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

University of Washington
Fiona Lo
Jeremy Hess, Cecilia Bitz

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1. 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°x0.05° 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

Zhang et al., 2002
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
Atlanta, 2011

Observed Pollen Count vs Google Trend "pollen" searches

- Google Mean
- Google Standard Error
- Observed total pollen count

(normalized count)

Feb | Mar | Apr

0 | 20 | 40 | 60 | 80 | 100
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.