Using Spark to predict Microclimate variables at high Precision future time scale and Assess Climate Driven Catastrophe Risk

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Abstract: The climate change poses huge destabilizing impacts in various industries like energy, logistics, agriculture, utilities, insurance, etc. What matters most to these industries is the prediction of microclimate, distinctive climate of a small-scale area, where the temperature, rainfall, wind or humidity is typically different from the conditions prevailing over the surrounding areas. Although the physics of climate is well understood and abstracted in dynamic models, identifying microclimates using the same is challenging and cost prohibitive requiring synthesis of outputs from high-resolution multi-dimensional multivariate models. Here we present an overview of the techniques for predicting microclimate using Spark.

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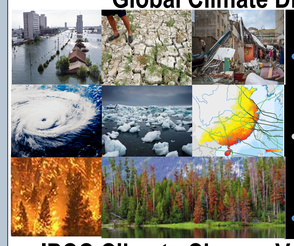
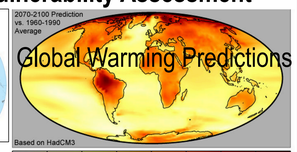
Climate Change is destabilising entire industries

Global Climate Disasters 1980-2014



- 178 climate disaster losses 1980-2014 in US **$1T+**
- 2014 loss **$8B+**
  Source: NOAA
- Total loss **$1.4T**

IPCC Climate Change Vulnerability Assessment



Scenario A2-550 in Year 2100 with Climate Sensitivity of 5.5 °C
Annual Mean Temperature with Aggregate Impacts Calibration and Enhanced Adaptive Capacity

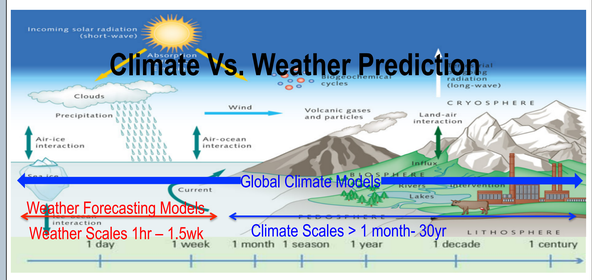
Climate Change is a Risk-Multiplier

Markets Impacted by Climate Change

What if you could predict future Micro-Climate at your location?

Predict your micro climate, mitigate risk, & reduce loss

The industry standard for customized pinpoint micro-climate prediction and risk mitigation



Our Unique Value Propositions

Current Climate Tech	Our Solution
General Large Area Forecast	Customized Pinpoint Climate Forecast
7 Day Forecast	1 month or longer forecast
Weather Data	Micro-Climate Data
Weather Driven Risk	Long term Climate Risk

Climformatics filing Patent

Climformatics Mitigates Climate Risk

Nobel winning technology for Real Time accurate analysis of future Temperature, Precipitation, Wind, and others

- 1 month to 30 year planning horizon
- Precise geographic information down to below zipcode level

Our Offerings

- Cloud based Self Service Prediction and Risk assessment

Actionable Recommendations through C/Risk™ Reports

C/Risk Basic	C/Risk Silver	C/Risk Gold
Climate Prediction 1 month – 1 year time scale	1-5 year climate prediction, more detailed prediction	1-10 year climate prediction, risk assessment & mitigation advice

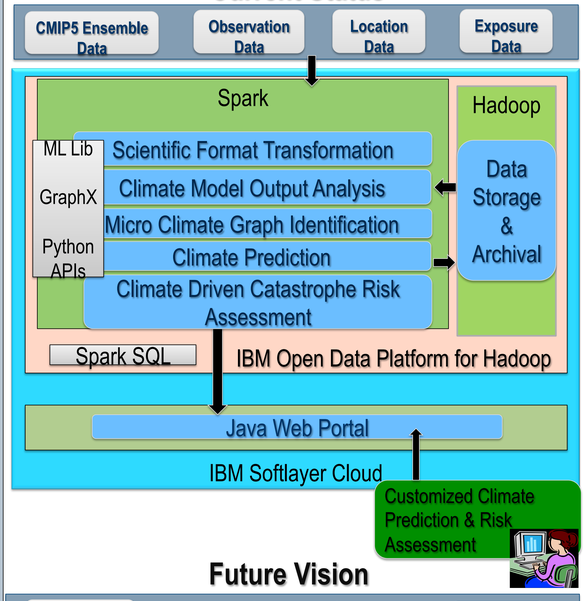
Solution for customized TURN-KEY climate risk assessment

How do we do it? Big Data Analytics, Climate & Risk

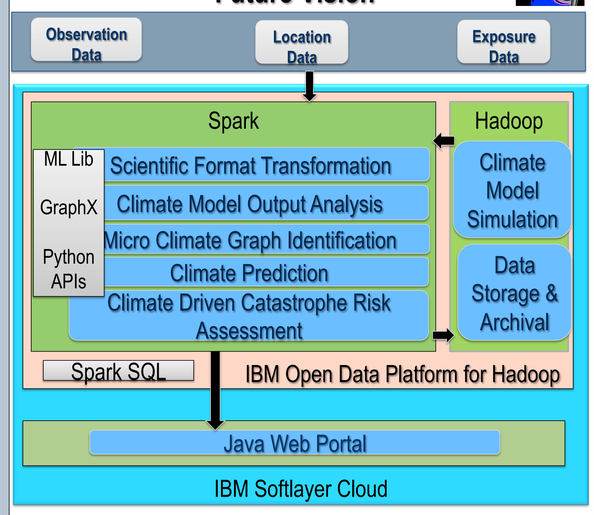
Integrated Climate Risk Assessment Platform

- Make Climate Data Consumable
- Develop Sustainable Big Data technology Platform for Climate Modeling and Prediction
- Design Risk Analytics based on Climate Change Peril
- Enable a plug and play interactive climate risk assessment technology
- Make Climformatics Climate Analytics platform widely applicable across any industrial, economic, market, medical, health, agricultural or scientific research.
- Pioneer a Climate Industry

Current Status



Future Vision



Who are We? Our accomplishments

World Leading Expertise In Climate Risk Modeling & Data Analysis

- Subarna Bhattacharyya, Risk Modeling & Climate Data Scientist

- Detelina Ivanova, Climate Modeling Scientist

- Velimir Mlaker, Computer Scientist

A team of former employees of Lawrence Livermore National Laboratory (LLNL), working with the Climate/Carbon group of Atmosphere Earth and Energy Division (Program for Climate Modeling Diagnostic and Interpretation part of working group 1 of International Panel for Climate Change). Combined over 20+ years of experience in modeling climate, climate data analytics, and catastrophe risk modeling.

- Marc Gottschalk
  Business Advisor, Attorney
  Partner, Sidley Austin LLP
  California Super Lawyer
  Co-Founder, Co-Chair Clean Tech Open

- Advisory Board:
  Big Data Evangelist, Business, Marketing and Technology specialists and industry IP Strategists. Incubated at California's i-GATE ideahub in Livermore, mentored by i-GATE, CleanTech Open, IBM and LLNL.

Feathers in our hat:

- Climformatics, a semifinalist at 2014 Clean Tech Open (CTO) caught IBM's interest and was invited to join IBM's Global Enterpreneurship Partner Program.
- Climformatics partners with IBM.
- Climformatics is winner of the 2014 Western US Category Finalist CTO Business Model Competition Award
- Climformatics won 3rd prize in iGATE pitch competition.
- Climformatics was one of the 6 Bay Area companies selected to present pitch at Hanhai Chinese investors meet in San Jose.

Our Target Market

- Weather industry ($3B US Market size, The Weather Company)
- Food and Agriculture ($4.8T in global market size)
- Insurance/Reinsurance ($23T in Global Investments, e.g. Munich Re)
- Futures' Market
- Energy Sector ($45T projected US investment in next 15 years, e.g. Chevron, PG&E, Siemens, GE)

Acknowledgements

IBM · Lawrence Livermore National Laboratory · i-GATE · CLEAN TECH OPEN

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CASIS-IEEE meeting LLNL, Livermore, May 13th 2015