NatCatSERVICE®

Carl Hedde, CPCU  Head of Risk Accumulation
Munich Re America
From 1980 until today all loss events; for USA and selected countries in Europe all loss events since 1970.

Retrospectively, all great disasters since 1950.

In addition, all major historical events starting from 79 AD – eruption of Mt. Vesuvius (3,000 historical data sets).

Currently ca. 36,000 data sets
MR NatCatSERVICE
Downloadcenter for statistics and analyses on natural disasters

The downloadcenter provides **free** access to:

- Annual statistics
- Long-term statistics
- Information on significant natural disasters
- Focus analyses
- NatCatSERVICE methodology, info brochure
- Publication Topics Geo

www.munichre.com/natcatservice/downloadcenter/en
# NatCatSERVICE

**Database Structure – Peril Families**  
(updated structure following IRDR DATA project)

<table>
<thead>
<tr>
<th>Family</th>
<th>Main event</th>
<th>Sub Peril</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geophysical</td>
<td>Earthquake</td>
<td>Earthquake (ground shaking)</td>
</tr>
<tr>
<td></td>
<td>Volcanic eruption</td>
<td>Fire following</td>
</tr>
<tr>
<td></td>
<td>Mass movement dry</td>
<td>Tsunami</td>
</tr>
<tr>
<td>Meteorological</td>
<td>Tropical storm</td>
<td>Volcanic eruption</td>
</tr>
<tr>
<td></td>
<td>Extra-tropical storm</td>
<td>Ash cloud</td>
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<tr>
<td></td>
<td>Convective storm</td>
<td>Subsidence</td>
</tr>
<tr>
<td></td>
<td>Local windstorm</td>
<td>Rockfall</td>
</tr>
<tr>
<td></td>
<td>Flood</td>
<td>Landslide (dry)</td>
</tr>
<tr>
<td>Hydrological</td>
<td>Mass movement wet</td>
<td>Heat wave</td>
</tr>
<tr>
<td></td>
<td>Extreme temperature</td>
<td>Cold wave / frost</td>
</tr>
<tr>
<td></td>
<td>Drought</td>
<td>Extreme winter conditions</td>
</tr>
<tr>
<td></td>
<td>Wildfire</td>
<td>Wildfire</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unspecified</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Subsidence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Avalanche</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Landslide (wet)</td>
</tr>
<tr>
<td>Climatological</td>
<td></td>
<td>Drought</td>
</tr>
</tbody>
</table>

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Geophysical events (Earthquake, tsunami, volcanic activity)

Meteorological events (Tropical storm, extratropical storm, convective storm, local storm)

Hydrological events (Flood, mass movement)

Climatological events (Extreme temperature, drought, wildfire)
Loss Events Worldwide 1980 – 2015
Number of events

Number

1200
1100
1000
900
800
700
600
500
400
300
200
100
0


Substantial part of increase due to improved reporting of small scale loss events!

Geophysical events
(Earthquake, tsunami, volcanic activity)

Meteorological events
(Tropical storm, extratropical storm, convective storm, local storm)

Hydrological events
(Flood, mass movement)

Climatological events
(Extreme temperature, drought, forest fire)

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Loss Events Worldwide 2015
Insured share on overall losses per continent

Quelle: Munich Re, NatCatSERVICE, 2016
Loss Events Worldwide 1980 – 2015
Overall and insured losses

Annual loss determined by “handful” of largest loss events per year.
Trend dominantly determined by socio-economic growth and not influenced by reporting trend in small scale loss events!

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Risk ~ Hazard $\times$ Vulnerability $\times$ Exposure

All three factors *can* and *will* change over time!
NatCatSERVICE

Examples of **Drivers** of NatCat Losses

**Exposure:**
- Inflation
- Population increase/shift
- Increase of wealth
- Increase of building stock

**Vulnerability:**
- Building codes
- Improved materials
- Expensive materials
- Flood zones

**Hazard:**
- Natural variability (rather short time scales)
- Climate change (long time scales)
## NatCatSERVICE

### Structure of NatCatSERVICE

**Field-of-work schematic**

<table>
<thead>
<tr>
<th>Data Maintenance</th>
<th>Loss Estimation</th>
<th>Loss Normalization</th>
<th>Analytics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sourcing of event information</td>
<td>Insured loss information:</td>
<td>Normalization procedures</td>
<td>Statistics &amp; charts</td>
</tr>
<tr>
<td>Geo-coding</td>
<td>- Internal / external sources</td>
<td>- CPI adjustment</td>
<td>Trends &amp; correlations</td>
</tr>
<tr>
<td>Quality control</td>
<td>Economic loss estimation:</td>
<td>- GDP normalization</td>
<td>Customized analyses</td>
</tr>
<tr>
<td></td>
<td>- Insurance penetration data</td>
<td>- GCP normalization</td>
<td>Explanations &amp; illustrations</td>
</tr>
<tr>
<td></td>
<td>- Home values / building &amp;</td>
<td></td>
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<tr>
<td></td>
<td>construction cost data</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Agricultural data</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>- Infrastructure information</td>
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<tr>
<td></td>
<td>- etc.</td>
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<tr>
<td></td>
<td>Loss estimation procedures</td>
<td>Provision and preparation of</td>
<td>(Re-)Presentation of NCS</td>
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<tr>
<td></td>
<td></td>
<td>socio-economic proxy data</td>
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<td></td>
<td></td>
<td>CatClassification</td>
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<tr>
<td></td>
<td></td>
<td>- Applying income group data on</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>normalized loss data to assign a</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>CatClass to each event</td>
<td></td>
</tr>
</tbody>
</table>

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Five levels of information quality:

1. Info on insured loss in industrial countries, compiled by institutions such as PCS, Perils AG or various Insurance Associations

2. Partial info on insured loss in developing markets / countries

3. Info on total economic loss, often from governments (no info on insured loss)

4. Partial info on economic loss (e.g. impact on agriculture, infrastructure etc.)

5. Only description of event (e.g. number of houses damaged / destroyed by flood, storm, earthquake etc.)
Economic loss estimation based on insured loss data is of best quality! …and easiest way to scale up

1. Insured loss info

2. Up-scaling of insured loss based on insurance penetration & take-up rates information

3. Modulation of economic loss based on event-specific information and/or NatCatSERVICE experience
Insurance penetration worldwide 2014
Defined by Munich Re

Classification per capita by property insurance premium (non-life including health)

- **Highly insured** (>1,000 US$)
- **Well insured** (101 – 1,000 US$)
- **Basically insured** (10 – 100 US$)
- **Inadequately insured** (<10 US$)
- **No data**