

Appendix D

HYSPLIT Back-Trajectory Results for Milwaukee Nonattainment Monitors

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HYSPLIT Back-Trajectory Results for Milwaukee Nonattainment Monitors

This appendix describes the 49 individual Hybrid Single-Particle Lagrangian Integrated Transport model (HYSPLIT) runs conducted to support the back-trajectory analysis located in Section 3.3.2 of the technical support document.

Methodology

Each HYSPLIT run was configured and executed using the publicly-available downloadable version of the software (November 2023 Release, Version 5.3.0). Details for each run are as follows:

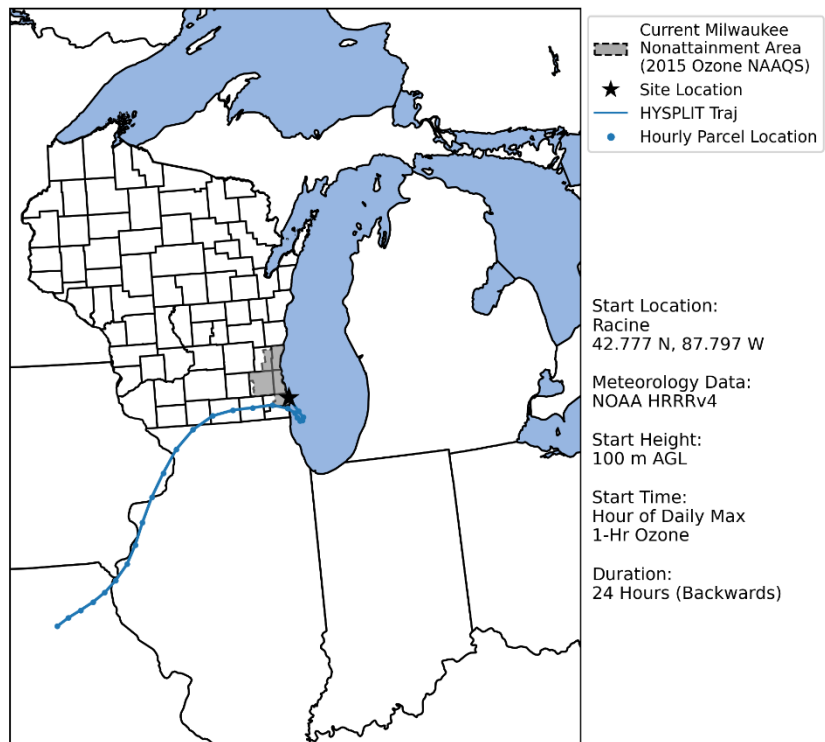
- Trajectory type: Single
- Starting time: Hour in which the daily maximum 1-hour ozone concentration was observed at the monitor, identified using certified ozone data from the U.S. EPA's Air Quality System (AQS). The starting hour for each individual back-trajectory run is identified on the graphic for that run. Note that all runs utilized UTC time. As a result, a couple instances where maximum 1-hour ozone occurred later in the day led to HYSPLIT initiation past 00Z for the following date.
- Starting location(s):
 - Bayside: Latitude (43.181), Longitude (-87.901) Decimal Degrees, respectively
 - Grafton: Latitude (43.34317), Longitude (-87.92087) Decimal Degrees, respectively
 - Harrington Beach: Latitude (43.4983), Longitude (-87.8102) Decimal Degrees, respectively
 - Racine: Latitude (42.77719), Longitude (-87.79675) Decimal Degrees, respectively
- Starting height: 100 meters AGL. This starting height is necessary to capture the impacts from lake breeze circulations and other meteorological patterns at these sites, as discussed in the Lake Michigan Air Directors Consortium's (LADCO's) 2023 Conceptual Models of Ozone Formation in the Great Lakes Region technical report.¹
- Duration: 24 hours, backwards
- Vertical motion method: Model-derived
- Meteorological data source: NOAA's 3-km High-Resolution Rapid Refresh model (HRRRv4) obtained from NOAA's Real-time Environmental Applications and Display System (READY) data archive.

The output from each HYSPLIT run was then plotted using Python and projected onto a Lambert Conformal coordinate system. Trajectories have been colored red by default. However, HYSPLIT trajectories that passed through any part of Washington or Waukesha counties, or the inland portions of Ozaukee and Racine counties are colored blue. The results of these runs follow and are grouped by monitor.

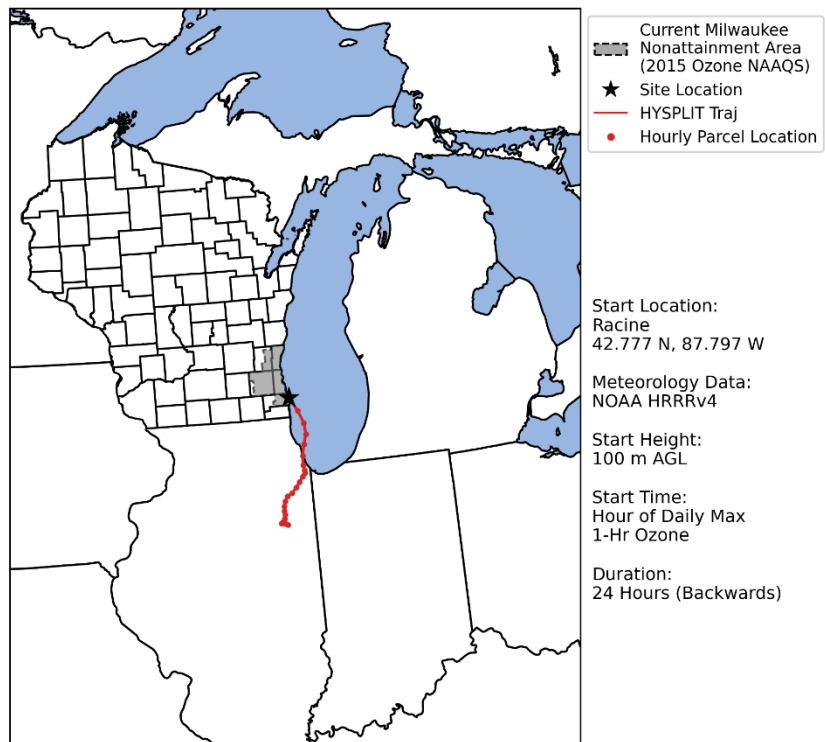
¹ Dickens, A. F. (2023). *Conceptual Models of Ozone Formation in the Great Lakes Region*. Lake Michigan Air Directors Consortium. [Ozone-conceptual-model-report-FINAL-Feb-2023.pdf](#), p. 115.

Racine-Payne & Dolan monitor (Racine County) – AQS Site ID 551010020 (18 runs)

HYSPLIT 24-Hr Back Trajectory from Racine
Initiated 06-12-2024 20:00 UTC

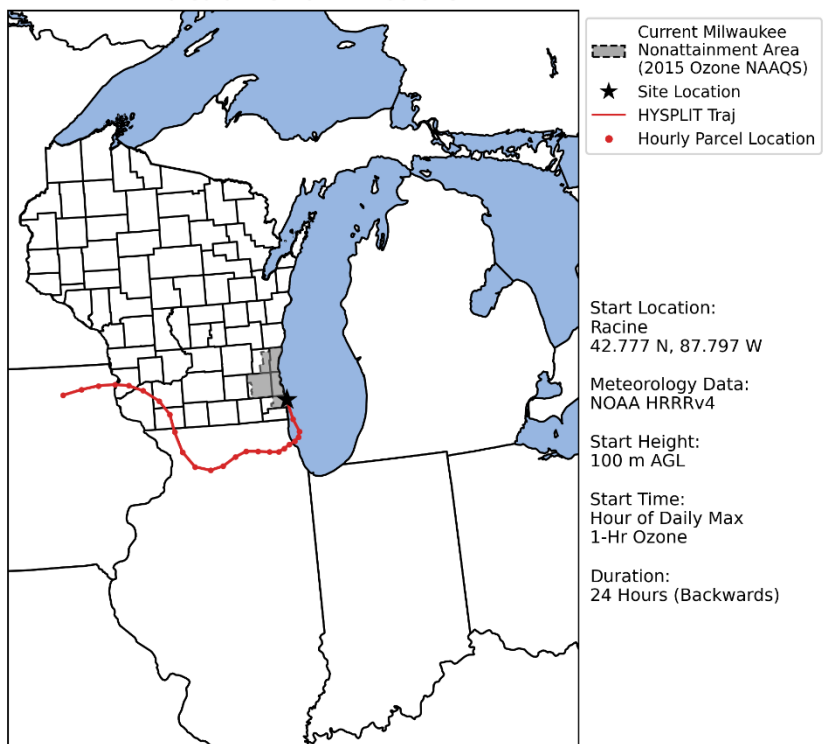


HYSPLIT 24-Hr Back Trajectory from Racine
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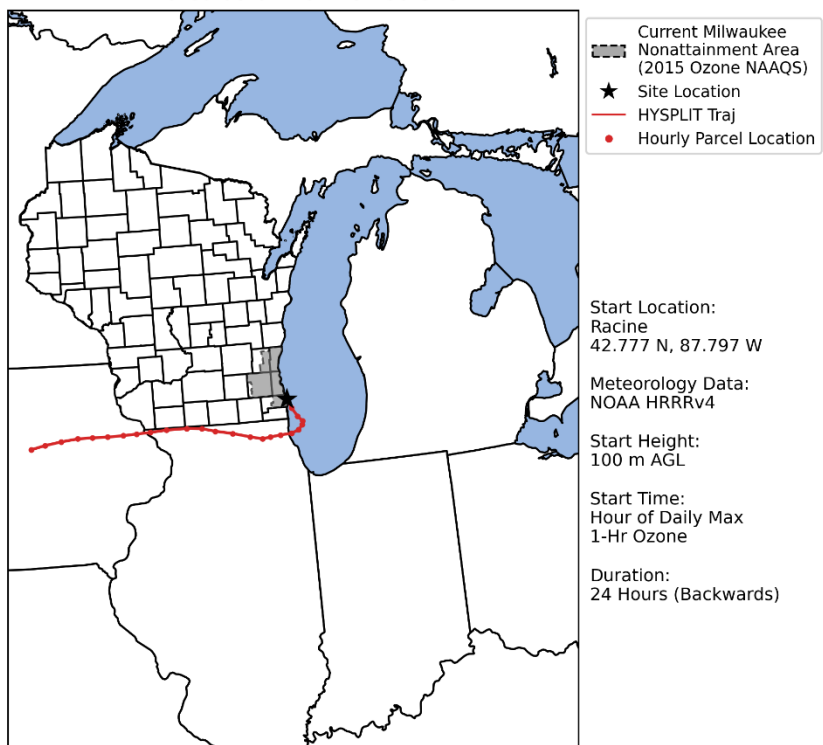


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HYSPLIT 24-Hr Back Trajectory from Racine
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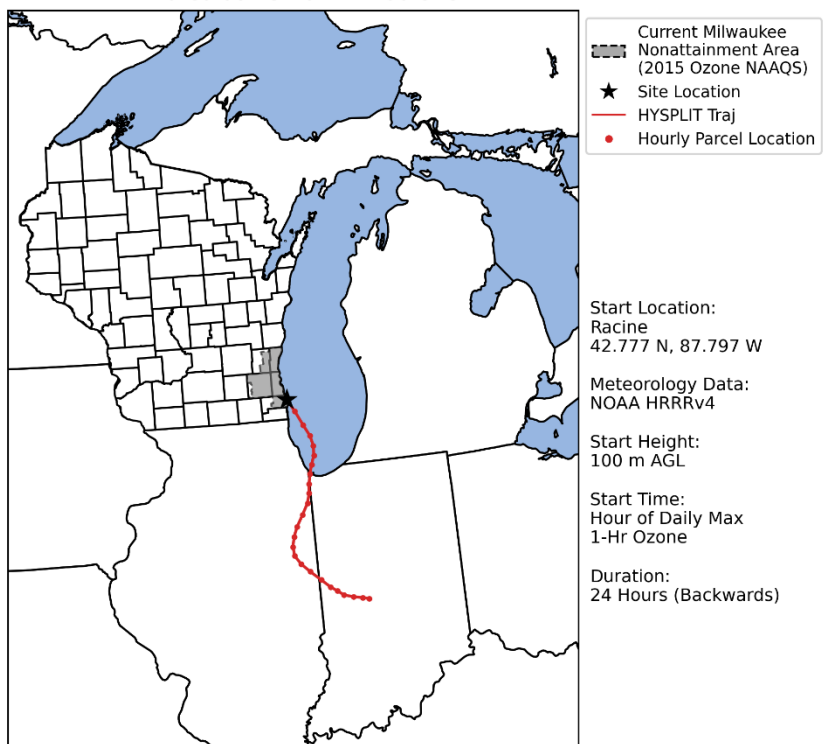


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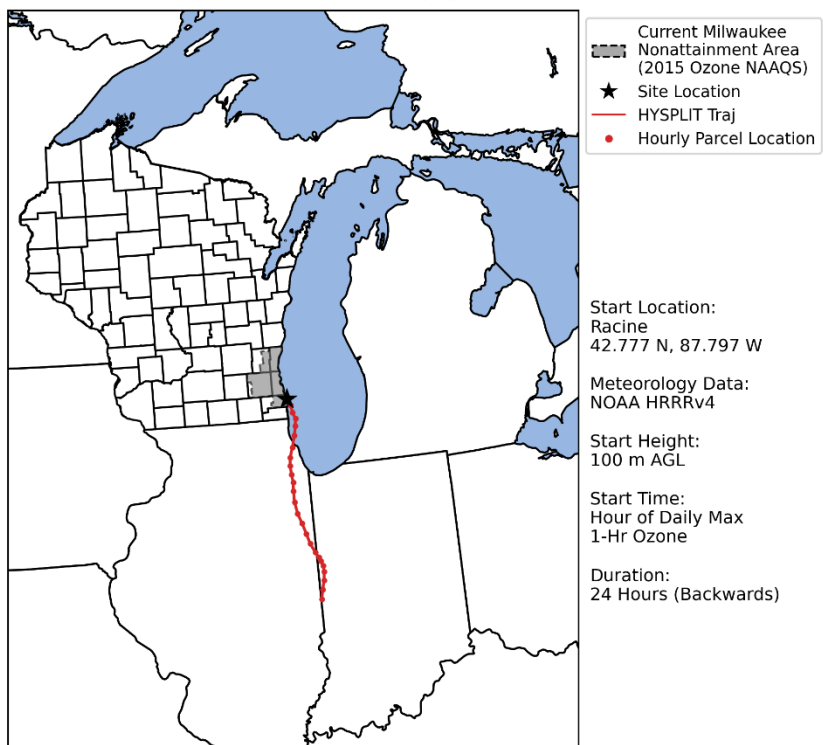


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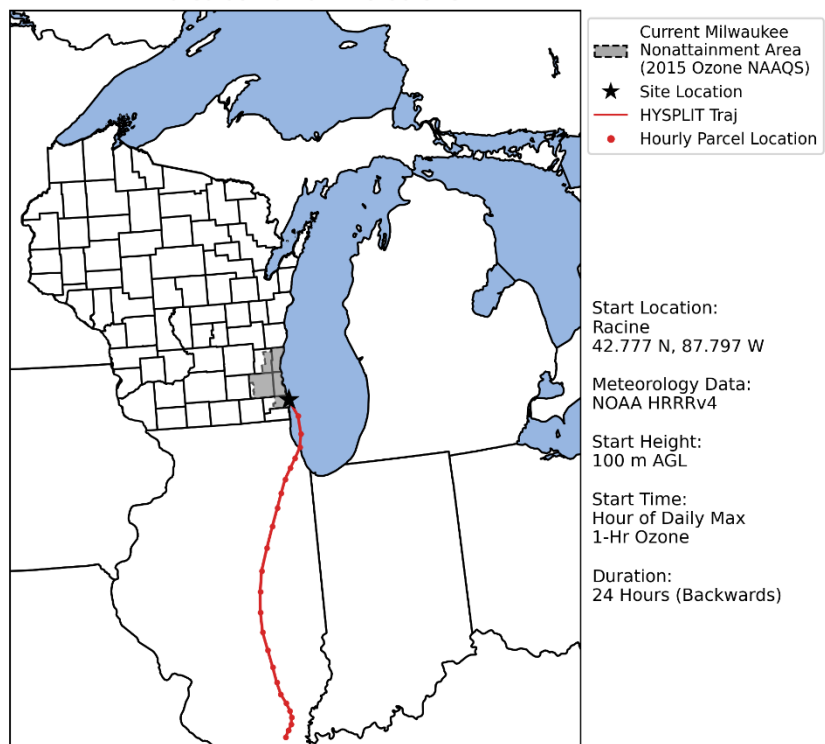


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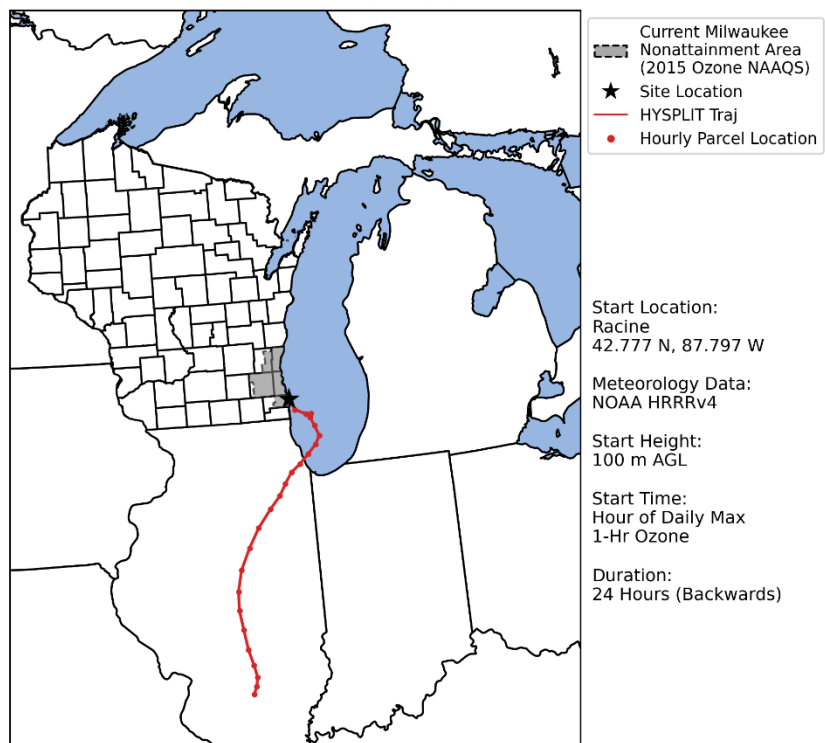


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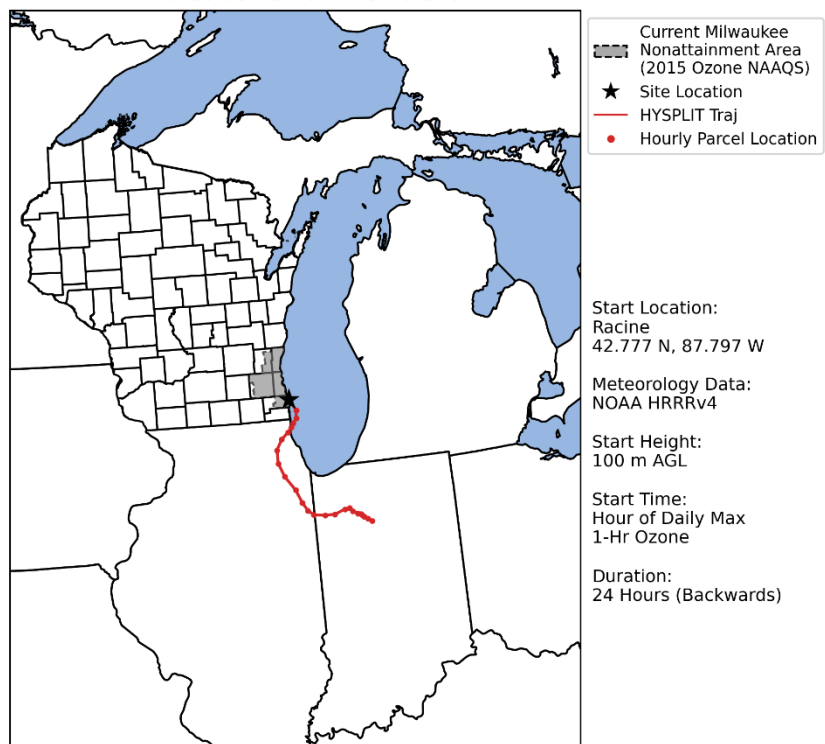


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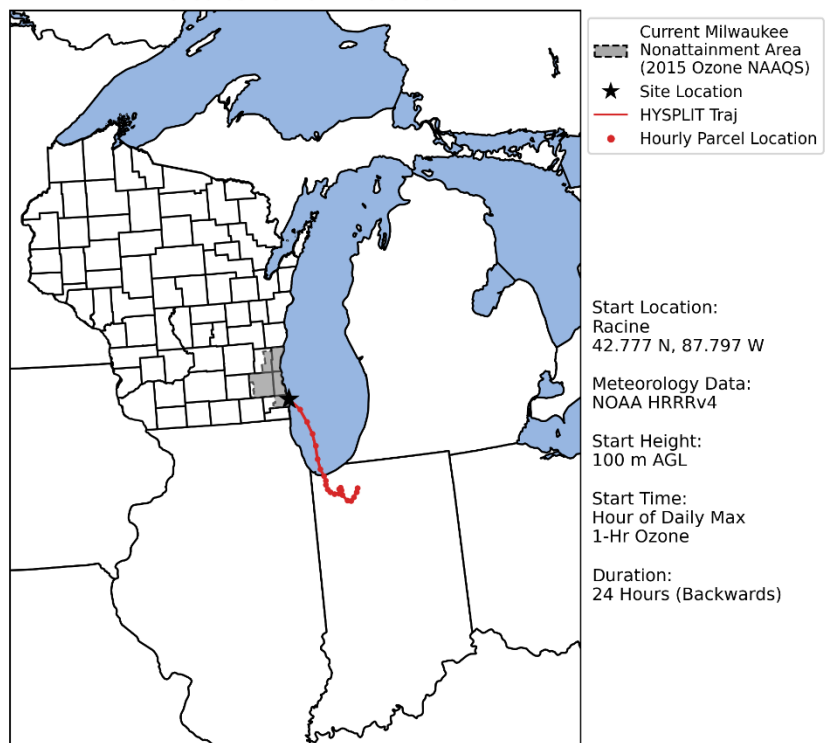


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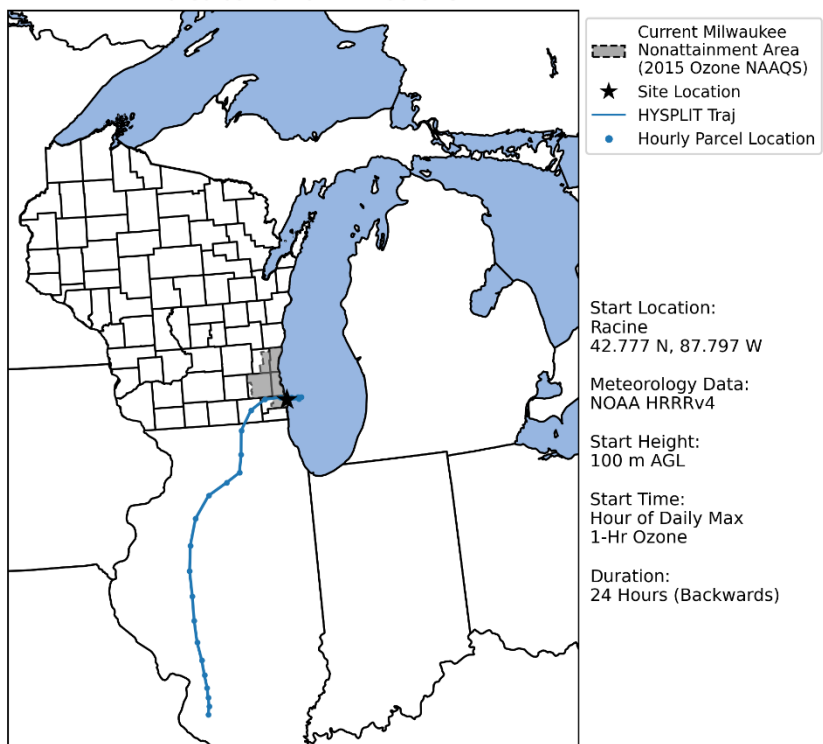


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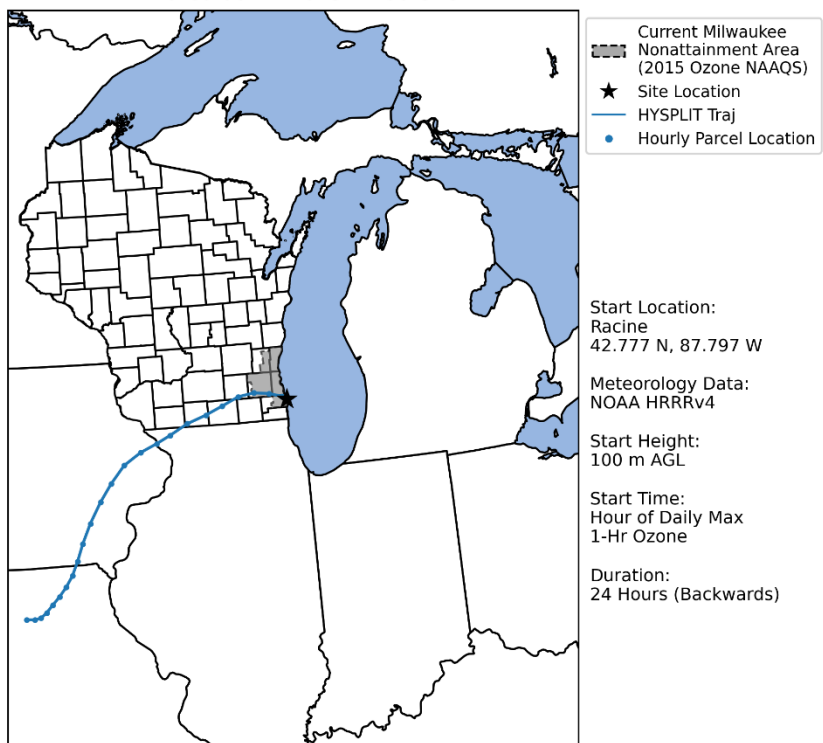


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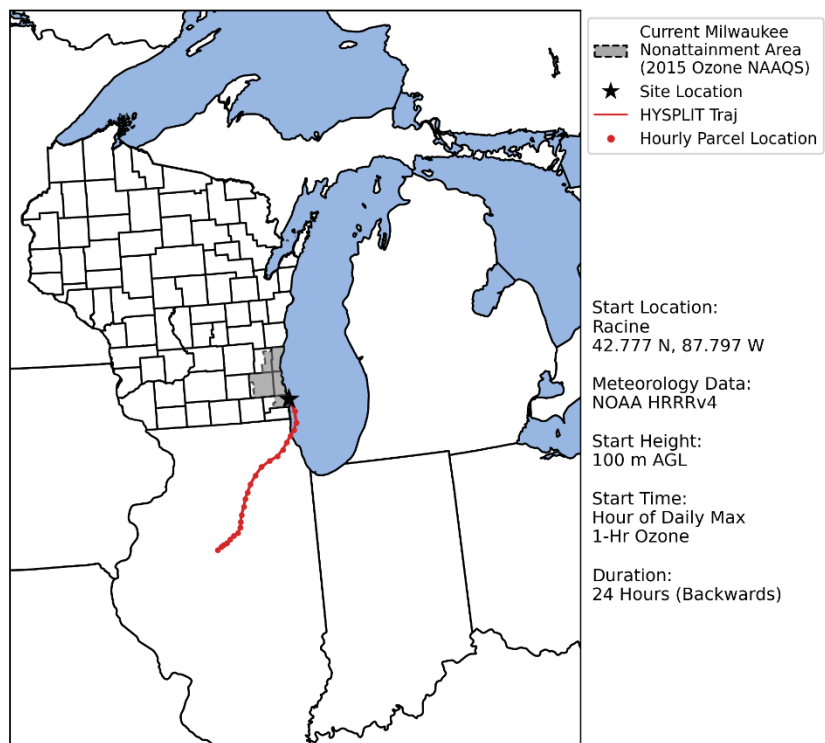


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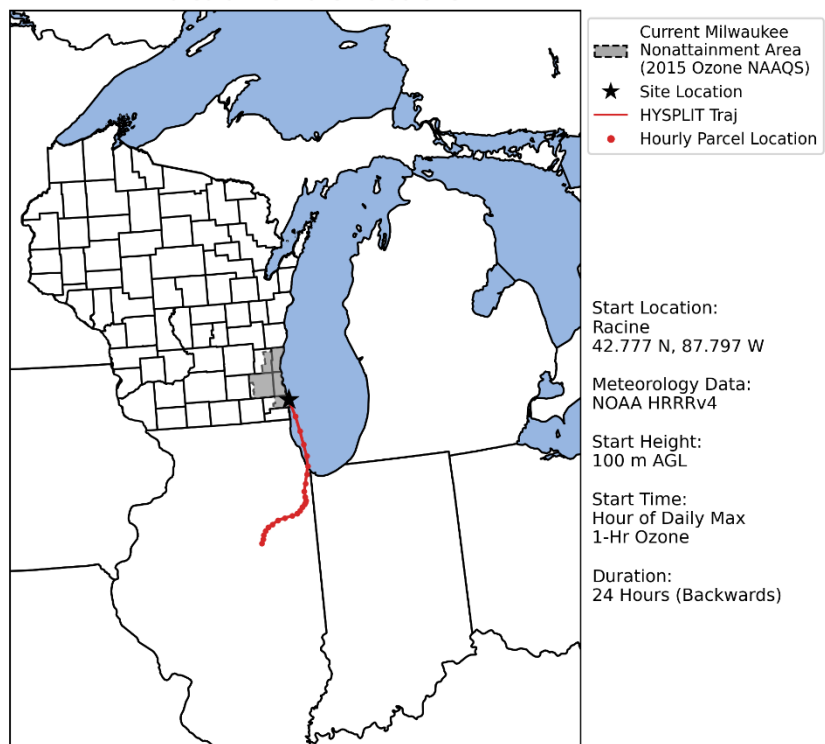


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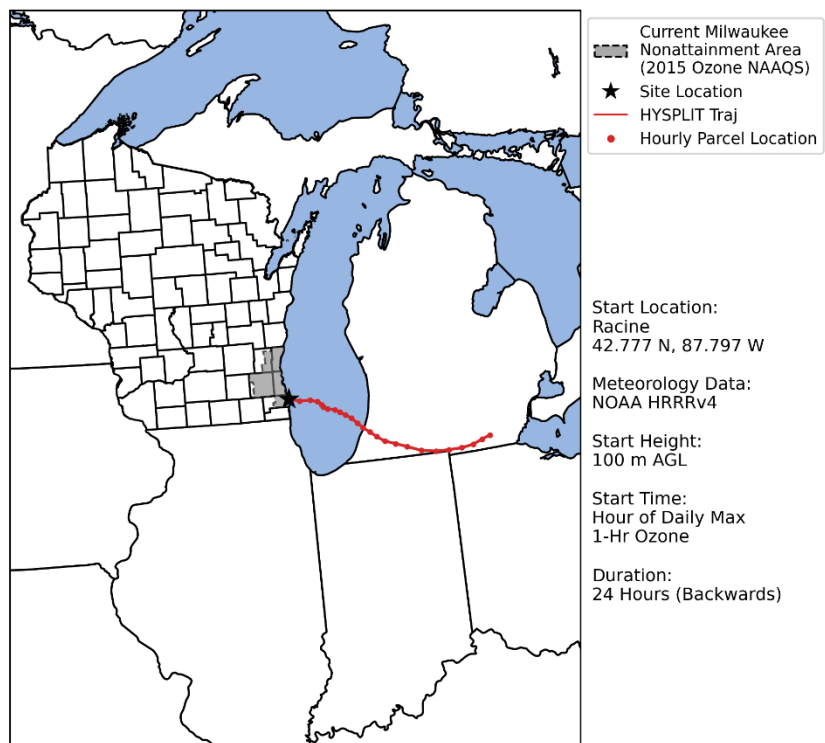


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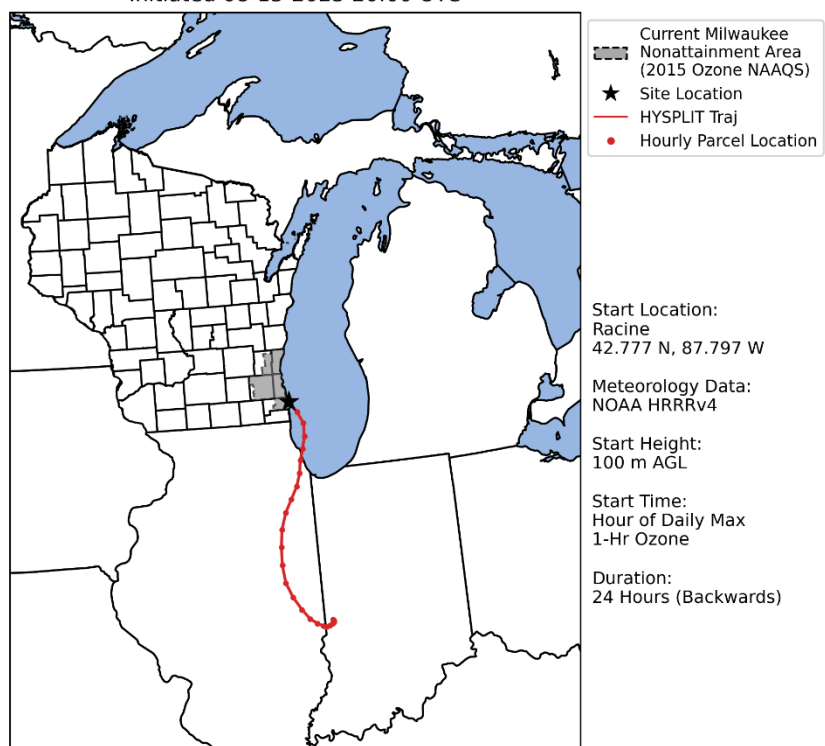


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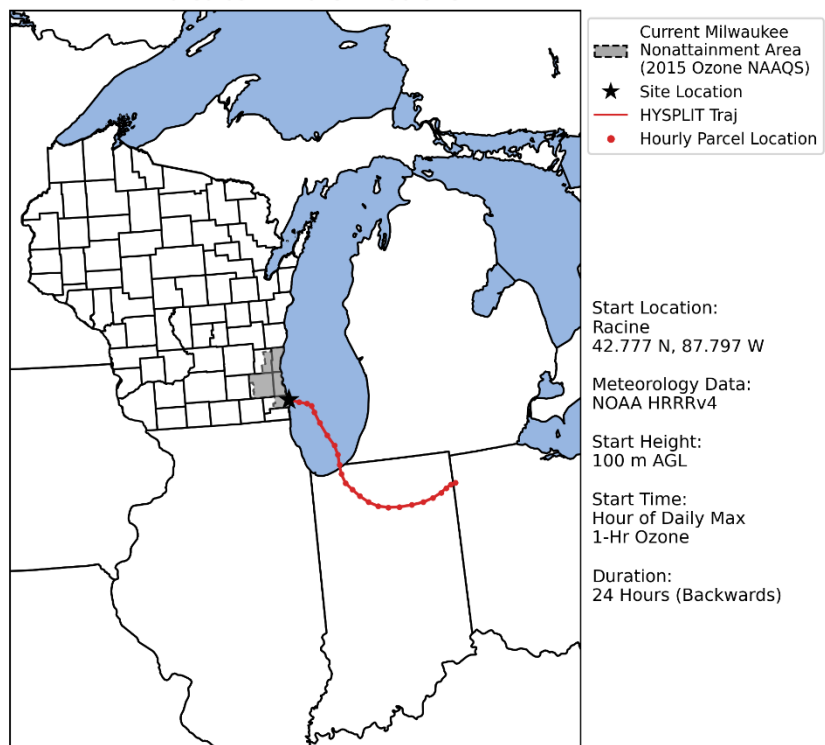


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Initiated 08-15-2025 20:00 UTC

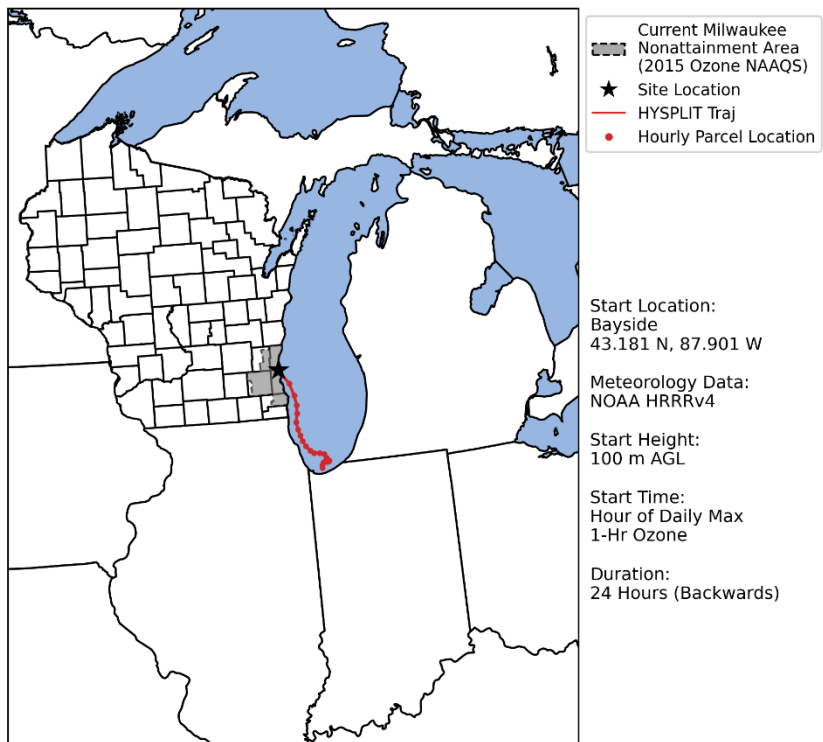


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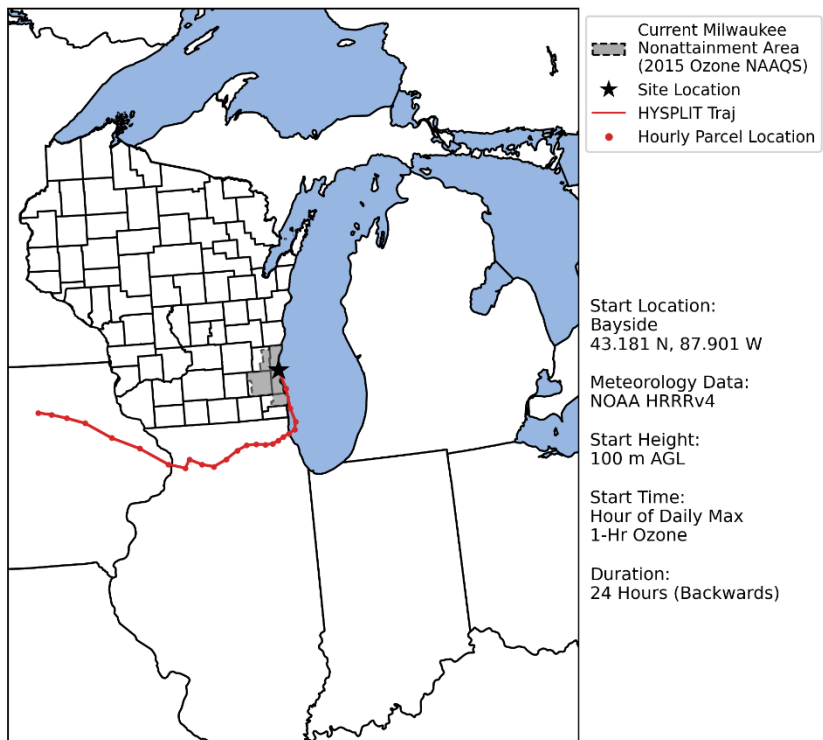


Bayside monitor (Milwaukee County) – AQS Site ID 550790085 (11 runs)

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Initiated 07-13-2024 18:00 UTC

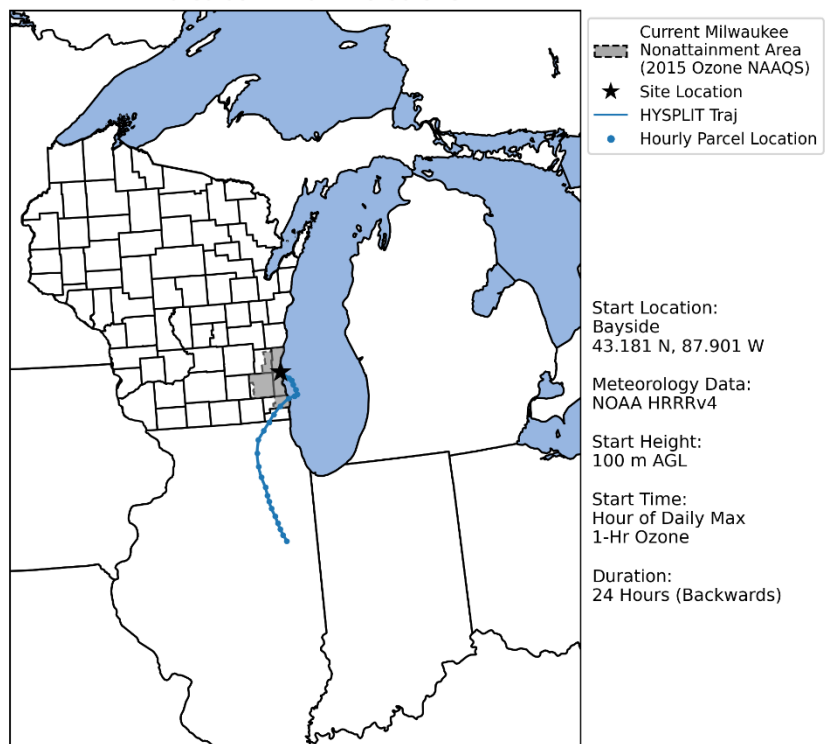


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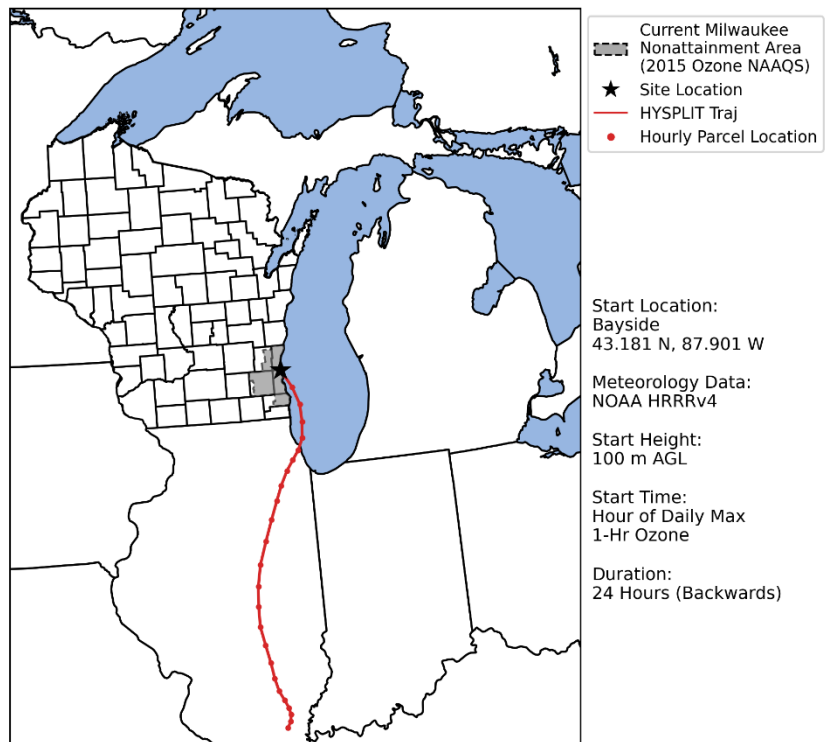


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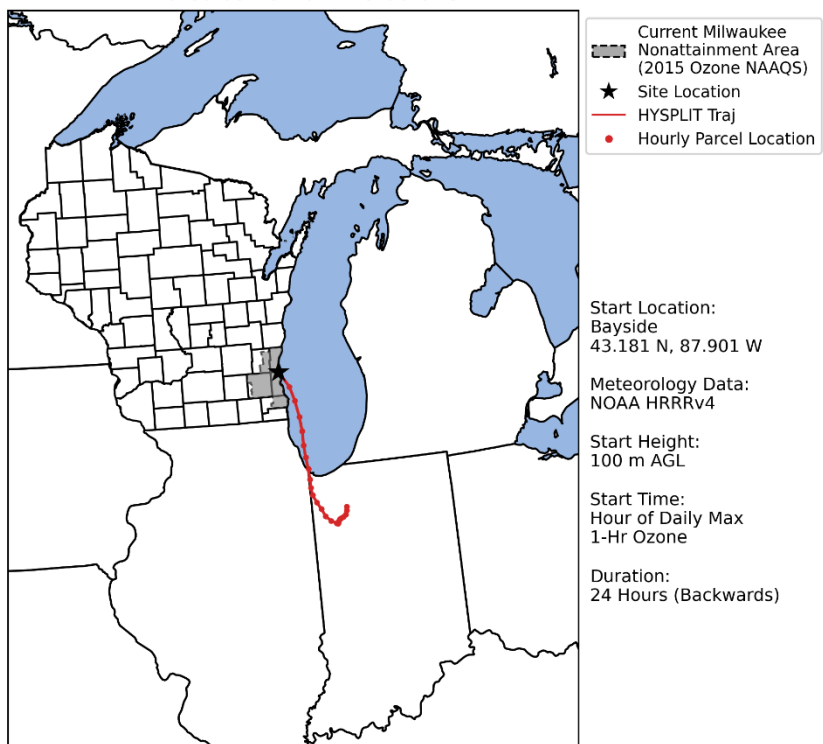


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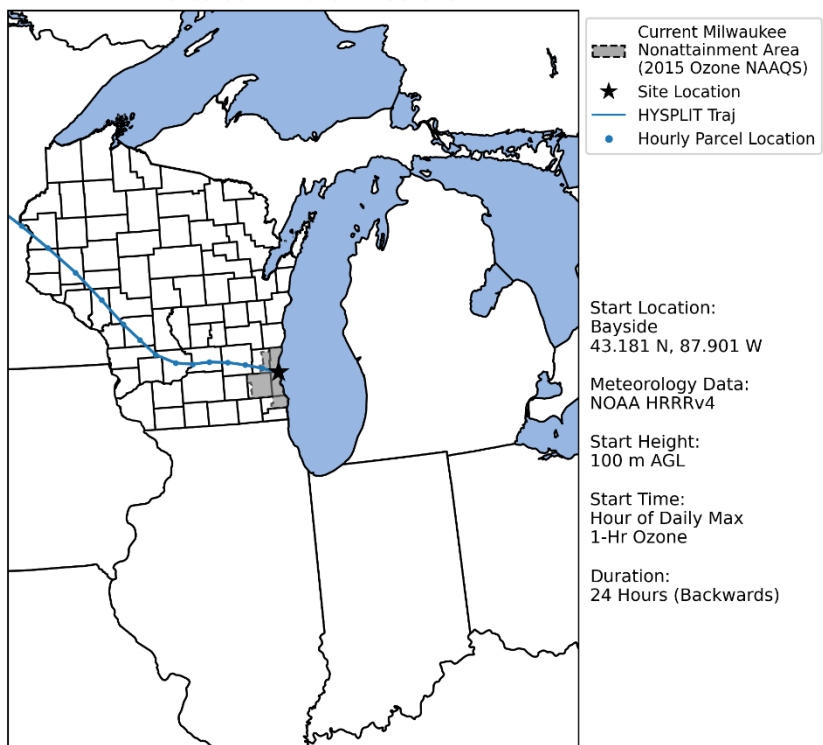


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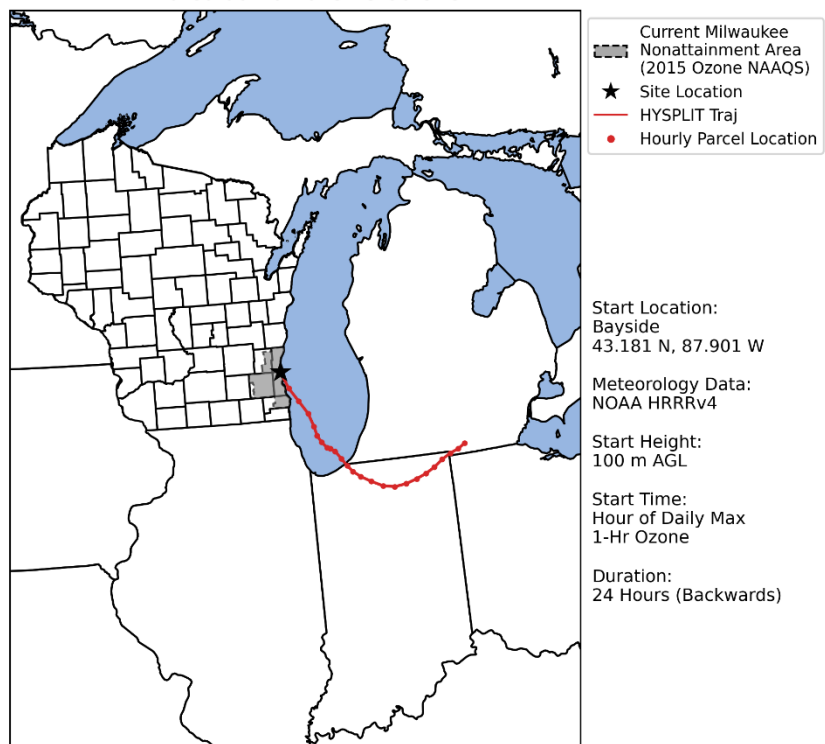


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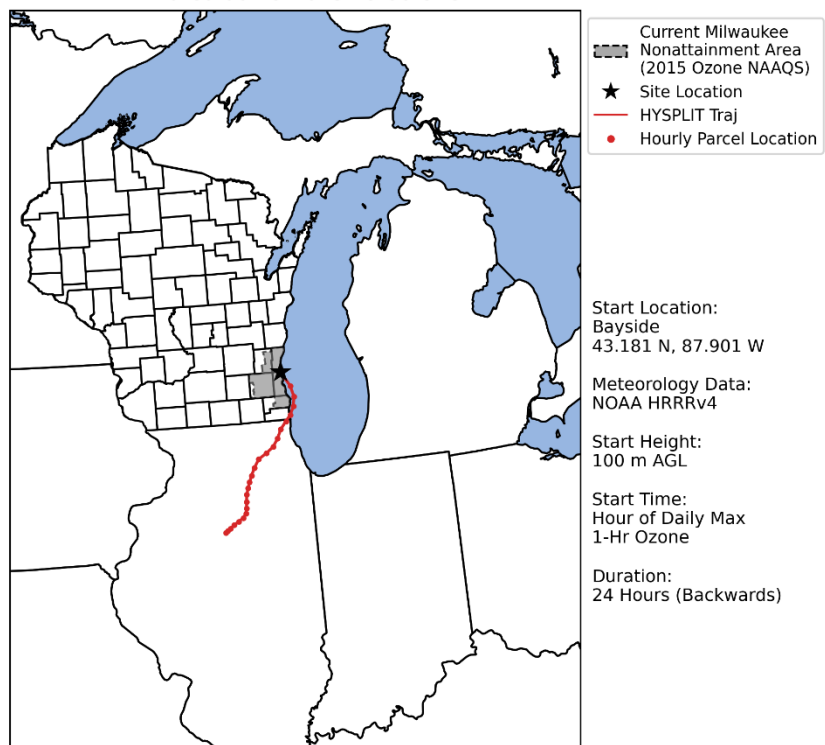


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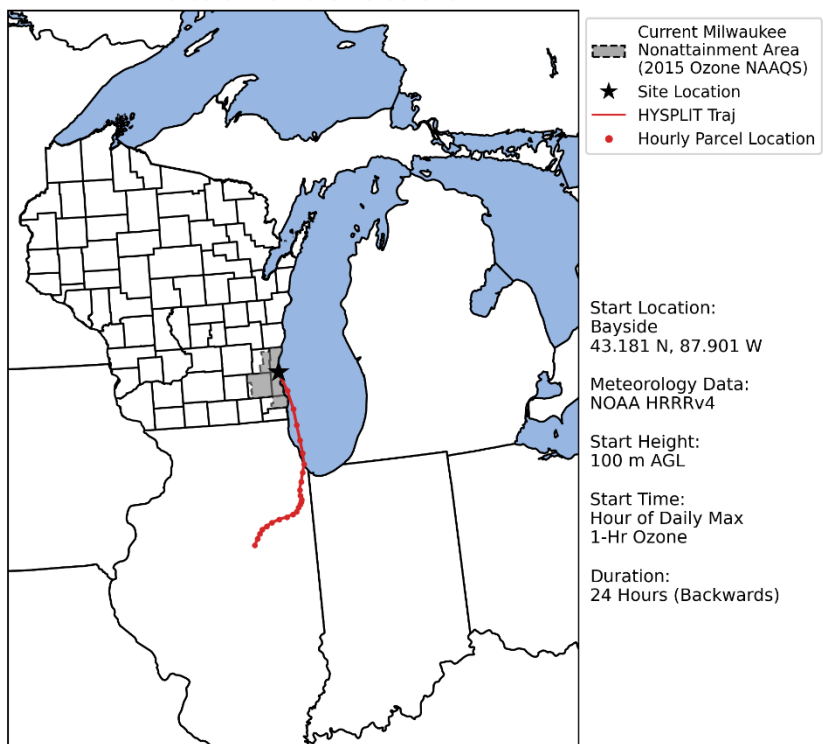


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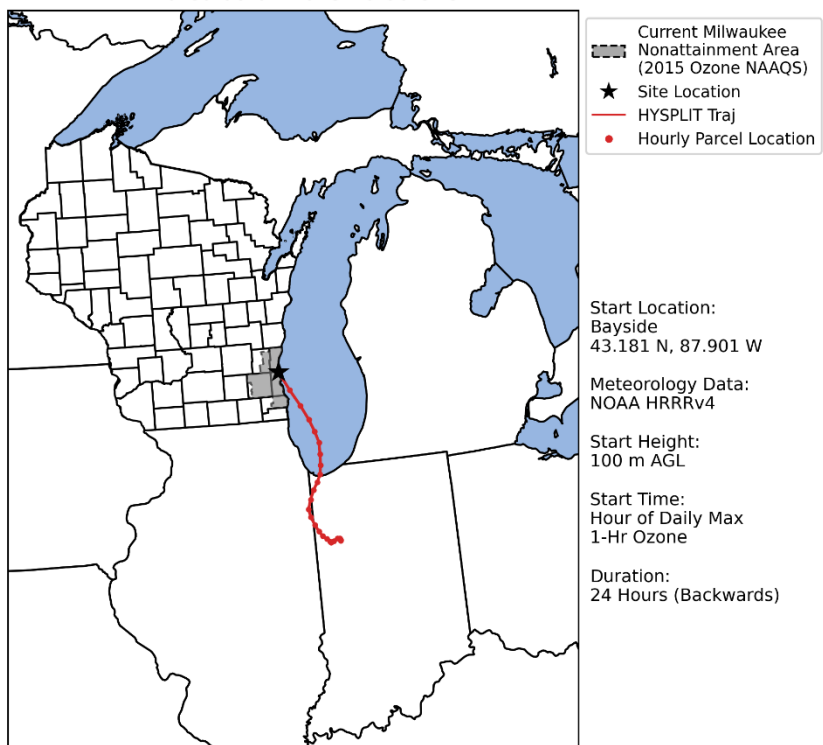


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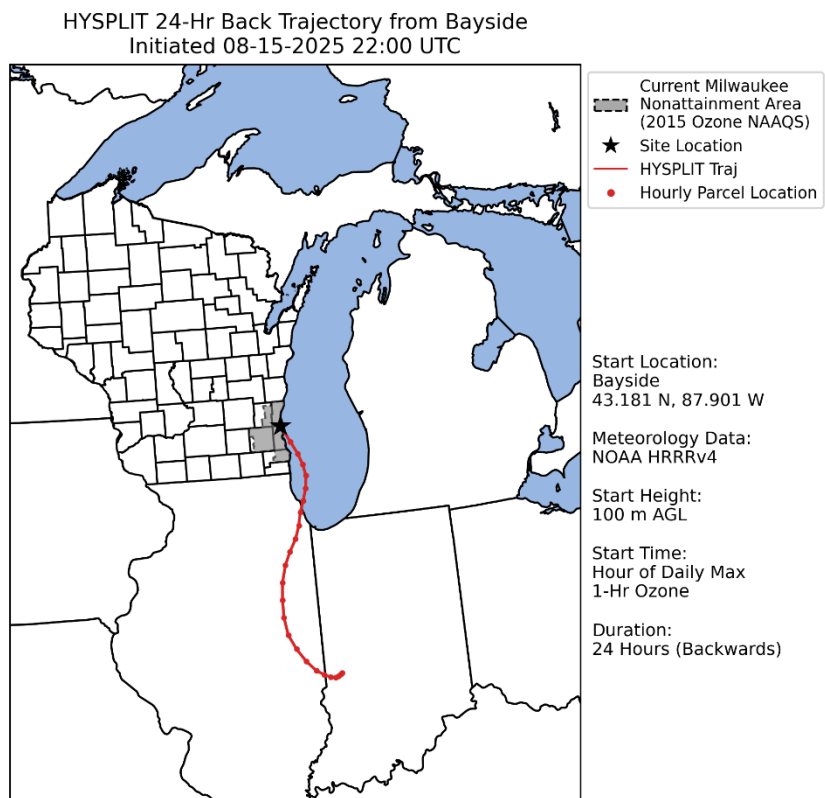
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Initiated 07-15-2025 19:00 UTC



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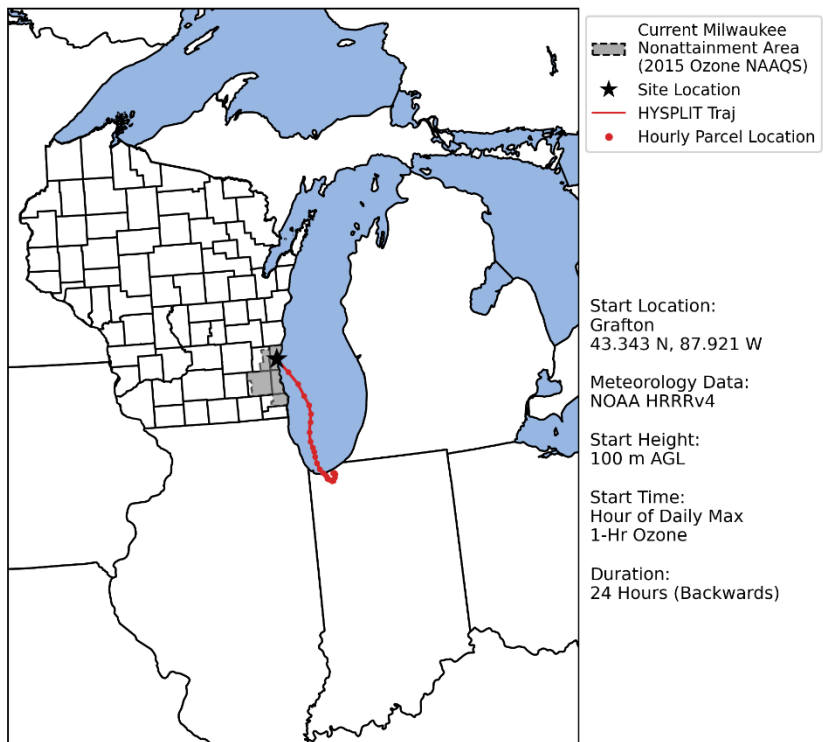


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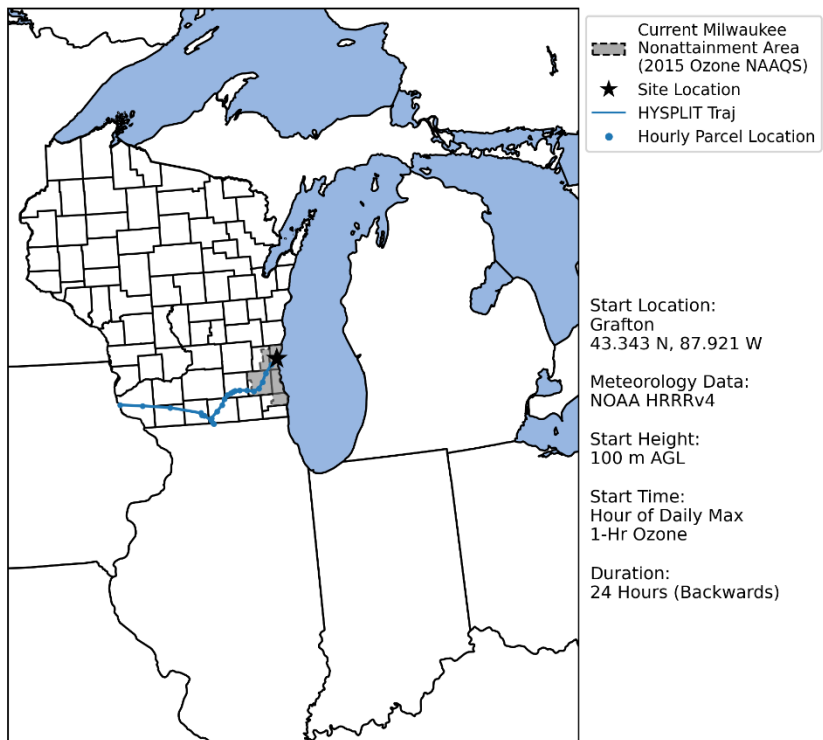


Grafton monitor (Ozaukee County) – AQS Site ID 550890008 (10 runs)

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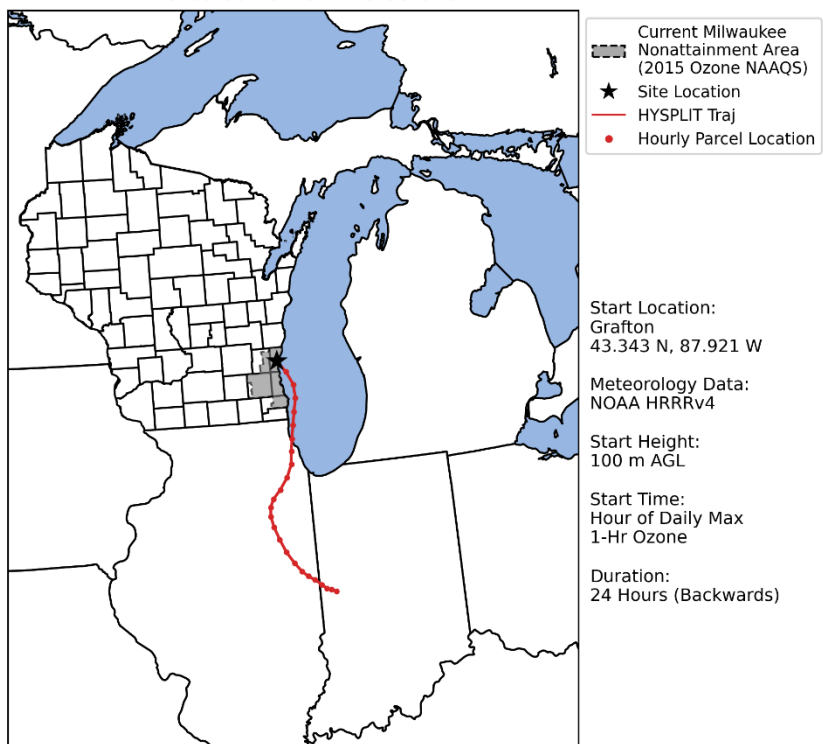


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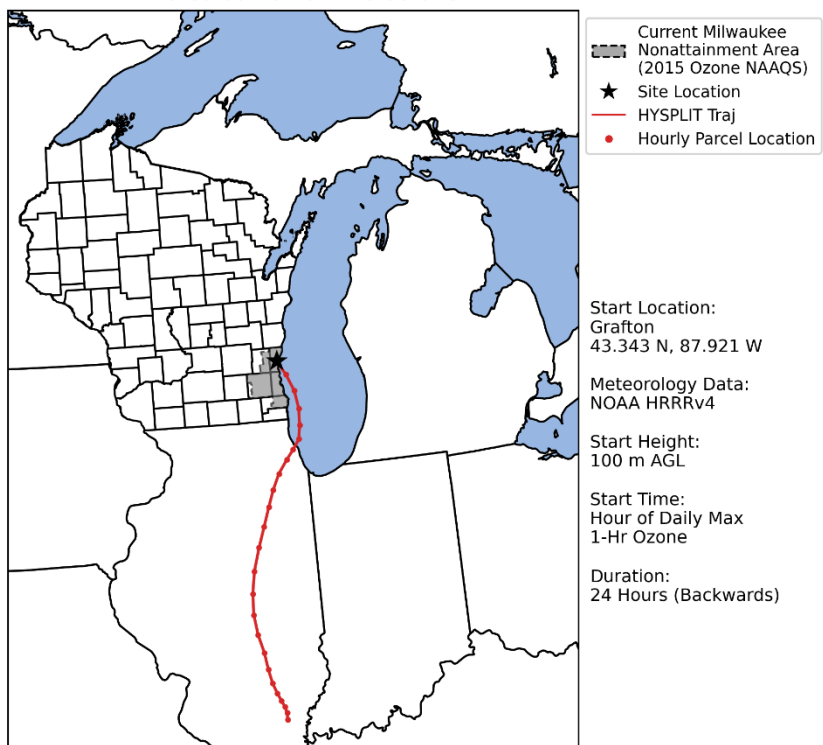


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HYSPLIT 24-Hr Back Trajectory from Grafton
Initiated 08-23-2024 20:00 UTC

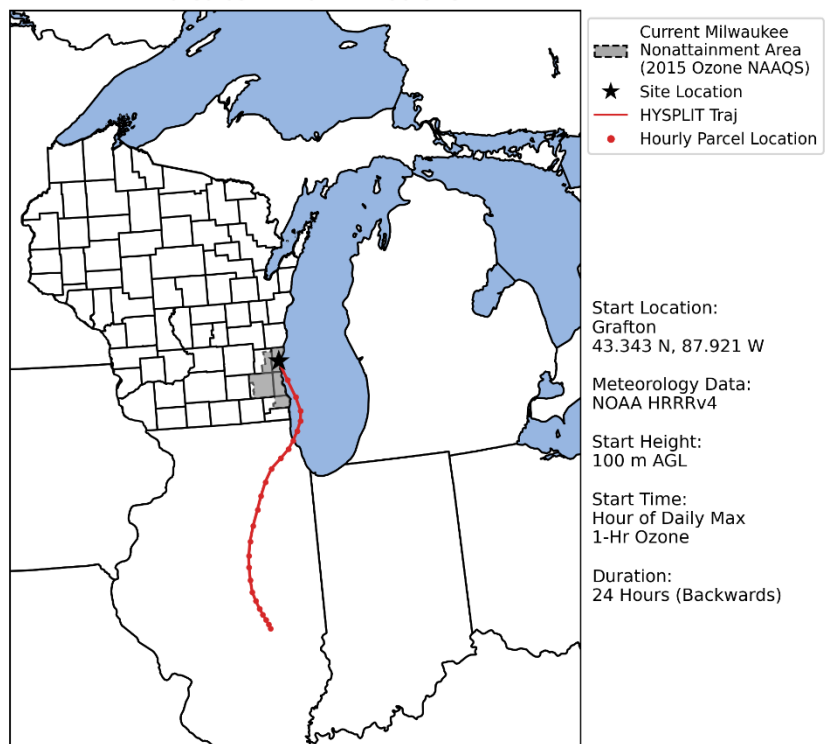


HYSPLIT 24-Hr Back Trajectory from Grafton
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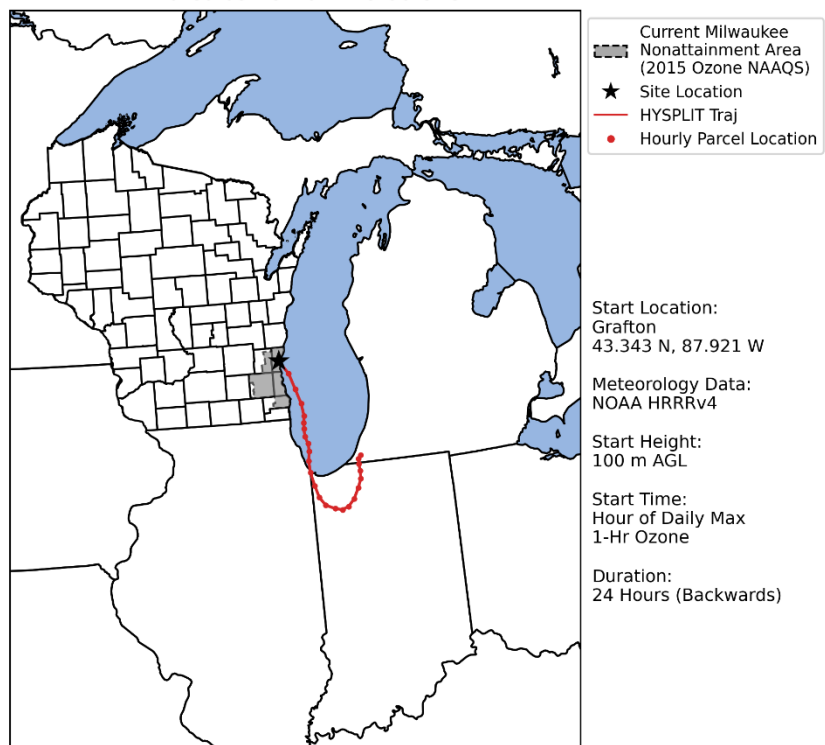


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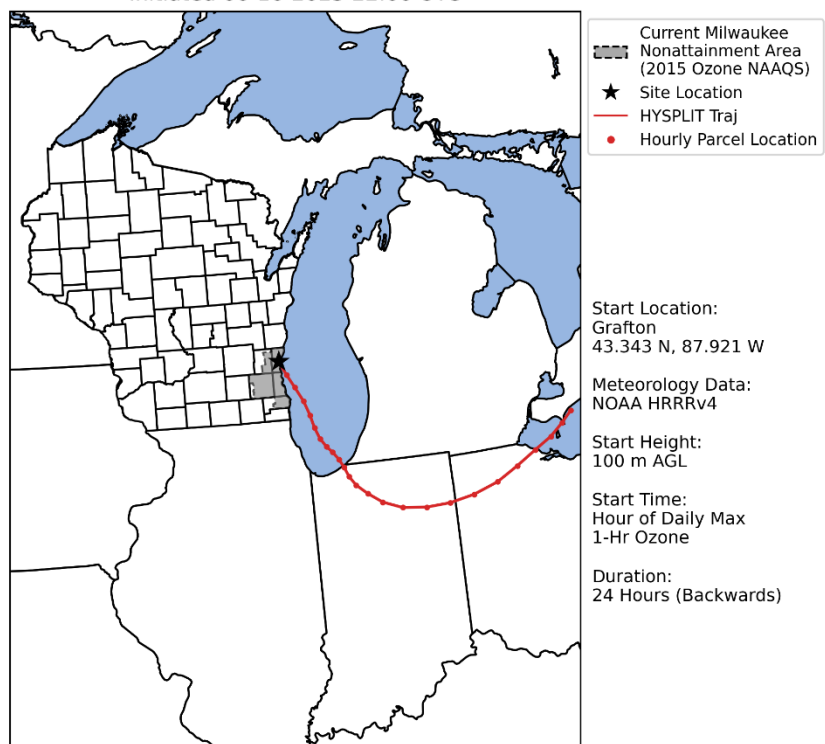


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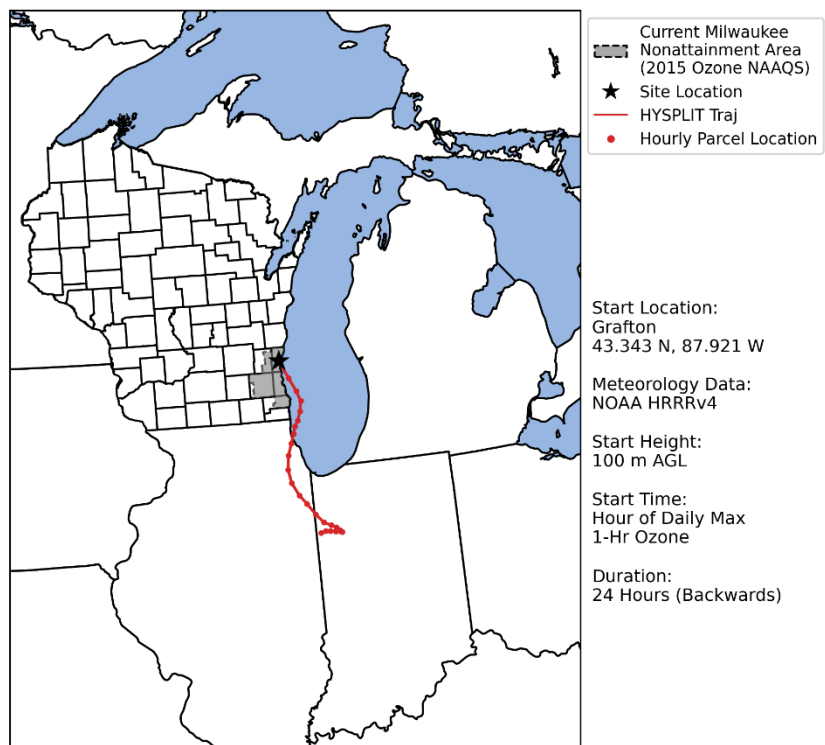


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HYSPLIT 24-Hr Back Trajectory from Grafton
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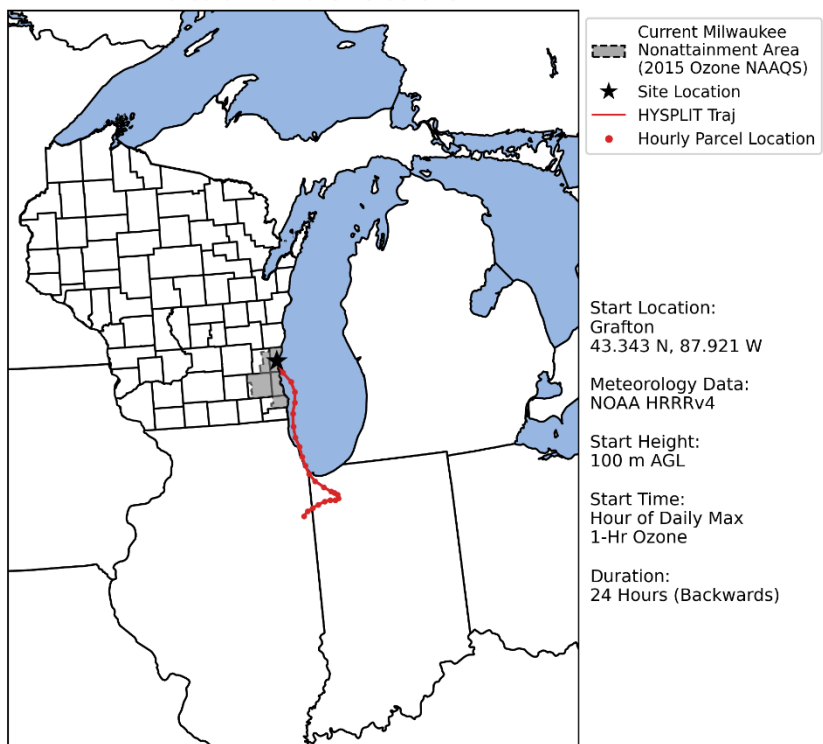


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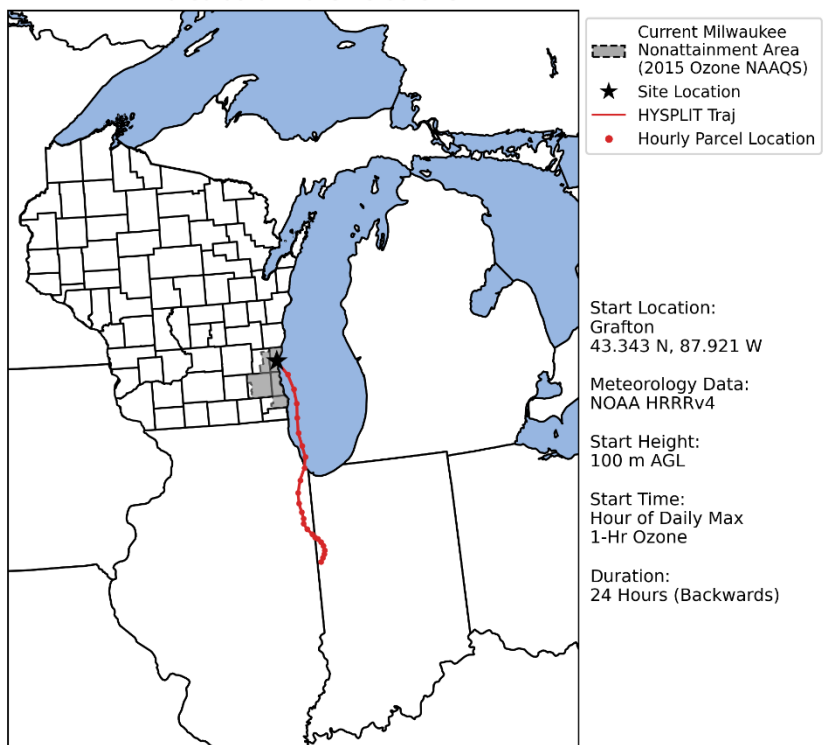


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HYSPLIT 24-Hr Back Trajectory from Grafton
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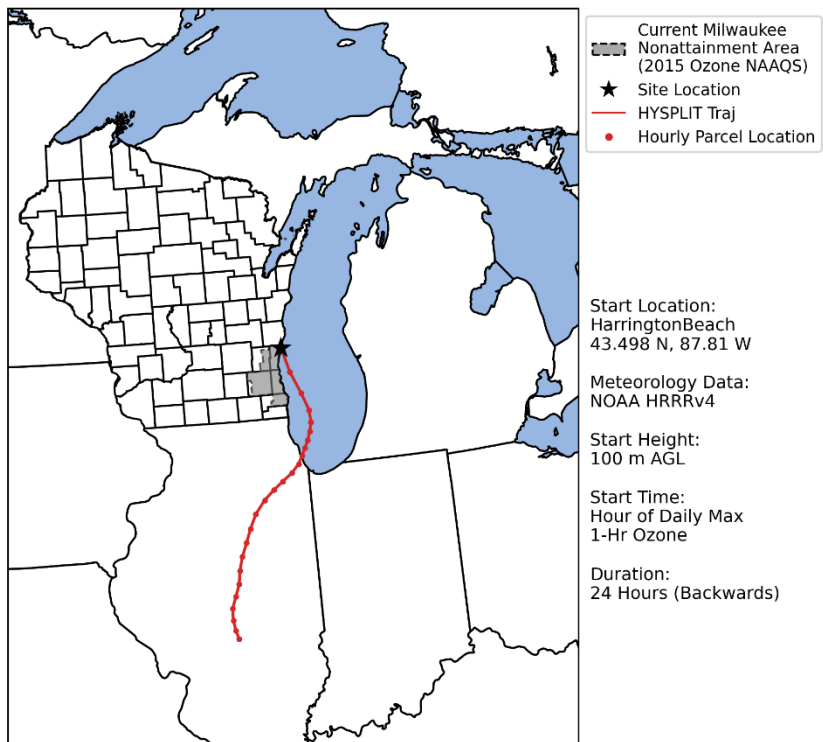


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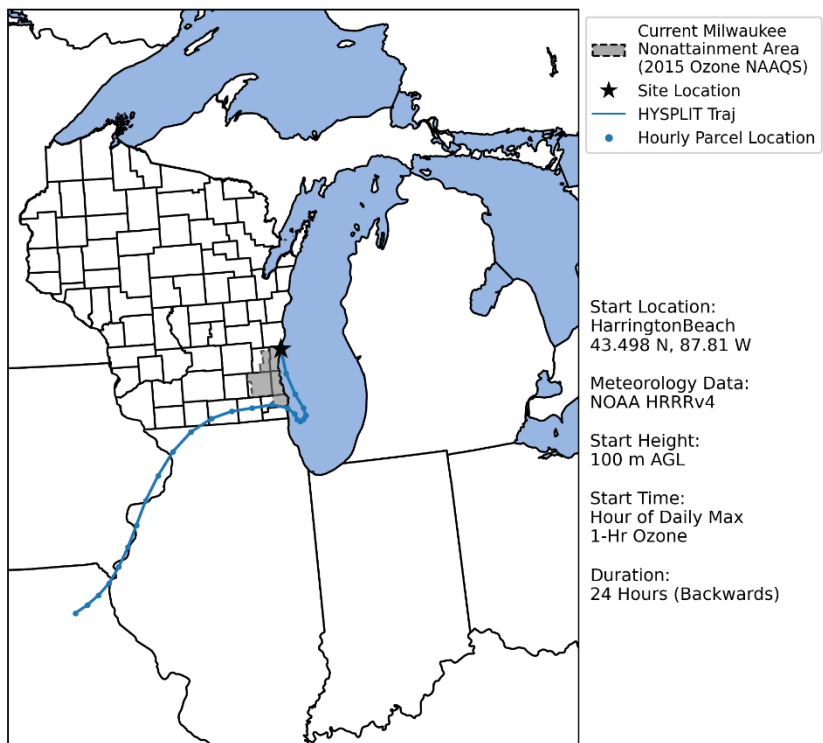


Harrington Beach monitor (Ozaukee County) – AQS Site ID 550890009 (10 runs)

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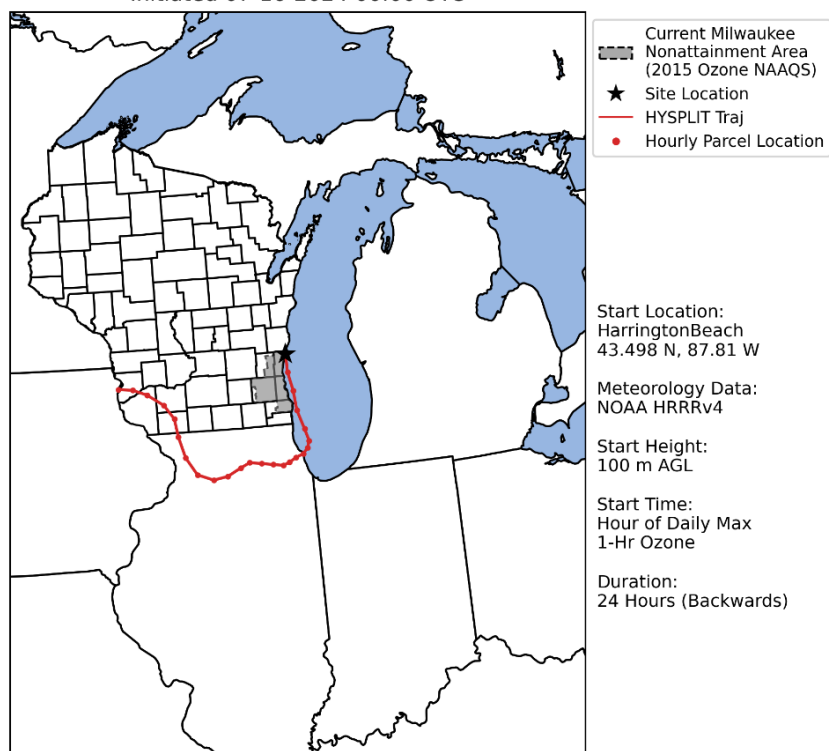


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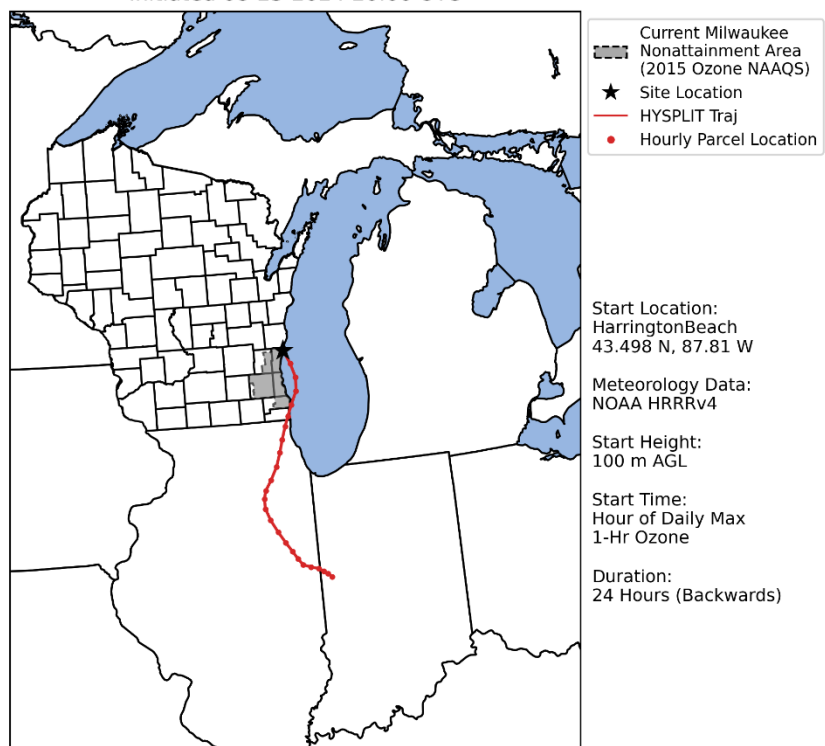


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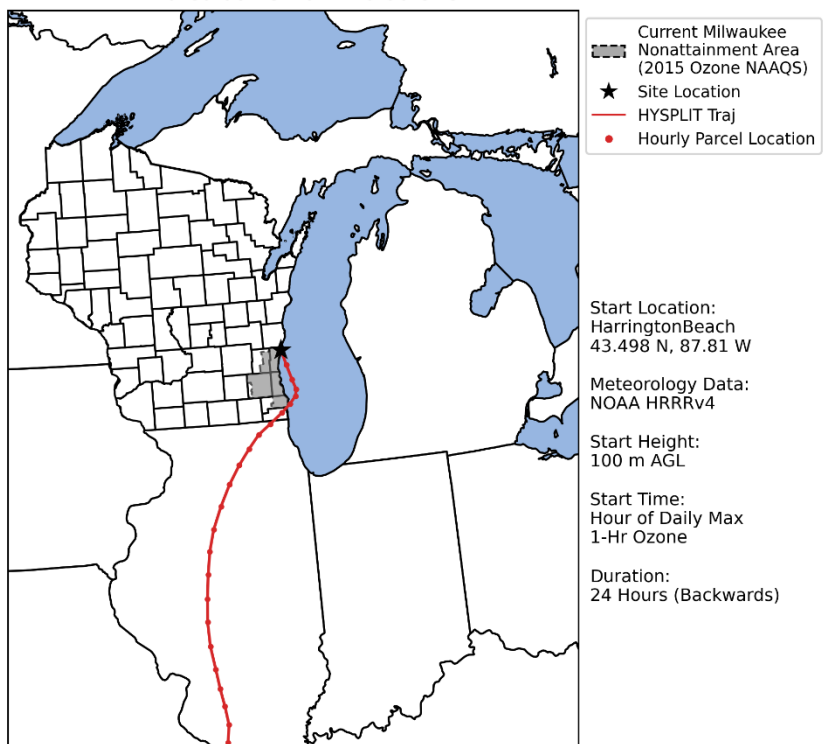


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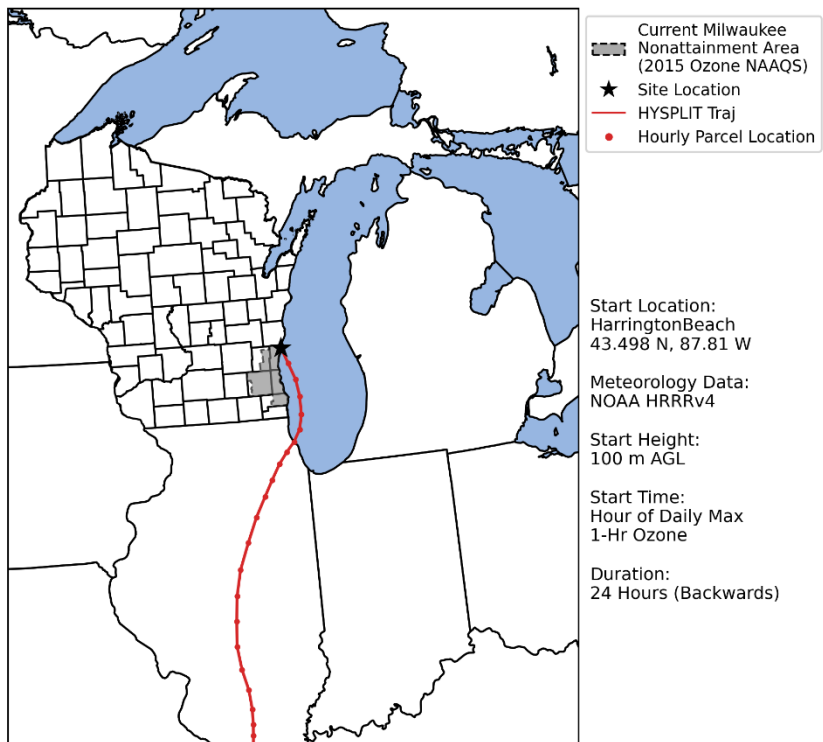


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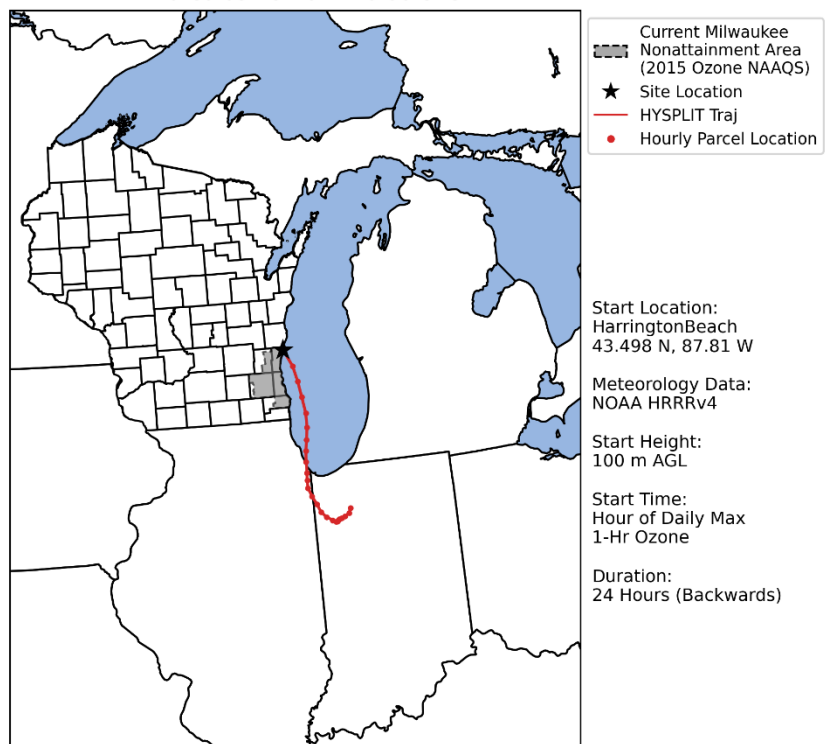


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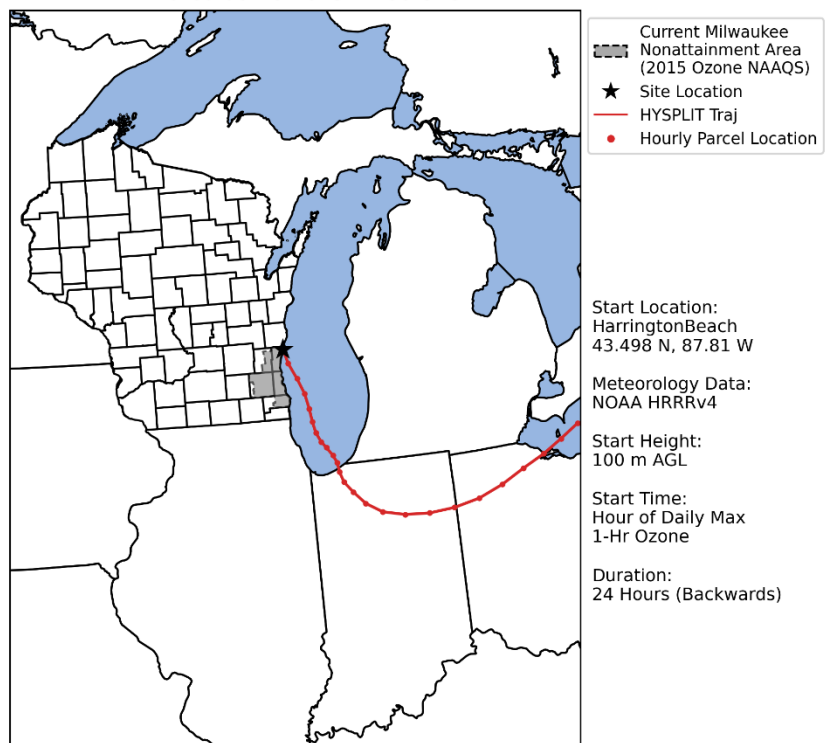


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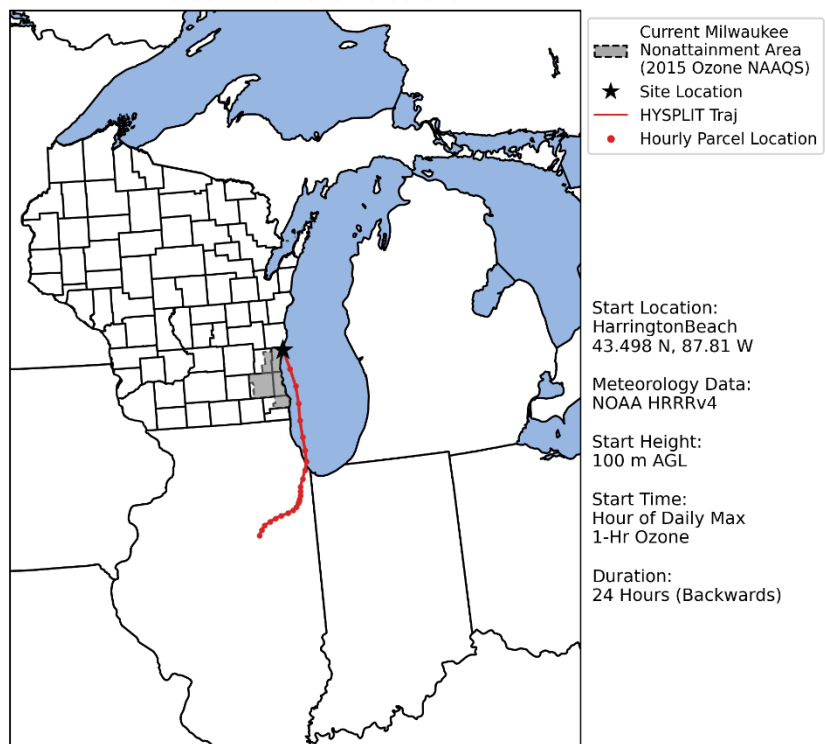


HYSPLIT 24-Hr Back Trajectory from HarringtonBeach
Initiated 06-16-2025 22:00 UTC



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HYSPLIT 24-Hr Back Trajectory from HarringtonBeach
Initiated 07-15-2025 20:00 UTC



HYSPLIT 24-Hr Back Trajectory from HarringtonBeach
Initiated 08-07-2025 21:00 UTC

