Global Grid For Weather Modelling

Regional Grid For Micro-Management

OPERATION CUMULUS

Stormproofing New York City by Avoiding Hurricane Landfall Instead of Protective Measures in Relation to the High Winds and Stormsurge.

Short Term Strategies

Reducing Urban Roughness by Wrapping the Buildings according to
1)Hurricane Motion Prediction model
2) Existing Urban Rouness Model of NYC

Scenario (Storms are getting stronger in each hurricane season, the cities should suit up and avoid hurricane landfall to avoid mass destruction to the production of the cities.)

During the past decade, coastal cities in the states were tested against hurricane systems and these events repeatedly proven the vulnerability of the built environment that we lived in. For a future of more unstable yet organizable weather system, weather will become a management issue for humanity. Such scenario frame the argument of this research that Management strategies should be developed in defending the cities from ever bigger storms. A stormproof city should be avoiding the hurricane landfall instead of any protection measures from high winds or stormsurge as storms are getting stronger in each hurricane season.

Hypothesis (Urban Roughness is Drifting Hurricane Towards the City and therefore Hurricane Landfall could be Avoided by Reducing Urban Roughness):

Wong and Chan (2006), huricane motion scientists found that if the northerly portion of the coast is rough and the rest is smooth, then the hurricane drifted several tens of kilometres northwards; and if the southerly section is rough, then the hurricane shifts southwards. They explain that over rougher land, greater friction causes the air to become more compressed, which forces it to rise and release more of its latent heat. This heating in turn makes the air spin faster, which pulls the hurricane towards the rough section. For the roughness of a city under threat of hurricane landfall is caused by the built environment, hence reducing urban roughness by 75.8% as shown by Wong and Chan (2006) simulation, a hurricane landfall could be avoided.

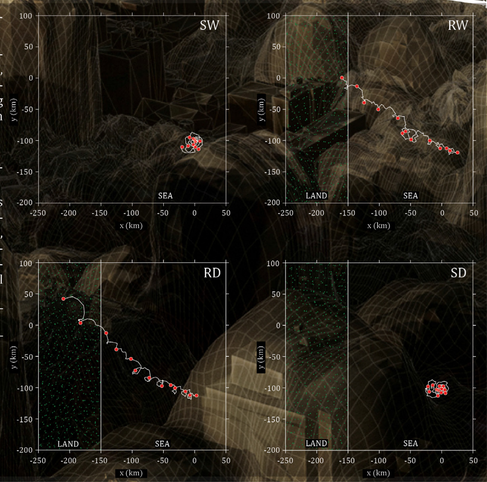
Simulation results of Wong and Chan(2006) in proofing the urban roughness is vital to the hurricane landfall motion. A rouughness reduced by 75.8% could avoid a hurricane landfall as the hurricane motion would be suceptible to coriolis forces.

Expt	Roughness Length (m)	Moisture Availability (%)
SW	As at Sea	100
RW	0.5	100
RD	0.5	5
SD	0.12	5

Objectives

1) Provision of a management model in reducing urban roughness to avoid hurricane landfall
2) The short/Mid/Long term design strategies for NYC in reducing Urban Roughness

Link to Animation Explaining the Concept : http://www.youtube.com/watch?v=0_zQgfBplg4

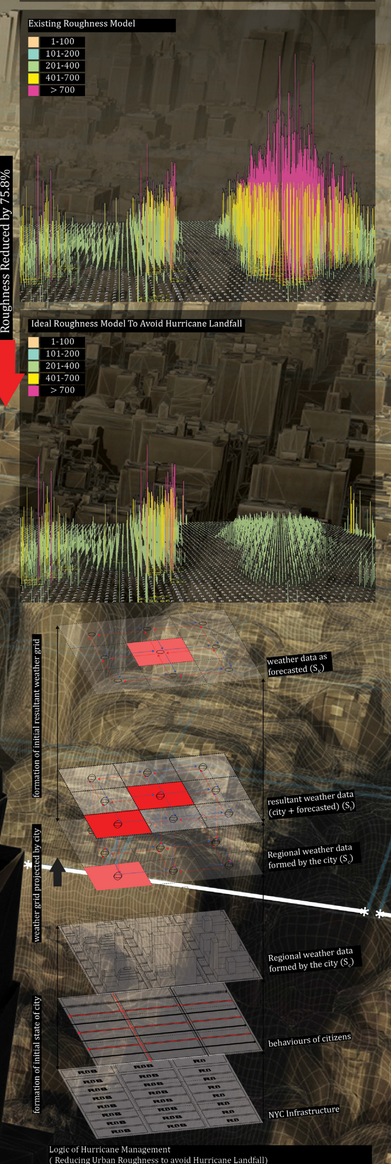


Urban Roughness Factor

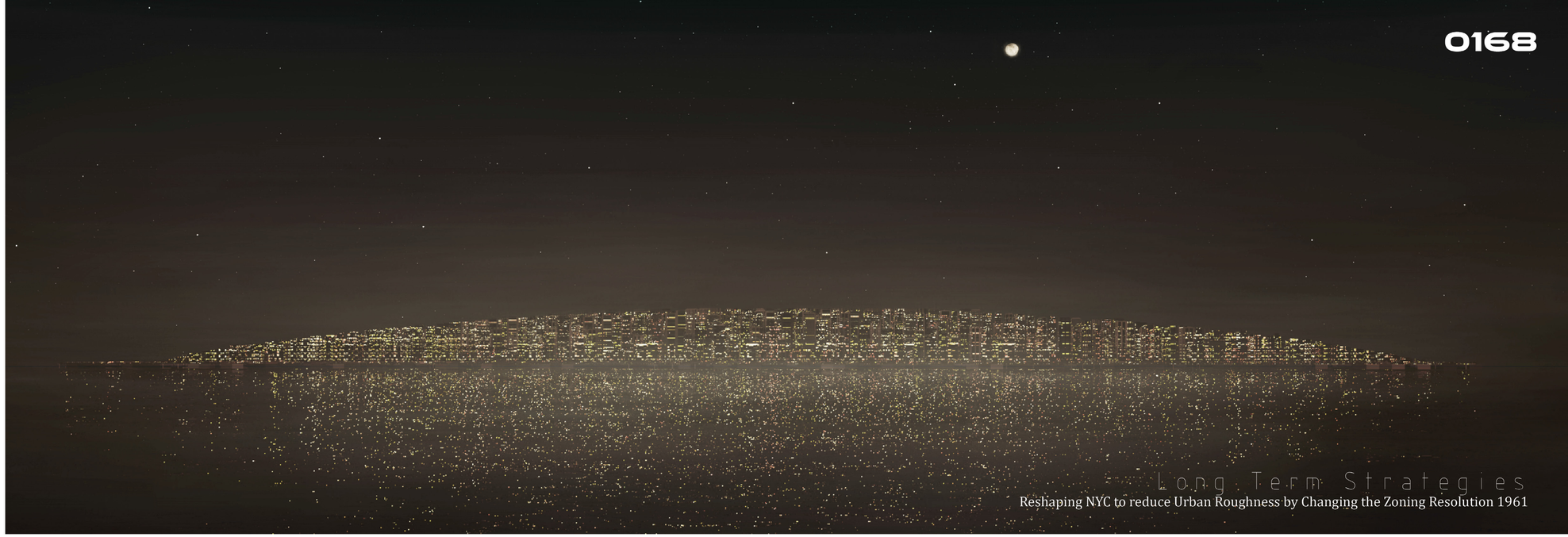
Urban Roughness Factor is defined as the mean height of the urban canopy. It describes the surface properties of an urban landscape at roof level.

$$F_r = \frac{A_b}{A_t} = \frac{\sum A_i h_i}{\sum A_i + \sum A_j}$$

F_r = Rugosity factor
A_b = Total area of urban canopy (m^2)
A_t = Total area of the sample (m^2)

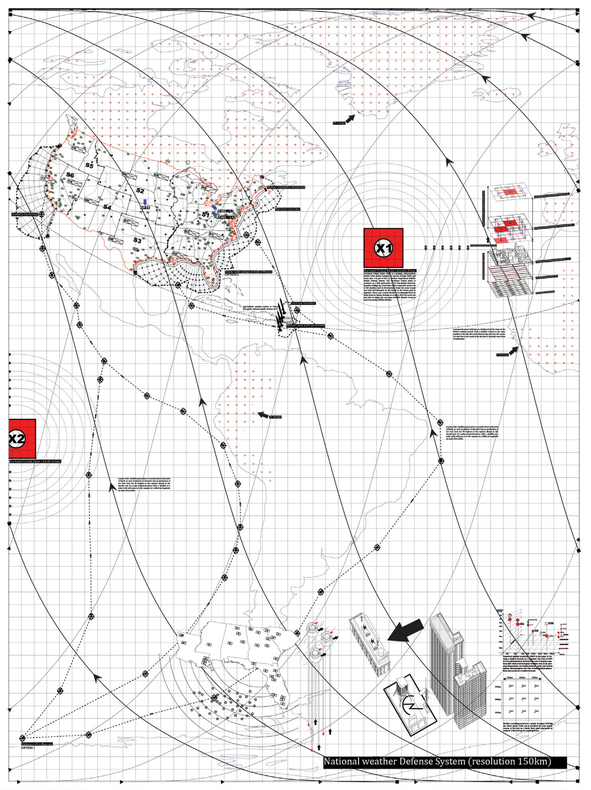


Logic of Hurricane Management
(Reducing Urban Roughness to avoid Hurricane Landfall)

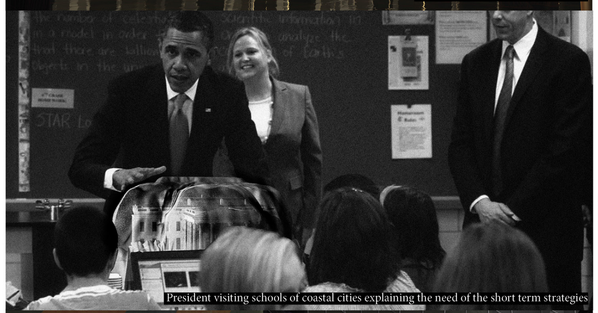


Long Term Strategies

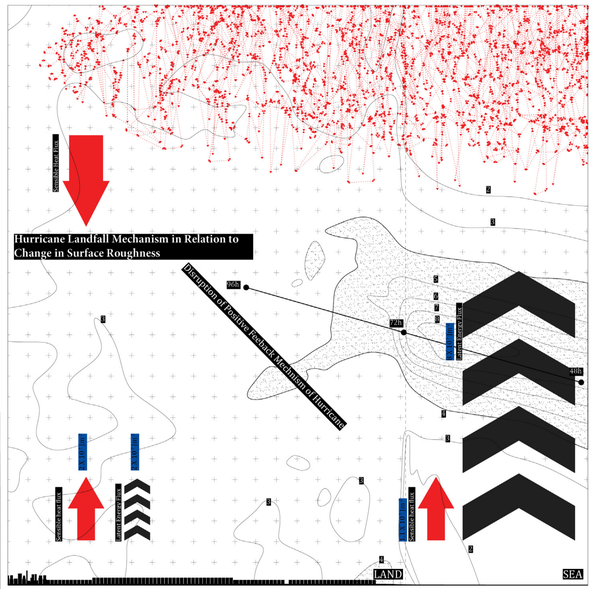
Reshaping NYC to reduce Urban Roughness by Changing the Zoning Resolution 1961

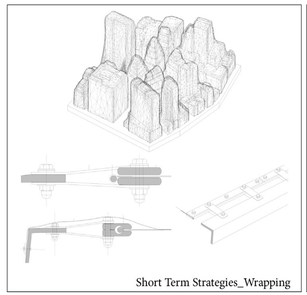


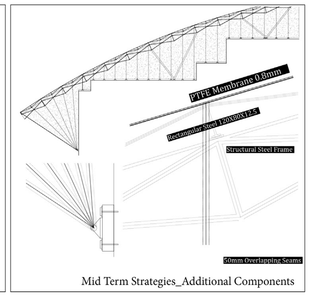

Hurricane Sensors at Gulf of Mexico


President visiting schools of coastal cities explaining the need of the short term strategies

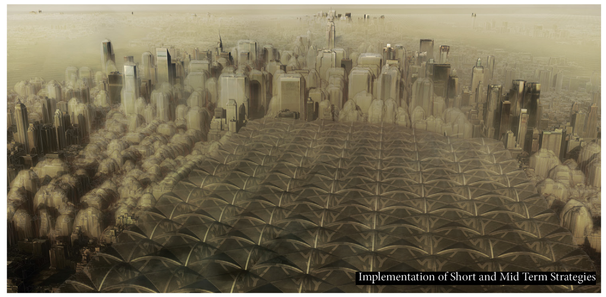

Military Takes Charge of Installing Building Wraps (Short Term Strategies)

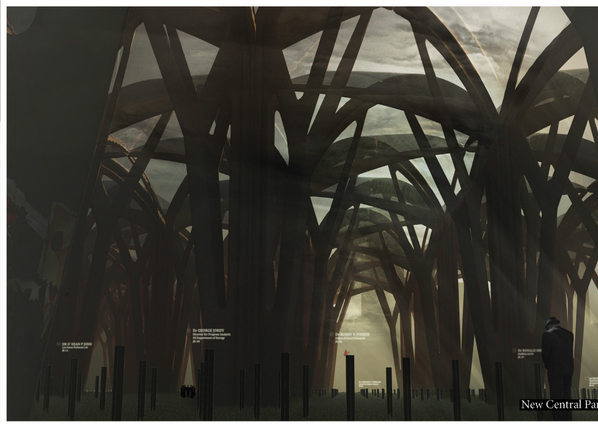



Short Term Strategies_Wrapping



Mid Term Strategies_Additional Components


Implementation of Short and Mid Term Strategies


New Central Park


Construction of Canopy at Central Park