

# RMS Europe Inland Flood HD Models

A Comprehensive and High Resolution Solution Across Fifteen European Countries



## KEY FEATURES AND BENEFITS

- Largest single Europe-wide event set on the market, covering 15 countries and 8,289 catchments (clients can license one or more countries, depending on interest)
- Models represent 50,000 years of simulation and over 800,000 events
- High-resolution flood maps (5 meters everywhere)
- Exposure disaggregation increases the accuracy of results for portfolios with low geocoding resolution

### Continuous precipitation-rainfall-runoff model enables modeling of:

- Antecedent conditions
- Seasonality and event clustering
- Spatial correlation across borders
- Snowmelt-driven flooding
- All sources of inland flooding

### Defenses modeled across the domain:

- Database a mixture of third-party and proprietary defense data
- Accounts for temporary defenses
- Stochastic defense failure included
- Supports user-defined defense assumptions

Flood is one of the most significant natural hazards affecting the (re)insurance industry in Europe, occurring almost anywhere and ranging from localized events to massive floods across multiple countries. RMS Europe Inland Flood HD Models offer a complete and consistent solution for use throughout an organization, developed using the latest RMS high-definition simulation methodology to provide detailed evaluation of flood risk. Simulating losses along realistic timelines, the models provide a comprehensive range of exposure resolutions extending from individual locations up to Pan-European portfolios, for underwriting individual risks and portfolio, reinsurance, and capital management.

### Single Europe-Wide Event Set

The RMS Europe Inland Flood HD Models offer the largest single Europe-wide event set available on the market, covering 18 river basins and 8,289 catchments over 15 countries. Twenty-five percent of observed Europe flood events, especially larger events, impact more than one country, and RMS research shows that floods simultaneously affecting at least three European countries accounts for 99 percent of tail risk\* across Europe.

Without modeling the correlation and diversification of a risk across both basins and countries, portfolio accumulations, reinsurance capacity, and capital requirements will be incorrectly estimated with a risk to large accounts. A continuous precipitation-rainfall-runoff model simulates more than 800,000 individual events, collectively representing 50,000 years of simulation. This both explicitly represents both antecedent conditions, and models risk from all sources of inland flooding, whether from permanent river systems (fluvial), surface water (pluvial), snowmelt, or groundwater.

### Market-Leading Resolution

Recognizing the localized nature of flood risk, the RMS Europe Inland Flood HD Models offer location-level "Quad-Key" simulation with stochastic disaggregation to resolve lower-resolution exposure data. The stochastic models are complemented by high-resolution hazard map data for underwriting, at a market-leading resolution of five meters across continental Europe and two meters in the U.K.

## FEATURES CONTINUED

### Component-based vulnerability:

- 300+ country-specific vulnerability curves
- 13 secondary modifiers
- Enhanced secondary uncertainty enables realistic claims distributions
- Industrial Facilities Model (IFM) supplements vulnerability module

### All lines of business and coverages are modeled, including:

- Residential, commercial, industrial, agricultural, and motor lines
- Building, contents, and business interruption coverages
- Ability to model Post-event Loss Amplification (PLA) explicitly

### New HD financial model includes:

- All financial perspectives
- Bespoke hours clauses and other time-dependent terms
- Model extensively validated against both component and loss datasets

### Countries Covered:

Austria, Belgium, Czech Republic, France, Germany, Hungary, Italy, Liechtenstein, Luxembourg, Monaco, Poland, Republic of Ireland, Slovakia, Switzerland, and the U.K. including Northern Ireland and the Channel Islands

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RMS is the world's leading catastrophe risk modeling company. From earthquakes, hurricanes, and flood to terrorism, agriculture, and infectious diseases, RMS helps financial institutions and public agencies understand, quantify, and manage risk.

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Localized flood defenses ensure more than 25 percent of exposure is well defended within the 1-in-100-year natural (undefended) floodplain, presenting underwriting opportunities without significantly increasing risk. The models use comprehensive, up-to-date regional defense databases to define the Standards of Protection (SoP) for both temporary and permanent defenses, and probabilistically consider defense failure. SoP can be overridden anywhere in the model to incorporate local expertise and tailor a view of risk.

The RMS vulnerability model represents more than 300 primary risk classifications, as flood vulnerability varies significantly from property to property. Combining these classes with flood-specific secondary risk characteristics, such as basement information, the model represents millions of possible vulnerability combinations to authentically represent each risk's characteristics. An ancillary Industrial Facilities Model provides accurate coding for specialized industrial lines exposure.

### Time-Based Modeling

Around 10 percent of observed Europe flood events last more than four weeks, and RMS research shows longer events contribute to about 75 percent of European tail risk\*. Flood risk accumulation in Europe is very sensitive to the temporal definitions of coverage and loss. Combined with an enhanced financial model, the models provide flexibility to define hours clause length for treaties, perform sensitivity testing, and understand the impact of hours clause length, along with the effect of other time-based conditions such as aggregate terms, upon losses.

The RMS HD-modeling approach also includes continuous temporal simulation, which provides a physical basis for capturing antecedent conditions, clustering, and seasonality, to accurately determine the tail risk, and perform capital requirement calculations and reinsurance-based decision-making.

### A Consistent Approach

RMS Europe Inland Flood Maps and Peril Rating Databases (PRDs) uniquely use the same methodology as the probabilistic models. Many insurers currently access flood data from disparate sources, methods, and models for policy-level underwriting and pricing. Using RMS data products for underwriting and pricing and RMS stochastic models for portfolio, reinsurance, and solvency management, ensures consistent, confident delivery of a desired flood business strategy in Europe.

### High-Quality Calibration

With over 15 years of flood modeling experience, RMS calibrates and validates every model component individually, enabling RMS to create consistent derivative data products such as the hazard maps that complement the models. Extensive, well-established quality assurance and product acceptance testing for each component establishes consistency between model components and overall losses, with full transparency providing confidence in the validity of the model results.

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