iProfileRisk

Apocalypse Pty Ltd

Natural Catastrophe Report

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Important Notice

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Introduction to Steadfast iProfileRisk

Steadfast Risk Group's Framework

Steadfast offers an end-to-end risk framework for brokers and their clients based on the internationally recognised ISO 31000 standard.

Steadfast Risk Group provides a spectrum of in-house services and solutions ranging from enterprise risk management, risk and natural catastrophe hazard identification, property engineering consultation/services and alternative risk transfer.

Framework diagram

What is iProfileRisk?

iProfileRisk is a data driven and online accessible platform aimed at simplifying risk hazard identification and providing natural catastrophe high level summaries for brokers and their clients.

It empowers proactive risk identification and risk centred conversations between brokers and their clients, through enabling data driven risk decisions and mature financial acumen for insurance risk considerations.

Objective of this report

Utilising iProfileRisk in conjunction with other Steadfast Risk Group offerings enables easy identification of the most prominent risks impacting an industry and SwissRe's natural catastrophe summary for a specific location.

Natural Catastrophe Summary

Identifying hazards in the workplace involves finding things and situations that could potentially cause harm to the organization. The following chart is a graphical representation or the likelihood and severity of a loss occurring within any of the classes of insurance listed in the chart.

YOUR SEARCH RESULTS

Natural Catastrophe

- Bushfire/Wildfire
  Moderate (6)
- Earthquake
  Moderate
- Hail
  Significant
- Lightning
  Significant (7-10)
- Coastal Flood
  Outside
- Landslide
  Negligible
- Tornado
  Low (0.1 - 0.2)
- Wind Speed/Cyclone
  Low (20-25 m/s)

NATURAL CATASTROPHE DETAILED DESCRIPTIONS

Bushfire/Wildfire

Medium risk

The Bushfire/Wildfire Map shows the number of months over the period June 1995 through December 2016 during which burned area per 0.25° latitude by 0.25° longitude grid exceeded a threshold value.

Sources:

- Global Fire Emissions Database (GFED4) burned area dataset https://daac.ornl.gov/VEGETATION/guides/fire_emissions_v4_R1.html
- 500-m MODIS burned area maps, https://modis-land.gsfc.nasa.gov/burn.html
- Active fire data from the Tropical Rainfall Measuring Mission Visible and Infrared Scanner https://earthdata.nasa.gov/earth-observation-data/near-real-time/firms/active-fire-data
- Along-Track Scanning Radiometer https://earth.esa.int/web/guest/-/along-track-scanning-radiometer-4006

Result: Moderate (6)
Fire Hazard per 0.25° grid (1995-2016)

Risk grades:

- Extreme (10)
- Very high (9)
- High (8)
- Significant (7)
- Moderate (6)
- Moderate (5)
- Low (4)
- Low (3)
- Very low (2)
- Very low (1)

Low risks: Very low (1), Very low (2), Low (3), Low (4)
Medium risks: Moderate (5), Moderate (6), Significant (7)
High risks: High (8), Very high (9), Extreme (10)

Earthquake

Medium risk

The seismic hazard is represented as the pseudo spectral acceleration in units of g at a period of 0.3s for a return period of 475 years.

Sources:

- Swiss Re proprietary models
- SHARE http://www.efehr.org:8080/jetspeed/portal/hazard.psml
- USGS https://earthquake.usgs.gov/hazards/interactive/
- GSHAP http://static.seismo.ethz.ch/GSHAP/index.html

Result: Moderate
PSA 0.3s(g) - Return Period 475years

Risk grades:

- Extreme (1.82-2.0)
- Very high to Extreme (1.22-1.82)
- Very high (0.82-1.22)
- High to Very high (0.61-0.82)
- High (0.41-0.61)
- Significant (0.27-0.41)
- Moderate (0.18-0.27)
- Low to Moderate (0.14-0.18)
- Low (0.09-0.14)
- Very low (0.06-0.09)

Low risks: Very low (0.06-0.09), Low (0.09-0.14), Low (0.14-0.18)
Medium risks: Moderate (0.18-0.27), Significant (0.27-0.41)
High risks: High (0.41-0.61), High (0.61-0.82), Very high (0.82-1.22), Very high to Extreme (1.22-1.82), Extreme (1.82-2.0)

Hail

Medium risk

The expected number of hail days per year with a hail diameter larger than 2 centimetres related to an area 50km x 50km is shown.

Sources:

Scientific literature about the global and regional climatological distribution of hail frequency and severity; Swiss Re's internal claims and hail model data; reports of severe hail events; expert judgement of Swiss Re's Atmospheric Peril Specialists

Result: Significant
Hail Days (>2cm) per 2500km2 and year

Risk grades:

- Extreme (>1.0)
- Very high (0.8 - 1.0)
- High (0.6 - 0.8)
- Significant (0.4 - 0.6)
- Moderate (0.2 - 0.4)
- Low (0.1 - 0.2)
- Very low (<0.1)

Low risks: Very low (<0.1), Low (0.1 - 0.2)
Medium risks: Moderate (0.2 - 0.4), Significant (0.4 - 0.6)
High risks: High (0.6 - 0.8), Very high (0.8 - 1.0), Extreme (>1.0)

Lightning

Medium risk

The global lightning hazard layer shows the mean annual flash rate per square kilometer.

Sources:

- NASA Earth Science Data and Information System (ESDIS) Project
- Global Hydrology Resource Centre (GHRC)
- Distributed Active Archive Centre (DAAC)

Result: Significant (7-10)
Annual flash rate per km2

Risk grades:

- Extreme (>50)
- Very high (36-50)
- Very high (26-35)
- High (21-25)
- High (16-20)
- Significant (11-15)
- Significant (7-10)
- Moderate (4-6)
- Low (1-3)
- Very low (<1)

Low risks: Very low (<1), Low (1-3)
Medium risks: Moderate (4-6), Significant (7-10), Significant (11-15)
High risks: High (16-20), High (21-25), Very high (26-35), Very high (36-50), Extreme (>50)

Coastal Flood

Low risk

Swiss Re's Coastal Flood Layer depicts coastal regions that are potentially affected by storm surges or tsunami, defined by the 'distance to the coast' and the 'elevation above mean sea level'.

Sources:

- 90 m resolution SRTM DTED1 digital elevation model;
- SRTM Water Body Data Set

Result: Outside
Coastal Flooding

Risk grades:

- Very high
- High
- Moderate
- Low
- Outside

Low risks: Outside, Low
Medium risks: Moderate
High risks: High, Very high

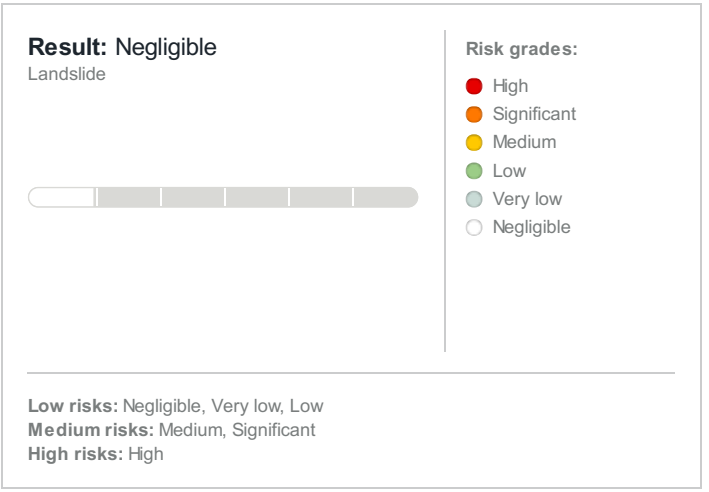
Landslide

Low risk

Landslide means the movement (whether by way of falling, sliding or flowing or by a combination thereof) of ground-forming materials composed of natural rock, soil, artificial fill, or a combination of such materials, which, before movement, formed an integral part of the ground.

Sources:

- InterMap Next DEM
- Global Lithologic Map (GLiM) by University of Hamburg
- Precipitation data East View Services
- Seismicity data GSHAP, SHARE



Tornado

Low risk

The hazard map consists of three parts with different data granularity:

United States & Canada

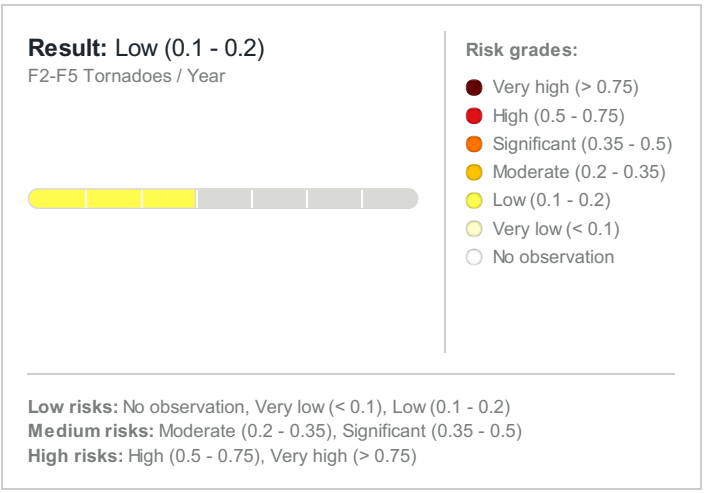
Data represents the average yearly tornado occurrence (F2-F5) within a grid cell of 50km x 50km based on 64 observation years and 30 years respectively

Rest of the world

Data for the calculation was derived from numerous scientific documentations, observations and expert knowledge

Sources:

- **USA:** data from NOAA's Storm Prediction Center (SPC), NOAA's National Hurricane Center
- **Canada:** Paper from 'Environment Canada' (David Sills), ams.confex.com/ams/26SLS/webprogram/Manuscript/Paper211359/SLS26manuscript-TornadoProne-FINAL.pdf
- **Rest of the World:** combination of the knowledge of Swiss Re's Atmospheric Perils Specialists, own interpretations of tornado models, recent event observations



Wind Speed/Cyclone

Low risk

The wind speed data shows the 3 seconds peak gust with a return period of 50 years.

Sources:

- Hazard module of Swiss Re's proprietary wind loss models; Global reanalysis dataset
- '20th century reanalysis project' designed by the Physical Sciences Division of the Earth System Laboratory of NOAA

Result: Low (20-25 m/s)
Local 50 Year Peak Gust Speed

Risk grades:

- Extreme (>70 m/s)
- Very high (60-70 m/s)
- High (50-60 m/s)
- Significant (40-50 m/s)
- Moderate (35-40 m/s)
- Moderate (30-35 m/s)
- Low (25-30 m/s)
- Low (20-25 m/s)
- Very low (<20 m/s)

Low risks: Very low (<20 m/s), Low (20-25 m/s), Low (25-30 m/s)
Medium risks: Moderate (30-35 m/s), Moderate (35-40 m/s), Significant (40-50 m/s)
High risks: High (50-60 m/s), Very high (60-70 m/s), Extreme (>70 m/s)

River Flood - Return Period

No risk data

River flood zones are based either on Swiss Re Global Flood Zones™ (based on Swiss Re's proprietary and patented multiple regression approach) or on flood zones that are officially used or developed by the insurance industry (available for Austria, Czech Republic, Italy, Luxemburg, Slovakia, Switzerland, UK, and USA).

Sources:

- *Swiss Re GFZ:* Swiss Re's patented Geomorph Approach using Intermap's NEXTMap World 30 digital surface model terrain data
- *Official Flood Zones:* Institut fur Angewandte Wasserwirtschaft und Geoinformatik (IAWG), cooperation project of the BMLFUW and the Association of Austrian insurance companies (WO) https://www.bmlrt.gv.at/en/fields/water/Protection-against-natural-hazards/Hora.html
- Swiss Re's patented Geomorph Approach using MMC's 1Om terrain data http://www.mmc.cz/mmcwebcz/downloads/documents/FRAT1.0_eventfd.pdf; IAWG http://www.zuers-public.de
- Swiss Re's patented Geomorph Approach using the Swiss Topo 25m terrain data http://www.bafu.admin.ch/naturgefahren/01916/06598/06600/index.html?lang=en
- FEMA's NFHL flood zones provided by FEMA https://www.fema.gov/flood-maps/national-flood-hazard-layer
- *Global Water Body Data:* EC JRC/Google: Jean-Francois Pekel, Andrew Cottam, Noel Gorelick, Alan S. Belward, High-resolution mapping of global surface water and its long-term changes. Nature 540, 418-422 (2016). (doi :10.10 38/ nature20 58

Result:
Official River Flood Zones

Risk grades:

- 10 years
- 20 years
- 30 years
- 50 years
- 100 years
- 200 years
- 250 years
- 500 years
- >500 years
- No Data

Low risks: No data, > 500 years, 500 years
Medium risks: 250 years, 200 years, 100 years
High risks: 50 years, 30 years, 20 years, 10 years

Storm Surge - Return Period

No risk data

Swiss Re's Global Storm Surge Zones provide information about the frequency of flooding due to storm surge from the ocean. The zones are available worldwide (from 60°S to 60°N) and cover all the ocean coastlines (except for the Black Sea and the Caspian Sea)

Sources:

- Intermap 30m digital terrain model
- C-GLORS Global Ocean Reanalysis. using E.U. Copernicus Marine Service Information
- Global Water Occurrence Layer (Jean-Francois Pekel, Andrew Cottam. Noel Gorelick, Alan S. Belward
- High-resolution mapping of global surface water and its long-term changes. Nature 540, 418-422 (2016). (doi:10.1038/nature20584))

Result:
Return period

Risk grades:
- 50 years
- 100 years
- 250 years
- 500 years
- 1000 years
- No data

Low risks: No data, 1000 years, 500 years
Medium risks: 250 years, 100 years
High risks: 50 years

Tsunami - Return Period

No risk data

Calculated Swiss Re tsunami hazard zones in CatNet® are available for all countries in the pacific basin on a 30 meter resolution, reflecting the Tsunami hazard in a near-global consistent manner.

Sources:

- Swiss Re proprietary models; NCTR Propagation Database by the NOAA Center for Tsunami Research https://nctr.pmel.noaa.gov/propagation-database.html
- Historic earthquake catalogues (NEIC, Centennial); Swiss Re global 30 m resolution digital elevation model and the Global Surface Water dataset (Jean-Francois Pekel, 2016)

Result:
Tsunami return period

Risk grades:
- 500 years
- 1000 years
- 2500 years
- 5000 years
- 10000 years
- No data

Low risks: No data, 10000 years, 5000 years
Medium risks: 2500 years, 1000 years
High risks: 500 years

Volcano

No risk data

The global map shows the volcanic hazard, represented as the local ash thickness around volcanoes (150km) from a major eruption with a return period of 475y.

Sources:

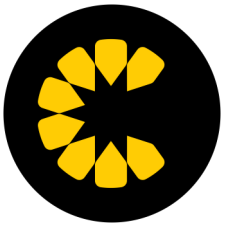
- Swiss Re proprietary models
- Global Volcanism Program (http://volcano.si.edu/)
- Wind: 20 Century Reanalysis Project/NOAA (https://psl.noaa.gov/data/20thC_Rean/)

Result:
Return Period 475y

Risk grades:

- Extreme (> 100cm)
- Very high (50 - 100 cm)
- Very high (40 - 50 cm)
- High (30 - 40 cm)
- High (20 - 30 cm)
- Significant (10 - 20 cm)
- Moderate (5 - 10 cm)
- Moderate (2 - 5 cm)
- Low (1 - 2 cm)
- Low (0.1 - 1 cm)

Low risks: Low (0.1 - 1 cm), Low (1 - 2 cm)
Medium risks: Moderate (2 - 5 cm), Moderate (5 - 10 cm), Significant (10 - 20 cm)
High risks: High (20 - 30 cm), High (30 - 40 cm), Very high (40 - 50 cm), Very high (50 - 100 cm), Extreme (> 100cm)



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