

CARIBBEAN REGIONAL OCEAN PARTNERSHIP

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DIRECTOR , PRCZMP



2013



Background

EO 13547 - July 2010: National Policy for the Stewardship of the Ocean, Coasts, and the Great Lakes.

Establishes the National Ocean Policy ...*to ensure that Ocean and Coasts, and Great Lakes are:*

- *healthy and resilient,*
- *safe and productive,*
- *understood and treasured to promote the well-being, prosperity, and security of present and future generations.*



CROP 2012

Background

To achieve this vision the National Ocean Policy establishes Coastal and Marine Spatial Planning (CMSP) a regionally based planning process:

...a comprehensive, adaptive, integrated, ecosystem-based, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean, coastal areas and resources.



I. Regional Planning Bodies

...consist of Federal, State, and tribal organizations working under relevant authorities to develop CMS plans for a region (e.g., resource management, coastal zone management or fisheries, transportation, and public health).



II. Regional Ocean Partnerships

...established by the States in recognition of the need to address a new generation of opportunities and challenges and to ensure that future generations can enjoy healthy and productive ocean and coastal ecosystems.

- Regional approach
- Potential to leverage existing relationships and resources
- Generate greater efficiency in regulatory processes.



Alaska/Arctic

Great Lakes

Northeast

Mid-Atlantic

South Atlantic


Gulf of Mexico

Caribbean

West Coast

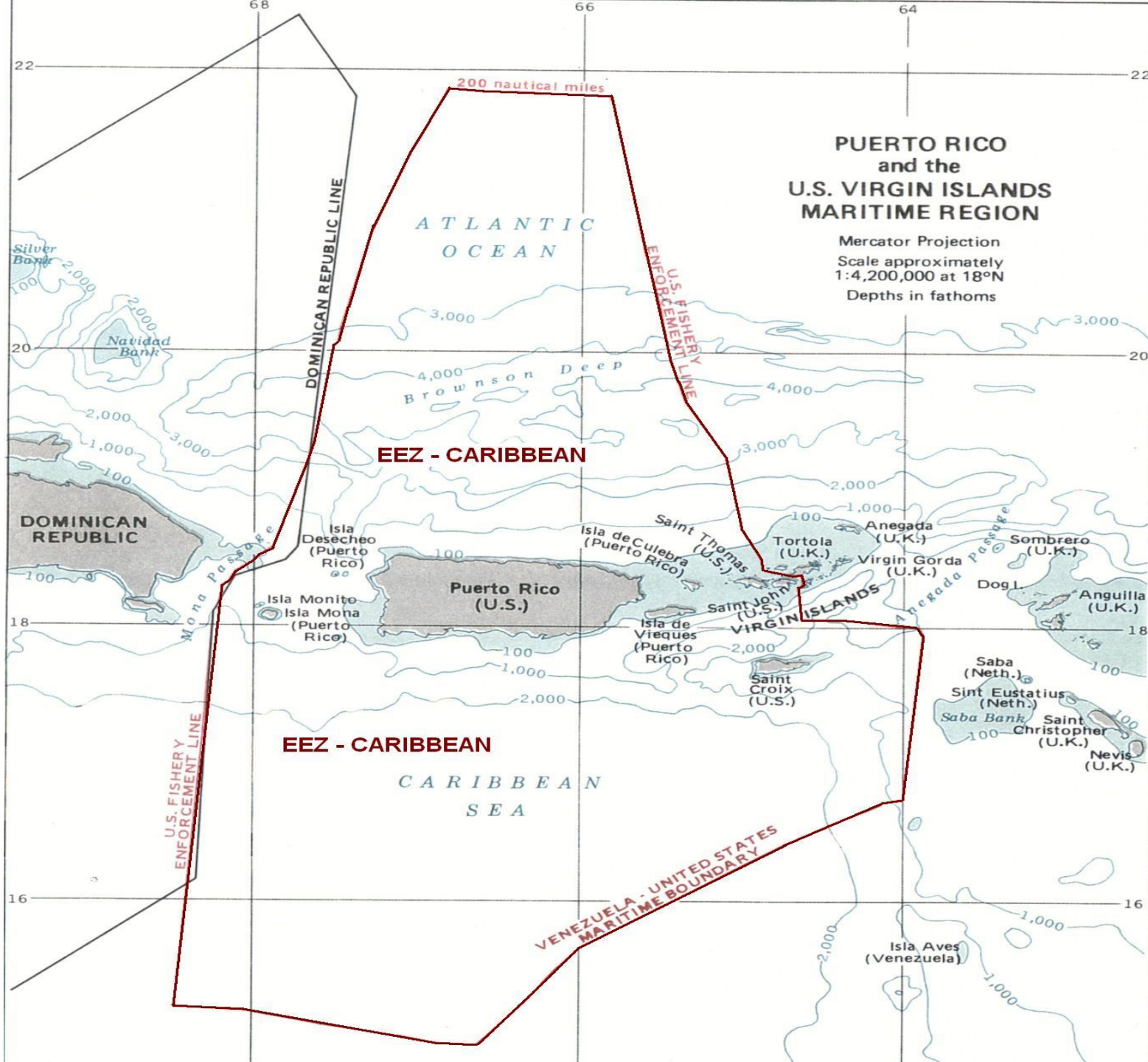
Pacific Islands

Legend

- US Exclusive Economic Zone (EEZ)
-  Regional Planning Areas
- Large Marine Ecosystems

Regional Planning Areas have been approximated for illustrative purposes only and should not be construed as a legal or official boundary of any kind.





PUERTO RICO and the U.S. VIRGIN ISLANDS MARITIME REGION

Mercator Projection
Scale approximately
1:4,200,000 at 18°N
Depths in fathoms

EEZ - CARIBBEAN

EEZ - CARIBBEAN

**VENEZUELA - UNITED STATES
MARITIME BOUNDARY**

**U.S. FISHERY
ENFORCEMENT LINE**

**U.S. FISHERY
ENFORCEMENT LINE**

DOMINICAN REPUBLIC LINE

ATLANTIC
OCEAN

Brownson Deep

CARIBBEAN
SEA

DOMINICAN
REPUBLIC

Puerto Rico
(U.S.)

VIRGIN ISLANDS

Isla Aves
(Venezuela)

22
20
18
16

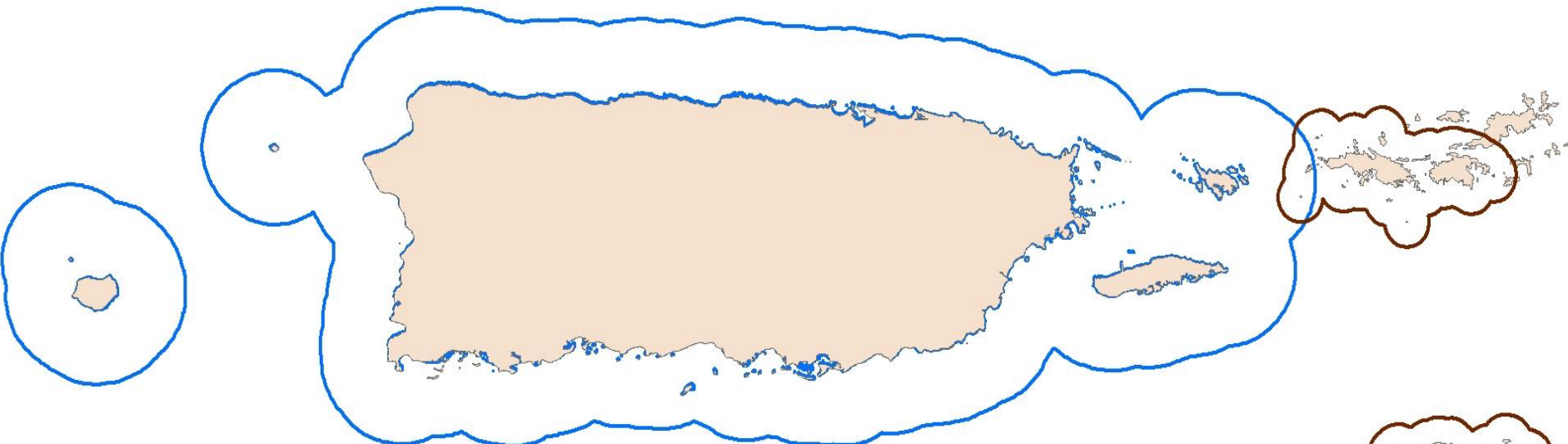
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16



68

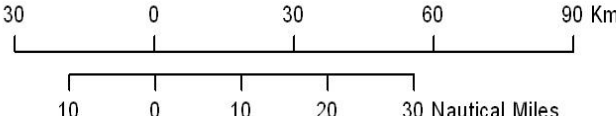
66

64

Territorial waters Puerto Rico - U.S. Virgin Islands



-  USVI (3 mn)
-  Puerto Rico (9 mn)





Memorandum of Understanding:

- **Creates the CROP**
- **The Parties recognize the importance of continuing cooperation and participation with Federal, PR, and USVI governmental, non-governmental organizations, and academic institutions in programs of mutual interest .**
- **Coordination with existing regional organizations such as the Caribbean Fisheries Management Council (CFMC), the Caribbean Coastal and Ocean Observing System (CARICOOS), and the Coral Reef Conservation and Management Programs, USCRTF, CCRI, PR and USVI government agencies.**
- **Collaboration with BVI, Dominican Republic, CCI 20/20 and Wider Caribbean Region.**



CROP 2012

CARIBBEAN REGIONAL OCEAN PARTNERSHIP

MEMORANDUM OF UNDERSTANDING
BETWEEN
THE GOVERNMENT OF PUERTO RICO
AND
THE GOVERNMENT OF THE U.S. VIRGIN ISLANDS

This MEMORANDUM OF UNDERSTANDING (hereinafter referred to as "the Memorandum") is made this _____ day of _____, 2011 BY AND BETWEEN GOVERNMENT OF PUERTO RICO, represented by Luis Fortuño, Governor, whose address is La Fortaleza P.O. Box 9020082, San Juan, PR, 00902-0082 (hereinafter referred to as "PR") of THE FIRST PART and the GOVERNMENT OF THE US VIRGIN ISLANDS, represented by John P. DeJongh, Jr., Governor, whose address is 21-22 Kongens Gade, Charlotte Amalie, St. Thomas, VI 00802 (hereinafter referred to as "USVI") of THE SECOND PART (all of whom are hereinafter collectively referred to as "the Parties" and individually the "Party").

ARTICLE I

WHEREAS the Commonwealth of Puerto Rico and the Territory of the United States Virgin Islands are the only inhabited jurisdictions of the United States of America in the Caribbean Sea.

WHEREAS these jurisdictions are neighbouring and share many similar cultural and natural histories as well as common threats and risks to their island communities and natural resources.

WHEREAS the submerged lands and waters of the Caribbean Sea and Atlantic Ocean that divide these jurisdictions contain many important resources for these jurisdictions.

WHEREAS no overall initiative to jointly manage the resources of the submerged lands and waters between these jurisdictions have been developed.

WHEREAS this initiative shall recognize and foster coordination with existing organizations and agencies.

WHEREAS this initiative will seek to address relevant aspects of climate change, conservation of natural resources, energy development, fisheries, navigation, pollution abatement, tourism, and interstate commerce.

WHEREAS an agreement will promote the integration and increased collaboration with neighbour island states and territories to address topics concerning regional ocean resources.

WHEREAS The Nature Conservancy has the experience, expertise and capacity to develop and advance a regional ocean partnership between these jurisdictions and others.

- Future climate scenarios adaptation
- Conservation of coastal and marine resources
- Data and information management
- Energy development
- Fisheries
- Navigation
- Pollution abatement
- Tourism
- Interstate commerce.



CROP seeks to:

- **Enhance transparency and accountability**
- **Balance marine uses providing access for: navigation, tourism, recreation, conservation, fishing, renewable energy facilities siting and electrical transmission and grids establishment.**
- **Mediation of coastal and marine resource conflicts.**
- **Protect coral reef systems, essential fish habitat and large marine ecosystems, corridors and connectivity.**
- **Strengthen regional ocean governance**



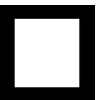
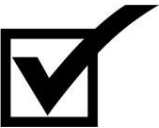
PR and USVI agree to:

- **Facilitate communication among participating jurisdictions;**
- **Oversee project financial management**
- **Work together to identify, prioritize, and provide technical assistance and funding to implement activities arising from the Caribbean Regional Ocean Partnership.**



During Phase I PR , USVI and TNC agree to:

- **Task 1: Formalize and launch the Caribbean Regional Ocean Partnership**
- **Develop a Regional Work Plan**
- **Task 2 : Conduct a Policy Analysis**
- **Task 3 : Coordinate Regional Spatial Data Efforts and develop Regional Data Management and Sharing Mechanisms to Support Future Planning Activities**





RELEVANT STATISTICS

Ernesto L. Díaz
2012

Emerged land area:	3,508 mi ² (9,497 km ²)
Territorial waters:	9 mn (10.35 mi)
Population:	~3.7 millions (27 th U.S.)
Coastal Population:	2.52 millions (62%)
Urban areas at CZ:	40%
Urban/coastline ratio:	24%

GDP: ~\$ 95.7 BILLION / YR

ECONOMY (2010):

- Manufacture: 45.5%
- Finances, Insurance and Real Estate: 19%
- Services: 12.8% (Turismo: 7%)
- Government: 9.7%
- Commerce: 7.8%
- Transportation and Services: 3.2%
- Construcction: 1.9%
- Agriculture: 0.7%



Critical Infraestructure within 1 Km (coast)



- Eight ports

- Eight airports



- Seven Power Plant complexes (>40 plants)

- 1,080 miles of sanitary infrastructure



- 14 waste water treatment plants

- 81 industrial parks

- 114 miles of primary roads

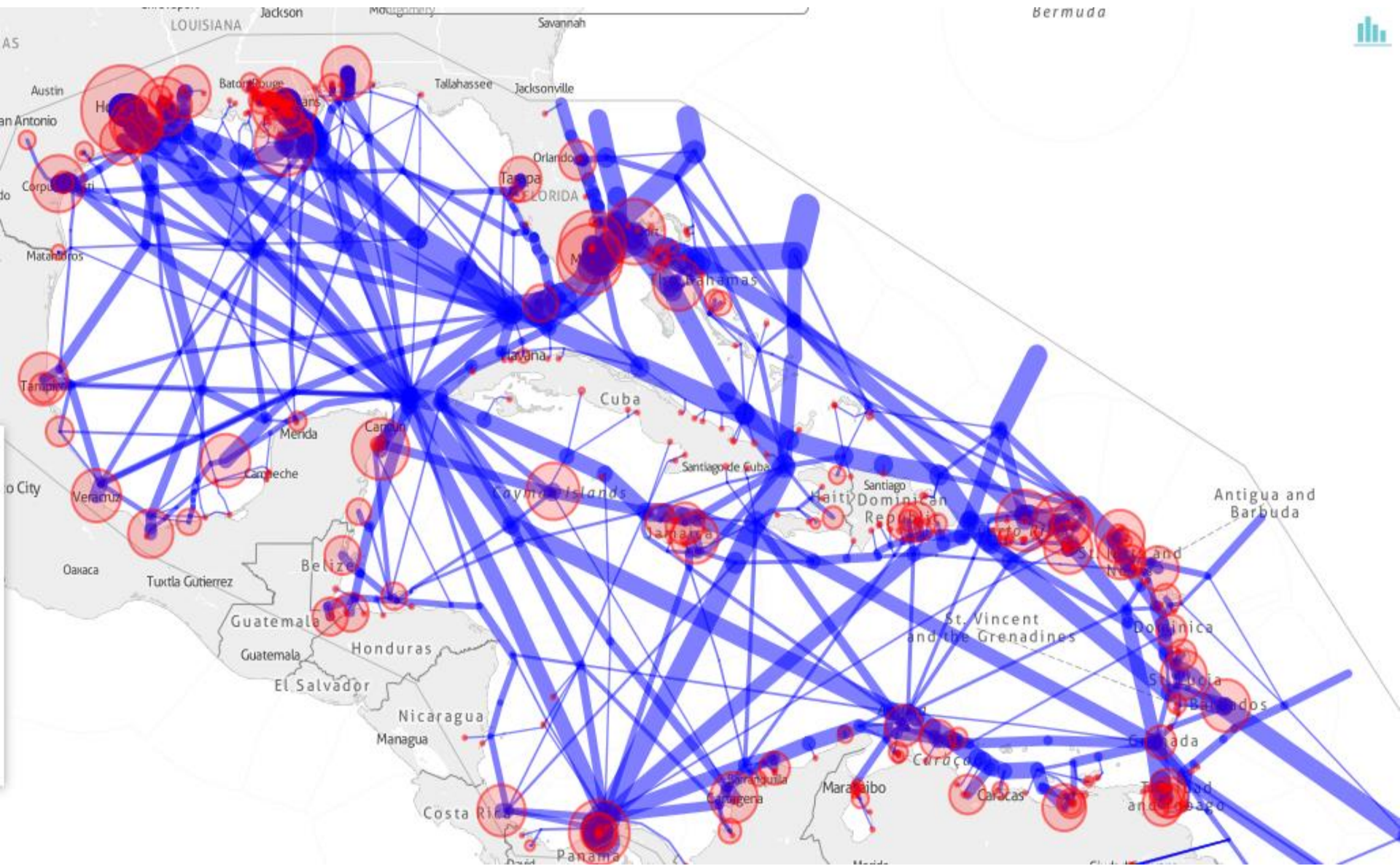


COASTAL AND MARINE USES



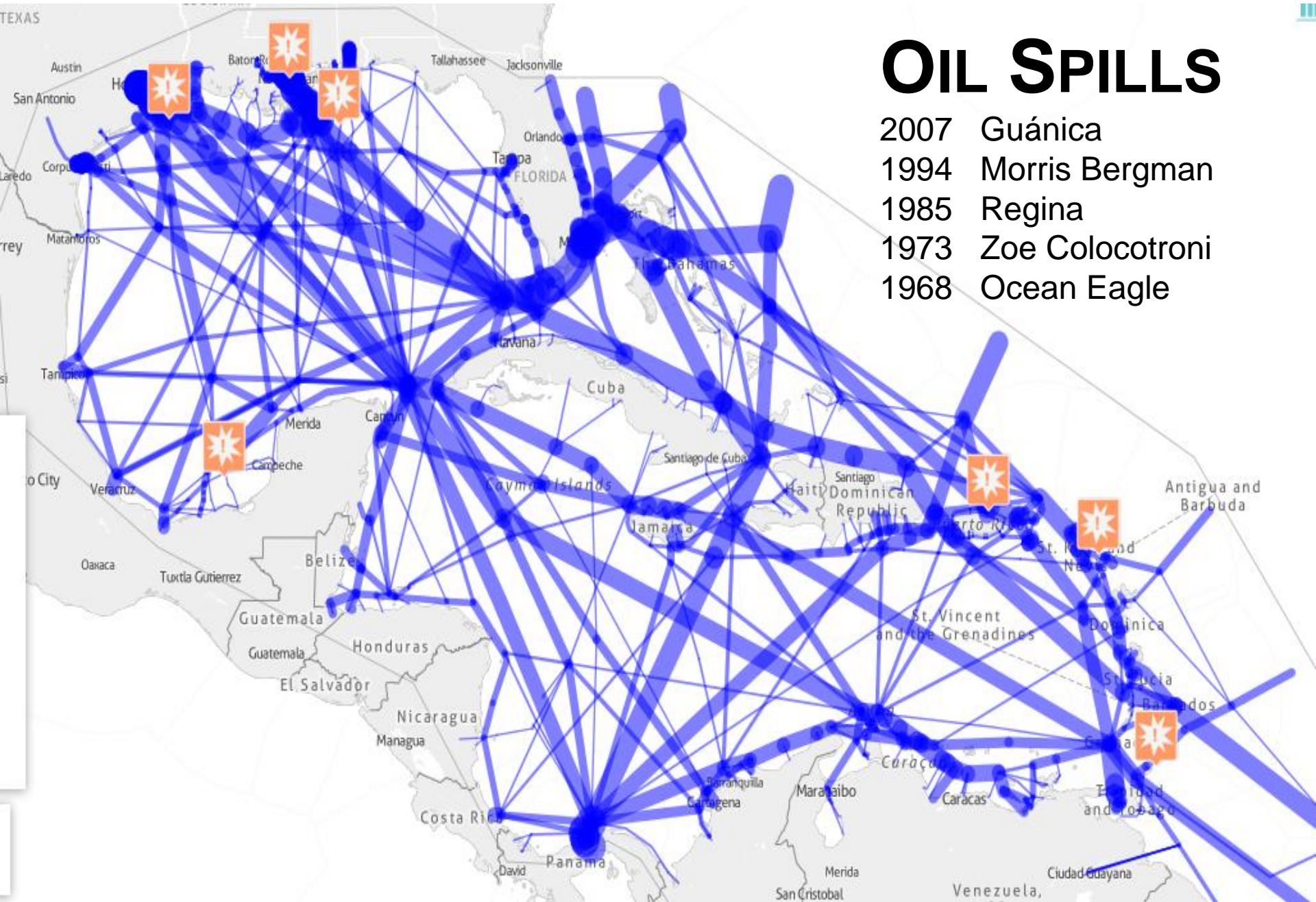
HUMAN USES: NAVIGATION





OIL SPILLS

- 2007 Guánica
- 1994 Morris Bergman
- 1985 Regina
- 1973 Zoe Colocotroni
- 1968 Ocean Eagle



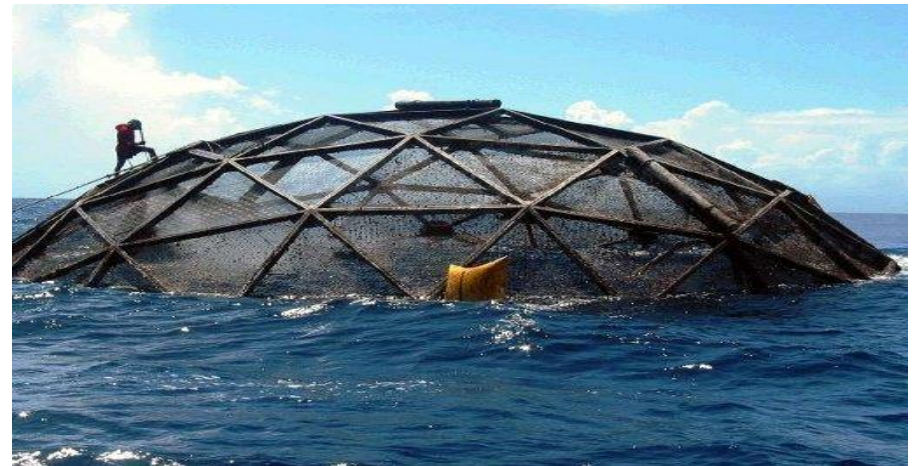


HUMAN USES: TOURISM AND RECREATION





HUMAN USES: FISHERIES AND AQUACULTURE





HUMAN USES: NATIONAL SECURITY



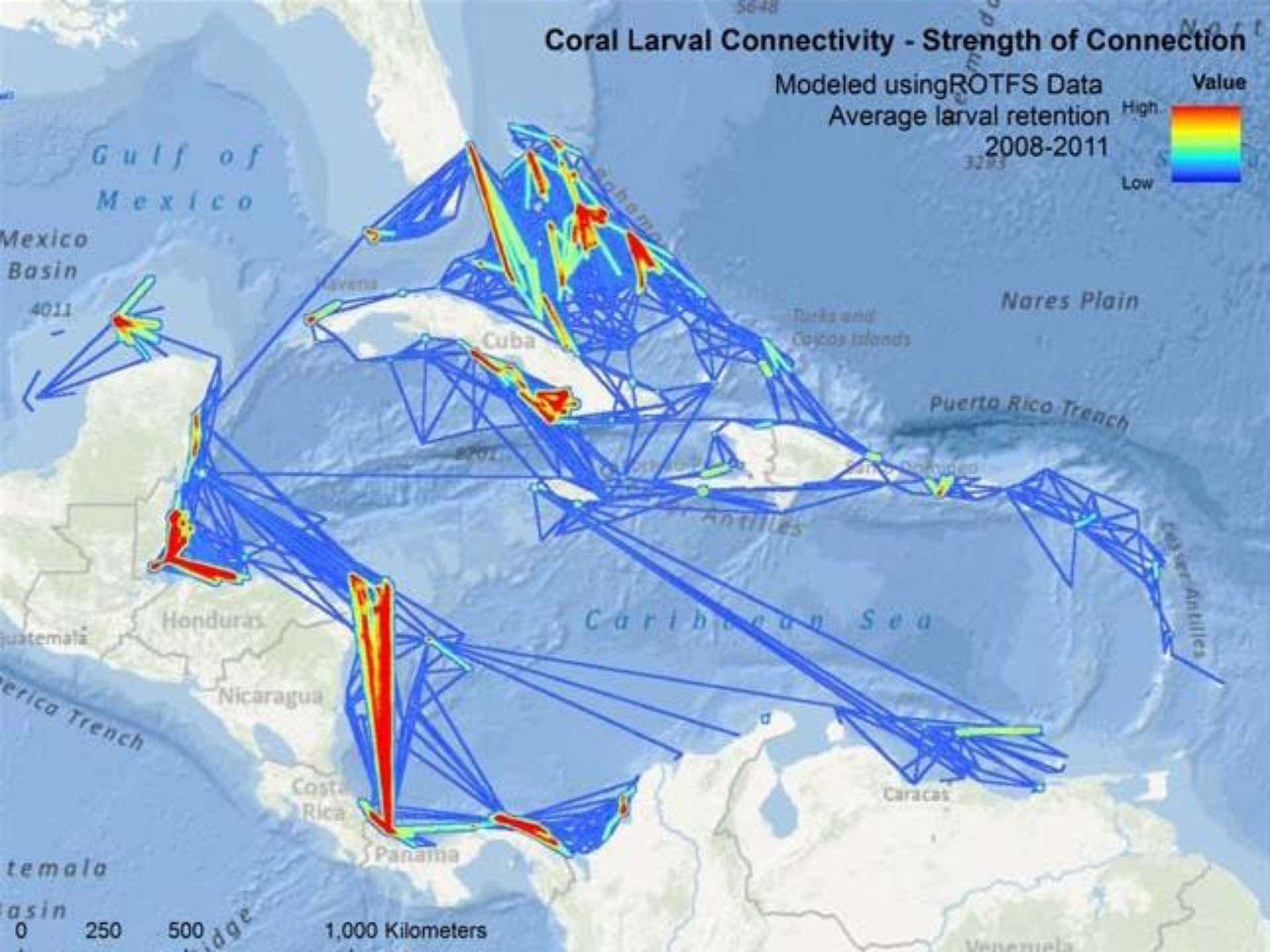
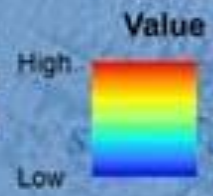


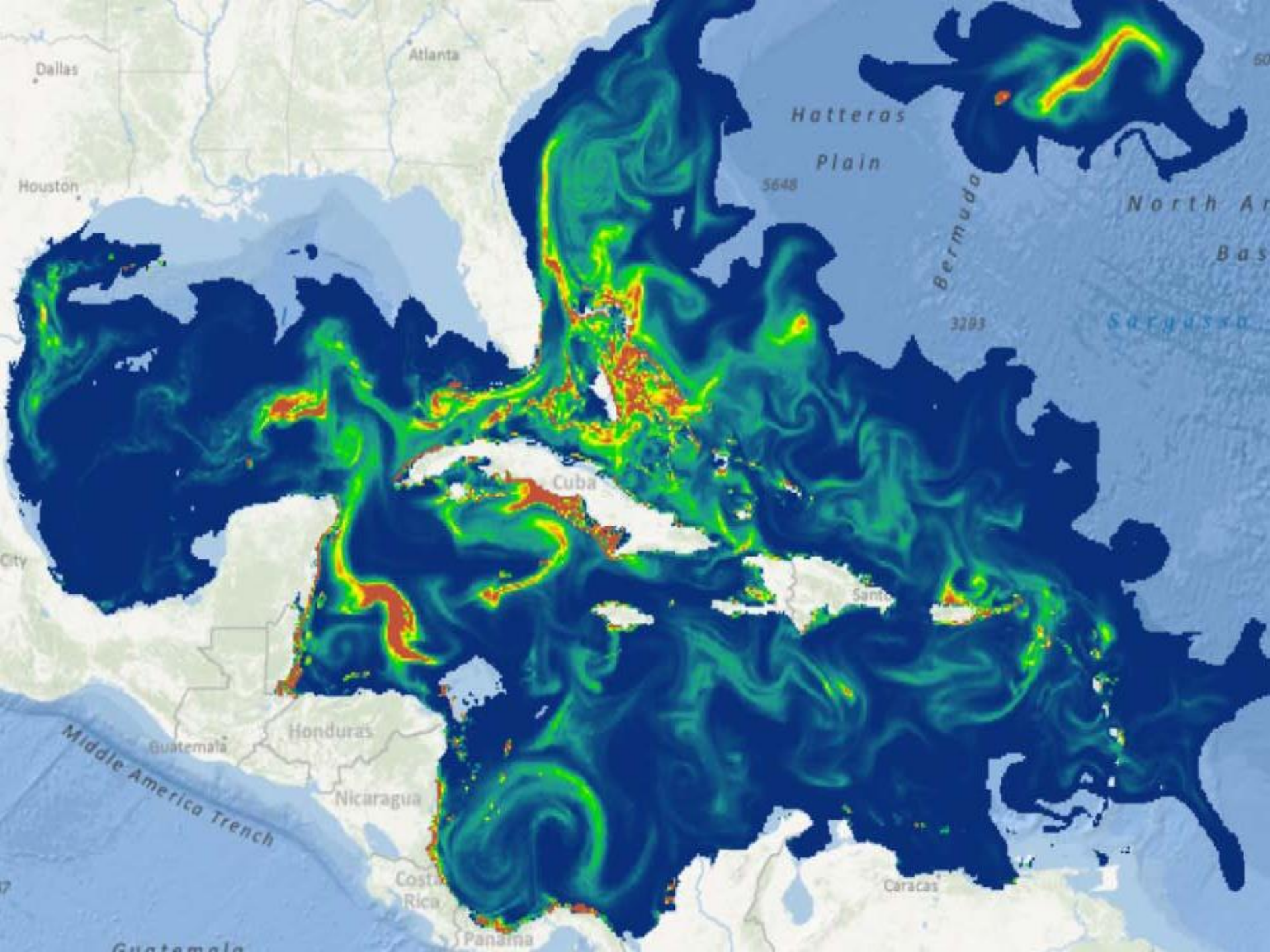
HUMAN USES: NATURAL RESOURCES CONSERVATION



Coral Larval Connectivity - Strength of Connection

Modeled using ROTFS Data
Average larval retention
2008-2011







HUMAN USES: ENERGY





CROP 2012

Mayor granja eólica 'offshore' del mundo abastecerá Londres

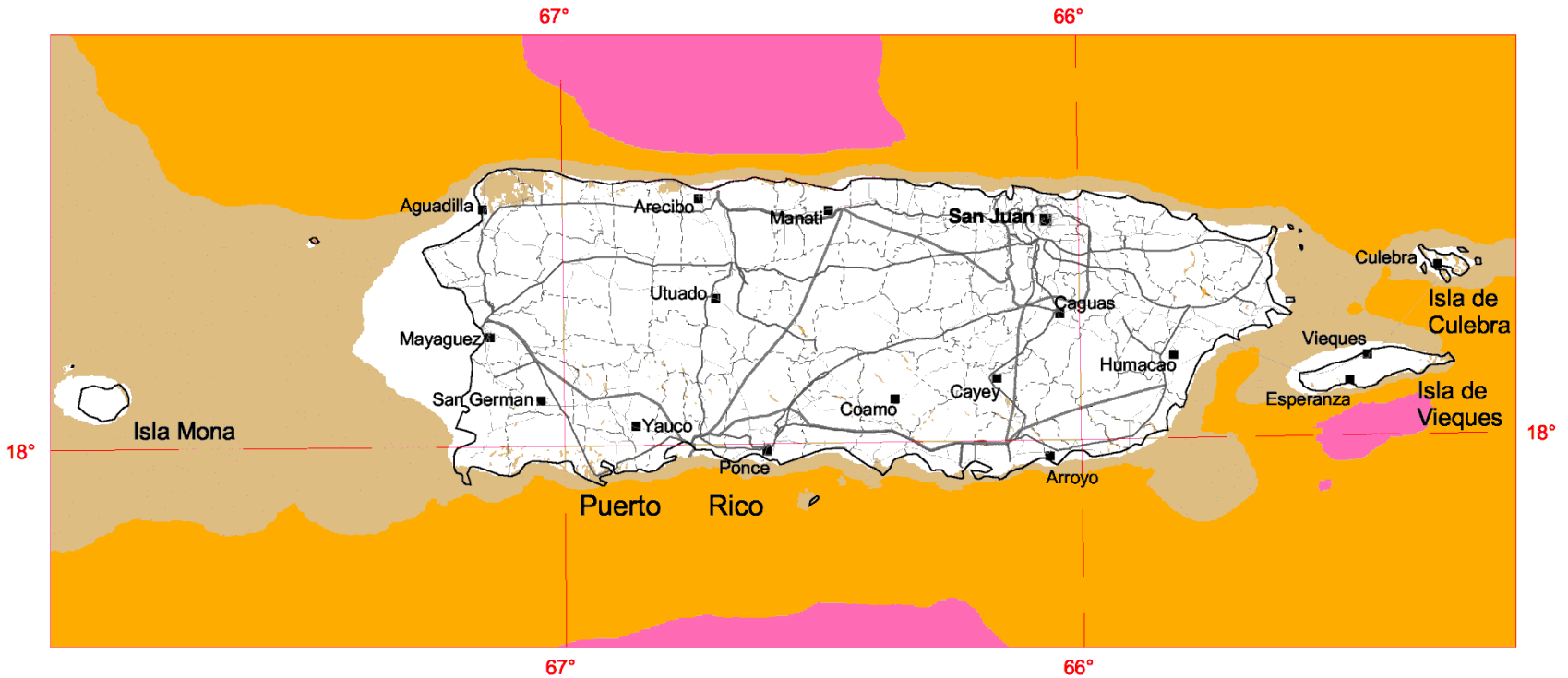
El Mundo España el Dom, 07/10/2012



“341 turbinas y una potencia de 1.000 megavatios, capaz de abastecer el 25% de los hogares de Londres.” (Población: 8,174,100)

“El auge de las turbinas en la costas británicas contrasta sin embargo con el patrón que se ha producido en tierra, donde se enfrentan a una férrea oposición por motivos 'paisajísticos, ambientales y oposición de las comunidades’”

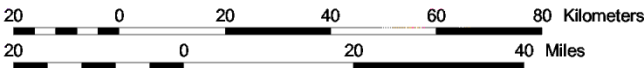
Puerto Rico - 50 m Wind Power



Wind Power Classification				
Wind Power Class	Resource Potential	Wind Power Density at 50 m W/m ²	Wind Speed ^a at 50 m m/s	Wind Speed ^a at 50 m mph
1	Poor	0 - 200	0.0 - 5.9	0.0 - 13.2
2	Marginal	200 - 300	5.9 - 6.8	13.2 - 15.2
3	Fair	300 - 400	6.8 - 7.5	15.2 - 16.8
4	Good	400 - 500	7.5 - 8.0	16.8 - 17.9
5	Excellent	500 - 600	8.0 - 8.5	17.9 - 19.0

^a Wind speeds are based on a Weibull k of 2.5 at sea level.

Transmission Line	
Voltage (kV)	
	38
	115
	230

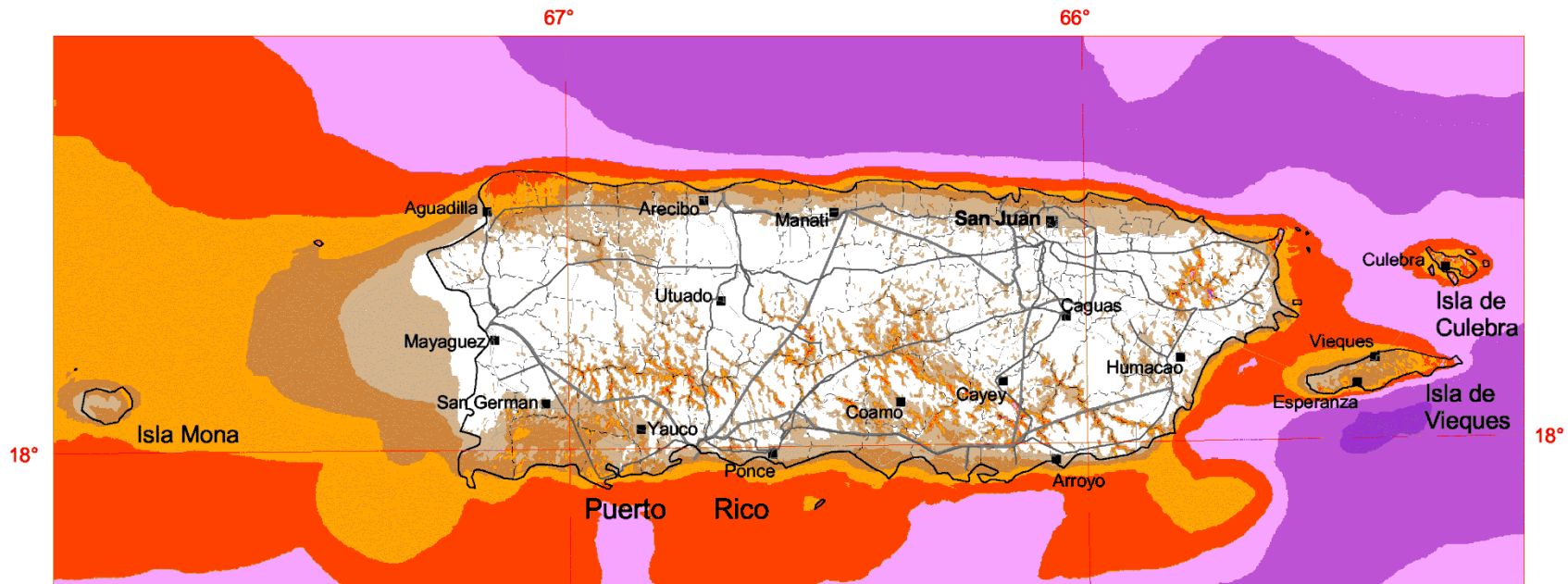


The annual wind power estimates for this map were produced by AWS Truewind using their Mesomap system and historical weather data.

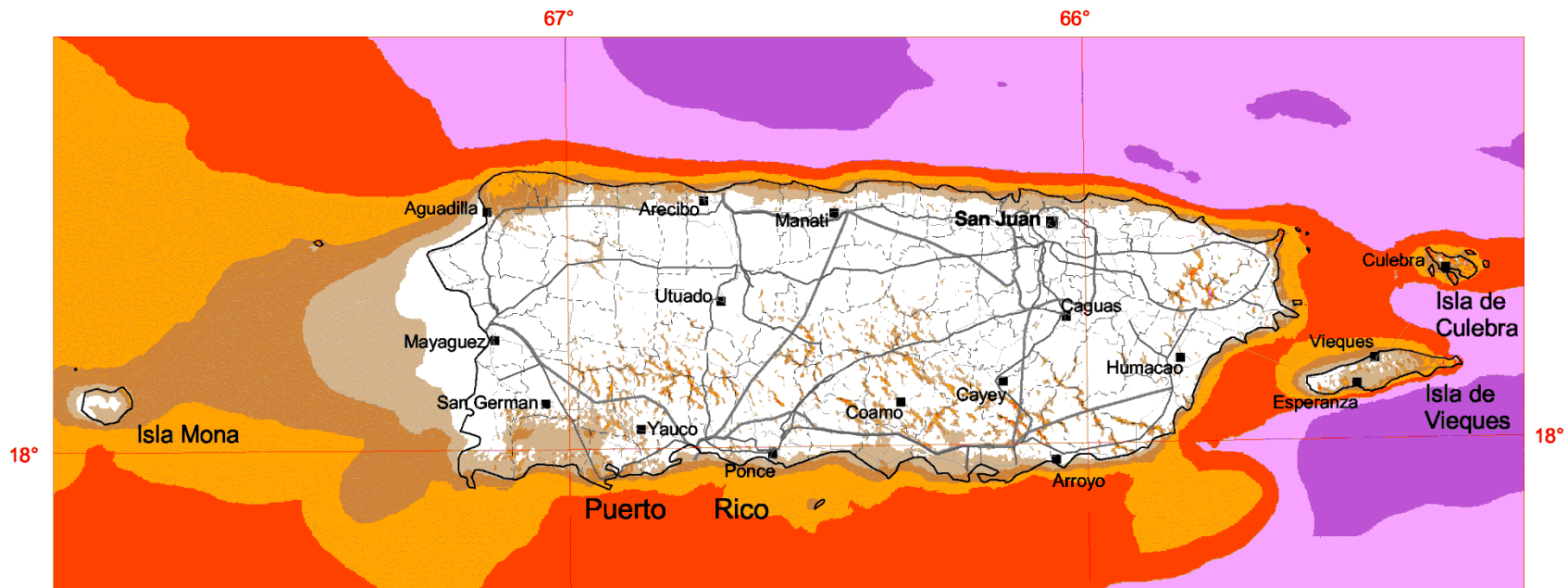


U.S. Department of Energy
National Renewable Energy Laboratory

Puerto Rico - 100 m Wind Speed



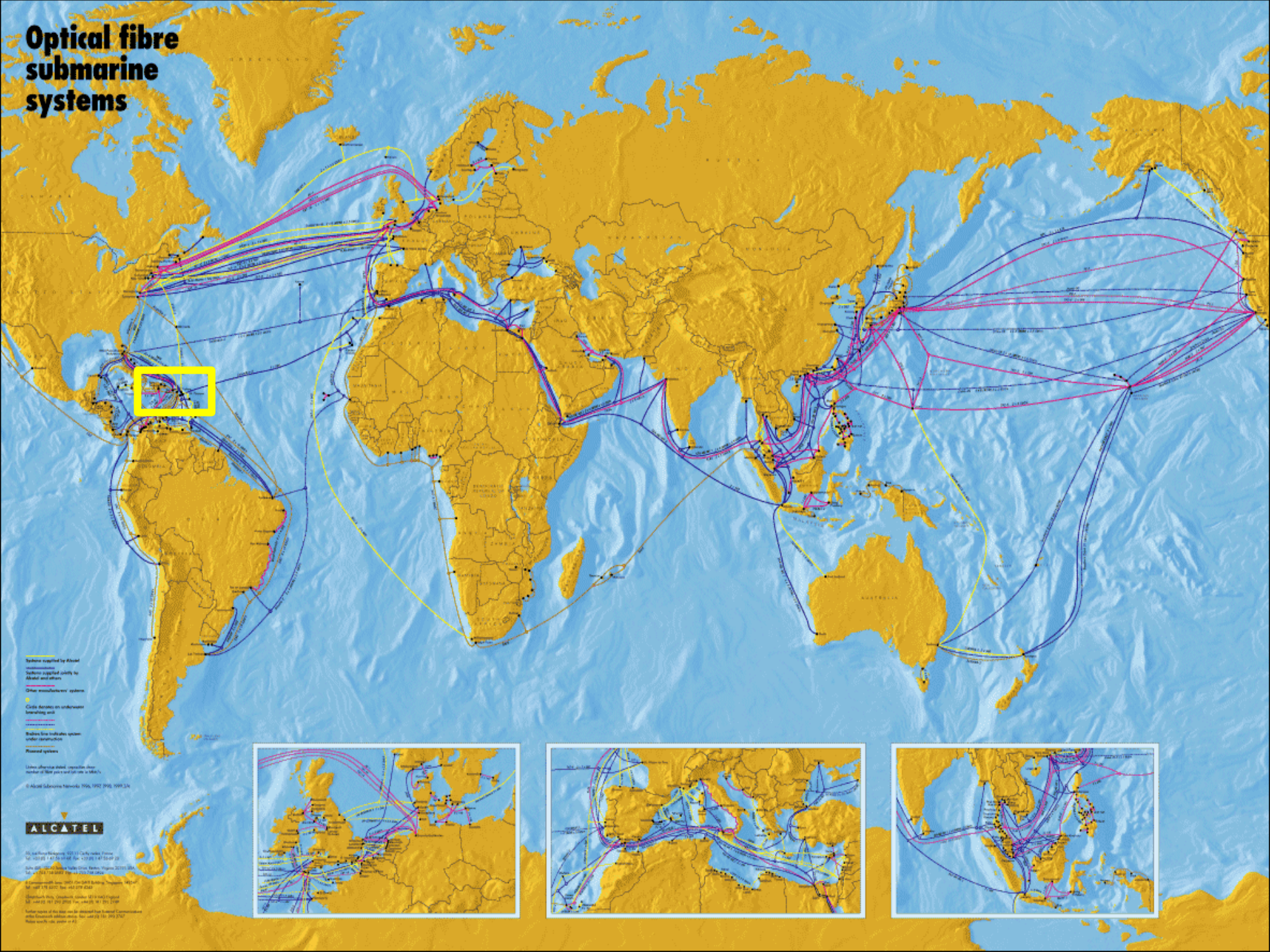
Puerto Rico - 70 m Wind Speed





HUMAN USES: COMMUNICATIONS

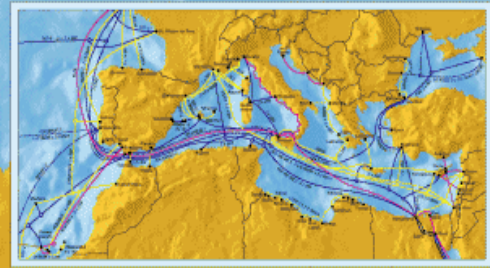
Optical fibre submarine systems



Systems supplied by Alcatel
 Systems supplied jointly to Alcatel and others
 Other manufacturers' systems
 Cable routes on underwater breathing area
 Broken line indicates system under construction
 Planned systems
 Lines of length 4000 km or more are marked with a line for each 1000 km



ALCATEL
 100, rue de France, 92011 Courcouronnes, France
 Tel: +33 (0) 1 67 51 31 00 Fax: +33 (0) 1 67 51 31 01
 Cable and optical fibre systems: 100, rue de France, 92011 Courcouronnes, France
 Tel: +33 (0) 1 67 51 31 00 Fax: +33 (0) 1 67 51 31 01
 © Alcatel Submarine Networks 1996, 1997, 1998, 1999, 2000



O C E A N

Isla Piedra

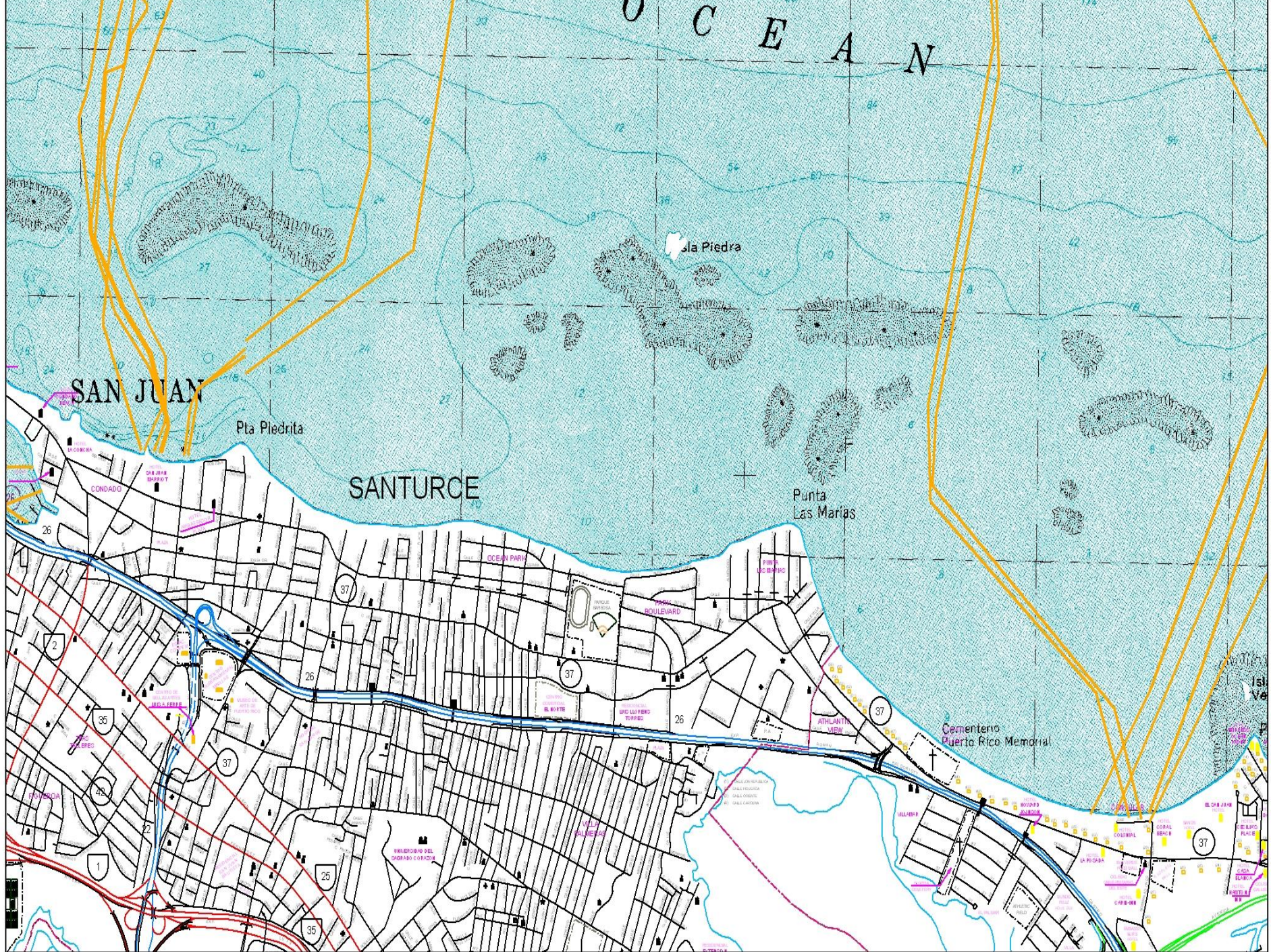
SAN JUAN

Pta Piedrita

SANTURCE

Punta Las Marias

Cementerio Puerto Rico Memorial



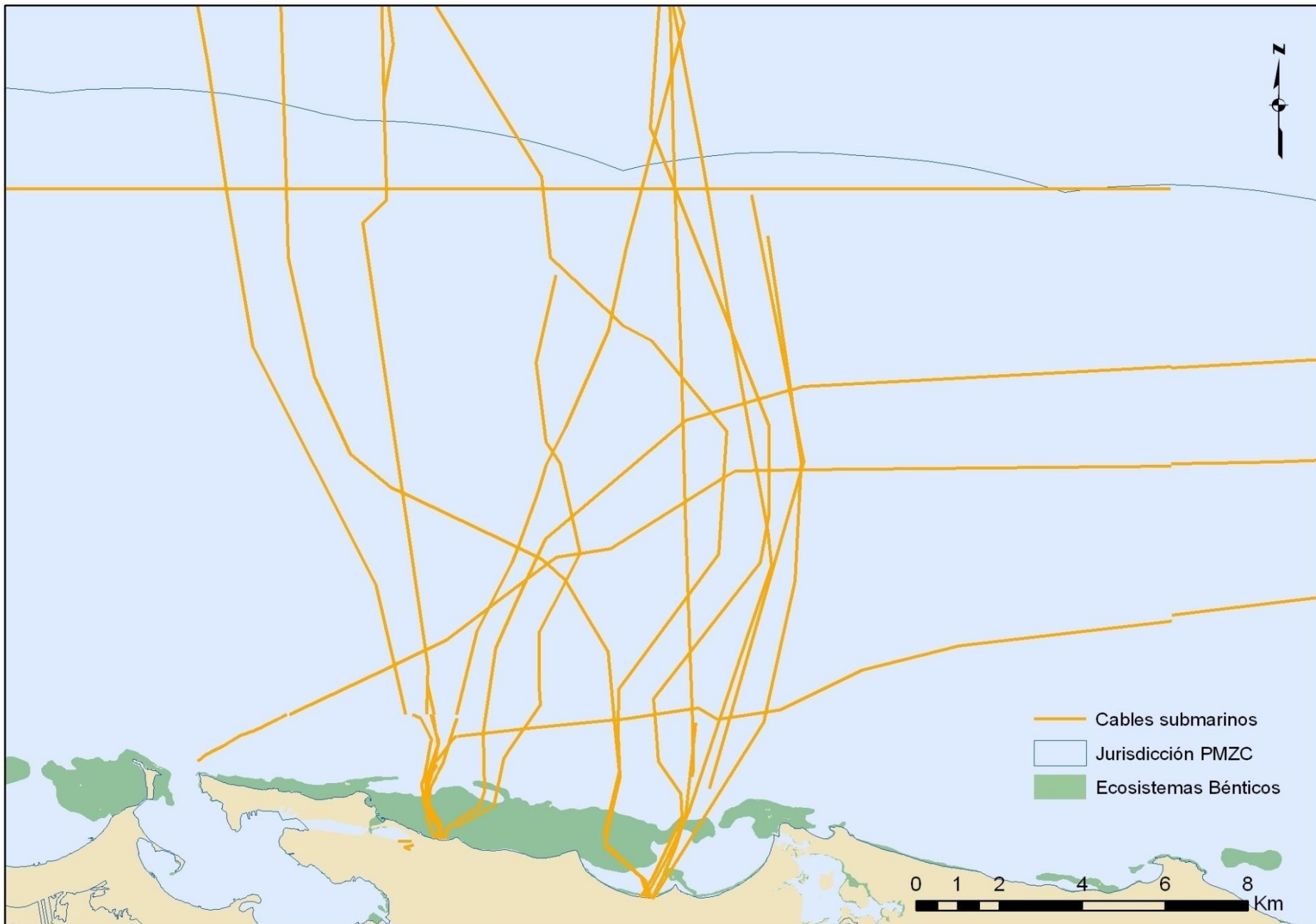
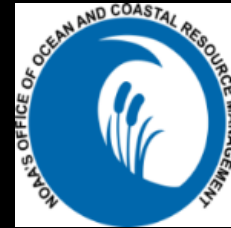
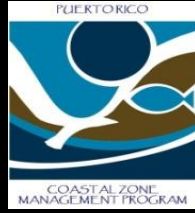


Imagen: Cables submarinos de fibra óptica en la costa norte de PR

NEED: Data and Information



- Planning decisions should be based on the best data about ocean resources .
- Need for robust and coordinated data collection, management, and dissemination.
- Several Federal agencies and regional ocean partnerships are currently developing data portals that will serve as clearinghouses for information central to planning.

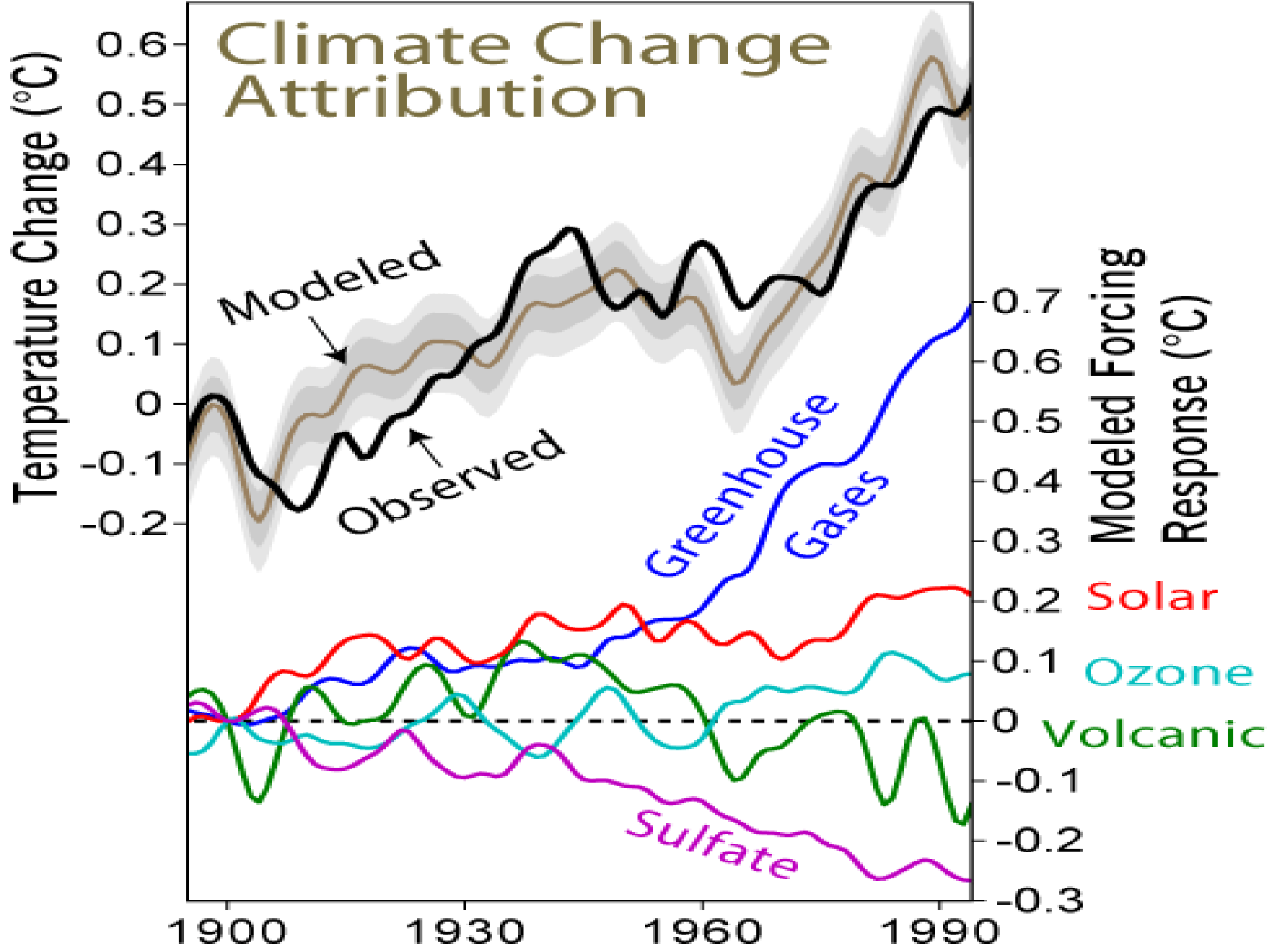


PRCCC 2013

Based on the results of the PRCCC's WG1, WG2 and WG3 as well as the results from coastal hazards risk assessment workshops conducted with 30 / 44 coastal municipalities, the PRCCC concludes:

...Puerto Rico's climate is changing and coastal communities , critical infrastructure, wildlife and ecosystems are all vulnerable to various effects and impacts associated with changes in global, regional, and island weather and oceanographic conditions.

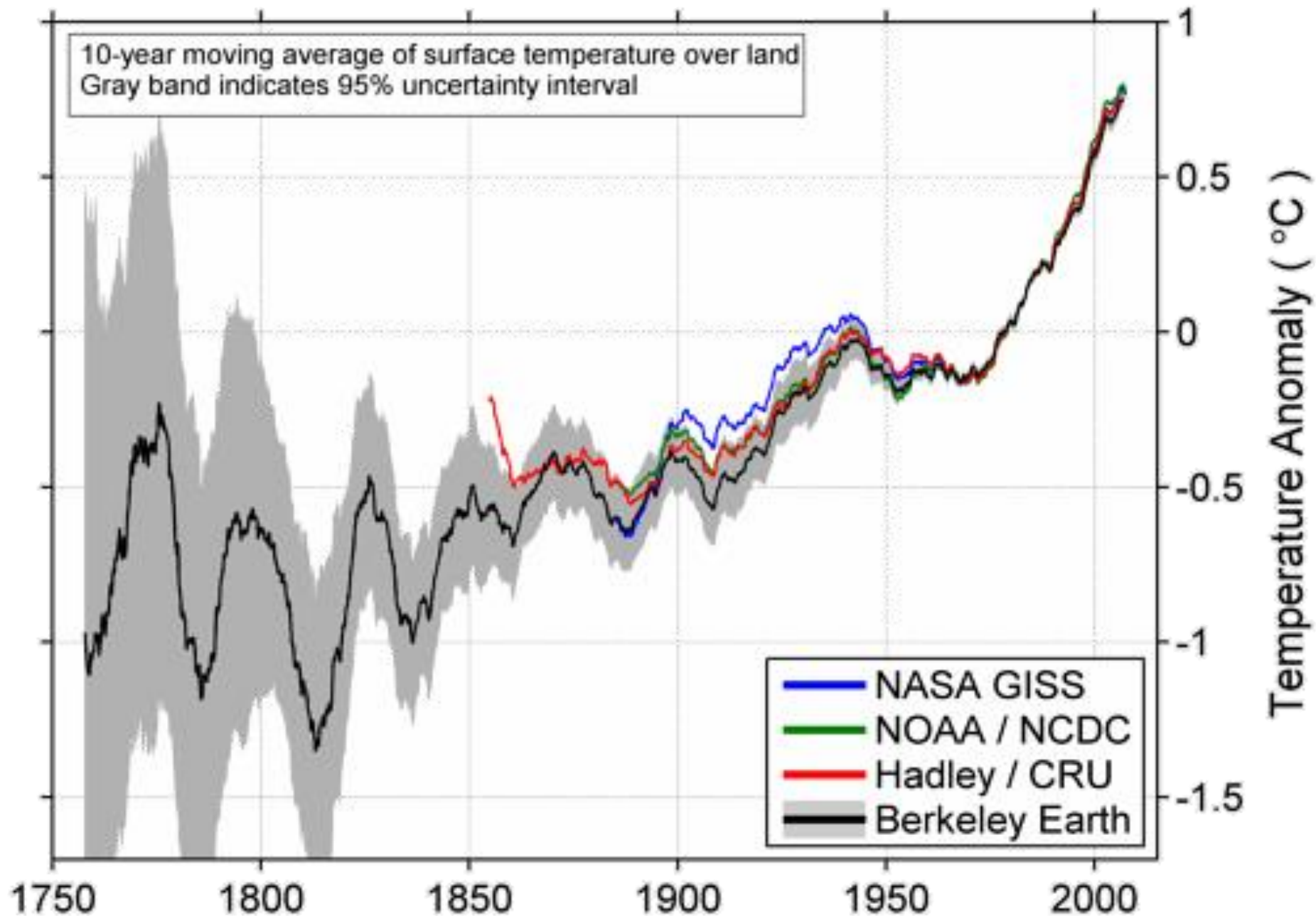
Climate Change Attribution



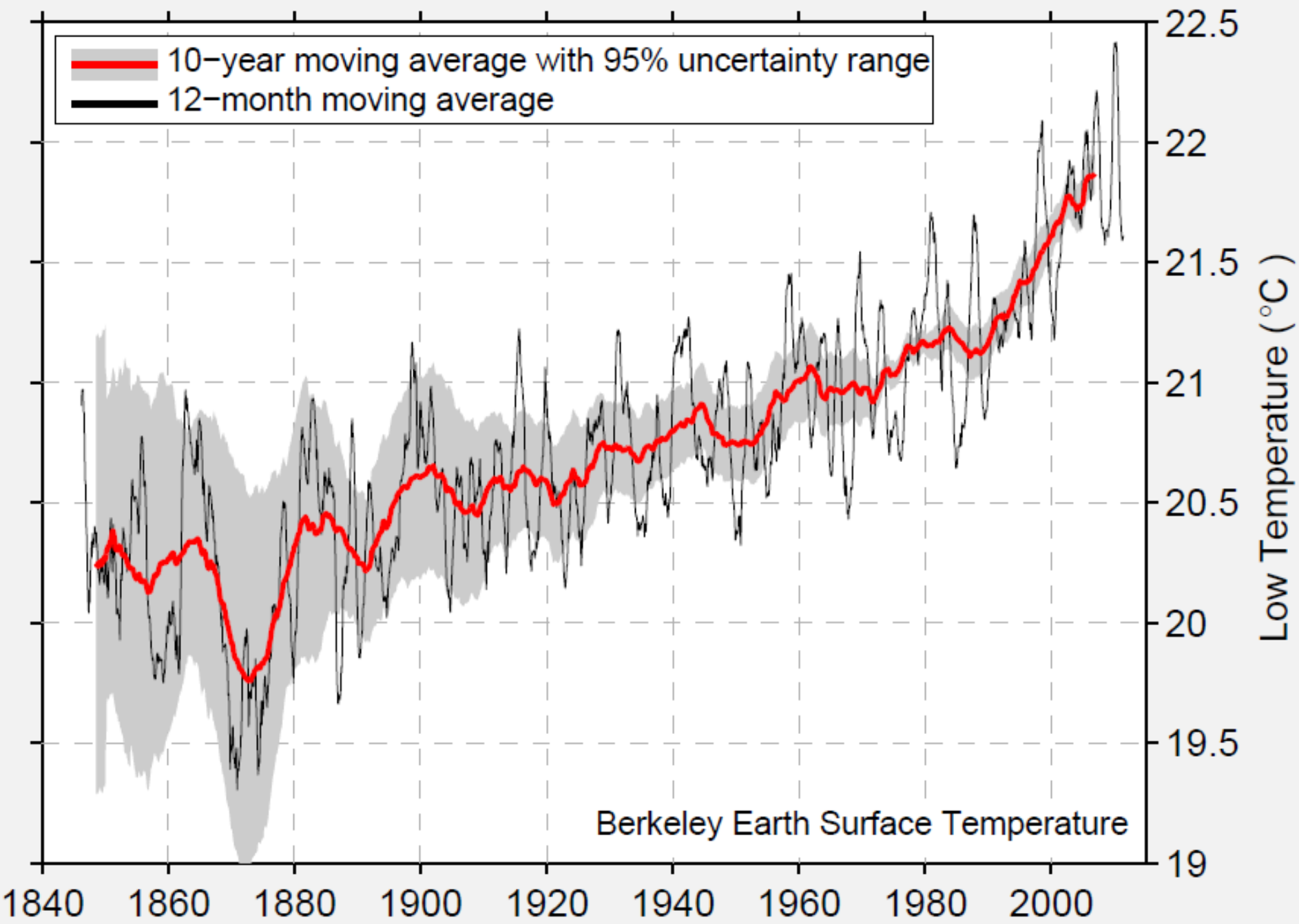


- Berkeley Earth Surface Temperature (BEST) analysis of land-surface temperature records going back 250 years, from 1800, using over 39,000 unique stations *vs.* the 7,280 stations used in the Global Historical Climatology Network Monthly data set (GHCN-M) that has served as the focus of many climate studies to date.
- The analysis shows that in average rise in world land temperature is approximately **1.5 degrees C in the past 250 years**, and about **0.9 degrees in the past 50 years.**

Decadal Land-Surface Average Temperature

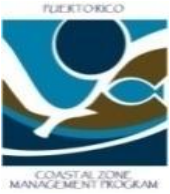


Puerto Rico





- Atm. Temp for Puerto Rico on the average- has increased **annually 0.03 °C** from 1970-1995
- 12 stations out of 16 used throughout the island expressed positive trends from ~1948 to 2007 (Velazquez-Lozano et al., 2006)
- Heat island effect: Temperature in San Juan has grown at a rate of 0.06 ° C over the last 40 years.



Precipitation

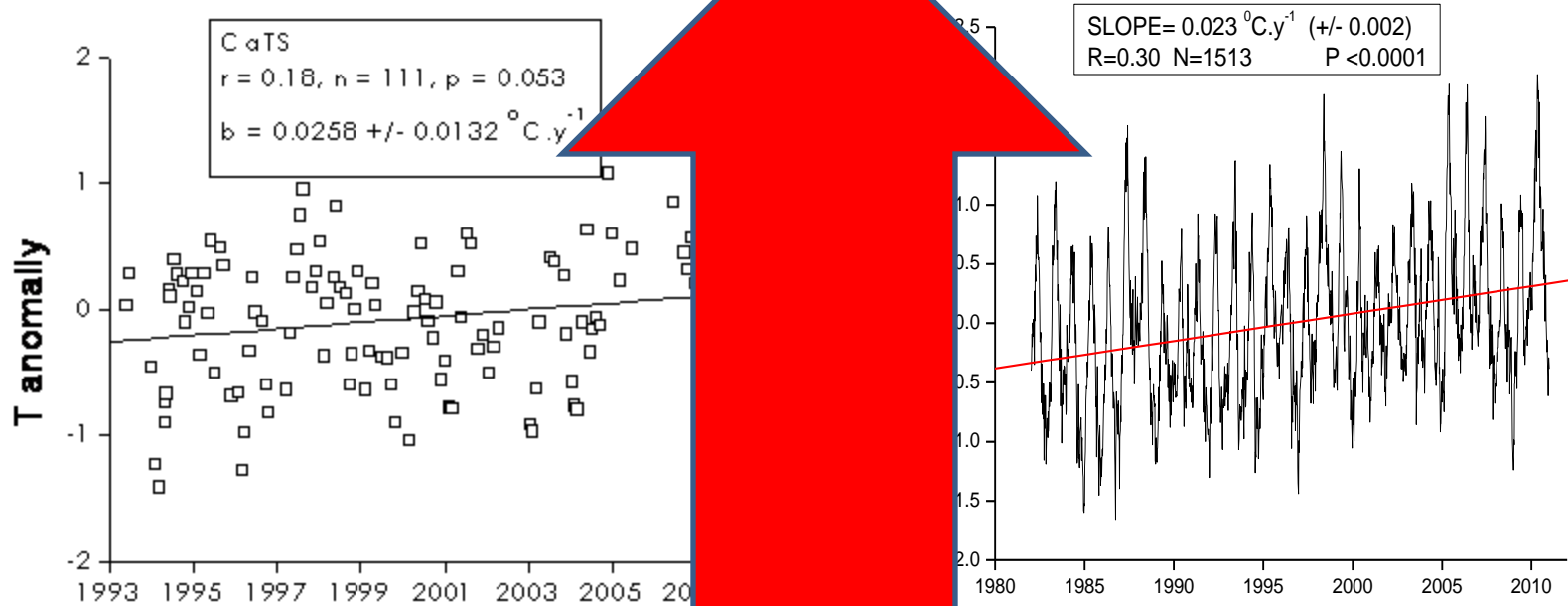
- Analysis dates (1950-2007):
- Data analysis shows no clear trends. No regional trend can be established and concern is expressed for the Western Region of PR, where increased precipitation (14 stations) and decreased precipitation (12 stations) were observed; other regions show mixed trends.

Western Region of PR

Southern Region of PR

Northeast and Eastern

Sea Surface Temperatures (SSTs) - Caribbean

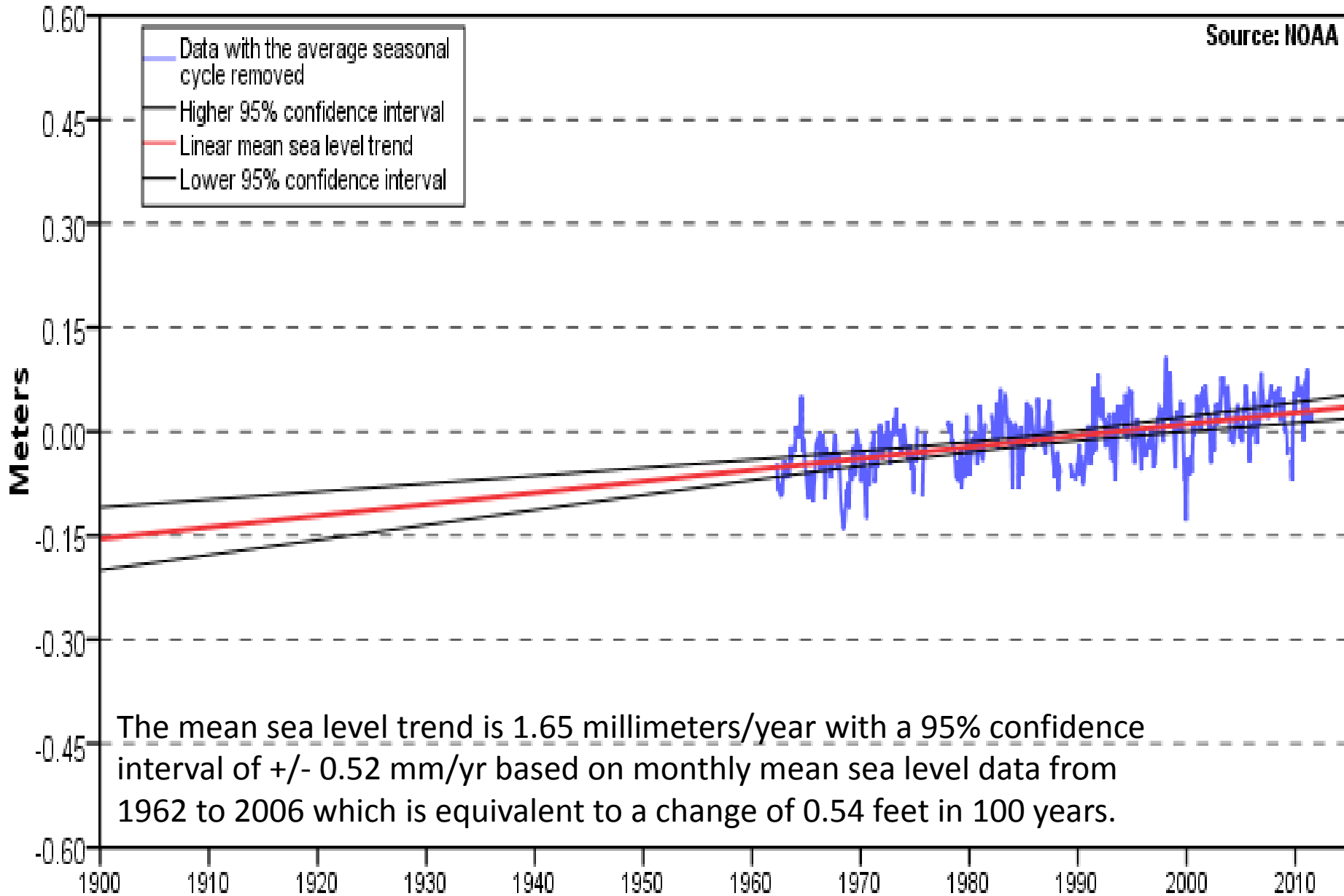


SST data from CaTS. The slope of the trend between 1993 and 2007 was linearly estimated as 0.0258 ± 0.0132 degrees Celsius/yr.

SST data from 1980 to 2010. The slope of the trend between 1980 and 2010 was linearly estimated as 0.023 ± 0.002 degrees Celsius/yr.

San Juan, PR 1.65 +/- 0.52 mm/yr

Source: NOAA

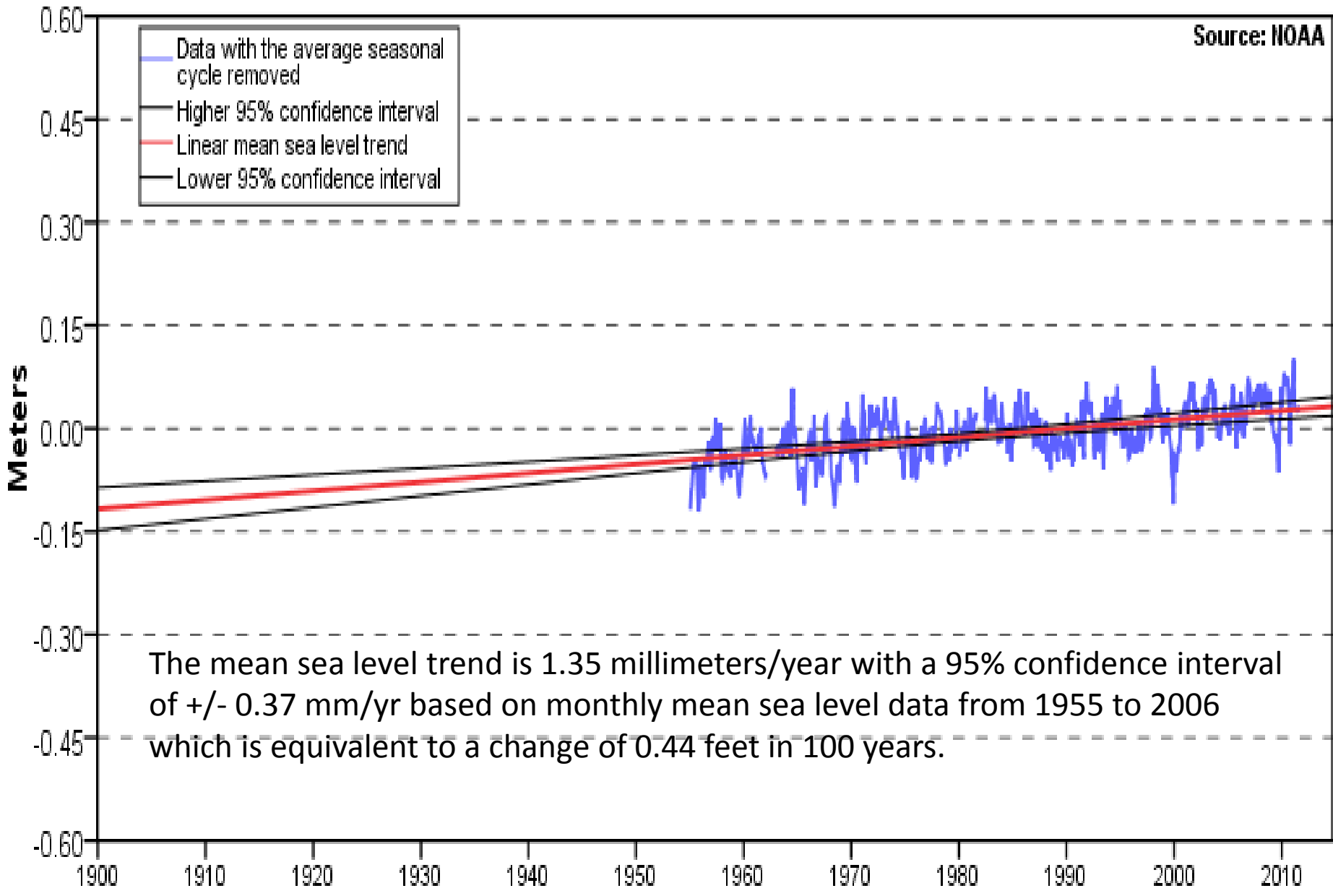


Magueyes Island, PR

1.35 +/- 0.37 mm/yr

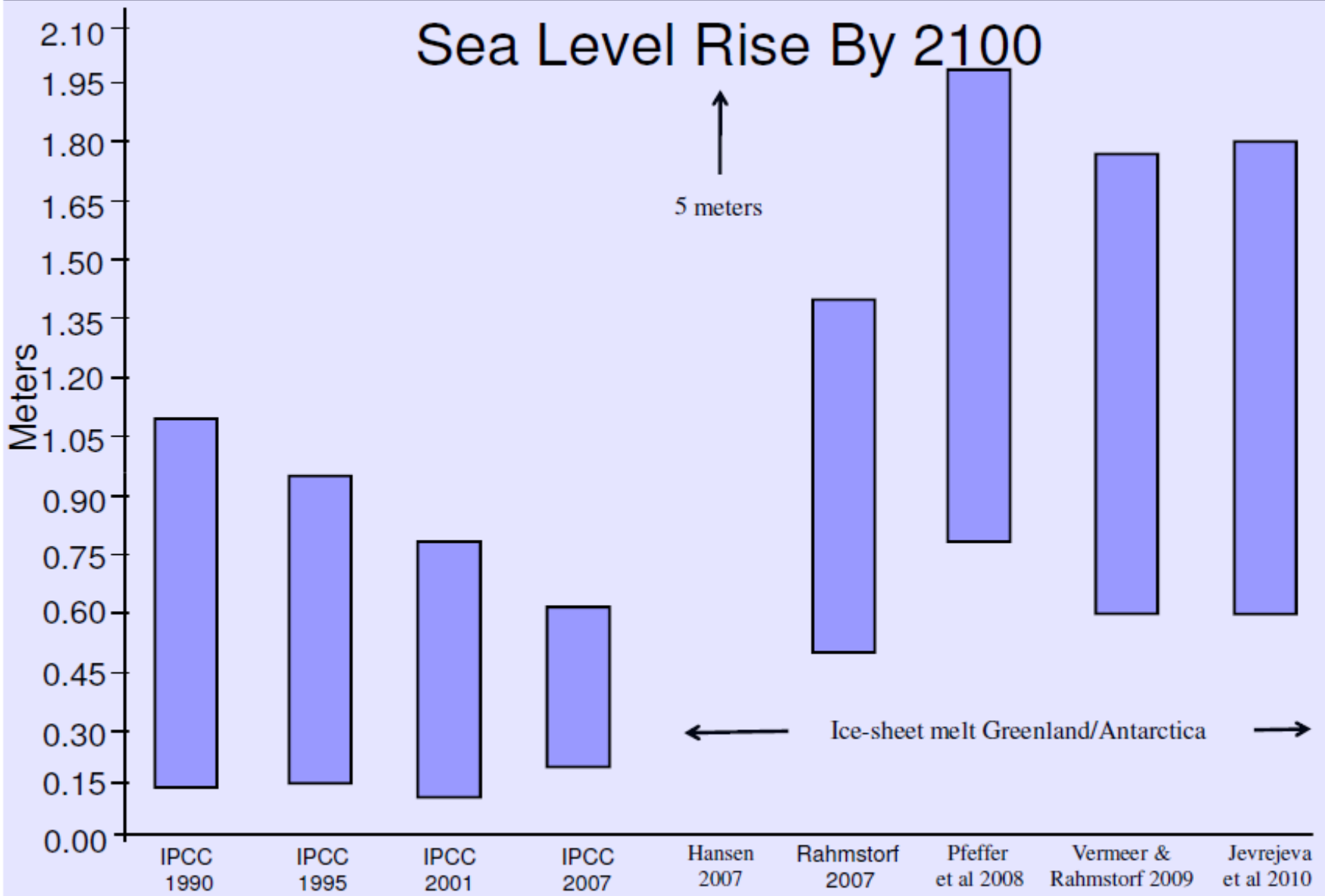
Source: NOAA

- Data with the average seasonal cycle removed
- Higher 95% confidence interval
- Linear mean sea level trend
- Lower 95% confidence interval



The mean sea level trend is 1.35 millimeters/year with a 95% confidence interval of +/- 0.37 mm/yr based on monthly mean sea level data from 1955 to 2006 which is equivalent to a change of 0.44 feet in 100 years.

Sea Level Rise By 2100



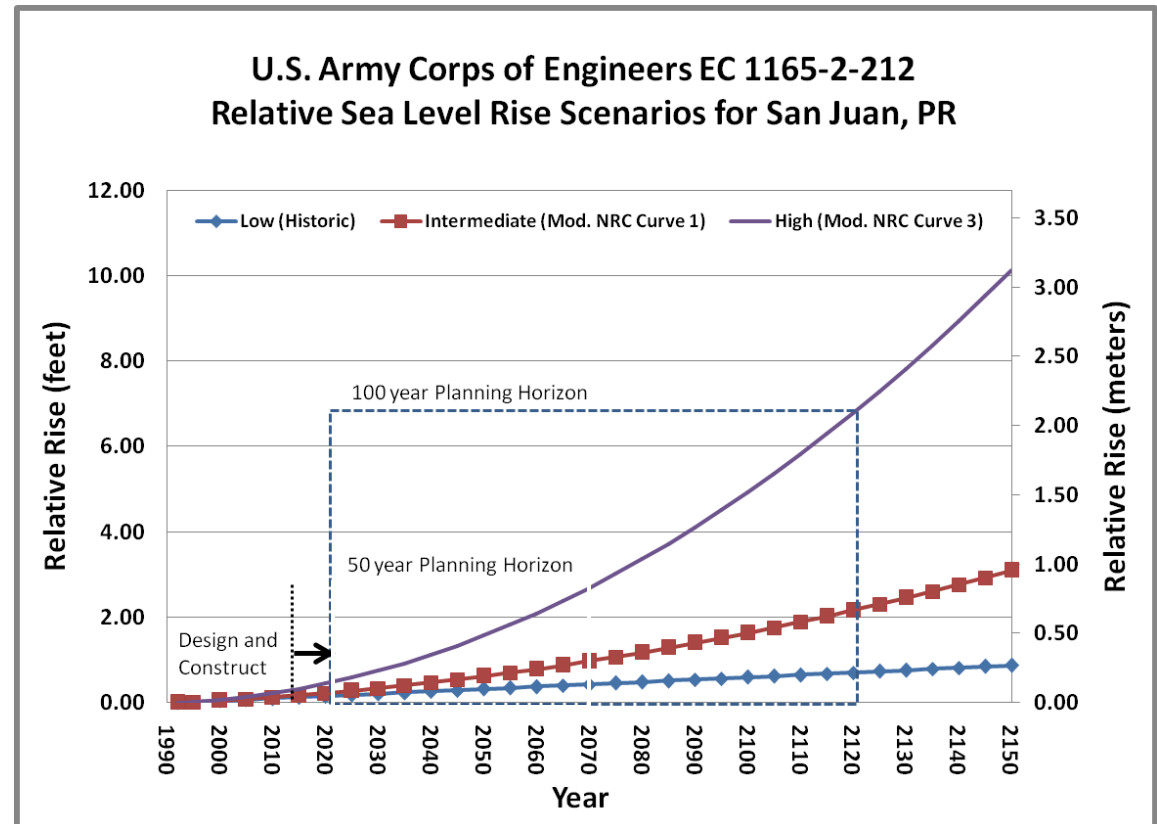


**Are climate and ocean changes
natural or human induced?**

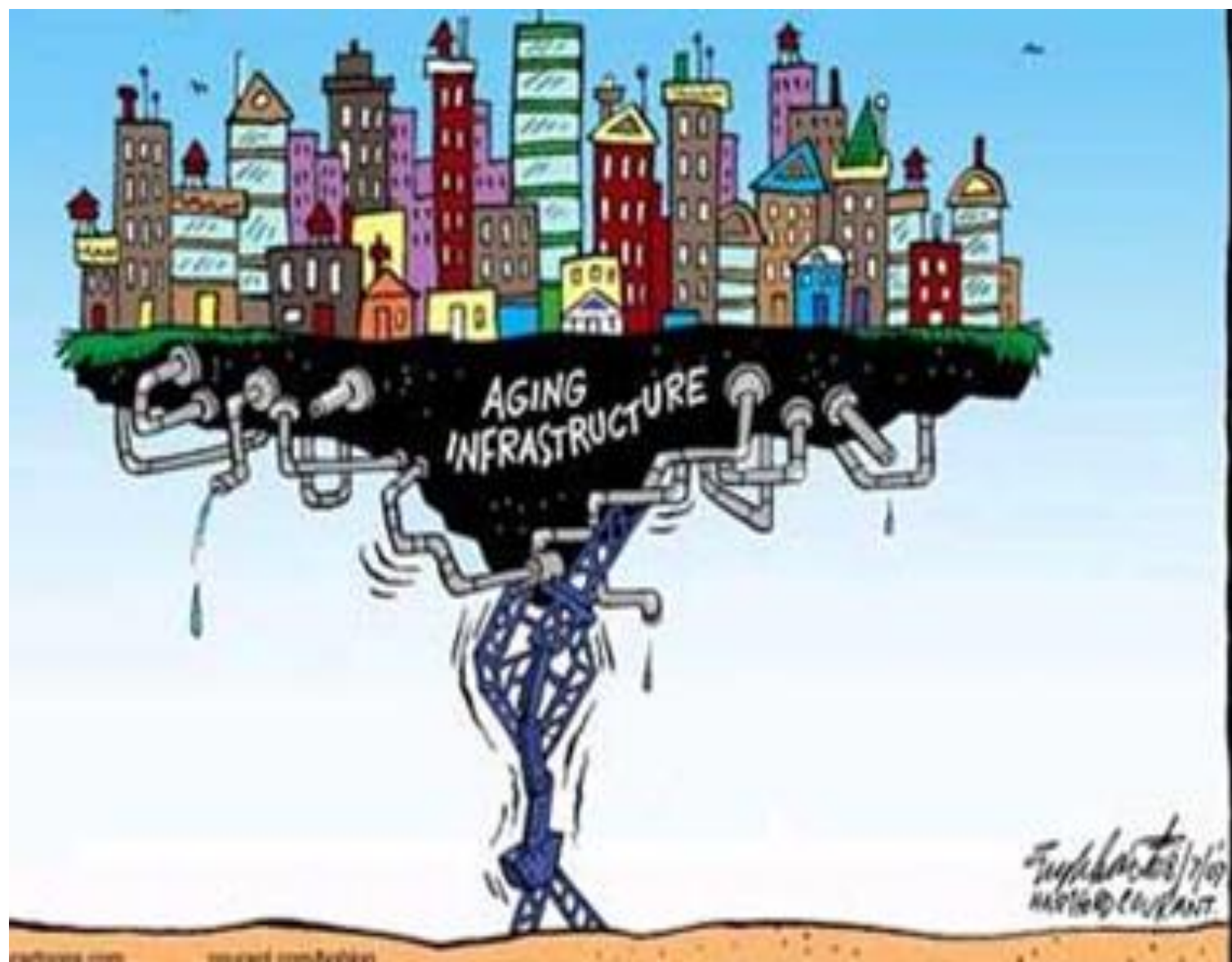
...we must adapt!

USACE SLR Projections, Planning and Design considerations for Puerto Rico

- by 2060: 0.07 to 0.57 m above current mean sea level
- by 2110: 0.14 and 1.70 m above current mean sea level



1. PRCCC Analysis Conducted by USACE , Jacksonville District
2. Section 22 Agreement has been formalized by DNER-USACE







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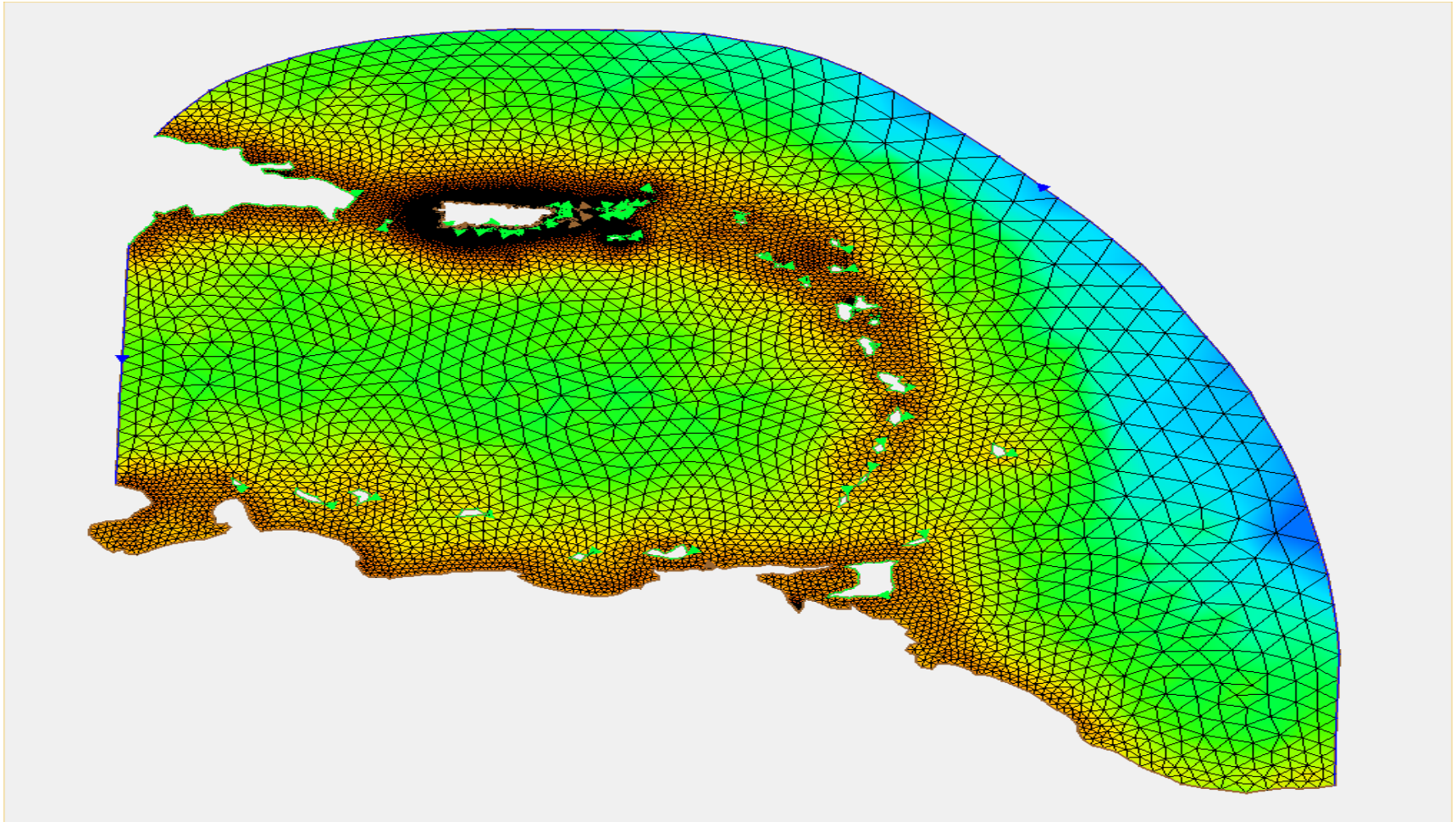


¡DEJAMOS TRABAJAR
HASTA LA PERDUCCIÓN!
Este Proyecto tiene todo la Permisos

 **Condado Delivery**
725-4666







**Storm Surge Modeling in Puerto Rico in Support of Emergency Response,
Risk Assessment, Coastal Planning and Climate Change Analysis**

RECOMMENDATIONS

- Develop geographically explicit, locally-validated physical models to identify coastal areas with higher risks.
- Develop economic models to account for projected losses, **justify and prioritize investments in adaptation projects.**
- Promote greater involvement by stakeholders, resource users, professional associations, design schools, and local communities to create an **alternative and resilient future.**



FEDERAL

EXPORTS

PUERTO RICO

COMMUNICATIONS

IMPORTS

TOURISM

FISHERIES

FOOD SECURITY

CMSP GOVERNANCE

CLIMA

ENERGY

NAVIGATION

RECREATION

CONSERVATION

PORTS

NGO

MARINE ENVIRONMENT

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