Cherry Blossom Peak Bloom Prediction 2026

University of Maryland

Team 5103

5 competition sites + 3 auxiliary + USA-NPN enrichment = 14,598 records

Site	Records	Span	Climate
Kyoto	837	812–2025	Humid subtropical
Washington DC	105	1921–2025	Humid subtropical
Liestal	132	1894–2025	Oceanic/Alpine
Vancouver	4	2022–2025	Oceanic (Cfb)
New York City	2	2019–2025	Humid continental

Auxiliary: Japan regional (6,573), MeteoSwiss (6,642), South Korea (994)

NYC enrichment: 5 citizen-science records from Washington Square Park (USA-NPN)

Key features: Winter/spring mean temperature (primary bloom driver), latitude, longitude, altitude, year trend

Model A — Local Trend (per site): Weighted quadratic regression, recent years weighted more heavily ($\sim$6 yr half-life)

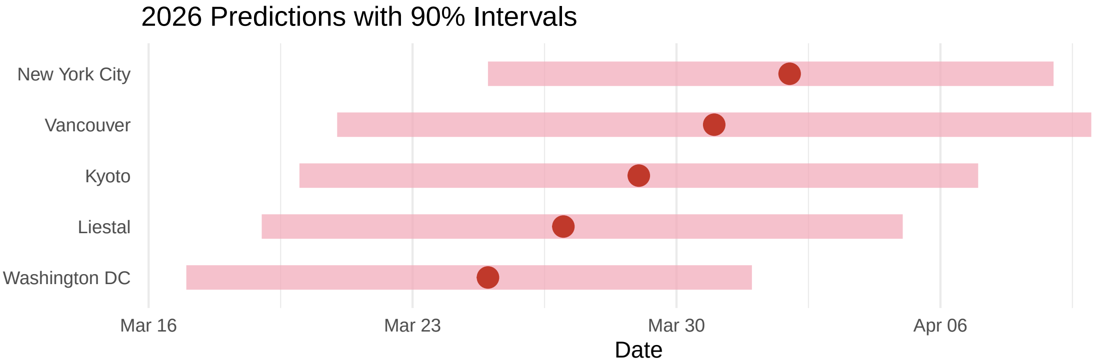
Model B — Pooled GAM (R): Smooth functions of year, location, altitude + winter/spring temperature

Model B′ — Gradient Boosted Trees (Python): 800 trees, robust loss, same temperature features

Component	Method
Blending	Per-site optimal weight between local and global models via rolling backtest
Intervals	Conformal: 90th pctl $\lvert$residuals$\rvert$ per site, $>=$90% coverage
Cross-language	R+Python agree within 2.8d, averaged blend

Key: Deep-history sites lean on Model A. Sparse sites lean on Model B.

Model	MAE (days)	Improvement
Local trend only	7.27	—
Baseline ensemble	~5.61	—
Enhanced (temp features)	4.52	19%
Final ensemble	**4.23**	**25%**



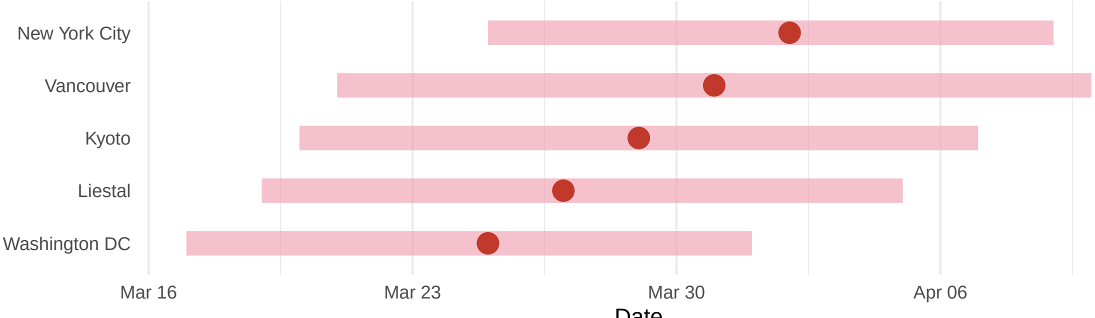
Why bloom timing changes:

- **Winter warming:** Warmer winters mean trees start spring development earlier
- **Spring temperatures:** Earlier warm spells accelerate bloom; late cold snaps delay it
- **Latitude:** ~1 day later per °N above 35°N. **Altitude:** ~2 days later per 100 m

Site-specific drivers:

Site	Key Driver
Kyoto	Urban heat island. 0.2 d/century advancement
Washington DC	Tidal Basin thermal buffer → earliest bloomer. 2.2 d/decade acceleration
Liestal	Alpine amplified warming (0.3°C/decade). Foehn winds → widest variability
Vancouver	PDO modulates decadal variability. Maritime buffering keeps volatility moderate
New York City	Shortest record (2 yrs). NPN fusion reduces MAE ~1.5 d

City	DOY	Date	Interval	Width
Washington DC	84	Mar 25, 2026	Mar 17 – Apr 01	15
Liestal	86	Mar 27, 2026	Mar 19 – Apr 05	17
Kyoto	88	Mar 29, 2026	Mar 20 – Apr 07	18
Vancouver	90	Mar 31, 2026	Mar 21 – Apr 10	20
New York City	92	Apr 02, 2026	Mar 25 – Apr 09	15



City	Baseline	Enhanced	Shift
Kyoto	DOY 88 (18d)	DOY 94 (12d)	+6d
Liestal	DOY 86 (17d)	DOY 95 (10d)	+9d
New York City	DOY 92 (15d)	DOY 98 (11d)	+6d
Vancouver	DOY 90 (20d)	DOY 95 (25d)	+5d
Washington DC	DOY 84 (15d)	DOY 89 (13d)	+5d