What is SLOSH? Sea, Lake and Overland Surge from Hurricanes

- A computer model developed by the National Weather Service (NWS) to estimate storm surge heights and winds resulting from historical, hypothetical, or predicted hurricanes.
• Storm Surge – amount of water pushed on shore by hurricane winds.

• Storm Tide – sum of astronomical tide plus storm surge.
SLOSH Grid

Types of Information for each SLOSH Grid Cell

- Polar coordinate grid
- Each grid cell has
  - Average surge height
  - Terrain elevation
  - Barriers such as levees, roads and railroads
  - Cuts to allow flow through deep water passes.
  - Bathymetry
- Accuracy +/- 20% of peak surge values
What is a MEOW?

- MEOW – Maximum Envelope of Water from each member of a family or ensemble of land falling model hurricanes.
New Orleans Basin 2009
How many individual SLOSH Model Runs are Used to Make MEOWS

<table>
<thead>
<tr>
<th>Category</th>
<th>Direction (moving toward)</th>
<th>Speed (mph)</th>
<th>Tide - ft (2.0 / 0.0)</th>
<th>RMW (st mi)</th>
<th>Tracks</th>
<th>Runs</th>
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</thead>
<tbody>
<tr>
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<td>5,15,25</td>
<td>High,Mean</td>
<td>15,25,40</td>
<td>20</td>
<td>1800</td>
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<td>15</td>
<td>1350</td>
</tr>
</tbody>
</table>
SLOSH Assumptions

- Levees and barriers are assumed to maintain structural integrity even if over topped by storm surge. SLOSH is not an engineering model.

- No storm frequency can be attributed to any MEOW.

- Run off from rainfall not included in SLOSH. It is considered to be minor compared to storm surge.

- Wind Waves are not included in SLOSH. Use 1/3 surge height to get estimate.
New Orleans SLOSH Basin

- Last Update 6/10/2009
- Annual updates scheduled until further notice due to ongoing levee construction.
- NAVD88 datum
How to Choose a MEOW

- Direction Hurricane is Moving Toward.
- Saffir Simpson Category.
- Speed
  - Mean Tide on open coast and tidal lakes...no corrections applied for pre storm run up, rise in sea level since 1900 and high tide. New Orleans example: Tide 0.0 ft.
  - High Tide on open coast and tidal lakes...use this operationally...corrections applied for pre storm run up, rise in sea level since 1900 and high tide. New Orleans example: Tide 2.0 ft.
Step 1: How to Choose a MEOW

Hurricane Gustav Example

- Use Hurrevac
- To Get
  - Category at landfall
  - Forward Speed
  - Direction moving towards
Step 2: How to Choose a MEOW

Hurricane Gustav Example

- **SLOSH**
- **Inputs**
  - **Northwest**
  - **Category 2**
  - **15 mph**
  - **High Tide Option ... 2.0 feet**

**Inputs**

- Northwest
- Category 2
- 15 mph
- High Tide Option ... 2.0 feet
Individual SLOSH Run

- So called “rex” file.
- Based on NHC forecast.
- Produced by NHC storm surge unit.
- Available on NHC internal web site around time of hurricane center conference call.

Mean Tide Option 0.0 ft
Difference Between Rex and MEOW

- A MEOW will always over represent amount of storm surge flooding due to concerns about forecast error prior to landfall.

- Individual or Rex file run assumes a perfect forecast was made prior to landfall. Rex files, no matter what source or model (SLOSH or ADCIRC) must be viewed with extreme caution due to potential for large forecast error, especially if produced during the watch and early warning stages.
SLOSH Registration

- Available for download via Internet
- http://slosh.nws.noaa.gov/sloshPub
- Select “SLOSH Display and Web Page” to register.
Slosh Disclaimer

National Weather Service

SLOSH Display Program DISCLAIMER

----- I acknowledge reading the following ----- 

1. Pay attention to your local emergency manager, particularly during an evacuation. DO NOT use the SLOSH Display program as an excuse to ignore your local emergency manager.

The SLOSH Display program is only one of several tools used by emergency management agencies to determine who is at risk and may be asked to evacuate.

2. We recommend people have some training. We have some here and we are developing additional training.

The key ideas to learn are:
   - What is storm surge?
   - There is inaccuracy in any model.
   - There is more inaccuracy in the input wind parameters to surge models than in the models themselves.

----- I acknowledge having read the preceding ----- 

Please provide your email address so we can register you, and email you the password:

Submit: I have read the above statement

Submit your email address
• Tool bar moved
• Configure Layers
Subtract Land

- Surge height above ground level or inundation.
- Takes terrain elevation into account.
- Removes guess work in determining elevation.
Hurricane Katrina
Subtract Land Example

- Left – Surge height in feet NGVD 1929.
- Right – Surge height with terrain taken into consideration…or surge height above ground.
Download Menu Enhanced

- MEOW /MOMs
- Rexfiles
  - Historical
  - Best Track
- Update Program
  - Need internet connection.
  - Get latest patches

Download
GULF OF MEXICO
Best way to change to an operational Slosh basin.

Useful after looking at historical rex file which may be using an older basin version.
Available SLOSH Basins

- Go to “Change-Basin”
- Select “Operational”
- Many available choices from Atlantic to Gulf coast.
Shapefiles

- Available
  - lakes
  - roads_limited_access
  - roads_highway
  - roads_other
  - rivers

- Can add your own shapefiles
Where to place your local shapefiles

- `\slosh.pkg\sloshdsp\shpfiles`
Other New Features

- User Profiles
  - Save
  - Load
- Add Text
- Change
  - Color
  - Line width

Change Line Width
Time Series of Observed and Predicted Data - Experimental

- Observed Tide
- Predicted Tide
- Residual Tide
- REX
- REX + Tide
- Wind Speed
- Wind Direction

![Graph showing time series data with observed, predicted, residual, REX, and REX+Tide tide levels over time.](image-url)
Summary Slosh 2009 Changes

• **Layout**
  - Tool bar on Top
  - Configure Layers on Left

• **Subtract Land**
  - New for 2009
  - Removes guess work

• **Shapefiles**
  - Load as many as you want for clarity
  - Can add others to /slosh.pkg/sloshdsp/shpfiles