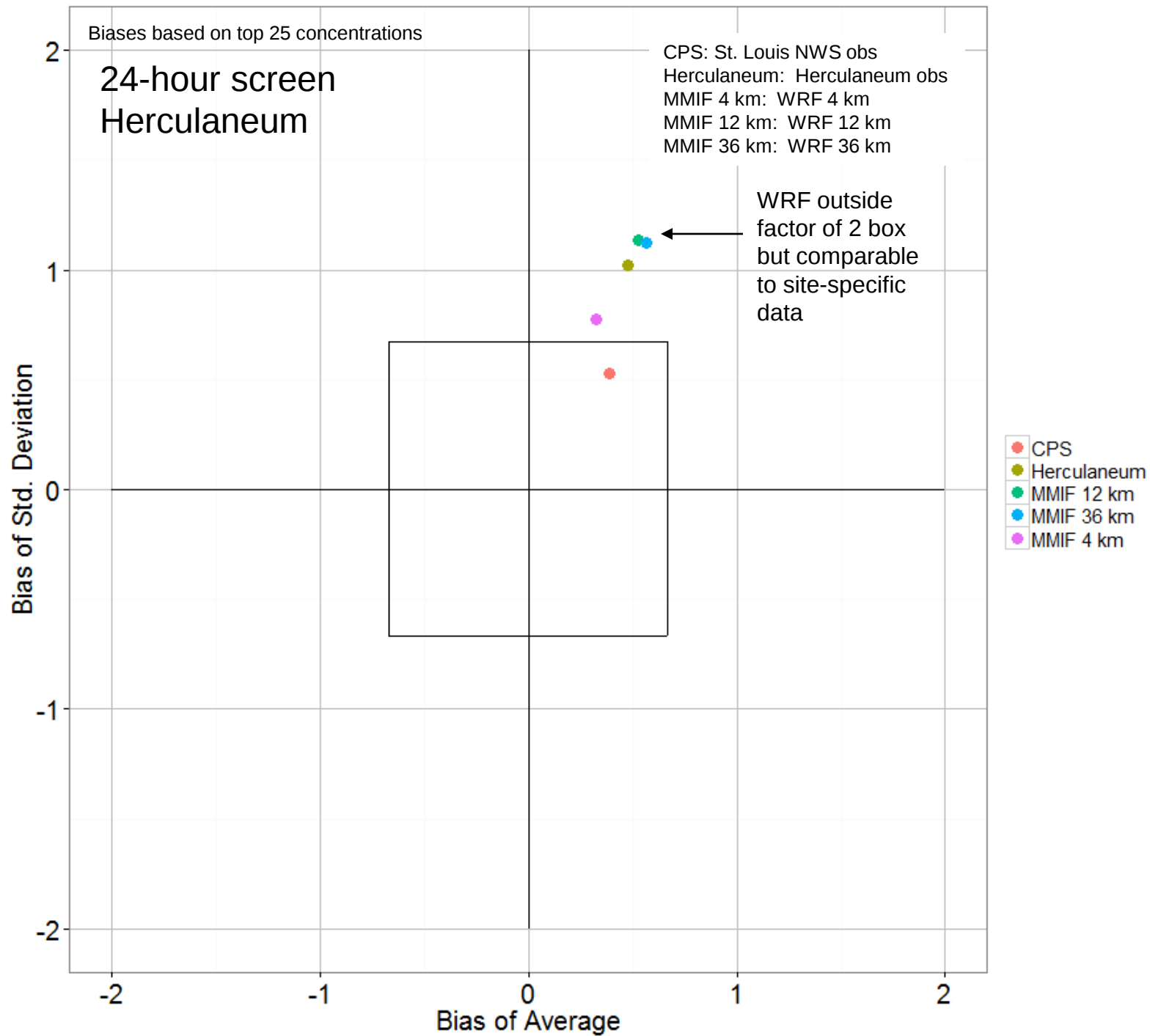


Model Comparison Measure (MCM) Martins Creek (95th percentile CI)



Herculaneum study meteorological data locations







Summary

- Gibson
 - Prognostic data not statistically different from observed data
- Martins Creek
 - Prognostic data statistically different from site-specific data; not statistically different from NWS data
- Herculaneum
 - Screening analysis indicated prognostic data performance comparable to site-specific data



Links

- Draft Guidance on use of MMIF in AERMOD
 - http://www.epa.gov/ttn/scram/11thmodconf/Draft_MMIF_Guidance.pdf
- Evaluation of Prognostic Meteorological Data in AERMOD
 - http://www.epa.gov/ttn/scram/11thmodconf/MMIF_Evaluation_TSD.pdf