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July 23, 2020

Floyd Yager, Chair  
Florida Commission on Hurricane Loss Projection Methodology  
c/o Donna Sirmons  
Florida State Board of Administration  
1801 Hermitage Boulevard, Suite 100  
Tallahassee, FL 32308

Re: Notification of Type I Error.

Dear Mr. Yager:

We would like to submit for the Commission's consideration an updated model, North Atlantic Hurricane Models 18.1.1 (Build 1945) which contains model changes that may affect the acceptability of our previous model, North Atlantic Hurricane Models 18.1 (Build 1945).

In accordance with the Process for Determining the Acceptability of a Computer Simulation Model, Section VI.F, (**Discovery of Differences in a Model after a Model has been Determined to be Acceptable by the Commission**) in the November 1, 2017 Report of Activities, we have prepared the following forms for the Commission's review. These are provided for the currently accepted model, the proposed updated/revised version of the model software and the comparison between the two versions demonstrating no change.

- Form A-1 (Zero Deductible Personal Residential Loss Costs by ZIP Code)
- Form A-4B (Output Ranges, 2012 FHCF Exposure Data)
- Form A-8 (Probable Maximum Loss for Florida)
- Form S-5 (Average Annual Statewide Loss Costs – Historical versus Modeled)
- Form V-2 (Hurricane Mitigation Measures and Secondary Characteristics, Range of Changes in Damage)

In addition, revised Appendices E and F are also enclosed, which show North Atlantic Hurricane Models 18.1.1 (indicating the revised version) on relevant screens and reports.

The forms have been provided for both the current model and the revised version of the model. A percentage change comparison demonstrates that there is no change in output between the two versions.

#### **Nature of the Software Updates/Revisions**

RMS has determined that the following item, addressed in North Atlantic Hurricane Models 18.1.1 (Build 1945), constitutes a Type I error:

- Geocoding updates introduced in Version 18.1 were not showing in the software. The Prevent Regeocoding feature, which prevents regeocoding of exposures that are already geocoded in the current software release, is preventing the deployment of Version 18.1 geocoding updates. This error was resolved in Version 18.1.1.

- A small percentage (0.05%) of United States locations that are geocoded at the parcel level may show distance shifts between versions 18.0 and 18.1 for the same address. The error was resolved in Version 18.1.1.

### **The Effect to the Underlying Acceptable Model**

Logic within the model has been revised as described in the items above.

### **The Effect on the Model Results**

The forms in the submission (as demonstrated), as well as extensive internal testing, show no difference in Florida model results for both the RiskLink and RiskModeler platforms. It is theoretically possible that conditions may exist that could alter results in specific locations under specific circumstances, as described above. We have not seen any changes or problems, heard of any related to these issues, and do not expect changes in results any time in the future under realistic conditions.

Thank you for your consideration.

Sincerely,

Matthew Nielsen  
[Matthew.Nielsen@rms.com](mailto:Matthew.Nielsen@rms.com)  
510-608-3392 (office)  
510-284-7820 (mobile)



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August 31, 2020

Floyd Yager, Chair  
Florida Commission on Hurricane Loss Projection Methodology  
c/o Donna Sirmons  
Florida State Board of Administration  
1801 Hermitage Boulevard, Suite 100  
Tallahassee, FL 32308

Re: Notification of Type I Error.

Dear Mr. Yager:

RMS has provided the following responses to questions that have arisen from our notification of a Type I error from the RMS version 18.1 submission. Each question is listed with the answer noted in italics in sub-bullets.

1. Evidence that the Type I Error has been corrected for both platforms is required.
  - a. *RMS is currently asking for approval for the RiskLink platform and will ask for the RiskModeler approval under separate cover. The reason for asking for these two approvals separately have to do with the availability of the RMS Hurricane Model on each platform. Neither the version 18.1 nor the 18.1.1 hurricane models have been released on the RiskModeler platform as of August 2020. Plans are to release RiskModeler in September, and RMS will reach out for approval at that time.*
2. Explain the version numbering used with the corrected model. In particular, why is Build 1945 retained? What changes have been made to each platform in light of the reported errors.
  - a. *The version 18.1.1 was a data update and not a change to the logic or code of the core model. These updates fix data input files and do not affect any of the binary files of the model itself. Data updates are tracked by increasing the model version number by an increment of 0.01. The build number only changes when binary files are updated.*
3. Provide Appendices E and F that are missing from the submitted material.
  - a. *Both Appendices are attached to this letter.*
4. Clarify the letter section "Nature of the Software Updates/Revisions" that reports there is one item that is a Type I error, yet two distinct items constituting errors are listed. Explain how these items constitute Type I errors given that a Type I error shall not involve any "additional actions or revisions to the model" per the Report of Activities.

- a. The description of a Type 1 error from page 64 of the ROA from 2017 states: “Type 1: The model is not the exact same model as found acceptable or the submission needs to be revised due to the discovery of inaccuracies or errors, but there are no differences in hurricane loss costs for any five-digit ZIP Code area and there are no differences in hurricane probable maximum loss levels for any return period.”  
RMS has submitted forms that show that there are no changes to the five-digit ZIP Code area loss costs nor to the hurricane probable maximum loss levels at any return period. RMS, therefore, believes that this still constitutes a Type I error. As to the quotation provided from the ROA in the question, the model does not require any additional actions or revisions to the model.*
5. What is the exact meaning of “not showing in the software?” In particular, how is the Prevent Regeocoding a feature if it prevents updates? How and when was the error discovered and resolved?
  - a. Please see response to Question 6.*
6. Further information is needed to verify that the logic within the model has been satisfactorily revised. Basically, a further dive into the model is necessary for verification.
  - a. RMS acquires parcel level information for geocoding in the models. RMS uses an external vendor that provides spatial information and attribute info (location and addresses) for those parcels. The nature of error is that some of those addresses were not of the parcels themselves but the address of the parcel owner. When geocoding, instead of the location being the parcel, it was the parcel owner’s address. The bug was found during the model validation phase but not before it was too late to be included in the version 18.1 release. The fix was compiled and provided to RMS clients as an update shortly after the release.  
RMS has developed an automated tool that will allow us to geocode all domain data and identify the impact of any changes. That tool had not included parcel level data at the time version 18.1 was released but was added for version 18.1.1. RMS now looks at every one of 150 million parcels in the country and 10 million in Florida. The tool identifies any year to year change in location. If we see distance shifts, we will perform further investigations. The issue that was corrected for version 18.1.1 only affected 672 addresses out of 10 million in Florida.  
RMS has also increased the number of external data sources from 1 to 3 and our tool flags any distance shifts in any of the data sets that are more than 100 meters.*
7. The section of the letter “The Effect on the Model Results” is discomfoting. That it is “theoretically possible that conditions may exist that could alter results in specific locations under specific circumstances,” indicates that there is a stability problem in the process. How is this occurrence determined to be absent or alternatively, detected and then flagged to recognize the problem?
  - a. Please see response to Question 6*
8. What is the implication of distance shifts between versions 18.0 and 18.1 given that version 18.1 is the currently accepted model that has been reviewed? What were

the geocoded locations reviewed in version 18.1? If there are distance shifts, why are there no changes in any loss costs? Moreover, what distance shifts are between versions 18.1 and 18.1.1? What is the relevance of corrections from version 18.0 to 18.1 on version 18.1.1?

a. *Loss costs are not affected because they are calculated at a lower level of resolution and do not rely on losses from any individual locations. As described above, the location level shifts were only identified in 672 addresses of the 10 million parcels that exist in Florida. Using postal code level geocoding produces identical results as it does not rely on the location parcel addresses.*

9. Explain the dates associated with the various versions. In particular, the date of version 18.1.1 is October 2019 while the error reported here is July 2020.

a. *The first deployments for 18.1.1 were provided in late October of 2019. The adoption of RiskLink 18.1.1 was slow due to both the timing of the release (prior to the January 1<sup>st</sup> renewals, then going into to the Covid shelter-in-place orders). A series of events caused us delays in submitting version 18.1.1 to the Florida Commission, and we are working on creating a faster and more direct process for preparing future submission to the FCHLPM in the future.*

10. What adjustments have been made to the testing and procedures to mitigate similar errors in the future?

a. *Please see the response to Question 6.*

Please let us know if you have follow up questions.

Thank you for your consideration.

Sincerely,

Matthew Nielsen  
[Matthew.Nielsen@rms.com](mailto:Matthew.Nielsen@rms.com)  
510-608-3392 (office)  
510-284-7820 (mobile)



# Post Import Summary



Friday, April 24, 2020

Version 18.1.1 (Build 1945)

EDM Database : FormA1\_RL181\_Geo\_EDM  
 Portfolio Name : 00 - All Locations  
 Peril : Wind

**Location:**

**Location Coverage Values and Limits :**

Valid	Loc Cov Count	Loc Cov Limits	Loc Cov Values
Yes	19,476	0.00	730,350,000.00
<b>Total</b>	<b>19,476</b>	<b>0.00</b>	<b>730,350,000.00</b>

**Valid Location Coverage Values and Limits :**

Loss Type	Loc Cov Count	Valid Loc Cov Value	Min Value	Max Value	Average Value
Building	9,738	446,325,000.00	5,000.00	100,000.00	45,833.33
Content	4,869	202,875,000.00	25,000.00	50,000.00	41,666.67
BI/ALE	4,869	81,150,000.00	10,000.00	20,000.00	16,666.67
<b>Total</b>	<b>19476</b>	<b>730,350,000.00</b>			

Loss Type	Loc Cov Count	Valid Loc Cov Limit	Min Limit	Max Limit	Average Limit
<b>Total</b>					

**Geocoded Values and Limits :**

Geocoded	Loc Count	Loc Cov Values	Loc Cov Limits
Yes	4,869	730,350,000.00	0.00
<b>Total</b>	<b>4,869</b>	<b>730,350,000.00</b>	<b>0.00</b>

**Site:**

**Site Limits :**

Valid	Loc Count	Site Limits
Yes	4,869	0.00
<b>Total</b>	<b>4,869</b>	<b>0.00</b>

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report.

**Valid Site Limits:**

Min Site Limit	Max Site Limit	Average Site Limit

**Account and Policy:**

**Account :**

Valid	Account Count	Loc Cov Values
Yes	4,869	730,350,000.00
<b>Total</b>	<b>4,869</b>	<b>730,350,000.00</b>

**Policy Coverage Limits :**

Valid	Pol Cov Count	Pol Cov Limits
<b>Total</b>		

**Valid Policy Coverage Limits :**

Loss Type	Valid Policy Cov Limit	Min Limit	Max Limit	AverageLimit
<b>Total</b>				

**Policy Limits :**

Valid	Blanket Limits Count	Blanket Limits
Yes	0	0.00
<b>Total</b>	<b>0</b>	<b>0.00</b>

**Valid Policy Limits :**

Min Blanket Limit	Max Blanket Limit	Average Blanket Limit
0.00	0.00	0.00

**Policy Dates :**

Expired Policy Count

Active Policy Count

**Line of Business:**

Line of Business	Valid Loc Cov Values
<b>Total</b>	

**Construction Class:**

Schema	Class	Valid Loc Cov Values
RMS	Manufactured/Mobile Home with Tie-Downs	146,070,000.00
RMS	MASONRY	292,140,000.00
RMS	WOOD	292,140,000.00
	<b>Total</b>	<b>730,350,000.00</b>

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report.

**Occupancy Class:**

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Schema	Class	Valid Loc Cov Values
ATC	Permanent Dwelling (single family housing)	730,350,000.00
<b>Total</b>		<b>730,350,000.00</b>

**Geocoding Resolution:**

---

Resolution	Location Count	Loc Cov Values
Postcode	4,869	730,350,000.00
<b>Total</b>	<b>4,869</b>	<b>730,350,000.00</b>

**Area :**

---

Country	State/Cresta	Valid Loc Cov Value
US		730,350,000.00
<b>Total</b>		<b>730,350,000.00</b>

**Peril Details (WS) :**

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<u>Distance to Coast (in miles)</u>	<u>Valid Loc Cov Values</u>
>= 0.00 and < 0.00	0.00
>= 0.00 and < 0.00	0.00
>= 0.00 and < 0.00	0.00
>= 0.00 and < 0.00	0.00
>= 0.00 and < 0.00	0.00
>= 0.00 and < 0.00	0.00
>= 0.00	730,350,000.00

---

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report.

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**Aggregate US Windstorm Exposures for Coastal Counties by Geocoding Resolution :**

Category	State	Geocoding Resolution	# of Locations	Location Cov Values
<b>Tier 1</b>	FL	Postcode	3,462	519,300,000.00
		<i>Total</i>	3,462	519,300,000.00
<i>All Tier 1 Counties</i>		Postcode	3,462	519,300,000.00
<b>Total for Tier 1 Counties</b>			3462	519,300,000.00
<b>Tier 2</b>	FL	Postcode	1,239	185,850,000.00
		<i>Total</i>	1,239	185,850,000.00
<i>All Tier 2 Counties</i>		Postcode	1,239	185,850,000.00
<b>Total for Tier 2 Counties</b>			1239	185,850,000.00
<b>Total for Tier 1 and Tier 2 counties</b>				<b>705,150,000.00</b>

**Aggregate US Windstorm Exposures for Coastal Counties by Unknown Building Characteristics :**

Category	State	Building Characteristics	# of Locations	Location Cov Values
<b>Total for Tier 1 and Tier 2 counties</b>				<b>0.00</b>

**Reinsurance :**

**Facultative :**

<b>Location Count</b>
0

<b>Policy Count</b>
0

**Surplus Share Treaty :**

<b>Location Count</b>
0

<b>Policy Count</b>
0

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report.

Friday, April 24, 2020

Version 18.1.1 (Build 1945)

## Analysis Settings:

**Analysis Name (ID) :** 00 - All Locations(1)  
**RDM Database :** RDM\_FormA1\_RL181\_MCERT\_TEST  
**DLM Profile Name :** Form A-1      **Loss Amplification :** Bldg+Cont+BI  
**Analysis Date :** 02/27/2020      **Residual Demand Surge :** Excluded  
**Perils :** Wind Only      **Currency :** US Dollar  
**Region :** North Atlantic (including Hawaii)      **EDM Database :** FormA1\_RL181\_Geo\_EDM  
**Analysis Mode :** Distributed      **Exposure Type :** Portfolio  
**Analysis Type :** Exceedance Probability      **EDM Portfolio :** 00 - All Locations  
**Vulnerability Curves :** Vulnerability - Default  
**Use RiskAssessor Curves :** No  
**Event Rate Set :** RMS 2019 Historical Event Rates  
**Storm Surge assumptions :** None  
    **SFD :** 0.00  
    **Low-Rise MFD and COM :** 0.00  
    **Other :** 0.00  
**Primary modifiers assumed 'Unknown' :** None  
**All secondary modifiers assumed 'Unknown' :** No  
**Scale Factors**  
    **Building :** 1.00  
    **Contents :** 1.00  
    **BI Values :** 1.00  
**'Unknown' deductibles assumed 2% :** No  
**Local defenses ignored :** No  
**All user entered Base Flood Elevation values reset to RMS Default :** No

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report.

**Exposure Data Summary Statistics:**

<b>Average Location Value</b>	:	150,000.00
<b>Average Location Limit</b>	:	0.00
<b>Average Location Deductible</b>	:	0.00

**Exposure Data Detail Statistics:**

<b>CONSTRUCTION QUALITY</b>	<b># Locations</b>	<b>% of Locations</b>	<b>BASEMENT</b>	<b># Locations</b>	<b>% of Locations</b>
0 Unknown	4869	100.00	0 w/ Unknown Flood Protection	4869	100.00
<b>ROOF COVERIN</b>	<b># Locations</b>	<b>% of Locations</b>	<b>ROOF GEOMETRY</b>	<b># Locations</b>	<b>% of Locations</b>
0 Unknown	4869	100.00	0 Unknown	4869	100.00
<b>ROOF ANCHOR</b>	<b># Locations</b>	<b>% of Locations</b>	<b>ROOF AGE</b>	<b># Locations</b>	<b>% of Locations</b>
0 Unknown	4869	100.00	0 Unknown	4869	100.00
<b>ROOF EQUIPMENT HURRICANE BRACING</b>	<b># Locations</b>	<b>% of Locations</b>	<b>FLASHING AND COPING QUALITY</b>	<b># Locations</b>	<b>% of Locations</b>
0 Unknown	4,869.00	100.00	0 Unknown	4,869.00	100.00
<b>COMMERCIAL APPURTENANT STRUCTURES</b>	<b># Locations</b>	<b>% of Locations</b>	<b>CLADDING TYPE</b>	<b># Locations</b>	<b>% of Locations</b>
0 Unknown	4869	100.00	0 Unknown	4869	100.00
<b>ROOF SHEATHING ATTACHMENT</b>	<b># Locations</b>	<b>% of Locations</b>	<b>FRAME-FOUNDATION CONNECTION</b>	<b># Locations</b>	<b>% of Locations</b>
0 Unknown	4869	100.00	0 Unknown	4869	100.00
<b>RESIDENTIAL APPURTENAN STRUCTURES</b>	<b># Locations</b>	<b>% of Locations</b>	<b>MEC./ ELEC. EQPT - GROUND</b>	<b># Locations</b>	<b>% of Locations</b>
0 Unknown	4869	100.00	0 Unknown	4869	100.00

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<b>OPENING PROTECTION</b>	<b># Locations</b>	<b>% of Locations</b>			
0 Unknown	4869	100.00			

  

<b>WS DETAIL VALID FLAG</b>	<b># Locations</b>	<b>% of Locations</b>	<b>ADDRESS MATCH LEVEL</b>	<b># Locations</b>	<b>% of Locations</b>
1 Valid	4869	100.00	5 Postal Code	4869	100.00

  

<b>NUMBER OF BUILDINGS</b>	<b># Locations</b>	<b>% of Locations</b>	<b>NUMBER OF STORIES</b>	<b># Locations</b>	<b>% of Locations</b>
0 Unknown				3246	66.67
1	4869	100.00	1	1623	33.33

  

<b>YEAR BUILT</b>	<b># Locations</b>	<b>% of Locations</b>	<b>LOCATION VALID FLAG</b>	<b># Locations</b>	<b>% of Locations</b>
Unknown	4869	100.00			
			1 Valid	4869	100.00

<b>COVERAGE DAMAGEABILITY GRADE</b>	<b># Locations Coverages</b>	<b>% of Locations Coverages</b>
0 Unknown	14607	75.00
3 Damageable	4869	25.00

#### CONSTRUCTION CLASS

<b>Schema</b>	<b>Class</b>	<b># Locations</b>	<b>% of Locations</b>
RMS	Manufactured/Mobile Home with Tie-Downs	1623	33.33
RMS	MASONRY	1623	33.33
RMS	WOOD	1623	33.33

#### OCCUPANCY TYPE

<b>Schema</b>	<b>Class</b>	<b># Locations</b>	<b>% of Locations</b>
ATC	Permanent Dwelling (single family housing)	4869	100.00

#### SQUARE FOOT BAND

<b>Square Foot Bands</b>	<b># Locations</b>	<b>% of Locations</b>
Unknown	4,869	100.00
< 1506	0	0.00
BETWEEN 1507 AND 2507	0	0.00
BETWEEN 2508 AND 5005	0	0.00
BETWEEN 5006 AND 10010	0	0.00
>10011	0	0.00

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report.



**RMS**<sup>™</sup>

Version 18.1.1 (Build 1945)

**RiskLink** 18.1.1

