Land Use Forecasting and Backcasting Products and Peer Review

July, 06 2016

Peter Claggett, Fred Irani, Quentin Stubbs, Renee Thompson
US Geological Survey
Eastern Geographic Science Center

U.S. Department of the Interior
U.S. Geological Survey

Chesapeake Bay Land Change Model v3a

Population Projections

Total Housing Demand

Employment Projections

Historic Infill Patterns

Potential Infill Development

Historic Development Patterns

Housing Land Demand

Employment Land Demand

Unprotected and Developable?

Unprotected and Developable?

Residential Probability

Commercial Probability

Road Gravity

Road Gravity

Housing Density

Job Density

Residential Development

Commercial Development

Iterative & Stochastic

Present Land Cover

Future Land Cover

Future Development Statistics

Summary Units (P6 Land-River segments)

USGS

CONservation scenario

(Frederick County, MD)

2040

- Commercial (future)
- Residential (future)
- Mixed use (future)
- Forests
- Scrub-shrub/grasland
- Agriculture
- Wetlands
- Water
- Barren/ extractive
- Developed Open Space
- Low-Intensity Developed
- Moderate-Intensity Developed
- High-Intensity Developed

Chesapeake Bay Land Use Forecasts: Production Schedule

Full-state Trend Scenario forecasts:

- **Maryland (complete)**
- **Virginia and New York (in prep)**
- **Pennsylvania, West Virginia, Delaware, District of Columbia (scheduled for August)**

Comparison of CBLCM and MDP* models

- **August & September**

Comparison of CBLCM and SLEUTH models in Delaware Watershed

- **Fall 2016**

*** https://www.farmland.org/initiatives/the-future-of-sustainable-farming-and-forestry-in-maryland**

Chesapeake Land Change Model: Peer Review

- June 2016: manuscript submitted to USGS and “Computers, Environment, and Urban Systems” for peer review.
  - One USGS scientist review
  - Two journal-appointed blind reviews

- August 2016:
  - STAC scientist, Dave Newburn, agreed to review manuscript.
  - EPA Office of Research and Development conducting independent review: three scientists specializing in land cover mapping and modeling.

Data for Backcasting Land Use for calibrating the Chesapeake Watershed Model

Census of Population and Housing (block level)

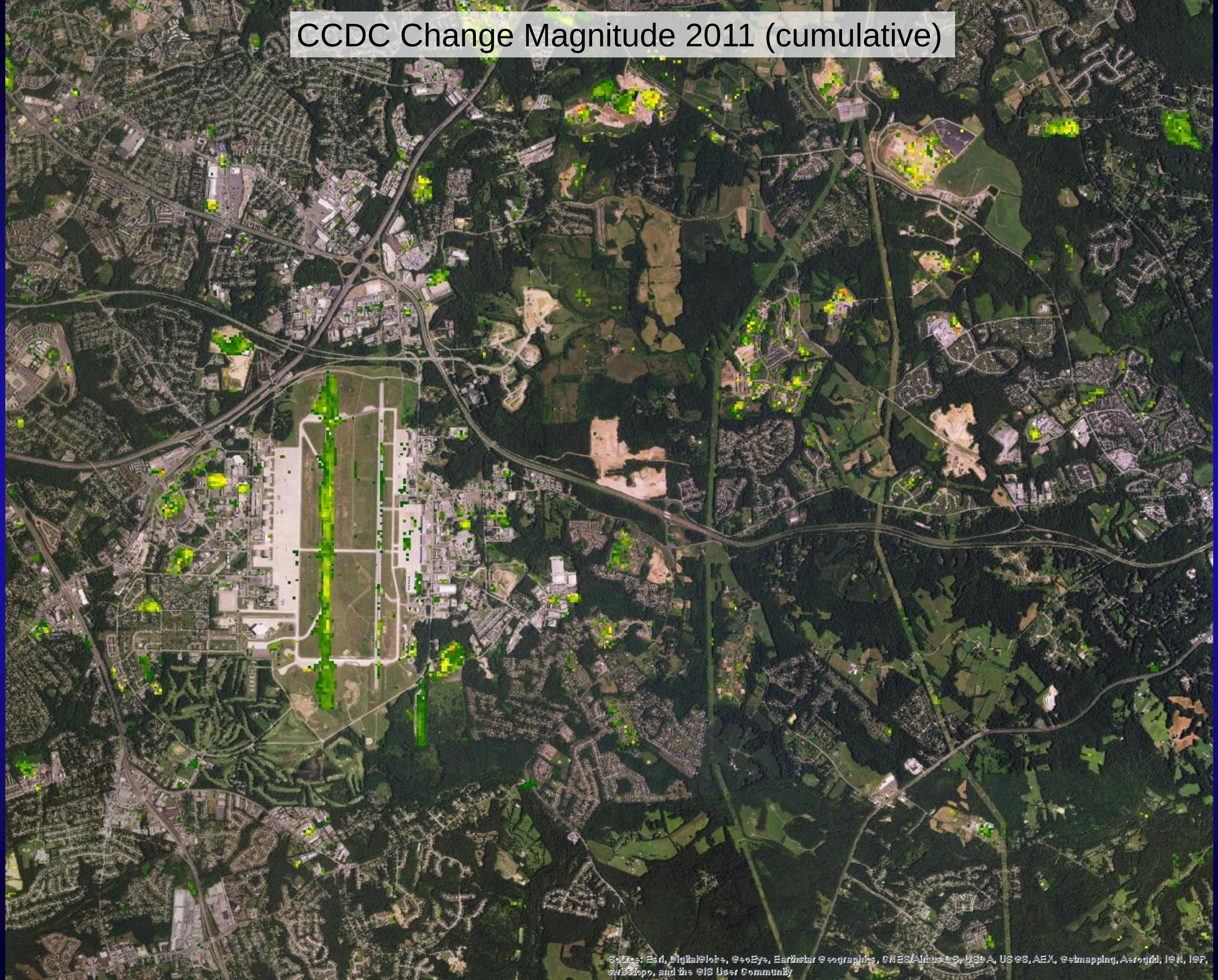
Census of Agriculture (county level)

Irani, F. M., & Claggett, P. (2010). Chesapeake Bay Watershed Land Cover Data Series. *US Geological Survey Data Series*, *505*.

2013 1-meter Land Cover

CCDC Change Magnitude 2010

CCDC Change Magnitude 2011 (cumulative)



CCDC Change Magnitude 2012 (cumulative)

CCDC Change Magnitude 2013 (cumulative)

New Methodology:
Backcasting Land Uses Annually from 2013 to 1984

1. Identify every year between 1984 and 2013 that change occurred within a 30m pixel.

2. Use 2013 land use and Chesapeake Bay Land Cover Data series (1984-2011) to interpret change.

3. Construct an annual, 30m resolution, land use/cover dataset based on the interpreted annual trajectory of change.

Phase 6 Land Use and Backcasting
Peer Review Questions

1. Given the available data and target Phase 6 land uses, is the Phase 6 land use methodology logical and scientifically sound.

2. Does the proposed backcast methodology utilize the best available data and scientific methods for reconstructing an annual Phase 6 land use history.
    - Are there alternative data or methods that should be considered.

3. Have the limitations of the analysis and data been well documented?

4. Are the backcasting results accurate?

Backcasting: Peer Reviewer Qualifications

- Land use/cover mapping
- Land use/cover change analysis
- Land use/cover change modeling
- Background: Geography, Planning, Land use economics

Contact Information:

Peter Claggett,
Research Geographer
U.S. Geological Survey
Chesapeake Bay Program Office
410 Severn Ave, Suite 109
Annapolis, MD 21403

410-267-5771
pclaggett@usgs.gov
pclagget@chesapeakebay.net

USGS