



Estimating Pollen Season Onset using Satellite Data and Google Trends: Preliminary Results

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I. MODIS Global Land Cover Dynamics (aka Phenology)

- identifies the day of year when key seasonal changes in vegetation occur (phenophases)
- logistic functions fit to time series of Enhanced Vegetation Index (EVI)
- 500m resolution
- 2001-2014

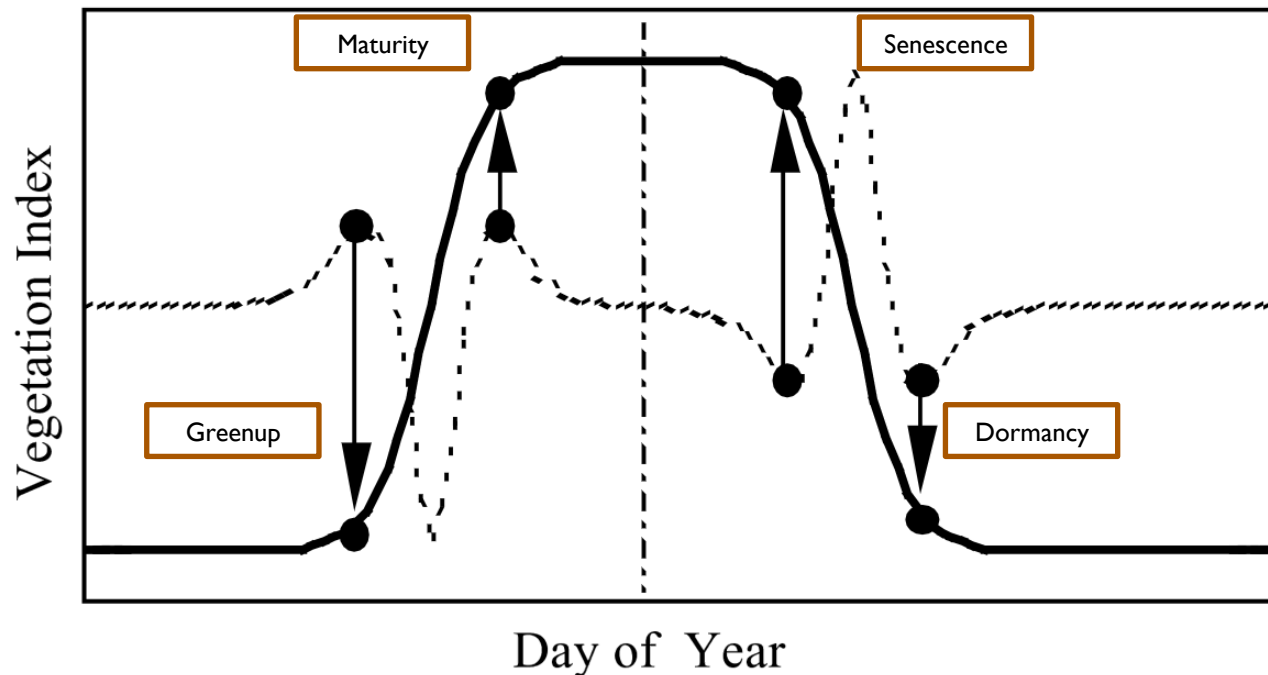
2. NOAA Climate Data Record

- AVHRR: daily, $0.05^{\circ} \times 0.05^{\circ}$ grid, 1981-present.
- Leaf Area Index (LAI) = green leaf area per unit ground surface area.
- Fraction of Absorbed Photosynthetically Active Radiation (FAPAR) = directly related to primary productivity of photosynthesis.

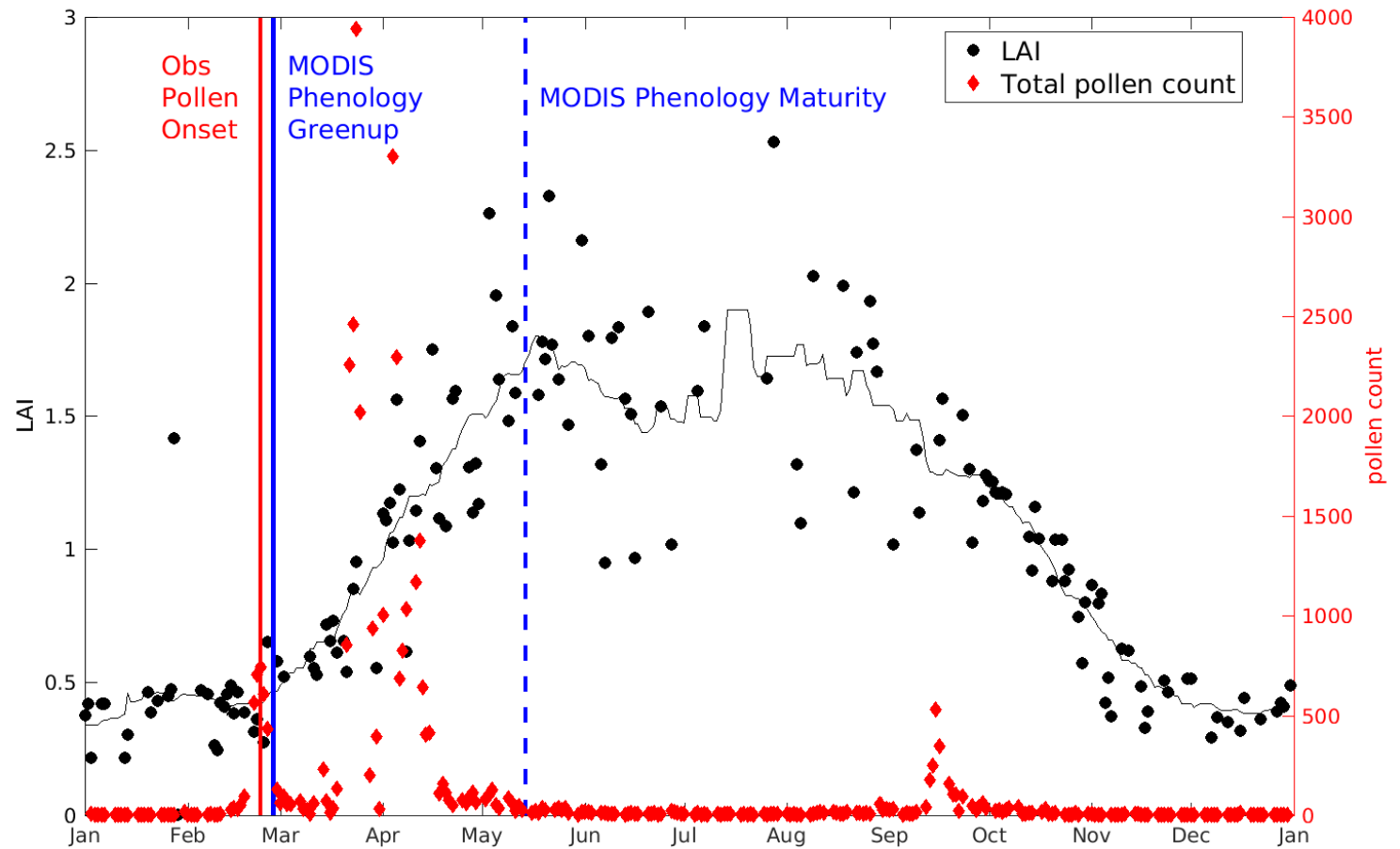
Seasonal Changes in Vegetation Index

Phenophases:

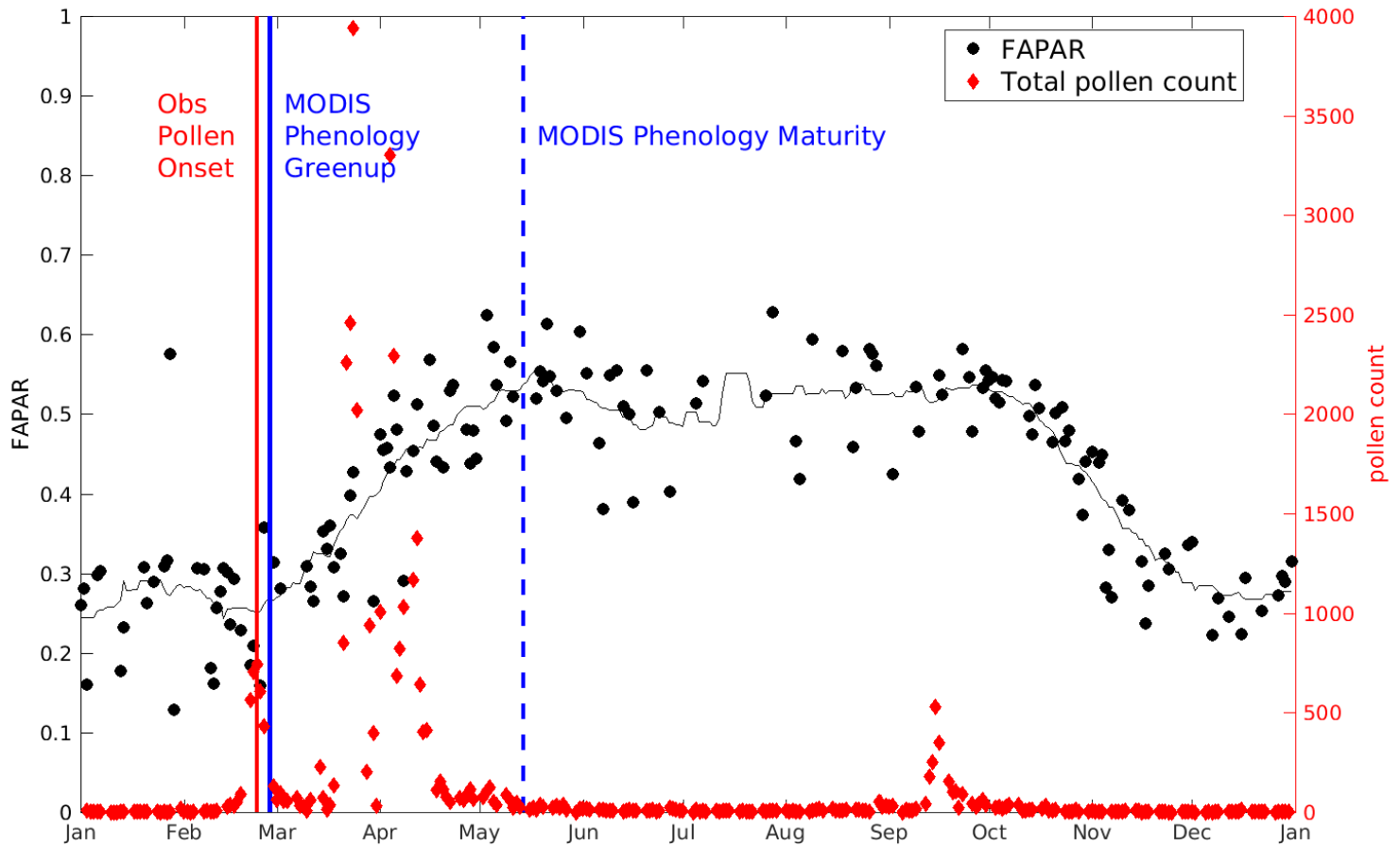
1. Onset of EVI increase: greenup
2. Onset of EVI maximum: maturity
3. Onset of EVI decrease: senescence
4. Onset of EVI minimum: dormancy



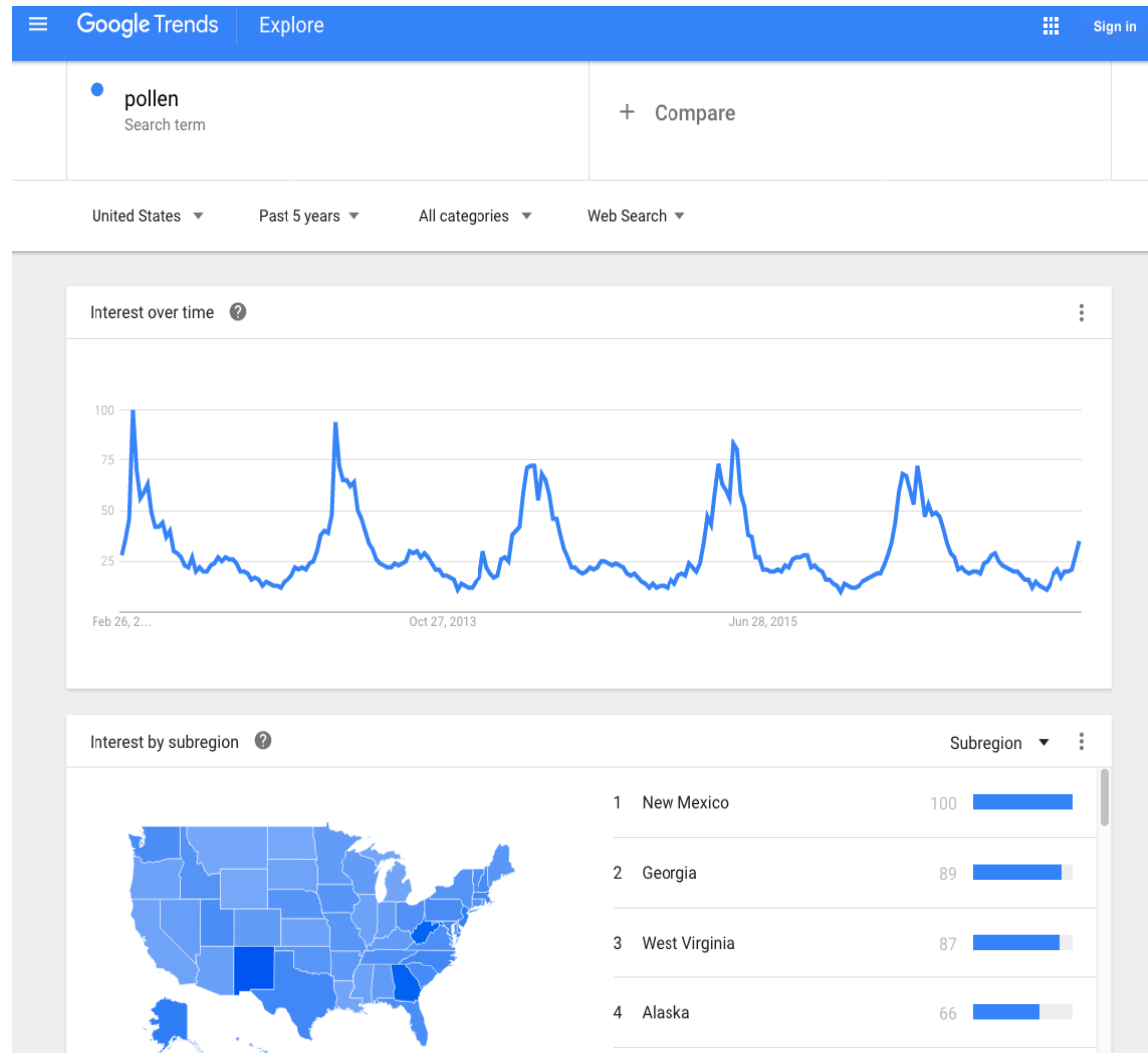
Atlanta, 2011



Atlanta, 2011



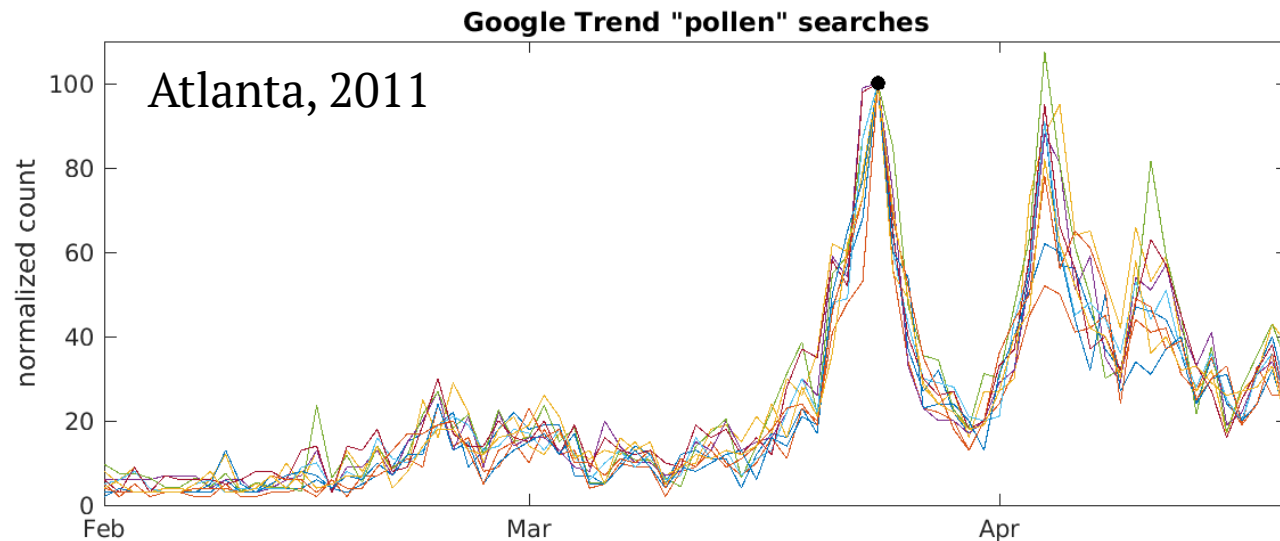
Google Trend Search Data as proxy for human response to pollen



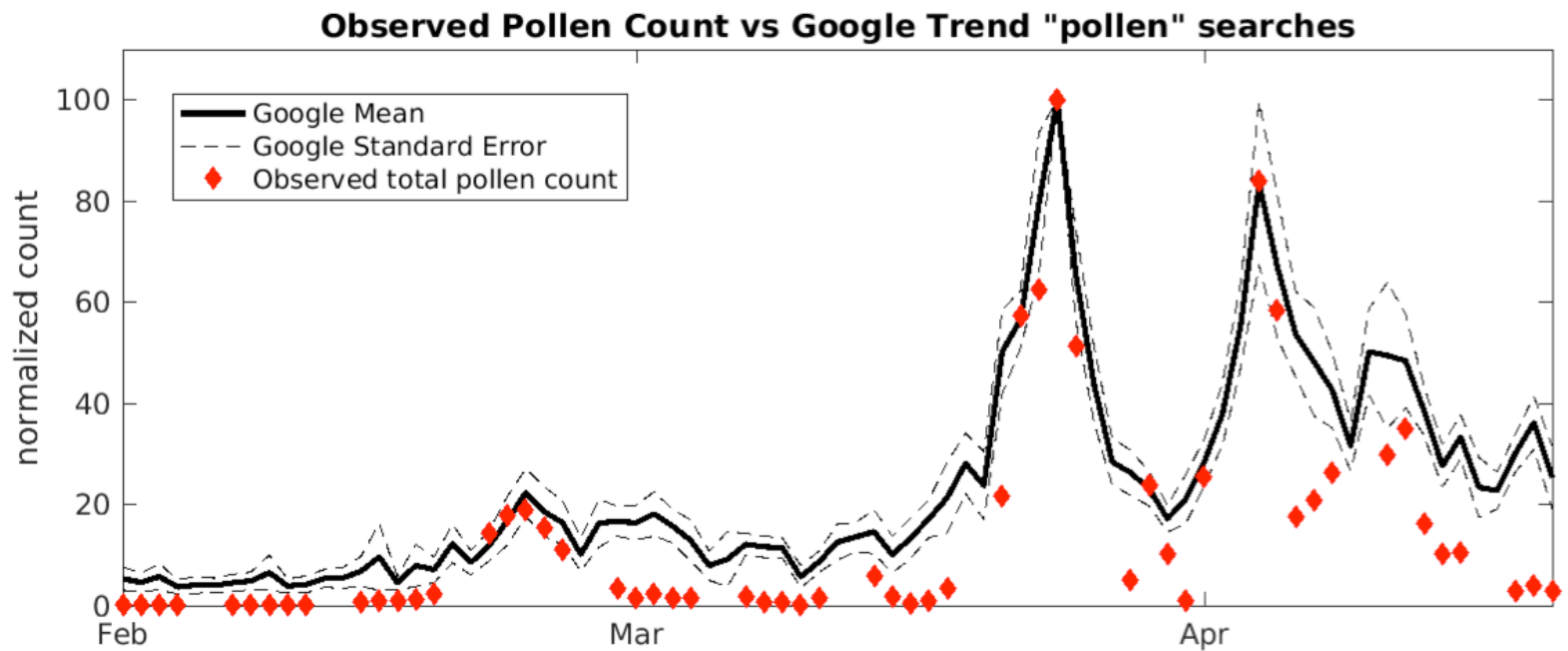
Google Trend Search Data

Limitations of publicly available data:

- daily data only available for time periods of 90 days or less
- normalized over time period
- random subsample of the total data



Atlanta, 2011



Summary

- Estimating onset of pollen season: LAI, FAPAR and MODIS Phenology seem to agree with observed pollen count data.
- Google Trend search data for “pollen” coincide with peaks in observed pollen count data.