

**XXIII International FIG Congress
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Shaping the Change**

**Disaster and Risk Management
for Puerto Rico**

Carlos Rodriguez, Eng., PLS
Carlos R. Vega Santos, LS



Introduction

- Nature is seldom accurately predicted
- As a consequence lives may be lost
- Technology developments have been implemented to render models which produce better predictions
- Puerto Rican Engineers, Land Surveyors, Geologists, Meteorologists and other professionals have united in efforts
- The use of tide gauges, meteorological sensors, seismometer sensors, buoys, and GPS stations

Objectives

- Keep Puerto Rico up to date with new technologies that are introduced into the market
- Aware the public of possible dangers in there area caused by natural phenomena's
- Prepare the island y its population to mitigate in case a disaster strikes
- Our goal is to make the standards for the Caribbean Disaster and Management Program

Problems

- Location – Lat. 18.22 N, Long. 66.49 W
- High Population Density - 3.95 million, 1,000 people per square mile
- Risks
 - Tsunami
 - Flash Floods
 - Earthquakes
 - Hurricanes
 - Storm Surge

Tsunami 1911

Plan for Tsunami Warning

- Prevention
 - Education
 - Maps
 - Signs

Plan for Tsunami Warning


- Prevention
 - Tide Gauges
 - Buoys

175 Permanent Tide Stations


Existing Proposed

Mitigation



Tsunami Evacuation Map



- Tsunami
 - Assembly Points
 - Evacuation Routes
 - Routes to Hospitals
 - Evacuation Zones
 - Affected Infrastructure




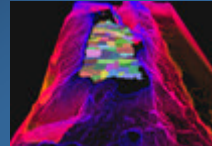
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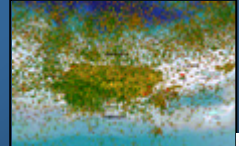
Mitigation

- Tsunami
 - Puerto Rico Bathymetry
 - Seismic Activity
 - Tsunami 1918 Simulation



Tsunami 3D Simulation

Mona Trench





1987-2006 Seismic Activity



Leveling Network

- PR Leveling Network
 - Puerto Rico Vertical Datum 2002
 - Gravimetric Observation
 - GPS Observation
 - Development a new precise Geoid model

Leveling Route



GPS Observation


GPS and RTK Networks

- PR GPS Reference Stations
 - CORS Stations
 - Real Time Data Streams
 - RTK Networks
 - Real Time Corrections



PR CORS Stations

PRMI CORS Station


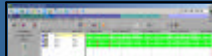


RTK Corrections





GPS and RTK Networks


- PR RTK Network
 - CORS Stations Feeds RT data
 - Leica Spider Net Software
 - Safe, Robust, and Stable
 - Real Time Corrections
 - TRIMBLE NETRS, Trimble 4600 SSI and Leica 1200 Systems



RTK Corrections



PRVE SUV Observations



FIX Ambiguities

Thanks

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