Assessment of Cascading Dynamics: *Work Unit 2.2 Flooding Impacts on Electric Power System*

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Phase I

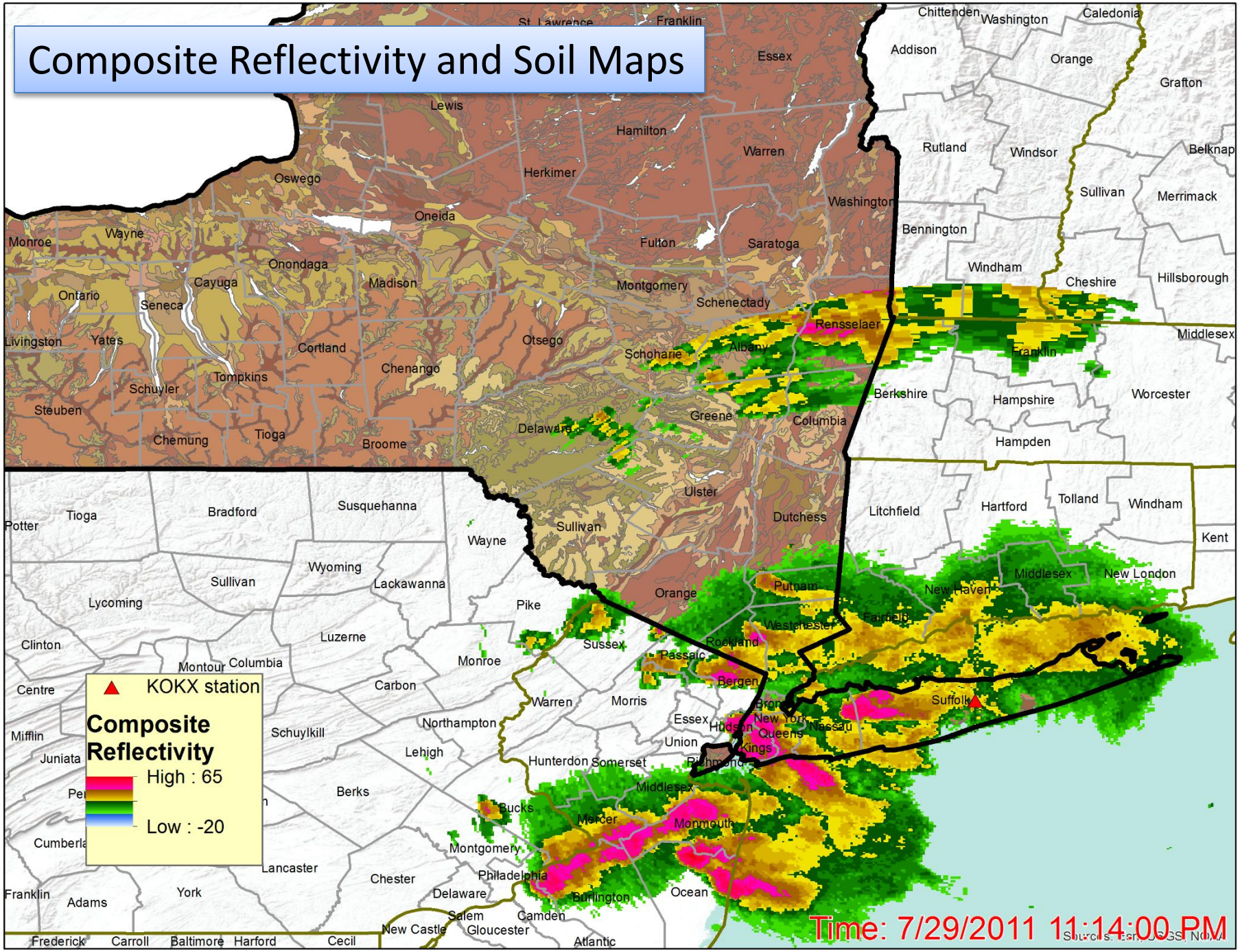
- Identify ~3 representative extreme weather systems that have caused major outages in region during 2010-2012 (2013?)
  - Hurricane Sandy caused too much damage
- Outage data (**business sensitive information: major bottle neck!**)

  Working on NDA with LIPA and Central
- Distributed energy resources (DERs) data
  - CHP: data from DOE (more details required: connection to circuit)
  - PV/wind: LIPA
  - Example: substation 7UM: Circuit 657: 6 DGs
  - Emergency generators: NYS DEC database
- Build a GIS database to manage geospatial data for the vulnerability assessment of power infrastructure. Geospatial data compiled (as of now):
  - Historical NEXRAD Radar data for selected storm tracks from BNL
  - Soil characteristics data from the USDA Soil Survey Geographic (SSURGO) data
  - Land use and land cover data from the USGS National Land Cover Database
  - Street lines of New York State (proxy data of transmission lines)
  - Household and population data from the Census 2010
- Visualize correlated geospatial data for the vulnerability assessment via both static and interactive map

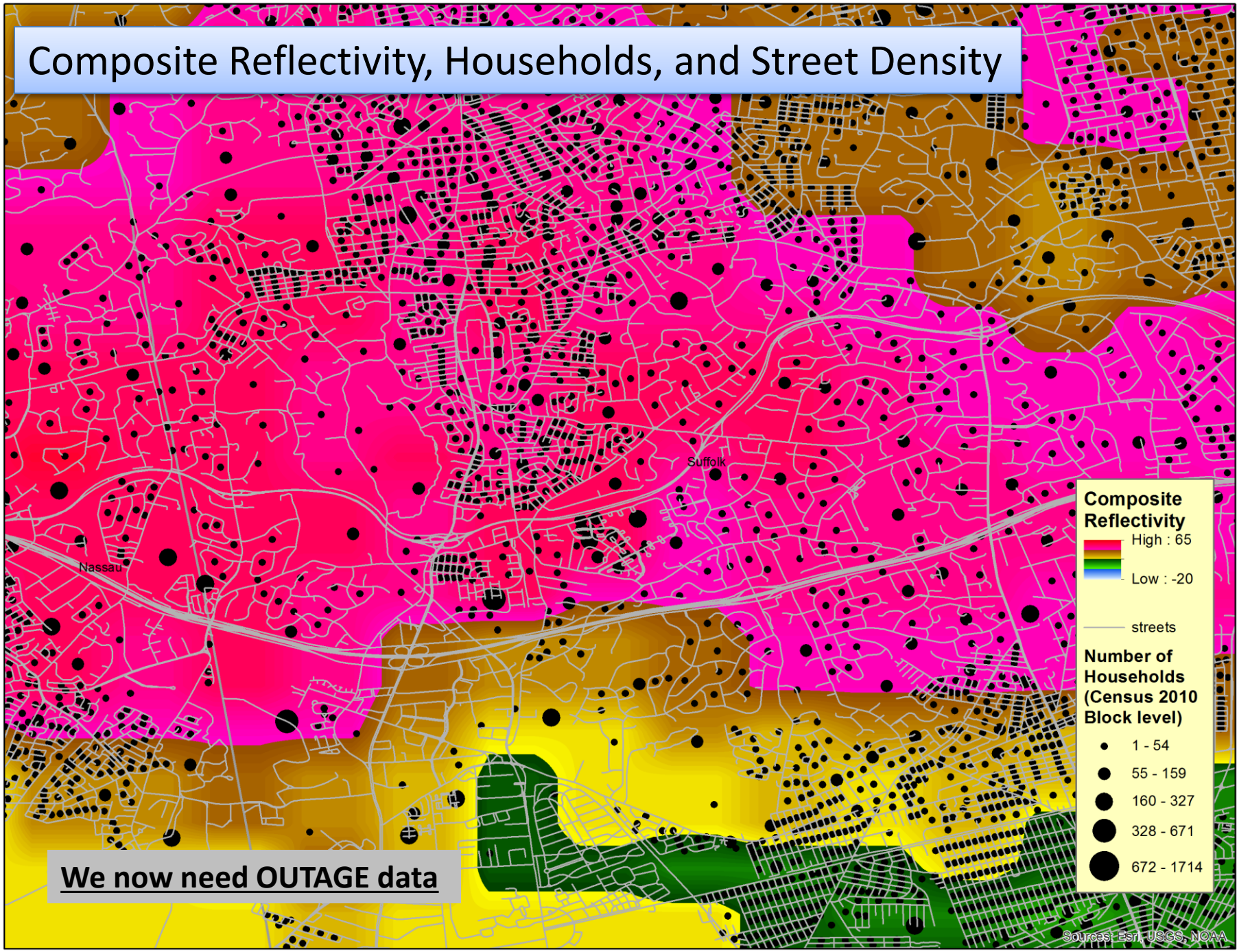
GIS Development (Phase I)

- Tasks in progress
  - Securing power infrastructure data and historical power usage data (**subject to NDAs**)
  - Deriving vegetation data from the Landsat satellite imagery
  - Developing an interactive visualization interface using ArcGIS for Server from the SBU Geospatial Center

Composite Reflectivity and Soil Maps



Composite Reflectivity, Households, and Street Density



We now need OUTAGE data

Phase II

- Objective: a tool to assess damages, cascading effects, effectiveness of adaptation, and economic impacts of adaptation measures
- Input:
  - Future severe weather simulation: wind, flood level, soil moisture, icing
  - Distribution grid: characterization of the grid, vegetation (?)
- Output
  - Probabilistic models for distribution grid (equipment level failure)
  - Effectiveness (measured as change in survivability) of dynamic microgrid, and hardening strategies (station elevation, pole replacing)
  - Economic impacts of investment: IMPLAN for multiplier effects