

Typhoon Maemi and Hurricane Katrina: Impacts and Aftermath

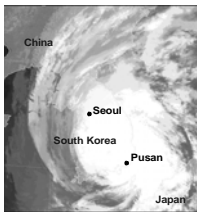
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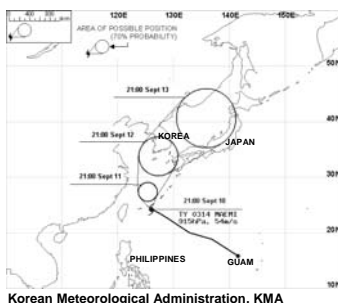
September, 2005

Typhoon Maemi: September 13, 2003



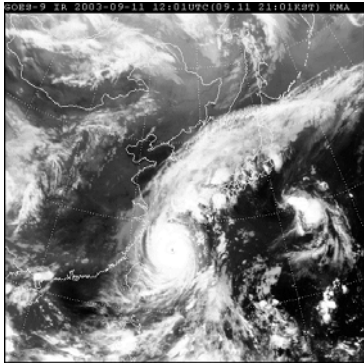
- Worst typhoon to hit South Korea
- Caused extensive damage
- 18,000 buildings damaged or destroyed by the strong winds
- Gupo Bridge failure
- More than 110 people killed

Typhoon Maemi Track and Characteristics



- Sept. 12th 2003
Typhoon
South coast of Korea
- Sept. 9th 2003
Typhoon
- Sept. 8th 2003
Severe tropical storm
- Sept. 6th 2003
Tropical depression
Near Guam

Visualization of Maemi's Track



Typhoon Maemi Landfall

- Lasted just 6 hours in South Korea
- Caused localized windstorms and torrential rainfall
- Extensive damage from wind and flooding
- Over 400 mm of rainfall with flashy hydrographs

Comparison with Other Typhoons

	Sarah 1959 (9/15/1929)	Thelma 1987 (7/15/1987)	Rusa 2002 (8/30/2002)	Maemi 2003 (9/12/2003)
Maximum Sustained Winds	117.9 mph (52.7 m/s)	90.1 mph (40.3 m/s)	88.8 mph (39.7 m/s)	134.2 mph (60 m/s)
Lowest Pressure	952 hPa	972 hPa	970 hPa	954 hPa

Korean Meteorological Administration, KMA

Saffir-Simpson Scale

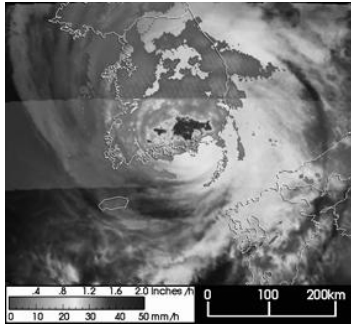
Category	Central Pressure	Winds	Surge	Damage
1	>28.94" (980 mb)	74-95 mph (119-153 km/hr)	4-5 ft (1.2-1.7 m)	Minimal
2	28.91-28.50" (979-965 mb)	96-110 mph (154-177 km/hr)	6-8 ft (1.8-2.6 m)	Moderate
3	28.47-27.91" (964-945 mb)	111-130 mph (178-209 km/hr)	9-12 ft (2.7-3.9 m)	Extensive
4	27.88-27.17" (944-920 mb)	131-155 mph (210-249 km/hr)	13-18 ft (4-5.5 m)	Extreme
Super Typhoon		>150 mph (241 km/hr)		Catastrophic
5	<27.17" (920 mb)	>155 mph (249 km/hr)	>18 ft (5.5 m)	Catastrophic

← Sarah
1959

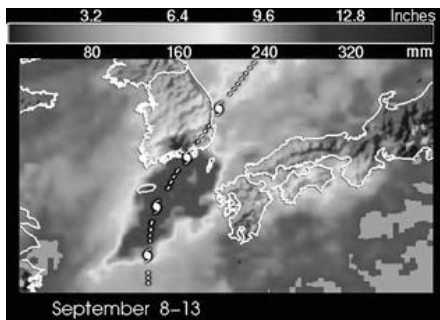
← Maemi
2003

← Katrina
2005

Rainfall Distribution of Typhoon Maemi



Total Rainfall of Typhoon Maemi

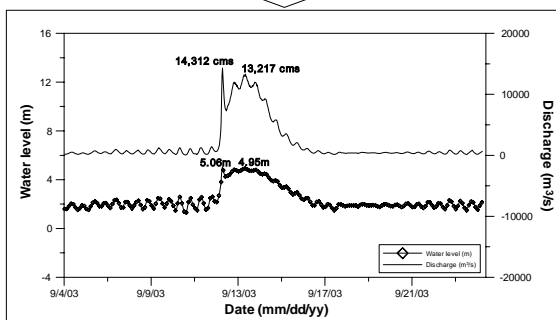


Typhoon Maemi Impacts



Basin area : 23,326 km²
Design flood : 18,300 m³/s
Estuary barrage located at the end of the river

Water stage and discharge graph at Gupo bridge
(Korea Water Resources Corporation, KOWACO)



Flood Damages

- 18,000 buildings damaged or destroyed by the strong winds
- Gupo Bridge failure
- More than 110 people killed
- Power outages for 1.5 million households
- Heavy-duty shipping cranes were damaged



Flooded rice field, 9/12/2003, [AP]



Wah Yeon Beach on Geoje Island,
9/15/2004, photo by Paul J. Riely



Damages of ferry-hotel, 9/13/2003, AP

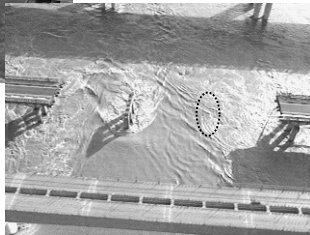


Gupo Bridge Failure

- 1.06 km-long Gupo bridge partially collapsed with the loss of 19th pier on 9/14/2003
- Bridge pier scour due to high velocities
- Nakdong River peak discharge: ~13,000 m³/s



Cuyo bridge failure after Typhoon Maemi (Yonhap)



Hurricane Katrina: August 29, 2005



- Damages: \$10B - \$120B
- Deaths (09/07/2005):
 - 1,014 direct
 - 577 indirect
 - Estimates up to 10,000
- Affected 233,000 km² (90,000 mi²) of US: United Kingdom
- Five million people with out power

Hurricane Katrina Track and Characteristics



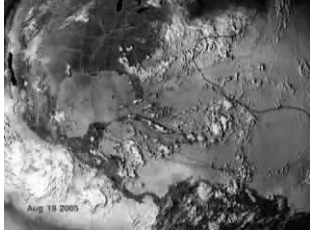
Aug. 29th 2005
Hurricane (Category 4)

Aug. 28th 2005
Hurricane (Category 5)

Aug. 24th 2005
Tropical storm

Aug. 20th 2005
Tropical depression

Visualization of Katrina's Track



Hurricane Katrina Characteristics

- Maximum sustained winds peaking at 175 mph (280 km/h)
- 918 mb of lowest minimum pressure at landfall: third strongest hurricane on record to make landfall on the United States
- 4.5 to 9 m (15 to 30 foot) storm surge

Comparison with Other Hurricanes

North Atlantic				Landfall U.S.			
Ran	Hurricane	Year	Pressur	Ran	Hurricane	Year	Pressur
1	Gilbert	1988	888 mbar	1	Labor Day	1935	892 mbar
2	Labor Day	1935	892 mbar	2	Camille	1969	909 mbar
3	Allen	1980	899 mbar	3	Katrina	2005	918 mbar
4	Katrina	2005	902 mbar	4	Andrew	1992	922 mbar

NOAA Technical Memorandum NWS TPC-1

During the Storm



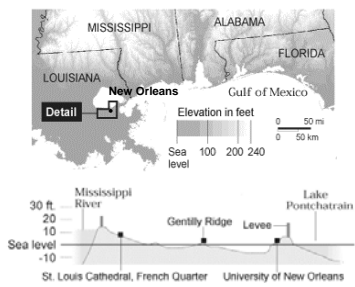
Total Rainfall and Storm Surge of Hurricane Katrina

Katrina's aftermath

Rescuers along the hurricane-ravaged Gulf Coast searched for survivors Tuesday in a race against time, while New Orleans sank deeper into crisis with rising waters.



New Orleans and Sea Level



80% of the city is below sea level

New Orleans levees



Heavy flooding forced the total evacuation of over a million people

Flood Damage: New Orleans, LA



Flood Damage: New Orleans, LA



Flood Damage: Biloxi, MS



Before: April 12, 2005



After: August 31, 2005

Flood Damage: Biloxi, MS



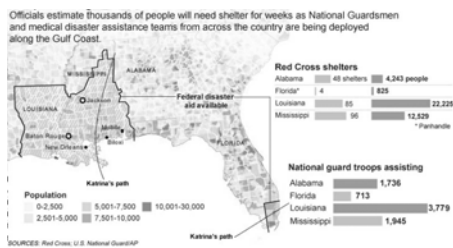
Aftermath



Aftermath



Response



Risk to survivors

Focusing on Disease Prevention

Volunteer physicians are moving into the Gulf Coast region to care for the sick and try to prevent some of the predictable diseases that occur days after flooding.

Risks monitored by medical professionals after a flood. Contamination of drinking water can cause diarrhea lead to dehydration.



Contact with polluted water may include wound infections, dermatitis, conjunctivitis, ear, nose and throat infections



Standing water increases the risk of mosquito-borne diseases like West Nile Virus.



SOURCES: Centers for Disease Control and Prevention/AP



Typhoon Maemi September 13, 2003	Hurricane Katrina August 29, 2005
<ul style="list-style-type: none">• Max. sustained wind speed: 134 mph• Lowest pressure: 954 hPa• Category 4• 18,000 buildings damaged or destroyed by the strong winds• Gupo Bridge failure• More than 110 people killed• Power outages for 1.5 million households• Heavy-duty shipping cranes were damaged	<ul style="list-style-type: none">• Max. sustained wind speed: 175 mph• Lowest pressure: 902 hPa• Category 5• Damages: \$10B - \$120B• Affected 233,000 km² (90,000 mi²) of US: United Kingdom• Deaths (09/07/2005): 1,014 direct 577 indirect Estimates up to 10,000• Five million people without power
