Global Damage Footprints

GeoDev Meetup, 2017/09/27
Thomas Zerweck, Munich Re

Munich Re – Reinsurance and Primary insurance

Munich Re (Group)[1]

Reinsurance

Primary insurance

Asset Management

1 This listing is incomplete and provides no precise indication of shareholdings.

Thomas Zerweck, CU Geospatial Solutions, Munich Re

NatCat events cause major losses

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Percentage distribution for relevant natural loss events worldwide 2016

Number of events:
772

- 6.7 %
- 32.3 %
- 50.5 %
- 10.5 %

Overall losses:
US$ 180bn

- 28.3 %
- 30.6 %
- 31.4 %
- 9.7 %

Fatalities:
9,646

- 15.6 %
- 21.5 %
- 52.7 %
- 10.2 %

Insured losses:
US$ 50bn

- 19.1 %
- 49.1 %
- 20 %
- 11.8 %

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- Geophysical events
- Meteorological events
- Hydrological events
- Climatological events

Footprints represent the locations of such events

Footprint: the spatial extent and distribution of the

- Event: the event itself, for instance the wind speed of a hurricane, the magnitude of an earthquake etc.

- Damage: the damage caused by an event, mainly qualitative (low-high; in numbers only in conjunction with detailed exposure data and NatCat models)

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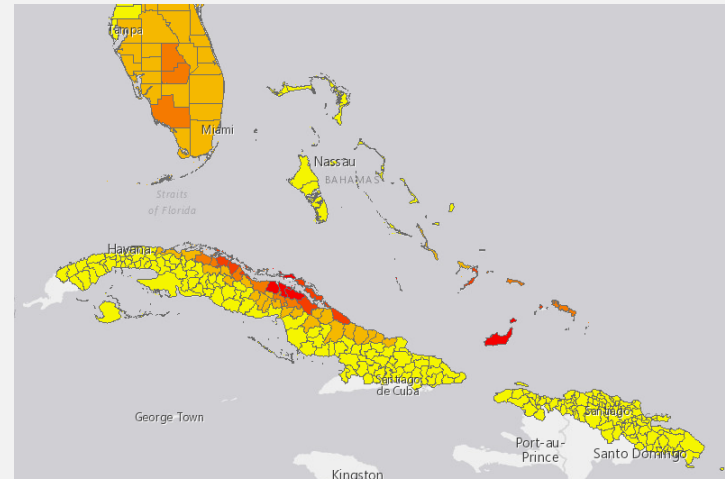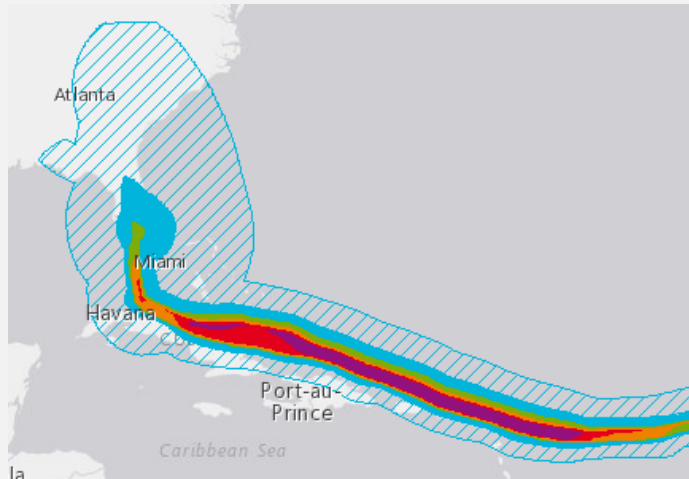
Short-term provision of footprints after an event is crucial

What can it be used for (Business cases)?

- Support of risk mitigation efforts and binding restrictions for external clients

- Fast and efficient loss estimation (internal/external)

- Fraud prevention (internal/external)

- Efficient steering of loss adjusters (external)

- Enhanced risk assessment (internal/external)

Who is using it (potential users and applications)?

- Portfolio manager, Underwriters, Claims manager, Risk analysts (internal as well as external)

- All applications supporting exposure analysis and portfolio management

Footprint creation as a manual process

So far, footprints are created by a manual process

- Information is collected from the internet

- Footprints are calculated by using MatLab

- Geodata is produced using GIS software

- Data is distributed to users by copying it to data folders or sending it via email

This process has several downsides

- Expert resources have to be available

- Time needed is relatively high

- Quality (different versions etc.) might be a problem due to the various departments involved

Efficiency and new products through digitization

By digitizing the whole workflow, footprints can now be created and directly provided to the users immediately after the event happened

- Footprints are updated at regular intervals, 24/7

- Data is automatically available to users, one source of distribution

- Data has a versioning information (time stamp)

- Expert resources are available for other tasks

Furthermore, new products like damage footprints can be built

- Advanced geoanalytics will be executed during the automized process

- Affected administrative zones, population distribution, vulnerability regions or industry exposure distribution can be used to enrich result data and give further insights into expected damages and losses
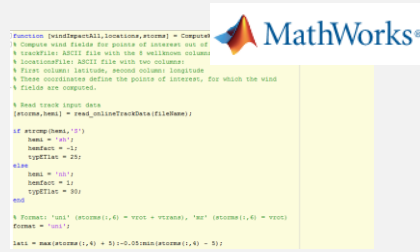
Workflow Hurricanes North America

NOAA Server

Provides storm track information for all storms in the north atlantic and pacific basin
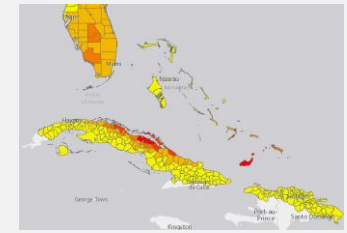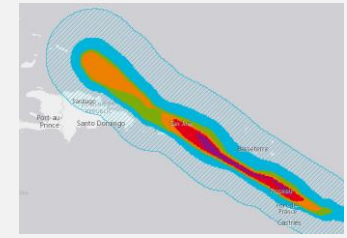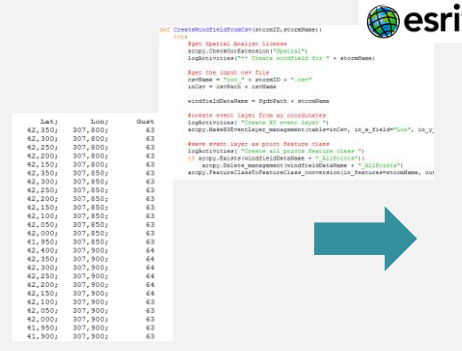
Data Lake

Regularly downloads these files and triggers windfield calculation code from CU GeoRisks

GeoDataServer (GDS)

Creates footprints from windfield information; provides the data to users and applications and publishes data as map services to visualize them in applications

Thomas Zerweck, CU Geospatial Solutions, Munich Re

Technical implementation: Geoanalytics using ArcPy

- The calculation, publishing and distribution of footprints is done via Python using ArcPy package from ESRI

- Main steps:

  - Create event footprints (raster and polygon data) from csv-file (XY-Eventlayer)

  - Create damage footprints by selecting administrative zones and calculating a weighted mean wind speed using zonal statistics

  - Create an ArcMap document containing data layers with appropriate symbolization

  - Copy event and damage footprint geodata to ArcGIS Server and to users exchange folders

  - Publish ArcMap document as Map Service (i.e. refresh service)

- Time scheduler: data and services are updated regularly

- Version management: updates only if there have been changes, time stamp as version information

User interface: Web app
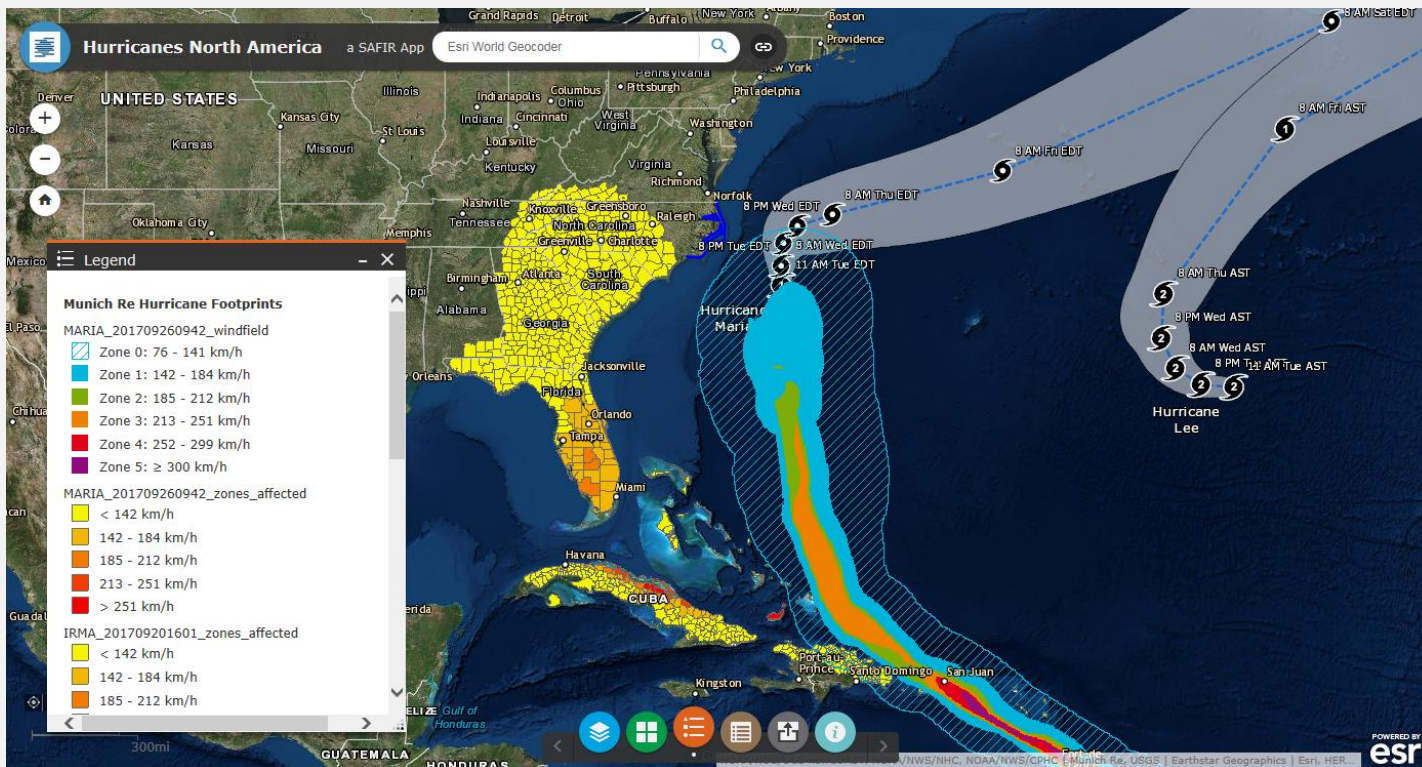
Status and next steps

Status: Currently, the system is up and running for Hurricane footprints in North America

Next steps:

- Identify further users and add them to data distribution channels

- Refine products needed (data, services) in dialogue with users

- Include further hazards (e.g. Earthquake)

- Include further regions (e.g. TC Australia)

- Technical improvements and enhancements (stabilization, monitoring, logging, version handling, geoanalytics)
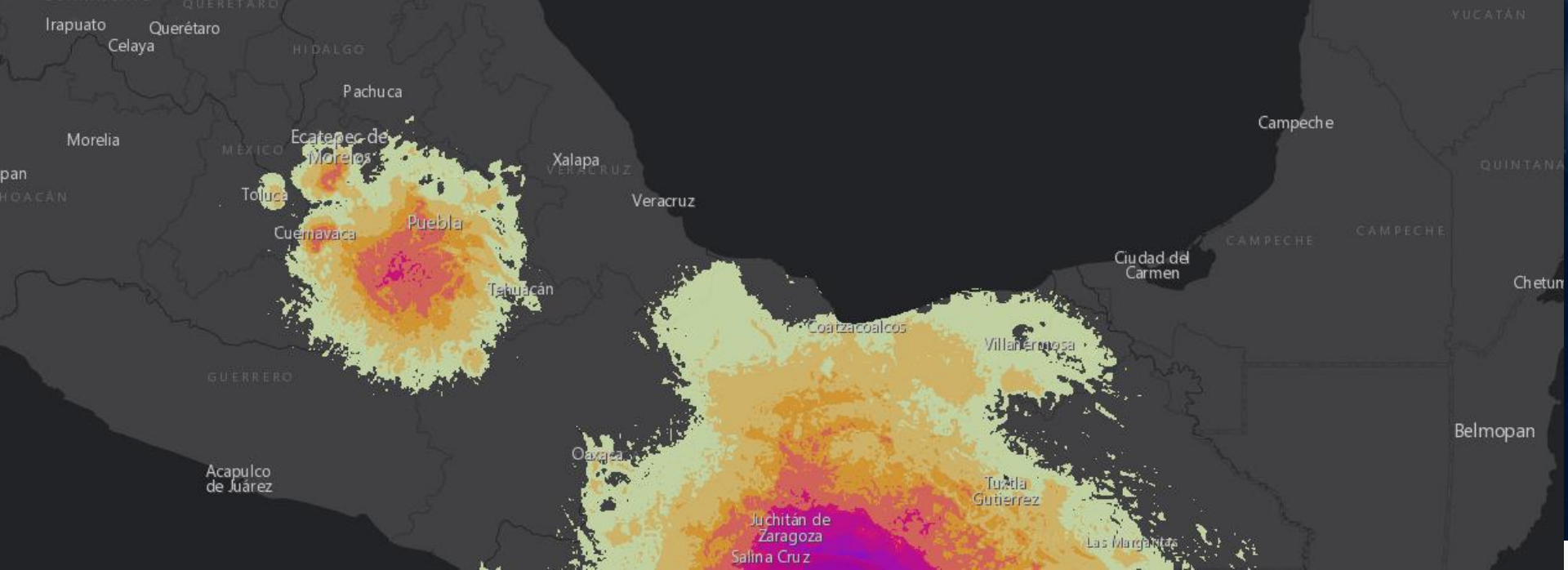
Thank you very much for your attention!

Thomas Zerweck (ThZerweck@munichre.com)

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