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TEN-YEAR RETROSPECTIVE OF THE 2004 AND 2005 ATLANTIC HURRICANE SEASONS

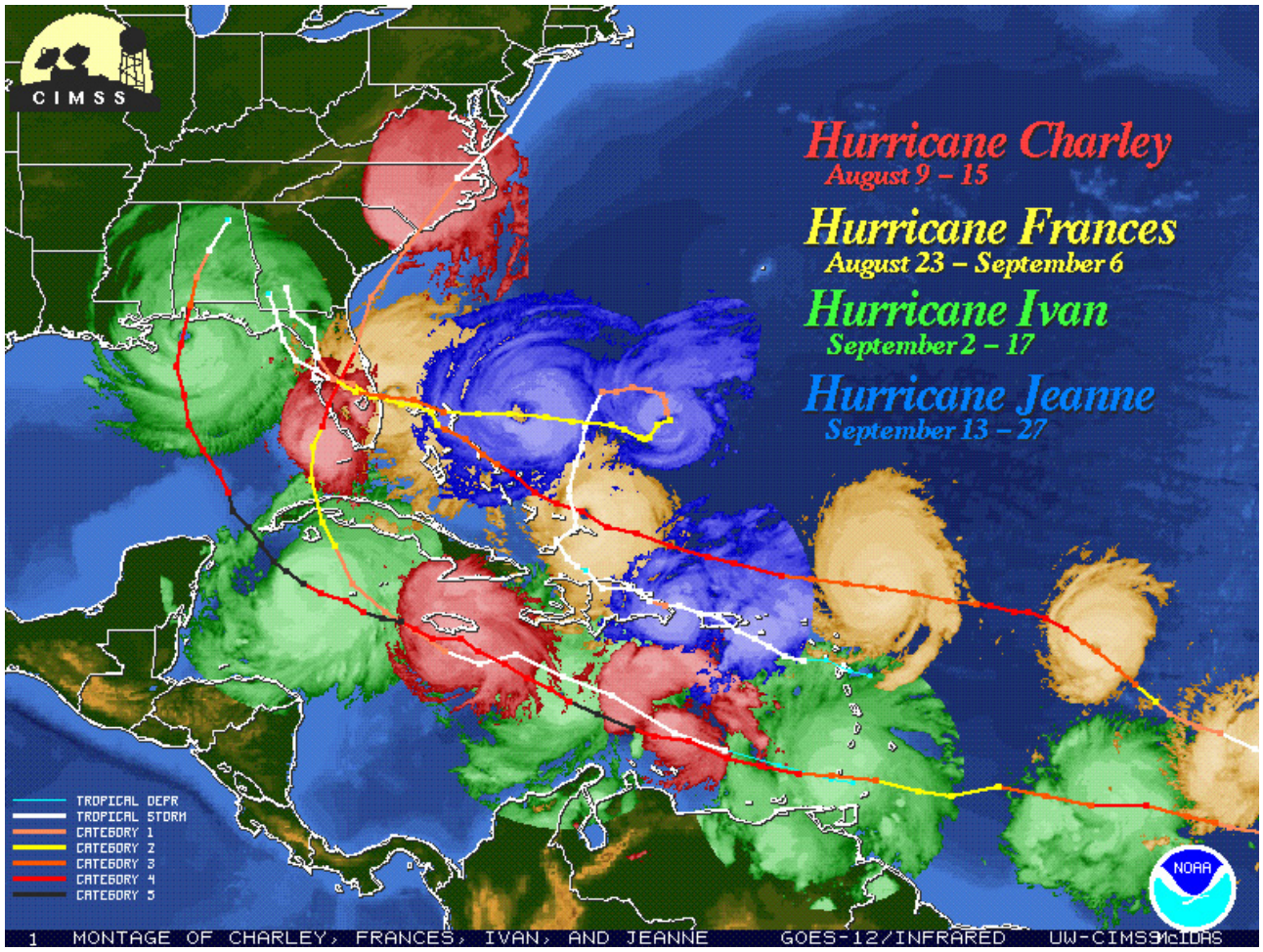
PART 1: THE 2004 SEASON

The 2004 Atlantic hurricane season kicked off on July 31, when the first named storm formed off the coast of the southeastern United States. It was to be the start of two back-to-back seasons that would bring hurricanes to the forefront of discussions in the media, the scientific community, and especially in the insurance/reinsurance industry. Many of the changes to underwriting practice, insurance and reinsurance contract wording, and catastrophe modeling as a result of the 2004 and 2005 hurricane seasons are still in practice today.

This paper will revisit 2004 and 2005, exploring the underlying meteorological conditions that led to these two hurricane seasons and the impacts to the insurance and reinsurance industry, including changes to underwriting practices, claims adjusting practices, insurance and reinsurance contract wording and the Florida Hurricane Cat Fund. In addition, responses from Rating Agency and Catastrophe Model vendors will also be explored.

Part I discusses the 2004 hurricane season and the immediate impacts of that season. Part II, published at a later date, will focus on the 2005 hurricane season and the cumulative impacts on the industry from the combined seasons.

F-1 | MONTAGE OF CHARLEY, FRANCES, IVAN AND JEANNE



(Source: CIMSS)

ATLANTIC HURRICANE SEASON SUMMARY

The 2004 and 2005 hurricane seasons in the North Atlantic Basin were impactful to both residential and commercial property owners, the oil and gas industries, and the (re)insurance industry at large. In many ways these seasons reshaped our understanding of the hurricane threat and our approach to risk management. The historical record prior to 2004 did not show two consecutive hurricane seasons with five landfalls. Following the 2005 season it was speculated that the trend in hurricane landfalls was a result of global warming; however to date the scientific consensus is that there is no discernable long term trend in US hurricane landfalls. Furthermore, only one season since 2005 has shown a higher landfall rate than the long term average. Florida's last landfalling hurricane was in 2005.

T-1 | 2004 ATLANTIC HURRICANE SEASON STATISTICS

No.	Name	Class[a]	Dates[b]	Maximum 1-min Wind (kt)	Minimum Sea Level Pressure (mb)	Direct Deaths	U.S. Damage ($ millions)
1	Alex	H	31 Jul–6 Aug	105	957	1	5
2	Bonnie	T	3–13 Aug	55	1001	3	Minor[C]
3	Charley	H	9–14 Aug	125	941	15	15,000
4	Danielle	H	13–21 Aug	95	964		
5	Earl	T	13–15 Aug	45	1009		
6	Frances	H	25 Aug–8 Sep	125	935	8	8,900
7	Gaston	H	27 Aug–1 Sep	65	985	8	130
8	Hermine	T	27–31 Aug	50	1002		
9	Ivan	H	2–24 Sep	145	910	92	14,200
10	Jeanne	H	13–28 Sep	105	950	3000+	6,900
11	Karl	H	16–24 Sep	125	938		
12	Lisa	H	19 Sep–3 Oct	65	987		
13	Matthew	T	8–10 Oct	40	997		Minor[C]
14	Nicole	ST	10–11 Oct	45	986		
15	Otto	T	29 Nov–3 Dec	45	995		

(Source: NOAA/NWS)

a T = tropical storm and ST = subtropical storm, wind speed 34–63 kt (17–32 m s^{-1}); H = hurricane, wind speed 64 kt (33 m s^{-1}) or higher.
b Dates begin at 0000 UTC and include tropical and subtropical depression stages but exclude extratropical stage.
c Only minor damage was reported, but the extent of the damage was not quantified.

Despite the presence of a weak El Niño, the 2004 hurricane season was one of the most significant in the historical record. The season produced nine hurricanes in the North Atlantic Basin, five of which made US landfall. Four of those five hurricanes rendered severe impacts to the state of Florida. In addition, two storms affected the Mid-Atlantic, one making a close approach to the North Carolina Outer Banks, and another making direct landfall in South Carolina as a minimal hurricane.

Another notable aspect of the 2004 hurricane season was the placement of the Bermuda High (a portion of the subtropical ridge) to the south and west. The steering currents resulting from this average placement were responsible for the similar landfall locations of Frances and Jeanne, the pre-landfall loop of Jeanne, and the track of Ivan through the Gulf of Mexico.

F-2 | TIMELINE OF ATLANTIC STORMS IN 2004

Chart shows storms from Tropical Storm (Category 0) to Hurricane (Categories 1-5). Maximum intensity for each day shown. Days determined by Greenwich Mean Time (Eastern Standard Time +5 hours)

The 2004 season got off to one of the latest starts of the recent past, with the first named storm forming on July 31. Hurricane Alex made a close bypass of the Outer Banks of North Carolina on August 3, with Category 1 sustained winds experienced overland. In addition to wind damage, there was significant storm surge damage and beach erosion in Dare and Hyde Counties. And this was just the beginning.

A mere six days later, Hurricane Charley formed, rapidly intensifying to a Category 4 hurricane before making landfall in southwest Florida on August 13 as the strongest hurricane to hit the United States since Andrew in 1992. The combination of the quick strengthening with a considerable shrinking of the eye in the twelve-hour period prior to landfall caused the power of the storm to be concentrated in a small area, with devastating results. Charley made landfall near Cayo Costa, slightly north of Captiva Island. An hour later the eye passed over Punta Gorda and nearby Port Charlotte, before accelerating to cross central Florida, passing Kissimmee and Orlando before exiting Florida into the Atlantic near Daytona Beach on August 14.

F-3 | CAPTIVA ISLAND

Top image: Pre-landfall (9/29/1999). Bottom image: Post-Hurricane Charley (8/15/2004). Note the intrusion of sand onto the formerly grassy area and the damaged palm trees in the foreground of the image. There is also evidence of roof damage to the structures.

(Source: USGS)

At the time of its landfall near Awendaw, South Carolina, on August 29, Gaston was believed to be a tropical storm. But based on Doppler radar data from National Weather Service instruments in Charleston, SC, and Wilmington, DE, Gaston was retroactively upgraded to a Category 1 hurricane. The storm caused heavy rains and flash floods in Virginia, particularly in the Richmond area, as well as in the Carolinas.

Back in Florida, Hurricane Frances made landfall on September 5 on the southern part of Hutchinson Island as a Category 2 storm. This storm was both wider and slower than Hurricane Charley, moving northwest across Florida before exiting into the Gulf of Mexico near New Port Richey on September 6, on its way to a second landfall in the Florida Big Bend region, near the mouth of the Aucilla River. Although this storm crossed the state in the opposite direction from Charley, the two paths crossed in Polk County in central Florida.

While Frances was traveling its path of destruction, Hurricane Ivan was looming about 100 nautical miles off the southern Windward Islands. Ivan reached Category 5 strength on three separate occasions, punishing the Caribbean islands of Grenada, Jamaica, the Cayman Islands and Cuba, before entering the Gulf of Mexico and making US landfall on September 16, just west of Gulf Shores, Alabama. Category 3 winds were seen over a narrow band on the Alabama/Florida border, on the east side of Ivan's eye. The most extensive damage was seen in the Pensacola region, with a quarter-mile section of a bridge over Pensacola Bay washing out due to surge and wave action, extensive beach erosion and the severe damage or total destruction of beachfront homes.

In addition, offshore oil and natural gas production was disrupted for more than four weeks. Twelve large pipelines and six drilling platforms sustained heavy damage, and an additional seven platforms were completely destroyed. Ivan was also among one of the top tornado-producing cyclones on record, spawning 117 tornadoes from September 15-17, with at least two of F2 intensity.

F-3 | SECTION OF AN INTERSTATE 10 BRIDGE OVER ESCAMBIA BAY, IN PENSACOLA, FL, WASHED OUT DURING HURRICANE IVAN

(Source: Florida Department of Highway Safety and Motor Vehicles)

Meanwhile, Hurricane Jeanne was already making its destructive way through the Caribbean, dumping torrential rains and causing deadly flash floods in Haiti. Jeanne appeared to be heading east, away from the United States, before making a loop and circling back towards the Florida coast, making landfall near Stuart on September 26, at almost the identical spot Frances had made landfall just three weeks earlier.

There were still five named storms to come in the season, but only one more made landfall in the United States – Tropical Storm Matthew, on October 10, west of Cocodrie, Louisiana. The season finally ended on December 3, when Otto died out 800 nautical miles southeast of Bermuda. Four storm names were retired after the 2004 season – Charley, Frances, Ivan and Jeanne – tying with 1955 and 1995 for the most storm names retired in a season since storms were first given human names in 1953. But that record was about to be broken the very next year.

LOSS STATISTICS

The 2004 hurricane season saw four of the top twenty-five costliest storms for the mainland United States between 1949 and 2012, according to adjusted PCS loss statistics.

T-2 | TOP 25 US TROPICAL CYCLONE EVENTS BY ADJUSTED PCS LOSS

Event Name	Year	PCS Estimate	PCS Estimate Adjusted by Guy Carpenter*	Rank Based on PCS Estimate	Rank Based on Guy Carpenter Adjusted Estimate
Hurricane Katrina	2005	$41.10B	$57.53B	1	1
Hurricane Andrew	1992	$15.50B	$46.35B	3	2
Hurricane Sandy	2012	$18.75B	$19.53B	2	3
Hurricane Betsy	1965	$0.52B	$18.86B	30	4
Hurricane Hazel	1954	$0.12B	$16.33B	48	5
Hurricane Ike	2008	$12.50B	$15.24B	4	6
Hurricane Hugo	1989	$4.20B	$14.59B	11	7
Hurricane Carol	1954	$0.14B	$13.56B	44	8
Hurricane Wilma	2005	$10.30B	$13.35B	5	9
Hurricane Charley	**2004**	**$7.48B**	**$10.57B**	**6**	**10**
Hurricane Cecelia	1970	$0.31B	$10.17B	35	11
Hurricane Ivan	**2004**	**$7.11B**	**$9.99B**	**7**	**12**
Hurricane	1950	$0.01B	$9.61B	93	13
Hurricane Donna	1960	$0.09B	$9.53B	57	14
Hurricane Carla	1961	$0.10B	$8.92B	54	15
Hurricane Rita	2005	$5.63B	$8.34B	8	16
Hurricane	1949	$0.01B	$6.96B	97	17
Hurricane Frances	**2004**	**$4.60B**	**$6.50B**	**9**	**18**
Hurricane Cleo	1964	$0.07B	$5.78B	62	19
Hurricane Frederic	1979	$0.75B	$5.18B	24	20
Hurricane Georges	1998	$2.96B	$5.16B	13	21
Hurricane Jeanne	**2004**	**$3.66B**	**$5.16B**	**12**	**22**
Hurricane Opal	1995	$2.10B	$5.12B	16	23
Hurricane Irene	2011	$4.30B	$4.65B	10	24
Tropical Storm Allison	2001	$2.50B	$4.62B	14	25

* Guy Carpenter adjusted the PCS Estimates from the year losses were incurred to 2014 levels by using a population (frequency) index and per capita income (severity) index.

(Source: PCS/Guy Carpenter)

In addition, the season in aggregate was the third costliest (when PCS losses were adjusted to 2014 levels), behind 2005 – which brought the most costly insured hurricane event of the historical record – and 1992, the year of Hurricane Andrew. The overall insured loss for the 2004 season was over USD 32 billion (adjusted to 2014 levels).

T-3 | TOP 10 US TROPICAL CYCLONE SEASONS BY ADJUSTED PCS LOSS

Year	PCS Estimate	PCS Estimate Adjusted by Guy Carpenter*	Rank Based on PCS Estimate	Rank Based on Guy Carpenter Adjusted Estimate
2005	**$58.30B**	**$80.89B**	**1**	**1**
1992	$17.10B	$50.14B	4	2
2004	**$22.90B**	**$32.31B**	**2**	**3**
1954	$0.27B	$31.10B	21	4
2012	$19.79B	$20.61B	3	5
1965	$0.52B	$18.86B	19	6
2008	$15.50B	$18.73B	5	7
1989	$4.32B	$15.12B	7	8
1970	$0.31B	$10.17B	20	9
1950	$0.01B	$9.61B	47	10

* Guy Carpenter adjusted the PCS Estimates from the year losses were incurred to 2014 levels by using a population (frequency) index and per capita income (severity) index.

(Source: PCS/Guy Carpenter)

IMPACT TO THE INSURANCE AND REINSURANCE INDUSTRY

The 2004 hurricane season led to an increased focus on aggregate losses and the effects of multiple storms in a single season.

F-5 | OVERLAPPING TRACKS OF HURRICANES CHARLEY, FRANCES AND JEANNE

(Source: USGS)

CLAIMS AND DEDUCTIBLE PRACTICES

Over the course of the hurricane season, Florida was hit with four storms, Hurricanes Charley, Frances, Ivan and Jeanne. It was estimated at the time that one out of every five residential structures in Florida sustained damage during this hurricane season. Hurricanes Frances and Jeanne followed very similar tracks and some locations that were already damaged from one storm saw a second storm less than a month later, before insurance companies could send claims adjusters out to assess the damage. The already weakened structures also may have sustained more damage from the second event than would otherwise have been expected. Polk County in Central Florida hadn't seen a tropical cyclone hit in over forty years, since Hurricane Donna in 1960. Then in the course of six weeks, it was pummeled by Charley, Frances and Jeanne. In Highland Park, a village of roughly 250 residents, many houses were damaged so badly from the three storms that they had to be leveled and replaced. One of the original Highland Park residences, built in 1922, was damaged by Charley, only to see further damage, primarily water intrusion through the walls, from the subsequent storms.

As a reaction to this, the state of Florida passed legislation that reimbursed homeowners using funds from the FHCF cash balance for multiple deductibles applied for two or more hurricanes in a single season. This effectively made policy deductibles aggregate. The bill further restricted insurers to only apply a hurricane deductible a single time in subsequent hurricane seasons (starting with the 2005 hurricane season). After the first event, the standard non-hurricane deductible was required to be applied to all subsequent events.

FLORIDA HURRICANE CATASTROPHE FUND CHANGES

In 2005, Florida passed legislation that made changes to the Florida Hurricane Catastrophe Fund (FHCF) and the Florida Commission on Hurricane Loss Projection Modeling (FCHLPM). To address concerns of paying multiple retentions in a season, insurers were now required to pay their full FHCF retention on the insurer's two largest covered events, and after that the FHCF retention dropped down to one-third of the full retention for any additional events. The legislation also reset the FHCF industry aggregate retention to USD 4.5 billion.

Additional legislation required that Florida Office of Insurance Regulation and Consumer Advocate had access to the assumptions and factors used in "developing the actuarial methods, principles, standards, models, or output ranges before those methods, principles, standards, models, or output ranges found by the FCHLPM to be accurate and reliable may be used by an insurer in a rate filing."

IMPACT TO THE CATASTROPHE MODELS

In mid-2005, one of the model vendors incorporated the option for users to apply aggregate demand surge to catastrophe modeling runs. In previous versions of the vendor's model, demand surge applied on an occurrence basis, contemplating single events only. The model now allowed the user to contemplate additional cost inflation due to competition for labor and materials to repair damages from multiple events. This option was largely adopted by the industry and eventually that model vendor phased out the original single-occurrence demand surge, leaving aggregate demand surge as the only option in their model which still exists today.

This change was fairly limited in both scope and impact to the modeled losses, and no other model vendors released any changes to their Atlantic hurricane models in advance of the 2005 hurricane season. It would take the back-to-back impact of the 2004 and 2005 hurricane seasons to spur disruptive change to the catastrophe models. The big changes, which will be discussed in Part II, were yet to come.

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Resources

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Note: PCS loss estimates used with permission: http://my.iso.com/Q2CatReview?source=gc