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.**

- **Compared average values (2003-2006) with average values (2007-2010):**
  - ✓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 <u>lightning-caused</u> 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.**

- ❑ **Submitted Technical Input report on February 22, 2012.**