

Evaluation of predicted medfly (*Ceratitis capitata*) quarantine length in the United States utilizing degree-day and agent-based models

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Abstract

Abstracts should be up to 300 words and provide a succinct summary of the article. Although the abstract should explain why the article might be interesting, care should be taken not to inappropriately over-emphasize the importance of the work described in the article. Citations should not be used in the abstract, and the use of abbreviations should be minimized. If you are writing a Research or Systematic Review article, please structure your abstract into Background, Methods, Results, and Conclusions.

Keywords

Please list up to eight keywords to help readers interested in your article find it more easily.



Figure 1. Location of sites reported on.

Take-homes:

1. There is significant variation in predicted quarantine length at different times and locations.
 - (a) Captured by normals
 - (b) Climate
2. Variation in prediction within time / location (across years) is important.
 - (a) Captured by day-of-year (between-year) variation
 - (b) Informs reliability of prediction
 - (c) Influenced by rare events (eg. cold snaps)
 - (d) Prediction based on normal temps vs normal of predictions based on measured temps
3. DD vs ABS comparison
 - (a) ABS is better behaved
 - i. Seasonal swings less dramatic; Much less discontinuity at beginning of autumn
 - ii. Smaller overall range
 - iii. Captures common-sense effects missed by DD: eg. extreme cold kills
 - (b) Large disagreement between DD and ABS may indicate DD prediction is unreliable/broken
 - (c) Variance in predictions should inform management and planning. ABS variance is easier to interpret (KFAT being a dramatic example).

Introduction

The format of the main body of the article is flexible: it should be concise and in the format most appropriate to displaying the content of the article.

Methods

Sites and Temperature Data

Hourly air temperature data for 11 sites was downloaded from NOAA's Integrated Surface Database (ISD) dataset[1, 2]. The airport sites shown in Table 1 were chosen for their biological relevance and availability of high quality hourly data over a long timeframe. Data was fetched and parsed using the "Fetching and parsing ISH.ipynb" program. Records for the same station callsign were merged, since identification, format, and precise location of stations has changed over the years.

The data was then cleaned using the "Cleaning temperatures.ipynb" program by removing outliers, identifying large gaps (gt 3 hours), resampling to every hour on the hour using linear interpolation, and filling the large gaps using day-over-day linear interpolation (interpolating using values for the same hour of day from previous and following days). The processing programs and resulting temperature datasets are provided in the Supplemental Materials with the intent that they may be adapted and used by others.

Degree-Day Calculation

Degree-days were computed using `foo[3]`
`single-sine[4]`
`single-triangle[5]`

Agent-based Simulations: MedFoes

Results

This section is not essential for Web Tool papers.

Discussion

The discussion should include the implications of the article results in view of prior work in this field.

Conclusions

Please state what you think are the main conclusions that can be realistically drawn from the findings in the paper, taking care not to make claims that cannot be supported.

Author contributions

In order to give appropriate credit to each author of an article, the individual contributions of each author to the manuscript should be detailed in this section. We recommend using author initials and then stating briefly how they contributed.

Competing interests

All financial, personal, or professional competing interests for any of the authors that could be construed to unduly influence the content of the article must be disclosed and will be displayed alongside the article.

Grant information

Please state who funded the work discussed in this article, whether it is your employer, a grant funder etc. Please do not list funding that you have that is not relevant to this specific piece of research. For each funder, please state the funder's name, the grant number where applicable, and the individual to whom the grant was assigned. If your work was not funded by any grants, please include the line: 'The author(s) declared that no grants were involved in supporting this work.'

Table 1. Sites.

| Callsign | Station Name | State | Latitude | Longitude | Elevation | Begin date |
|----------|-------------------------------|-------|----------|-----------|-----------|------------|
| KSFO | SAN FRANCISCO INTERNATIONAL A | CA | +37.620 | -122.365 | 2.4 | 1948-01-02 |
| KFAT | FRESNO YOSEMITE INTERNATIONAL | CA | +36.780 | -119.719 | 101.5 | 1949-08-22 |
| KBUR | BURBANK-GLENDALE-PASA ARPT | CA | +34.201 | -118.358 | 236.2 | 1973-01-01 |
| KLAX | LOS ANGELES INTERNATIONAL AIR | CA | +33.938 | -118.389 | 29.6 | 1947-01-02 |
| KRIV | MARCH AIR RESERVE BASE | CA | +33.900 | -117.250 | 468.2 | 1941-09-02 |
| KSAN | SAN DIEGO INTERNATIONAL AIRPO | CA | +32.734 | -117.183 | 4.6 | 1948-01-02 |
| KJAX | JACKSONVILLE INTERNATIONAL A | FL | +30.495 | -81.694 | 7.9 | 1948-01-01 |
| KIAH | G BUSH INTERCONTINENTAL AP/HO | TX | +29.980 | -95.360 | 29.0 | 1969-06-01 |
| KMCO | ORLANDO INTERNATIONAL AIRPORT | FL | +28.434 | -81.325 | 27.4 | 1973-01-01 |
| KTPA | TAMPA INTERNATIONAL AIRPORT | FL | +27.962 | -82.540 | 5.8 | 1948-01-02 |
| KMIA | MIAMI INTERNATIONAL AIRPORT | FL | +25.791 | -80.316 | 8.8 | 1948-01-01 |

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