Assessing Global Change Impact on the US using National Lightning Data

Project Update

National Climate Assessment

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(abbreviated version)

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Project Focus:

- Assess climate-induced changes in cloud-to-ground (CG) lightning.
- Assess the impact of these changes on the following US sectors:
  - Human Health
  - Agriculture
  - Forestry
Important to Note

- 2000 Assessment Report did not even mention lightning

- 2009 Assessment Report only briefly mentioned lightning
  - pie chart on page 89 regarding hazard-related deaths
  - plot on page 105 regarding insurance claims

- No career lightning researchers involved in these previous assessments

- National lightning network not really ready to make good assessments until 2003.
Accomplishments

- Developed a Lightning Software Analysis Tool (LSAT)
  - written in IDL programming language
  - ingests, calculates, and visualizes national CG lightning data
  - now serves as a new “sustaining assessment” tool

- Applied LSAT to analyze CG lightning over a region slightly larger than CONUS during the period 2003-2011.

- Used NOAA Storm Data, and National Interagency Fire Center (NIFC) data to obtain associated death/injury, crop damage, wildfire stats.

  - CG lightning frequency dropped by 10.7%
  - Fatalities dropped by 13.5%
  - Injuries dropped by 31.2%
  - Crop damage dropped by 61.25%
  - # wildfires dropped by 23.6%
  - Wildfire burn acreage dropped by 8.3%
  - Multiplicity dropped by 2.4%
  - Peak current increased by 9.9%

- Number of +CG (and +CG fraction) monotonically trended upward in 2003-2011
Accomplishments (cont.)

- Synthesized literature on lightning/climate relations & compared w/LSAT.

- Completed a conservative risk-based assessment of lightning-caused impacts to our analysis region assuming a 1 degree C (wet-bulb) global (land mass) temp change:
  
  Human Health:
  - Fatalities: 13.98 deaths per 1°C
  - Injuries: 87.47 injuries per 1°C
  
  Agriculture:
  - Crop Damage: $49,348 per 1°C
  
  Forestry:
  - Wildland Fires (Number): 4091.0 wildfires per 1°C
  - Wildland Fires (Acres): 936,097.6 acres per 1°C

- Completed a 30 page Technical Input report to summarize findings.