



PERILS

Excellence in Insurance
Industry Benchmarks

PERILS – Increased Data Availability for Better Flood Risk Management

- Prepared for
- Thailand General Insurance Association
- Prepared by
- PERILS, 5 November 2018

Agenda

1. Introduction of PERILS
2. Benefits of PERILS Data
 - i. Benefits for Risk Transfer
 - ii. Benefits for Risk Assessment
 - iii. Benefits for Claims and Exposure Benchmarking
3. Conclusion

Introduction of PERILS

PERILS Team



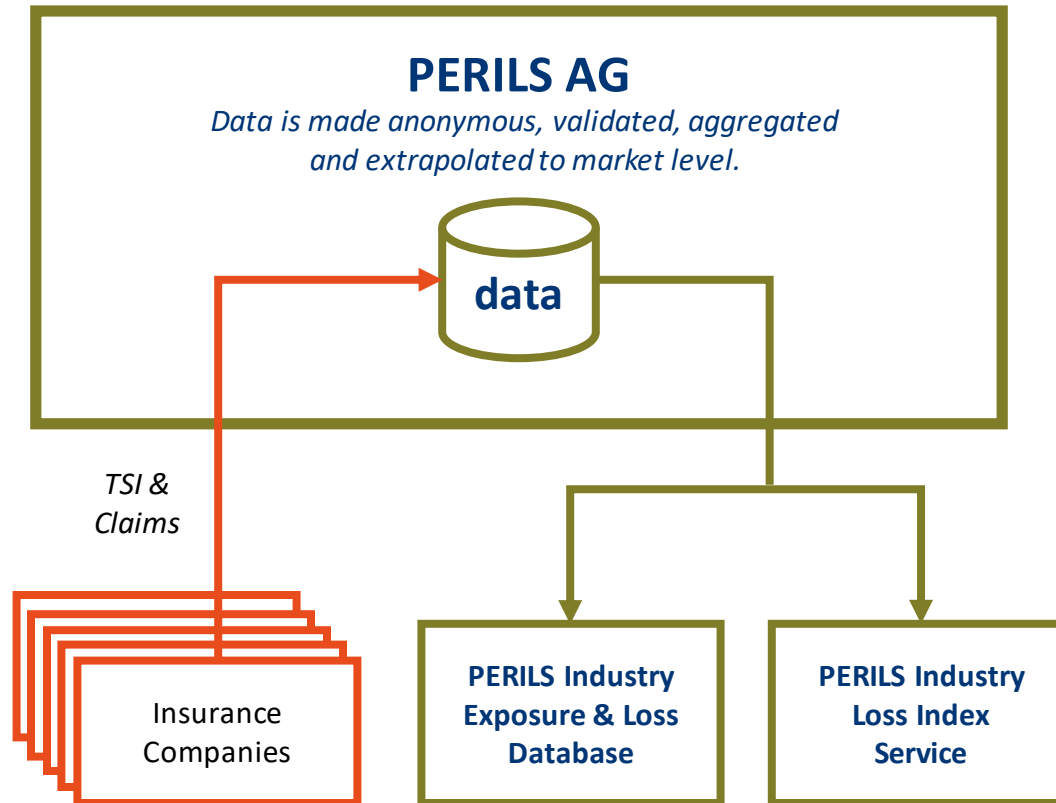
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- ▶ Incorporated in January 2009 in Zurich, Switzerland
 - ▶ 10 re/insurers with 10% share each
 - ▶ Not-for-profit
- ▶ PERILS mission
 - ▶ Improve Cat risk assessment
 - ▶ Facilitate industry-loss-based risk transfer

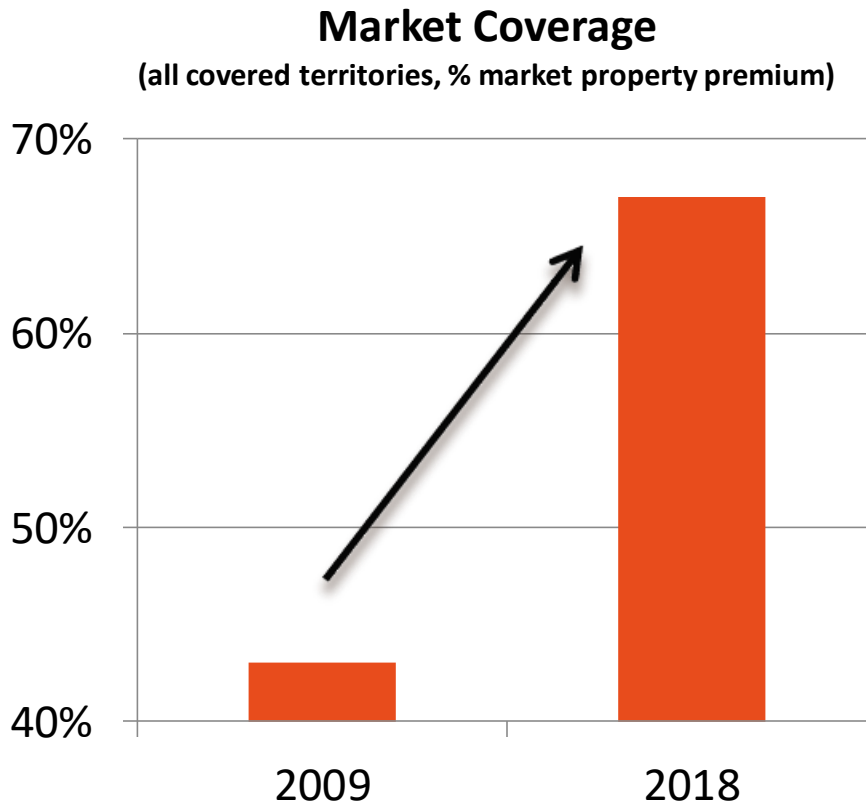
**For the Industry
By the Industry**

Independent Data Aggregator & Reporting Agency



PERILS is an independent reporting agency providing industry-wide catastrophe insurance data. PERILS was incorporated in January 2009 in Zurich, Switzerland, on the initiative of the CRO Forum. Shareholders, each with equal share, include Allianz SE, AXA, Assicurazioni Generali, Groupama, Guy Carpenter, Insurance Australia Group, Munich Re, Partner Re, Swiss Re, and Zurich Insurance Group. PERILS' purpose is to add transparency to the natural catastrophe risk landscape thereby increasing the liquidity and stability of the Nat Cat insurance market. For more info, please visit WWW.PERILS.ORG.

9 Years of PERILS – 9 Years of Increasing Industry Support



- ▶ Since 9 years
- ▶ Market support grew significantly over time
- ▶ Today 150+ insurance companies contractually agree to provide data
- ▶ PERILS continues to gain new data providing companies further increasing market coverage

PERILS Covers 16 Countries

▶ Australia



▶ Austria



▶ Belgium



▶ Canada



▶ Denmark



▶ **France**



▶ Germany



▶ Ireland



▶ Italy



▶ Luxembourg



▶ Netherlands



▶ Norway



▶ Sweden



▶ Switzerland



▶ Turkey



▶ United Kingdom



Thailand in the future ?

PERILS - Flood Exposure (TSI) Database

Aggregate Exposure Data - Flood United Kingdom - in National Currency - CRESTA Format

Agricultural and Industrial are included in COMMERCIAL							Total Sum Insured per Coverage		
Peril	Country	CRESTA ID	CRESTA Description	Occupancy Type	Currency	Number of Risks	Buildings Value	Contents Value	BI Value
FLXX	GBR	GBR_B	Birmingham	COMMERCIAL	GBP	112'961	56'020'952'364	16'333'373'761	25'555'939'096
FLXX	GBR	GBR_B	Birmingham	RESIDENTIAL	GBP	1'117'285	93'145'036'943	19'830'522'554	3'545'451'758
FLXX	GBR	GBR_E	London E	COMMERCIAL	GBP	59'698	48'589'524'166	7'659'711'004	9'932'019'393
FLXX	GBR	GBR_E	London E	RESIDENTIAL	GBP	507'692	52'488'382'296	4'977'281'644	1'922'507'237
FLXX	GBR	GBR_G	Glasgow	COMMERCIAL	GBP	95'417	42'768'005'526	9'335'193'089	13'652'862'867
FLXX	GBR	GBR_G	Glasgow	RESIDENTIAL	GBP	711'063	62'646'525'402	11'333'702'466	1'588'706'747
FLXX	GBR	GBR_L	Liverpool	COMMERCIAL	GBP	56'998	30'203'738'932	6'467'961'775	9'880'196'141
FLXX	GBR	GBR_L	Liverpool	RESIDENTIAL	GBP	492'828	43'418'980'138	7'622'262'286	1'332'680'527
FLXX	GBR	GBR_M	Manchester	COMMERCIAL	GBP	56'562	38'422'506'436	8'415'782'730	14'473'543'148
FLXX	GBR	GBR_M	Manchester	RESIDENTIAL	GBP	709'803	62'186'708'622	9'560'141'921	2'324'906'609
FLXX	GBR	GBR_N	London N	COMMERCIAL	GBP	49'715	29'101'294'512	5'495'090'065	6'218'970'794
FLXX	GBR	GBR_N	London N	RESIDENTIAL	GBP	357'669	45'554'911'956	5'185'324'512	2'388'858'283
FLXX	GBR	GBR_S	Sheffield	COMMERCIAL	GBP	87'919	39'885'413'860	13'064'160'620	17'754'900'118
FLXX	GBR	GBR_S	Sheffield	RESIDENTIAL	GBP	834'341	69'626'490'193	14'528'284'558	2'425'414'031

► Market Sums Insured covering Flood

- Australia, Canada, Italy, Turkey, United Kingdom

PERILS - Flood Event Loss Database

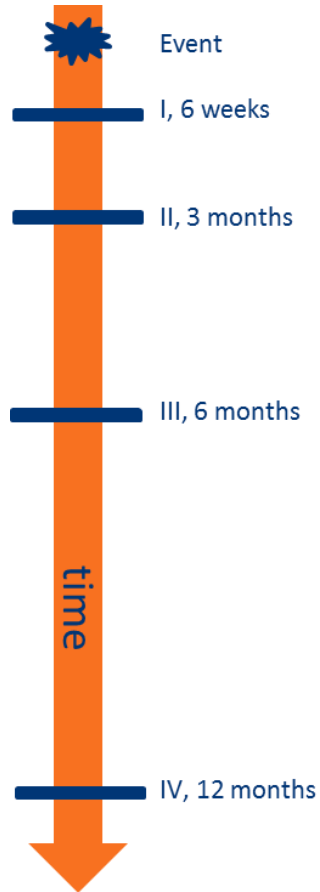
UK Floods "Desmond" - Aggregate Data National Currencies - 4th and final Report

Peril	Country	CRESTA ID	Occupancy Type	Currency	Number of Losses	Loss	Damage % TSI	Affected Risks (%)	Avg Loss
FLXX	GBR	GBR_B	COMMERCIAL	GBP	0	0	0.000000%	0.000000%	0
FLXX	GBR	GBR_B	RESIDENTIAL	GBP	24	241'859	0.000208%	0.002148%	10'077
FLXX	GBR	GBR_E	COMMERCIAL	GBP	0	0	0.000000%	0.000000%	0
FLXX	GBR	GBR_E	RESIDENTIAL	GBP	0	0	0.000000%	0.000000%	0
FLXX	GBR	GBR_G	COMMERCIAL	GBP	107	41'031'235	0.062399%	0.112139%	383'469
FLXX	GBR	GBR_G	RESIDENTIAL	GBP	74	730'657	0.000967%	0.010407%	9'874
FLXX	GBR	GBR_L	COMMERCIAL	GBP	77	8'676'206	0.018638%	0.135092%	112'678
FLXX	GBR	GBR_L	RESIDENTIAL	GBP	46	495'833	0.000947%	0.009334%	10'779
FLXX	GBR	GBR_M	COMMERCIAL	GBP	13	188'041	0.000307%	0.022983%	14'465
FLXX	GBR	GBR_M	RESIDENTIAL	GBP	29	457'296	0.000617%	0.004086%	15'769
FLXX	GBR	GBR_N	COMMERCIAL	GBP	0	0	0.000000%	0.000000%	0
FLXX	GBR	GBR_N	RESIDENTIAL	GBP	0	0	0.000000%	0.000000%	0
FLXX	GBR	GBR_S	COMMERCIAL	GBP	7	2'577	0.000004%	0.007962%	368
FLXX	GBR	GBR_S	RESIDENTIAL	GBP	27	338'360	0.000391%	0.003236%	12'532
FLXX	GBR	GBR_W	COMMERCIAL	GBP	0	0	0.000000%	0.000000%	0

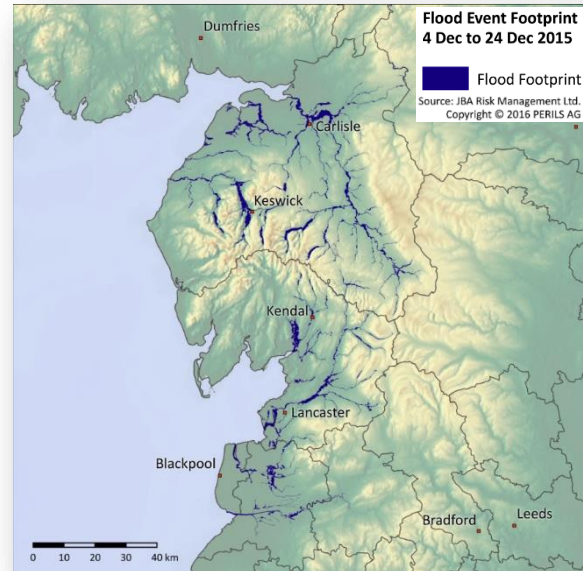
► Market Event Losses caused by Flood

- Australia, Canada, Italy, Turkey, United Kingdom

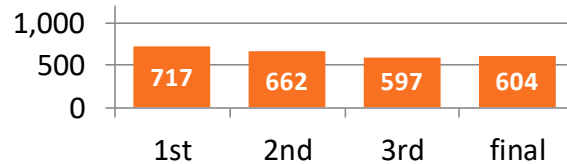
PERILS Reporting Schedule



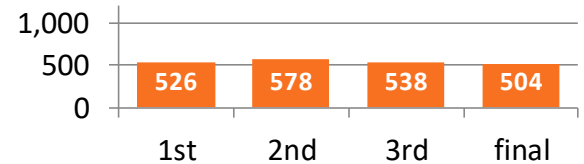
Flood Footprint for “Desmond”, Dec 2015



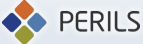
UK Floods “Desmond” GBP m

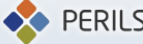


UK Floods “Eva-Frank” GBP m



All Data Available on PERILS Portal

 PERILS

 PERILS

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Subscription | [Secure File Transfer](#)

Choose User Type

☒ Subscriber
☐ Data Provider

Subscriber Login

Username

Password

[Login](#)

Subscription> Industry Loss

[Industry Exposure](#) >

[Industry Loss](#) >

[User Administration](#) >

PERILS Industry Loss Database

Your current database subscriptions (bold):

- ◆ Bushfire: **Australia**
- ◆ Earthquake: **Australia, Italy, Turkey**
- ◆ Flood: **Australia, Italy, Turkey, United Kingdom**
- ◆ Hailstorm: **Australia**
- ◆ Tropical Cyclone: **Australia**
- ◆ Windstorm: **Austria, Belgium, Denmark, France, Germany, Ireland, Luxembourg, Netherlands, Norway, Sweden, Switzerland, United Kingdom**

Publications:

► **Earthquake**

▼ **Windstorm**

► Mike-Niklas	Event Start Date: 2015-03-29
► Elon-Felix	Event Start Date: 2015-01-08
► Tini (Darwin)	Event Start Date: 2014-02-12
► Dirk	Event Start Date: 2013-12-23
► Xaver	Event Start Date: 2013-12-05
► Christian	Event Start Date: 2013-10-27
► Andrea	Event Start Date: 2012-01-04
► Joachim	Event Start Date: 2011-12-15
► Xynthia	Event Start Date: 2010-02-28
► Klaus	Event Start Date: 2009-01-24
► Kyrill	Event Start Date: 2007-01-18
► Jeanett	Event Start Date: 2002-10-26
► Martin	Event Start Date: 1999-12-27
► Lothar	Event Start Date: 1999-12-26
► Anatol	Event Start Date: 1999-12-03

**Free access for data
providing companies**
(others pay = reinsurers, brokers,
modelers, ILS funds)

What is PERILS good for?

Industry-Loss based Risk Transfer

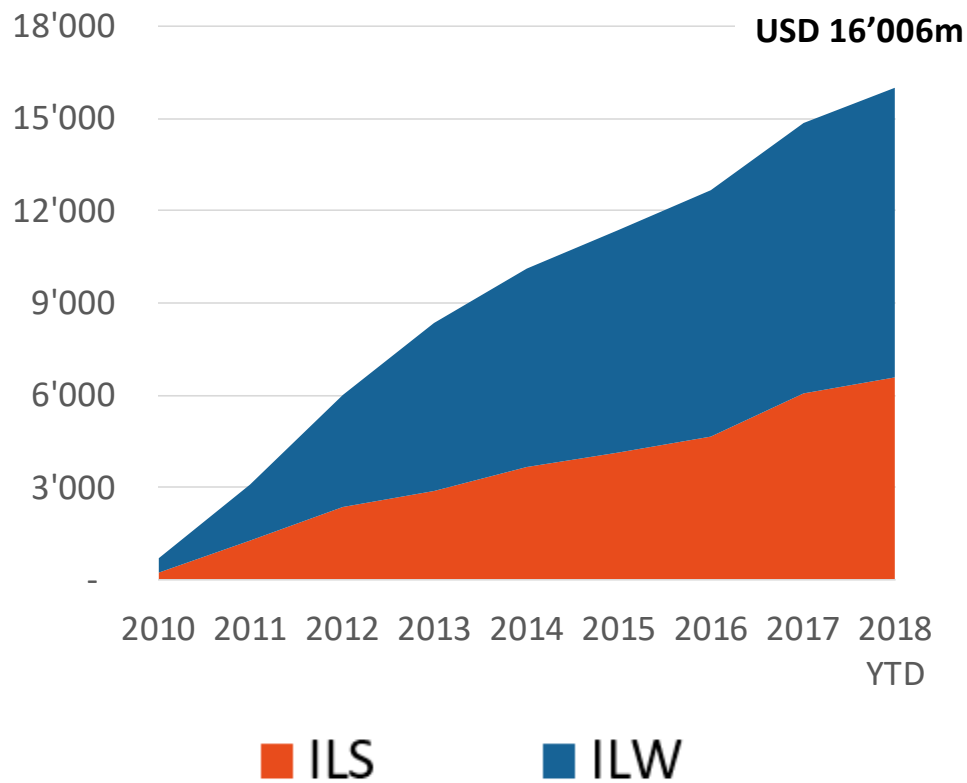
Industry Loss-Based Risk Transfer

- ▶ PERILS industry loss data are used as triggers for industry-loss-based risk transfer products
- ▶ Used in industry-loss-based
 - ▶ Cat Bonds (144A ILS), Industry Loss Warranty (ILW), Collateralized R/I, Risk Swaps
- ▶ Mostly used in retrocession
- ▶ **PERILS data is increasing the supply of risk capital for managing Cat risk**

PERILS Data facilitate additional Cat capacity

PERILS-based limits

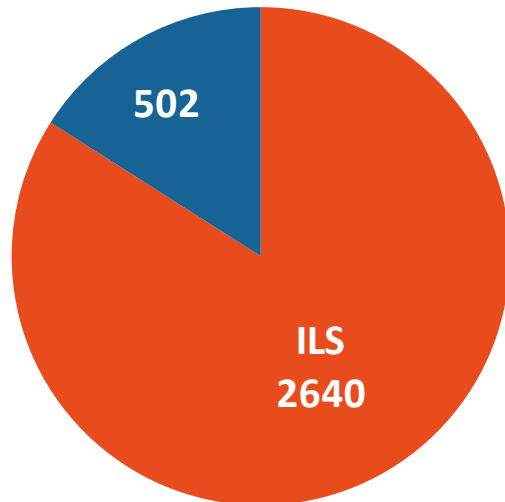
total issued 1 Jan 2010 to 30 Jun 2018, in USD m



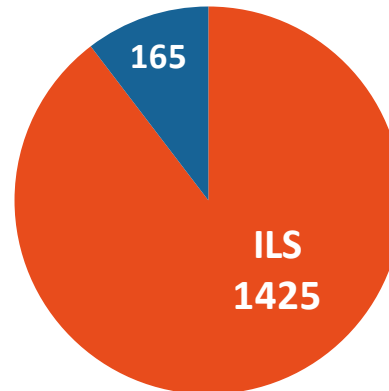
- ▶ PERILS acts as a Reporting Agency for industry-loss-based risk transfer
- ▶ Total of USD 16bn of PERILS-based limits up to today
- ▶ More than 250 transactions
 - ▶ Mostly structured triggers
 - ▶ Mostly retrocession

PERILS-Based Limits at Risk per 30 June 2018

WS Europe
USD 3'142m



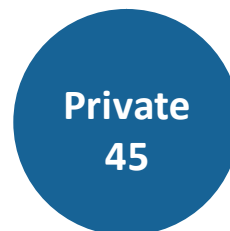
ANP Australia
USD 1'590m



EQ Turkey
USD 75m



ANP Canada
USD 45m



**PERILS Data
facilitate
additional
Cat capacity**

What is PERILS good for?

Risk Assessment

Reality Check – Rumours vs. Facts

Rumours in the Insurance Press: USD 1.8 bn (!)

BREAKING NEWS ALERT

Ophelia batters Ireland with hurricane-force winds

Ted Bunker

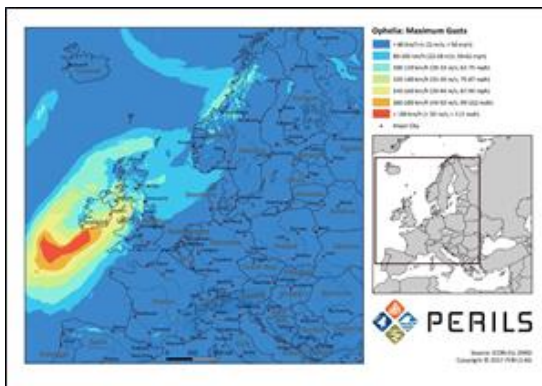
Follow
us:

The Atlantic season's latest hurricane, Ophelia, produced \$1.8bn (EUR1.5bn) in damage and disruption in Ireland, where the storm made landfall Monday as the most powerful wind event since Hurricane Debbie hit the republic in 1961.

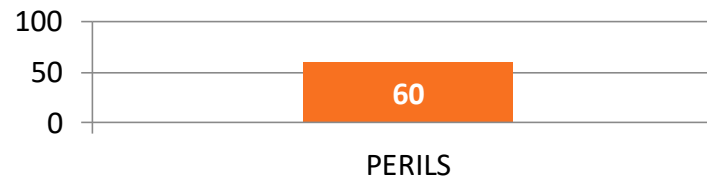
Storm Ophelia losses could be as much as \$1.8 billion: Reports

by ARTEMIS on OCTOBER 17, 2017

Reality: EUR 60 m



ETC "Ophelia" (16 Oct 2017) EUR m



Cat Risk Model Validation



vs.

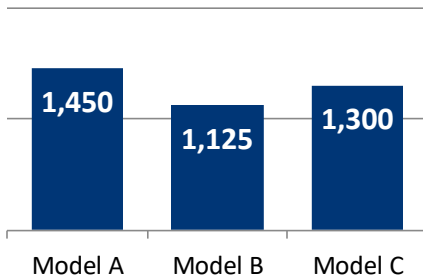


Model World

Real World

- ▶ Improve reliability of Cat models by testing modelled data with real data -> model validation
- ▶ Adjust models according to real experience -> model calibration
- ▶ **Increased data availability will lead to more realistic and robust risk assessment over time**

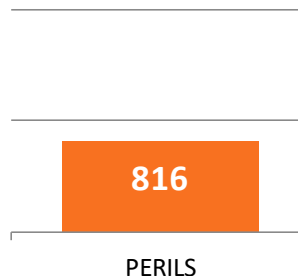
Windstorm Mike-Niklas



Modelled Loss

vs.

Windstorm Mike-Niklas



PERILS Loss

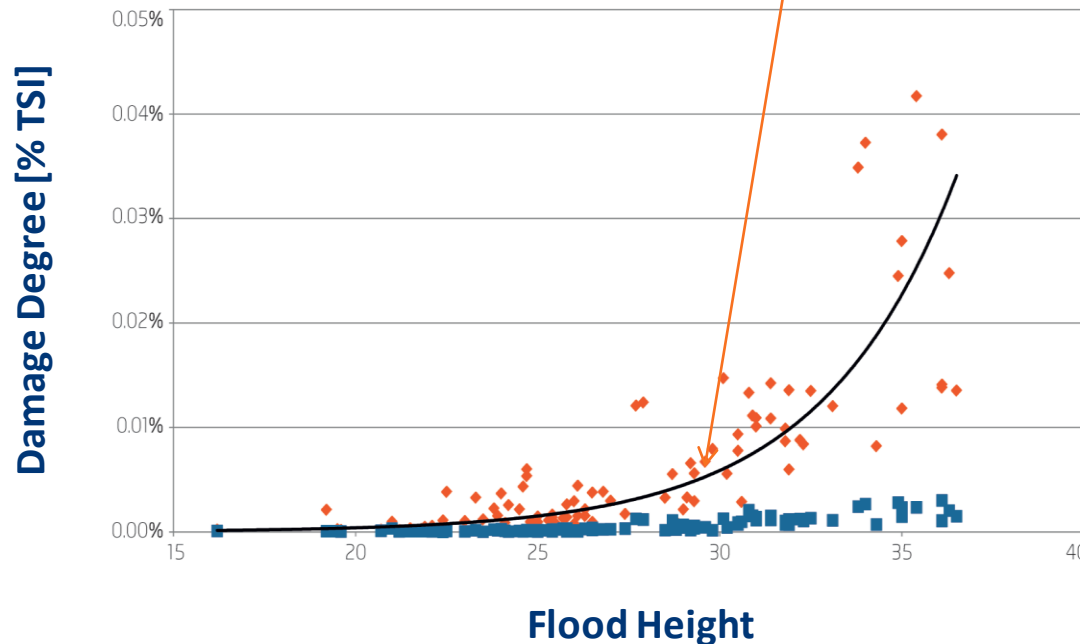
Flood Intensities in PERILS Loss Reporting

- ▶ PERILS includes physical intensity measures in its loss reports
- ▶ Intensity measures are independent from losses and allow for vulnerability analysis -> damage degrees vs. flood intensity measure
- ▶ JBA acts as source of flood intensity measures since 2014

UK Floods "Desmond" - Aggregate Data National Currencies - 4th and final Report										
CRESTA ID	Occupancy Type	Currency	Number of Losses	All Loss	JBA - % Flooded of Built-Up Area	JBA - Avg Water Depth in Built-Up Area [m]	Max Avg Gauge Height above 5% Level [m]	All MDR (%)	Affected Risks (%)	Avg Loss
GBR_B	COMMERCIAL	GBP	0	0	n/a	n/a	0.2316	0.000000%	0.000000%	0
GBR_B	RESIDENTIAL	GBP	24	241,859	n/a	n/a	0.2316	0.000208%	0.002148%	10,077
GBR_BB	COMMERCIAL	GBP	20	622,087	0.0038%	0.0002	0.8658	0.002587%	0.050281%	31,104
GBR_BB	RESIDENTIAL	GBP	40	853,613	0.0038%	0.0002	0.8658	0.002695%	0.013326%	21,340
GBR_BD	COMMERCIAL	GBP	20	353,534	n/a	n/a	0.7705	0.001239%	0.039879%	17,677
GBR_BD	RESIDENTIAL	GBP	49	1,062,772	n/a	n/a	0.7705	0.002906%	0.013885%	21,689
GBR_BH	COMMERCIAL	GBP	0	0	n/a	n/a	0.0313	0.000000%	0.000000%	0
GBR_BH	RESIDENTIAL	GBP	4	263,337	n/a	n/a	0.0313	0.000724%	0.001360%	65,834
GBR_BL	COMMERCIAL	GBP	8	127,975	n/a	n/a	0.3708	0.000700%	0.015735%	15,997
GBR_BL	RESIDENTIAL	GBP	20	387,284	n/a	n/a	0.3708	0.001665%	0.008976%	19,364
GBR_BN	COMMERCIAL	GBP	3	298,683	n/a	n/a	0.0758	0.000739%	0.005996%	99,561
GBR_BN	RESIDENTIAL	GBP	5	64,581	n/a	n/a	0.0758	0.000126%	0.001226%	12,916

Vulnerability = Damage Ratio vs. Flood Intensity

				Damage Degree	Flood Height
Loss	TSI				
100	/	1'000'000	=	0.01% of TSI	3m



- ▶ Link between flood intensity and damage degrees
 - ▶ Derived from PERILS event loss and TSI data
 - ▶ Loss Divided by Sum Insured = Damage Degree
 - ▶ Link to flood intensity measures = **vulnerability functions**

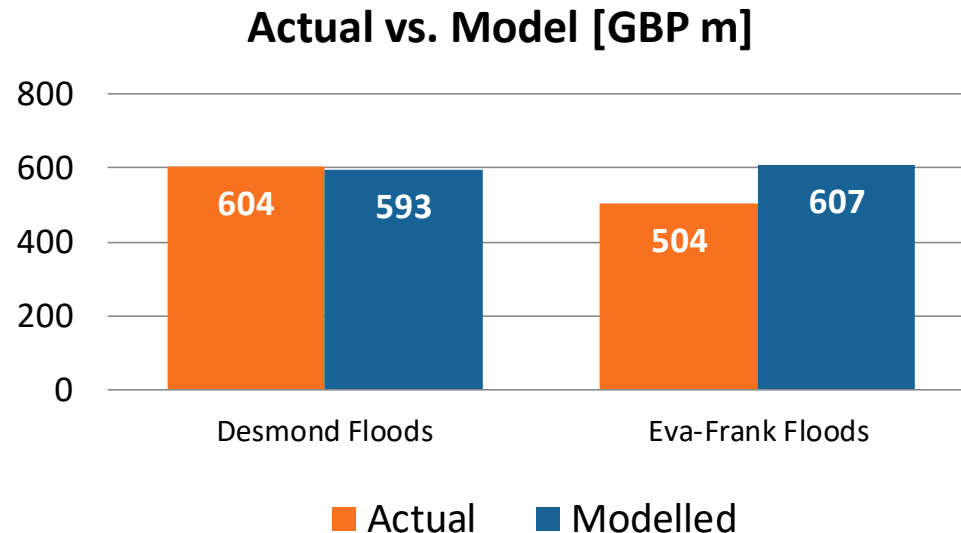
Flood scenario loss model

Postcode	Flood Height	Damage Degree (% TSI)	TSI	Loss
GBR_B	3 m	0.05%	10'000	5
GBR_BB	5 m	0.10%	20'000	20
etc.	etc.	etc.	etc.	etc.
Total GBR	-	-	1'500'000	300

- ▶ Build your own loss model using PERILS Data
 - ▶ Flood Height
 - ▶ Mean Damage Ratios (% TSI) from past events
 - ▶ PERILS Industry TSI DB

-> **Scenario Loss Calculation**

Modelled UK Flood Losses based on River Gauges



- ▶ Simple model with good results
- ▶ Anyone can build this by using PERILS Data
- ▶ Gives own, vendor-model-independent view of event losses
 - ▶ e.g. immediately after an event

What is PERILS good for?

Claims and Exposure Benchmarking

Market Benchmarking – Measure your Portfolio

TSI Market Shares



Loss Market Shares



- ▶ TSI and Loss market shares in both maps are with identical colour coding

- ▶ Some zones have clearly lower / higher loss market shares than TSI market shares

Assurances Hypothétiques SA

Market Shares Commercial Property

	Sums Insured	Loss Event A	Loss Event B	Loss Event C
FRA.31	4.5%	6.0%	7.2%	5.9%
FRA.32	2.9%	2.9%	3.0%	2.2%
FRA.33	6.0%	5.5%	6.1%	6.1%
...	...	...	...	...
FRA.64	14.0%	22.5%	24.0%	18.8%
FRA.65	5.4%	5.2%	5.3%	5.4%
FRA.66	3.0%	3.0%	2.5%	3.5%

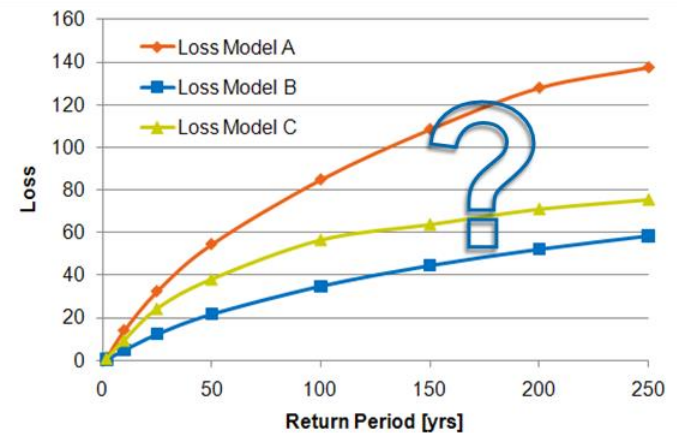
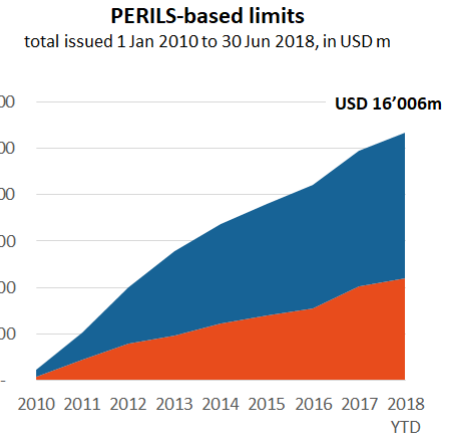
- ▶ Why?
 - ▶ Superior or inferior risks than market average?
 - ▶ Claims adjustment?
 - ▶ Claims fraud?
- ▶ **PERILS Market Data are being used to identify weak and strong spots of a portfolio**

Conclusion

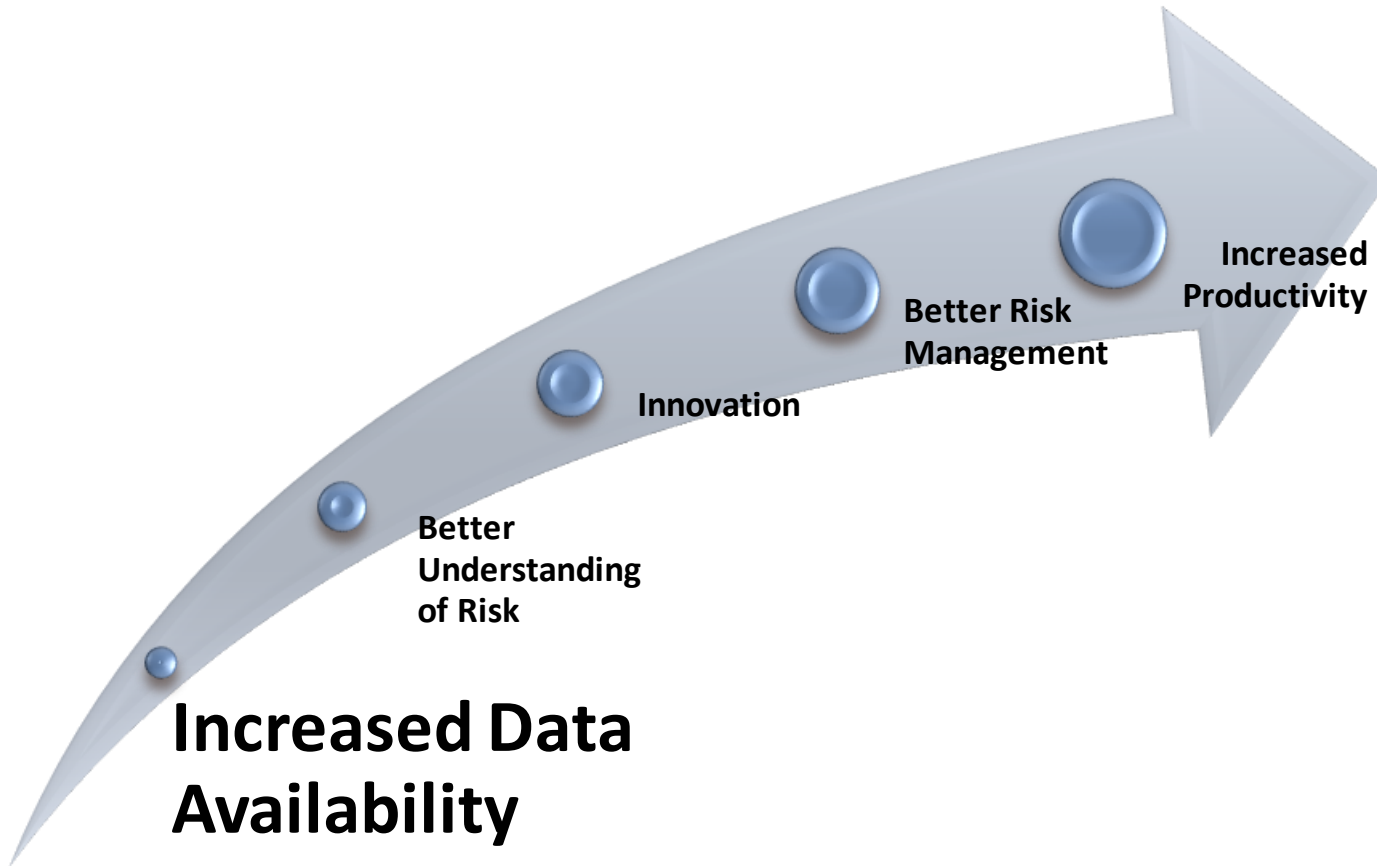
Conclusion

PERILS Data enable additional capacity / higher tradability of Cat risk

PERILS Data enable a more accurate assessment of Cat risk



Conclusion – Solid Data Lead To Increased Productivity



PERILS remains committed to increasing data availability for the insurance industry by working closely with the industry

Outlook



Europe



Australia



Canada



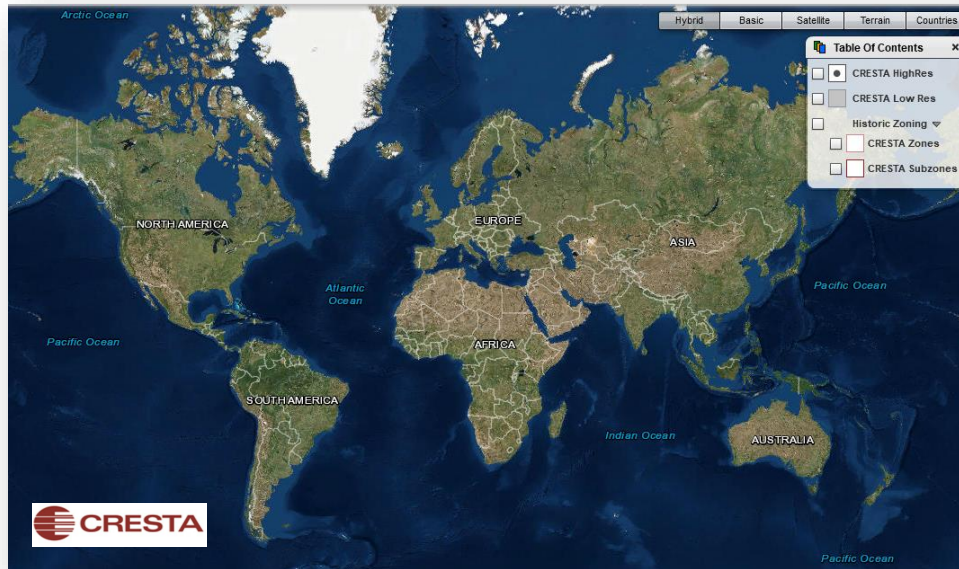
Turkey



One Industry Loss Reporting Agency

Addendum

PERILS = Manager of CRESTA



- ▶ **Standard Risk Accumulation Zones** for the insurance and reinsurance industry
- ▶ **Globally accepted standard** in more than 130 countries
- ▶ Used for data exchange, modelling, risk transfer, accumulation control
- ▶ Sep 2018: PERILS takes over Management of CRESTA from Munich and Swiss Re
- ▶ Future: Engagement with industry to further **develop CRESTA Standard**



Data Standard
=
Less Frictional Costs

NatCatDAX Initiative



**Nanyang Technological University:
Economic
Cat Exposure & Loss Database**

**PERILS:
Insurance Industry
Cat Exposure & Loss Database**

Joint project by Nanyang Technological University (NTU) Singapore and PERILS

NTU Singapore: Economic Exposure and Loss Database

- ▶ Based on all available data such as official statistics, national census, remote sensing, aerial photography, etc.

PERILS: Insurance Industry Exposure (IED) and Loss Database (ILD)

- ▶ Based on data collected from insurance companies

PERILS – Data Source Non-Disclosure

The image shows two pages of a 'Data Provider Agreement' from PERILS. A large red stamp with the word 'CONFIDENTIAL' in white capital letters is placed diagonally across the left page. The left page (Page 1 of 6) contains the following sections: 'DATA PROVIDER AGREEMENT', 'Agreement Parties' (PERILS AG, Merkgasse 3/6, 8001 Zurich, Switzerland), 'Effective Date' (Each Party and together the referred to as the ADDRESSEE), 'Data Provision' (The Data Provider hereby agrees to provide on its behalf data to and pursuant to INPUT DATA), 'Treatment of Input Data' (Upon receipt of input data to the PERILS employee design make a copy of the input data code that does not disclose DATA and destroy the copy source of such input data), and 'Confidentiality' (PERILS hereby agrees that all input data, and any other related information received from or through the Data Provider (CONFIDENTIAL INFORMATION) shall be maintained in strict confidence and PERILS shall not disclose such Confidential Information to third parties). The right page (Page 2 of 6) contains the following sections: 'Data Provider' (strictly confidential information in accordance with the highest standards prevailing in the financial services industry and (ii) shall not use any such Confidential Information in a manner detrimental to the Data Provider), 'PERILS further represents that its employees are aware of and have agreed to do all things necessary to ensure the PERILS comply with its obligations regarding Confidential Information', 'I terminate this Agreement in writing at any point and Confidential Information shall be ongoing (i) survive the termination or expiry of the PERILS records from the Data Provider (ii) the Data Provider does not wish to provide input data to or return to the Data Provider as it may portion of the input data materials received from joint input data from the index), 'ons under this Agreement shall be in writing and ended by hand, or if (3) days after meeting, confirmed mail, return postal requested to the other address or number as each party may be parties', 'B. Provision General Terms and Conditions', and a signature line 'Signed in this day of 200'. Both pages have the PERILS logo at the top and footer information: 'PERILS AG, Merkgasse 3/6, 8001 Zurich, Switzerland' and 'Page 1 of 6' / 'Page 2 of 6'.

- ▶ Company names and company data are not revealed
- ▶ Only 100% Market data are made available (no company data)
- ▶ Non-Disclosure Agreement
- ▶ Can be terminated by data providing company at any time

Cat Bonds (144A ILS) with PERILS as Reporting Agency

Protection Buyer	ILS Name	Limit USD m	Weighting
Swiss Re	Successor X	120	country
Swiss Re	Vega Capital	107	country
AXA	Calypso Capital I	395	CRESTA/LoB
Groupama	Green Fields	99	CRESTA/LoB
Munich Re	Queens Street II	100	country
Argo Re	Loma Capital	100	none
Munich Re	Queens Street III	150	country
AXA	Calypso Capital II	248	CRESTA/LoB
Munich Re	Queen Street IV	100	country
Swiss Re	Successor X	50	country
Amlin	Tramline	150	country
Scor	Atlas VI	67	CRESTA
Swiss Re	Successor X	23	CRESTA/LoB
Munich Re	Queen Street V	75	CRESTA/LoB
Swiss Re	Mythen Ltd.	250	country
Munich Re	Queens Street VI	100	CRESTA/LoB
Hannover Re	Eurus III	131	CRESTA
Munich Re	Queens Street VII	75	CRESTA/LoB
SCOR	Atlas VII	168	CRESTA
Groupama	Green Fields II	370	CRESTA/LoB
AXA	Calypso II - A	250	CRESTA/LoB
AXA	Calypso II - B	223	CRESTA/LoB
Catlin	Galileo Re	300	country
Amlin	TramlineII	200	country
XL Catlin	Galileo Re II	300	country
Munich Re	Queen Street XII	190	CRESTA/LoB
XL Catlin	Galilei Re 2016-1	750	CRESTA/LoB
XL Catlin	Galilei Re 2017-1	525	CRESTA/LoB
Aspen	Kendall Re Ltd	225	CRESTA/LoB
SCOR	Atlas Capital UK	300	CRESTA/LoB

- ▶ All shown ILS transactions use PERILS IED for risk assessment and PERILS event loss for trigger
- ▶ Consistent source and methodology for IED (used for risk assessment) and trigger
- ▶ Majority of PERILS-based bonds used for retrocession purposes

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END