Motivating Actions to Reduce Storm Vulnerability

James J Opaluch, Austin Becker,
Donald Robadue, Dawn Kotowicz, and Pamela Rubinoff

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Rationale:

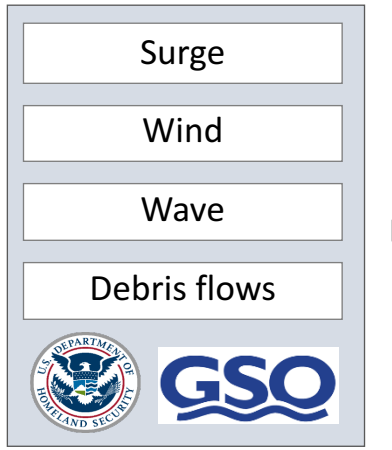
- Decision Makers are Often Slow to Adopt Protective Actions ("Adaptation Gap")
- Systematic Research Program is Needed to Improve our Understanding of Barriers to Resilience
- Project Focus on Coastal Organizations

Identifying Barriers - Research Questions

- What are key organizational barriers to adaptation?
- What policies & other interventions show promise to overcoming barriers?
- Test interventions and connect to end users

Anticipated Project Impact

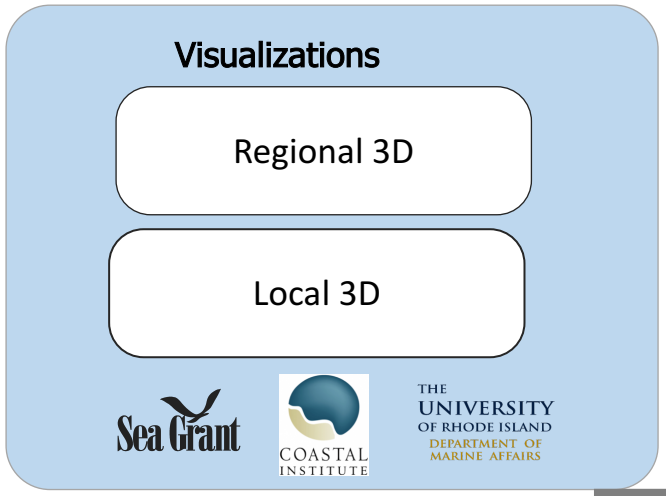
Modeling the combined coastal and inland hazards from high-impact hurricanes



Damage functions for infrastructure

Economic/ Env. Impacts

USC University of Southern California



Identify Barriers & Interventions for Adoption of Protective Actions

Motivating Actions to Reduce Storm Vulnerability; User Testing & Outreach; Policy Simulation Tools

COASTAL RESILIENCE CENTER
THE UNIVERSITY OF RHODE ISLAND DEPARTMENT OF MARINE AFFAIRS
COASTAL INSTITUTE
Sea Grant Rhode Island

End User Engagement

- Adopt "Whole Community" approach to reduce vulnerability (FEMA, 2015)

"…emphasizes need for whole community to work together"

"… requires involvement of everyone—not just the government—in a systematic effort to keep the nation safe"

"… empower individuals and communities to strengthen and sustain their own preparedness"

Activities to Date

- Task 1. Literature review. Development of an annotated bibliography.
- Task 2. Group Decision Processes. Organized/facilitated/participated in more than 25 public events on coastal storm hazards (End User Engagement)
- Task 3. Initial list of barriers and interventions
- Task 4. Initial draft Policy Simulation tools

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”Whole Community” End Users

Private Sector Associations, Educational Institutions and Nonprofits:

- RI Realtors Association
- RI Builders Association
- Westerly Economic Development Committee
- RI Independent Insurers Association
- Save-the-Bay
- Homeowners Associations of Block Island & North Kingstown
- Salt Pond Coalition (Nonprofit Advocacy Group
- RI Nursery and Landscape Association
- American Society of Civil Engineers
- Univ. of Albany
- Quonset Development Corp
- ProvPort (Port Authority)
- Private firms on the waterfront
- FM Global (Global Insurer of Commercial & Industrial Property)
- Save-the-Bay
- CommerceRI (State of RI Business Promotion Agency)
- RI Marine Trades Association,
- Newport Maritime Association.
- Private Marinas.
- RI Sea Grant/Coastal Resources Center

Federal/State/Local Government Agencies

- RI Department of Environmental Management
- RI Coastal Resources Management Council
- RI Division of Statewide Planning
- RI Flood Mitigation Association
- RI Emergency Management Agency.
- South County Communities (Town Representatives)
- RI Green Infrastructure Project
- US Army Corps of Engineers
- RI Coastal Resources Management Council
- RI Division of Planning
- Providence Department of Planning
- RI Emergency Management Agency
- US Marine Administration (MARAD)
- US Coast Guard
- US Army Corps of Engineers

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Barrier: The Rush to Rebuild

- The Immediate aftermath of storm is a “window of opportunity”
- But there is strong pressure to get life back to normal

Intervention: Storm Vulnerability Audits

- Provide free or mandatory Storm Vulnerability Audits
- Recommend a set of protective actions
- Provide incentives for adopting recommended protective actions
  - Expedite permits for rebuilding/repairs
  - Cost sharing and/or special financing (low interest loans)
  - Insurance discounts and/or requirements
  - Mortgage requirements
  - Cost of protective actions built into mortgages
  - Certified “Storm Resistant”

Barrier: Storm Threats Not "Real" Enough

- Storm threats not on "radar screen" of decision makers
- "More important things to think about"
- Threat is "theoretical"
- Intervention: Visualizations of damages to specific structures

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Draft Policy Simulation Tools

- Purpose: Develop Visual Tools to Help Decision Makers Better Understand Consequences of Storms and Protective Actions
- Test in Context of Leveraged Case Studies
- Use in Decision Simulation Exercises

COASTAL RI
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Leveraged Case Studies

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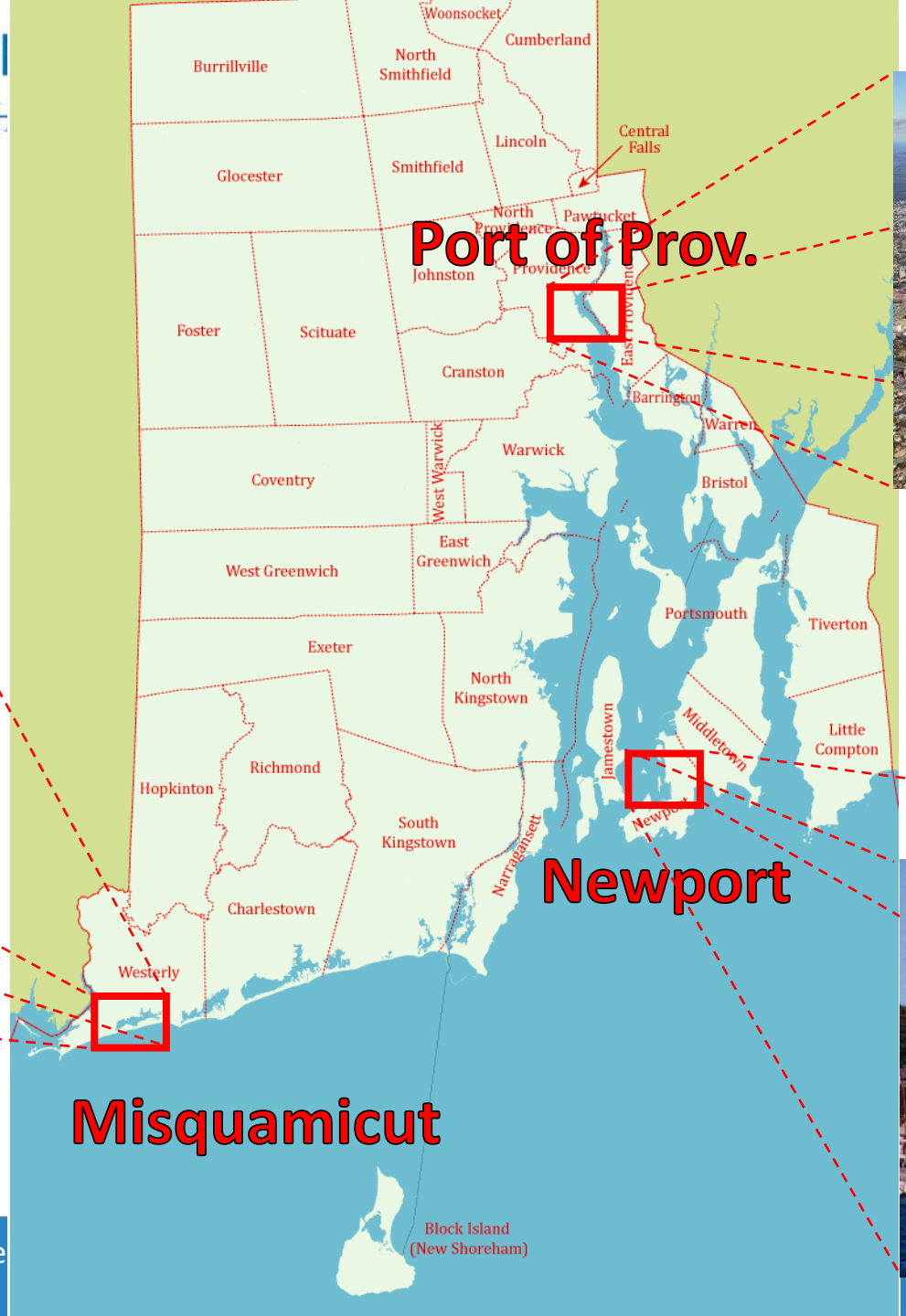

Misquamicut Beach


BENSON
STOP
TOW ZONE
NO PARKING ANY TIME
ANDREA


CAUTION

Misquamicut Case Study

- In Collaboration with URI Ocean Engineering Capstone Led by Drs. Malcolm Spaulding, Christopher Baxter & Craig Swanson
- Goals:
  - Engage Econ. & Eng. Students in Interdisciplinary Learning About Coastal Storm Hazards
  - Evaluate Protective Actions in Misquamicut Beach Area
  - Use Stated Choice Methods to Test Possible Interventions

Anticipated Project Impacts

- Identify Barriers to Adoption of Protective Actions, and Interventions to Overcome Barriers
- Test Interventions, as possible
- Help Decision Makers Better Understand Consequences of Storms and Protective Actions

Data Driven Visualizations & Proposed Future Work

- 3D Disaster Visualizations by Dr. Austin Becker and Peter Stempel
- Help Decision Makers Better Visualize Consequences of Storms and Protective Actions
- Test Effectiveness in Policy Simulation Exercises

Anticipated Project Impact

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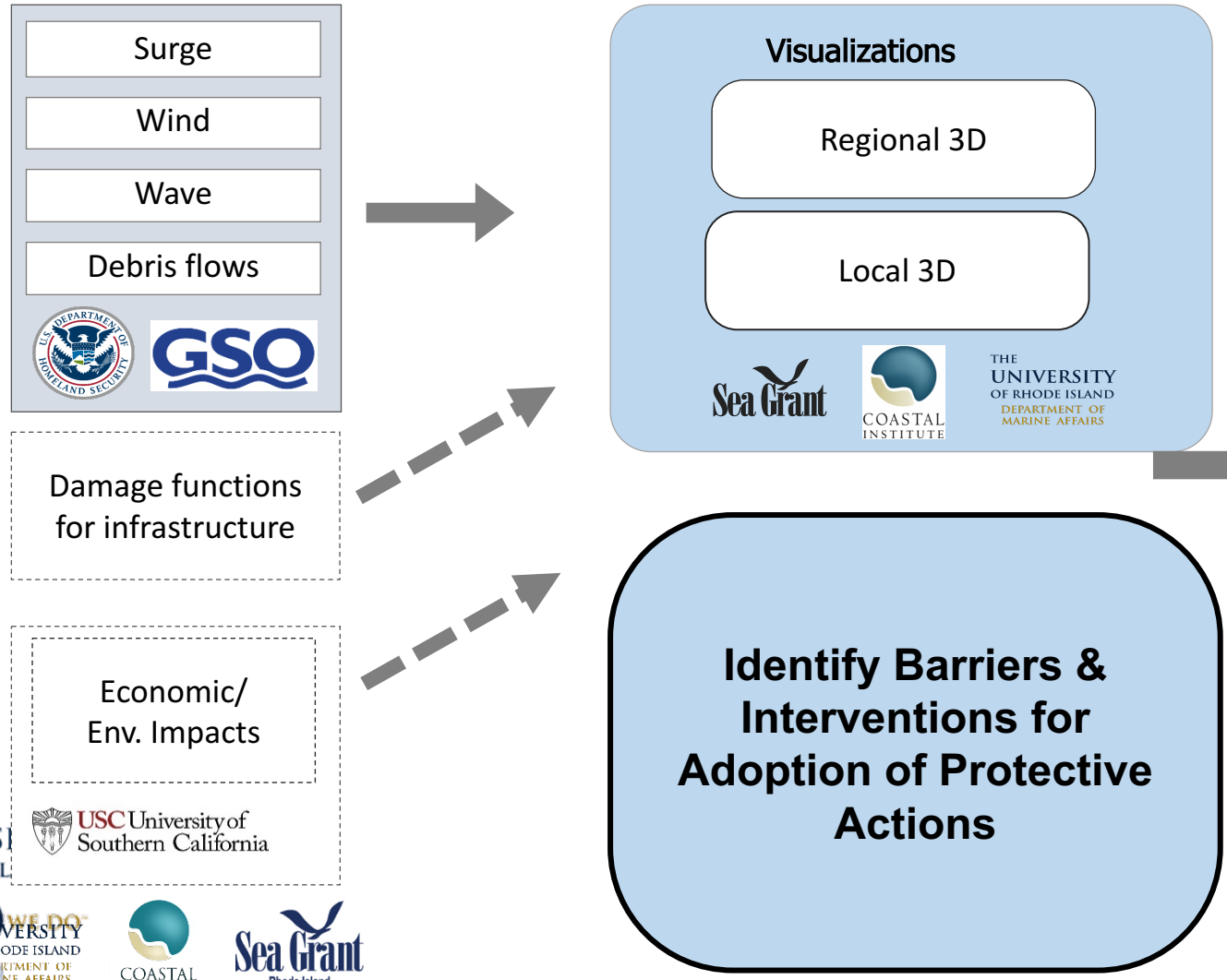
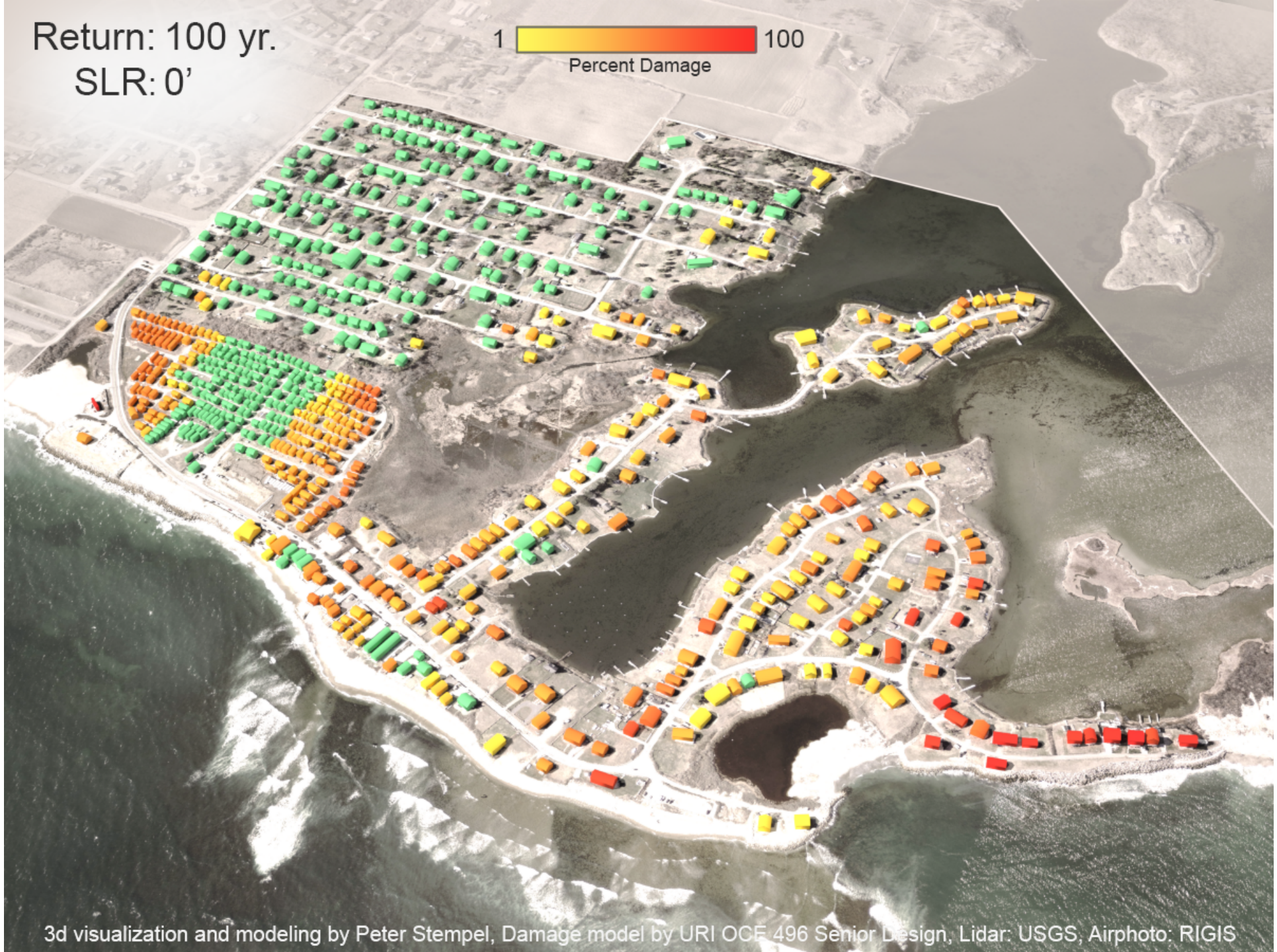
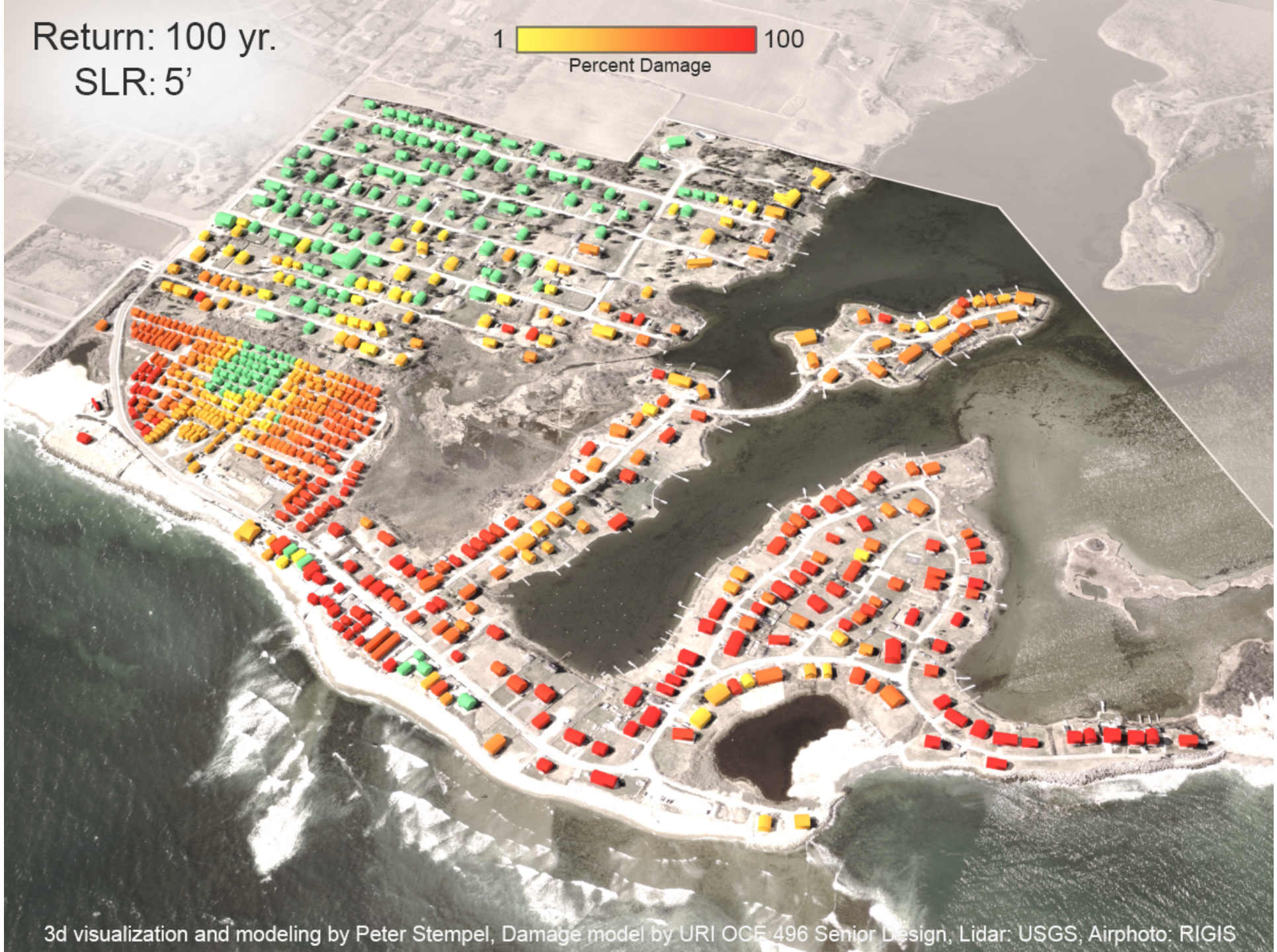


Research Agenda for Visualizations (leveraged project)

- Develop technical methods to connect local hydrodynamic modelling and other simulations to visualization tools.
- Establish ethical frameworks and methods of validating visualizations that can be applied in transdisciplinary contexts.
- Understand how the depiction of consequences influences perceptions of risk among local and non-local stakeholders and experts.


Return: 100 yr.
SLR: 0’
1
100
Percent Damage
3d visualization and modeling by Peter Stempel, Damage model by URI OCE 496 Senior Design, Lidar: USGS, Airphoto: RIGIS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SLR: 5’
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100
Percent Damage
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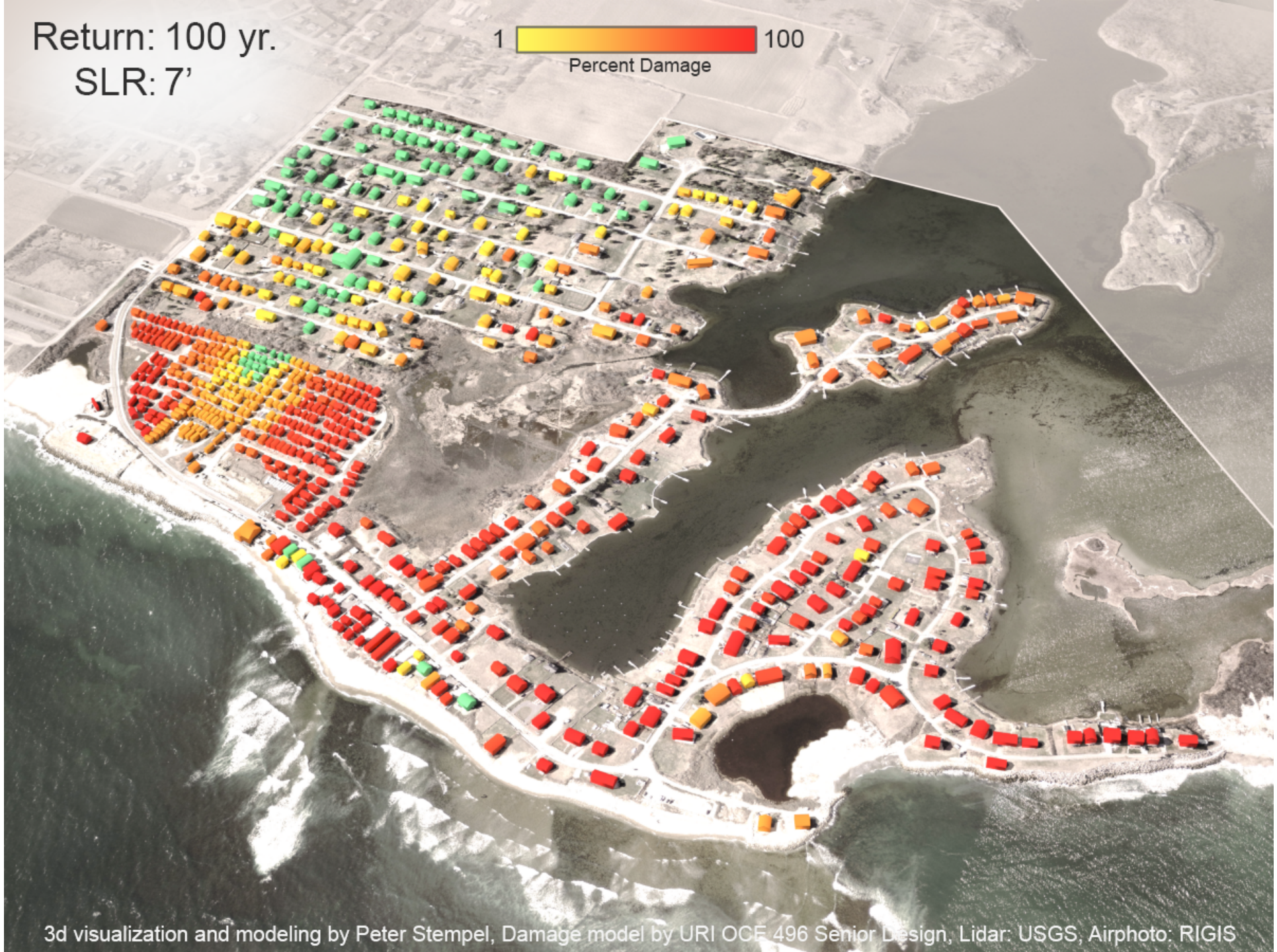
Return: 100 yr.
SLR: 7’
1
100
Percent Damage
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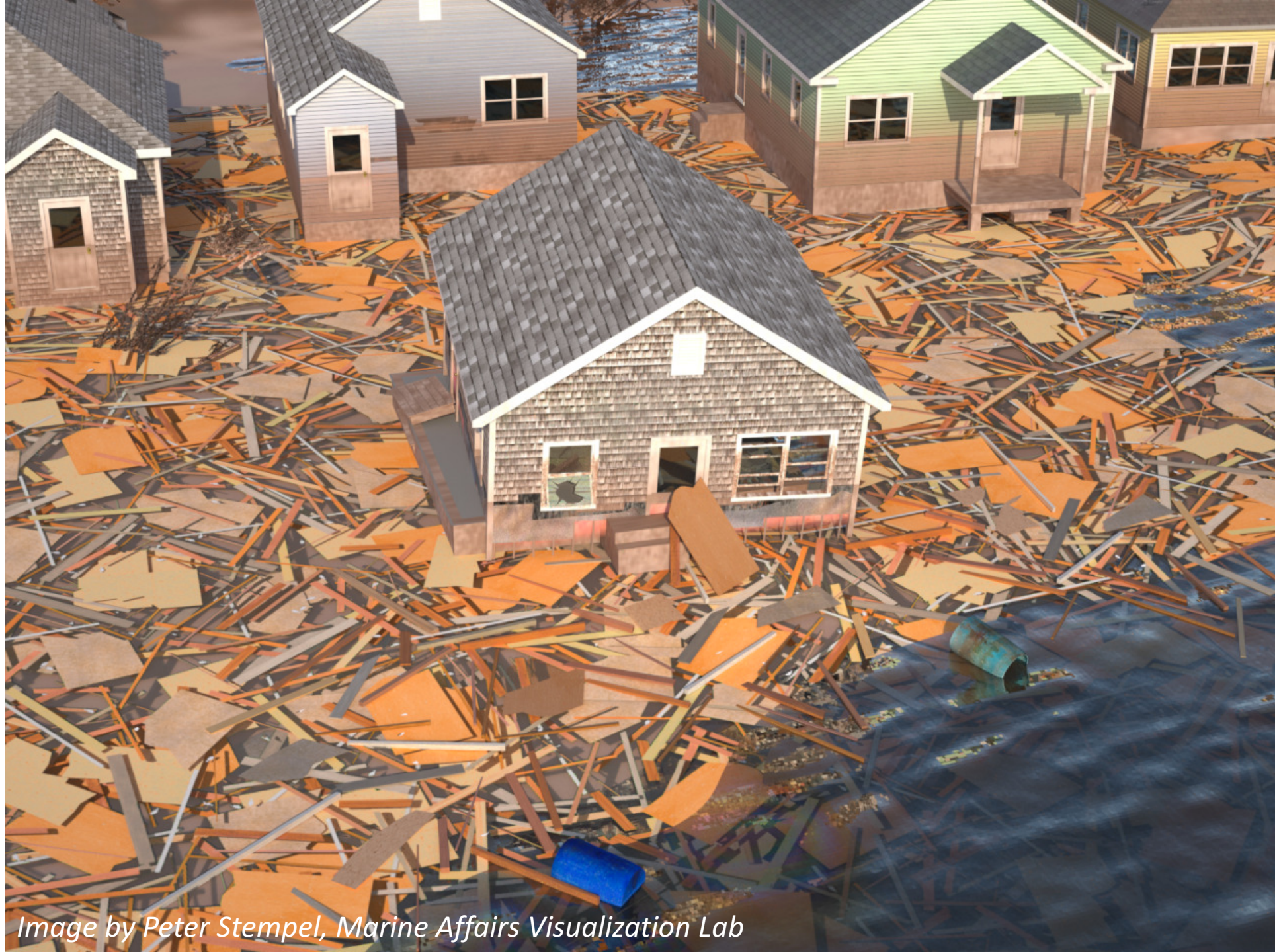

Image by Peter Stempel, Marine Affairs Visualization Lab

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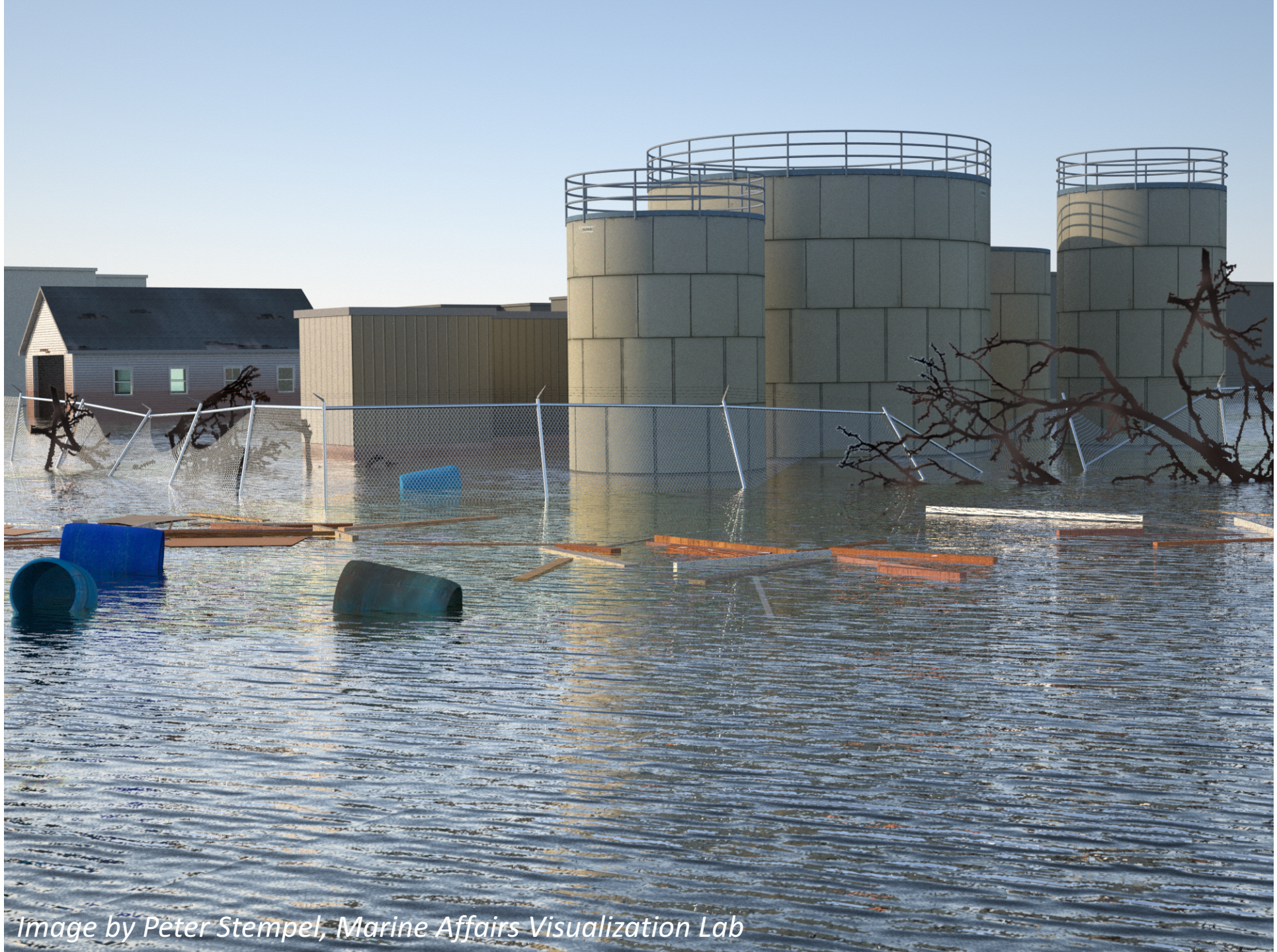

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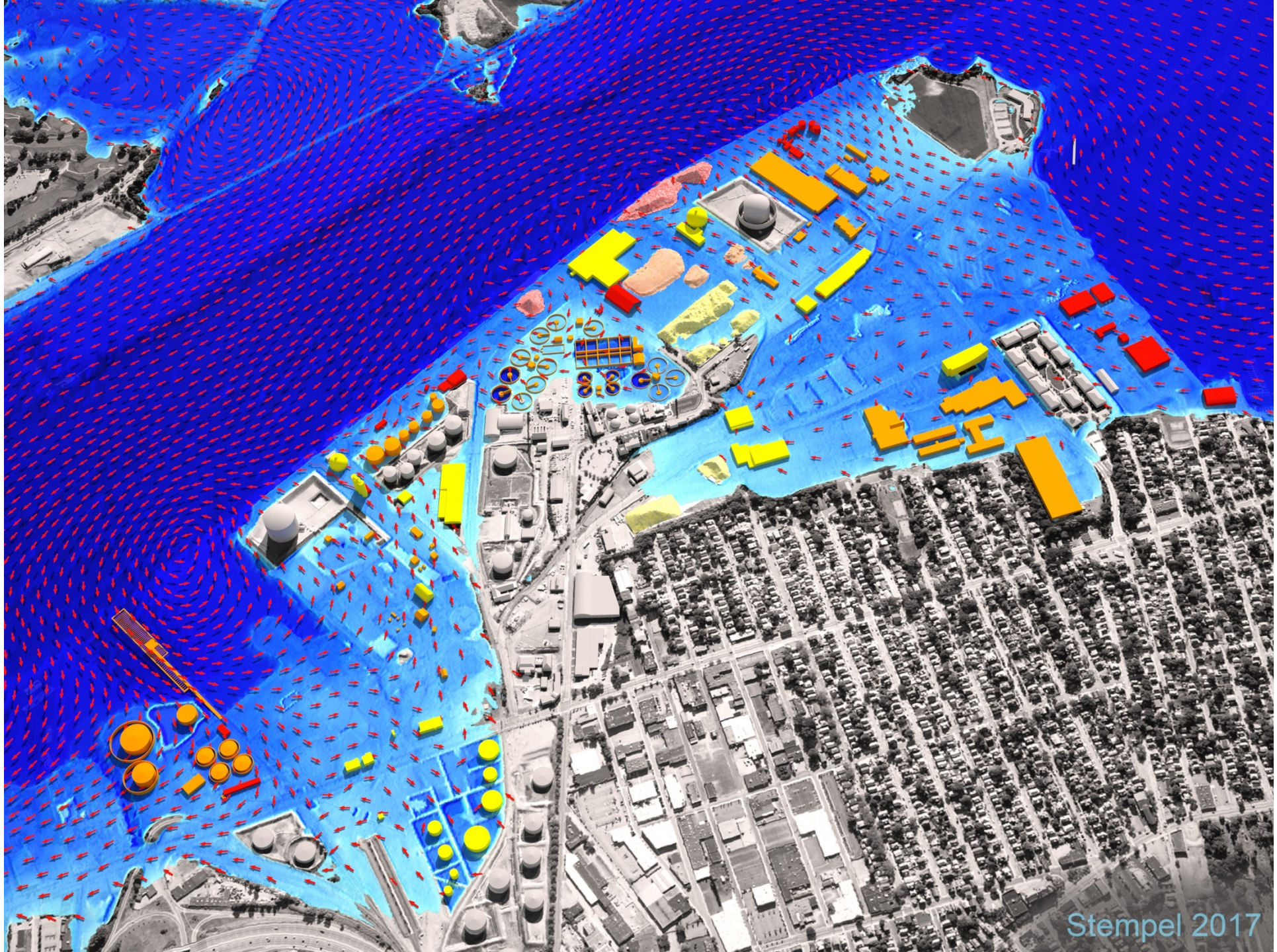
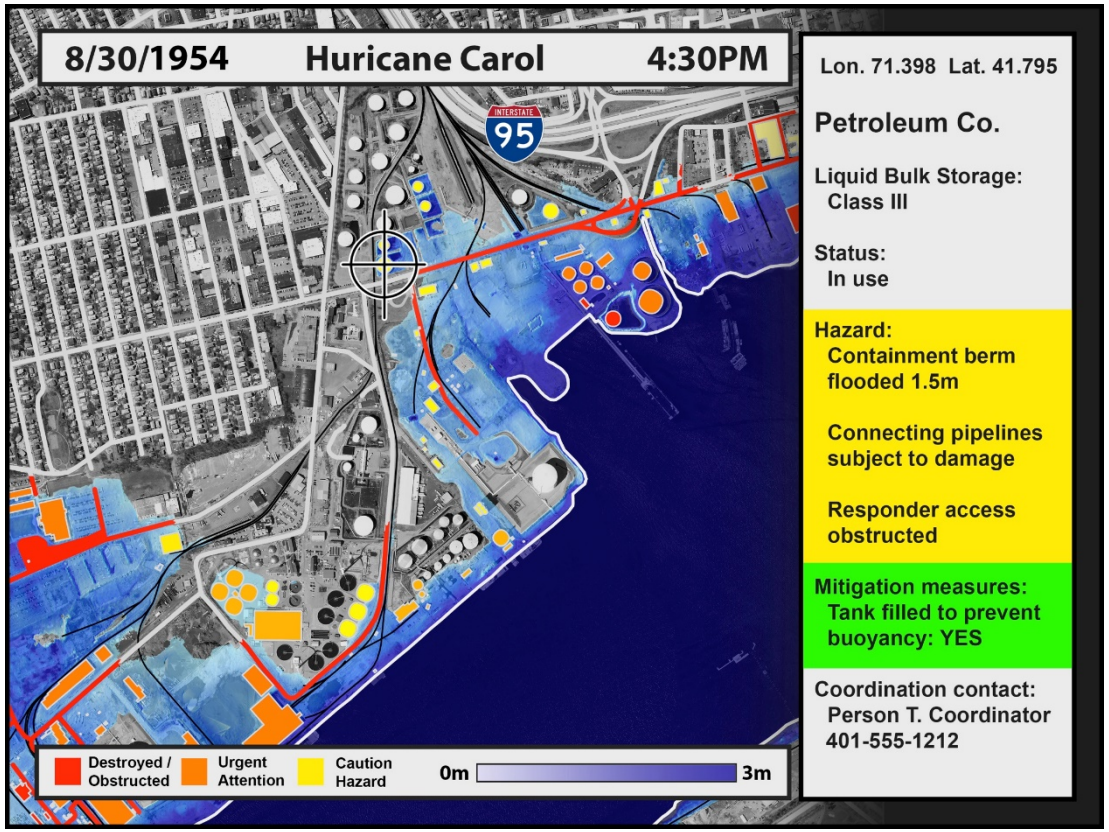
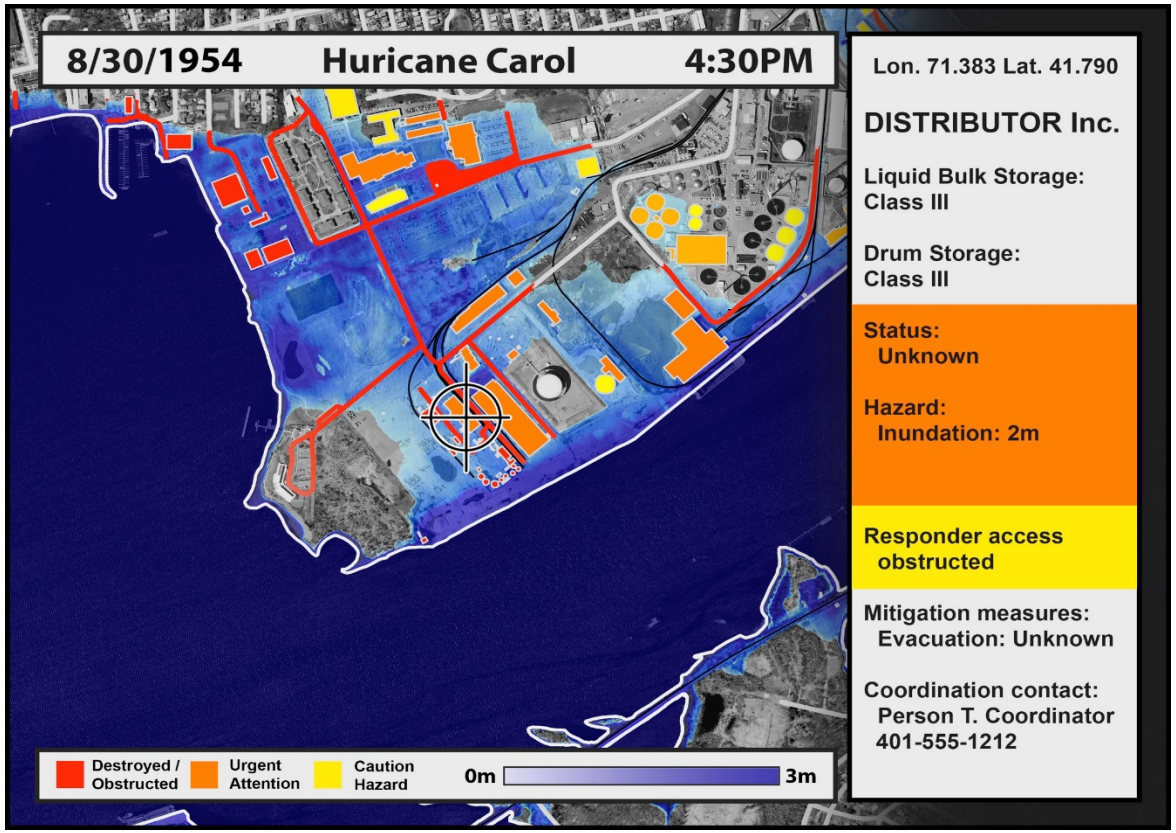

Stempel 2017

Example 1 – Understanding risk: Computational framework and interactive visualization for training and real-time hazard impact analysis





Example 2 – Stimulating dialogue for long-range planning - Port of Providence Vulnerability Assessment

8-3-15 workshop

Understand and comment on storm scenario & consequences

Review long-range transformational resilience concept

Review possible long-range "resilience goals" for the port and weigh importance of each using multi-criteria decision support tool

Private Firms	***Local Government***
Sims Metal Management	Providence Emergency Management Agency
Moran Shipping	City of East Providence Planning
Providence Working Waterfront Alliance	City of Providence Planning*
Narragansett Improvement	***State Government***
McAllister Towing	RI Coastal Resources Management Council*
Exxon Mobil	RI Statewide Planning
Shnitzer Steel Industries	CommerceRI*
Rhode Island Oil Heat Institute	Narragansett Bay Commission
Quonset/Davisville Development Corporation*	***Federal Government***
FM Global	US Maritime Administration*
National Grid	Federal Highway Administration*
Hudson Asphalts	US Coast Guard*
Capital Terminals	US Army Corps of Engineers*
Motiva	***Academia/NGO***
Northeast Pilots	RI Coastal Resources Center/RI Sea Grant/GSO*
P & W Railroad	Save the Bay

Example 3 – Testing resilience strategies against barriers in Policy Simulation Lab

Carry Out Policy Simulations under Controlled Laboratory Conditions

Questions?

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