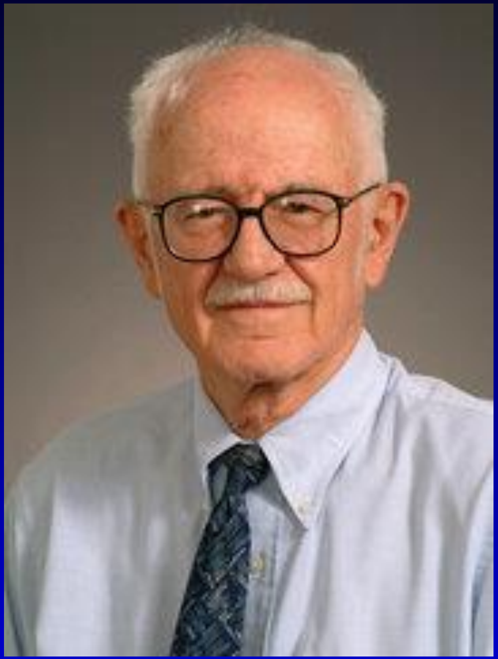
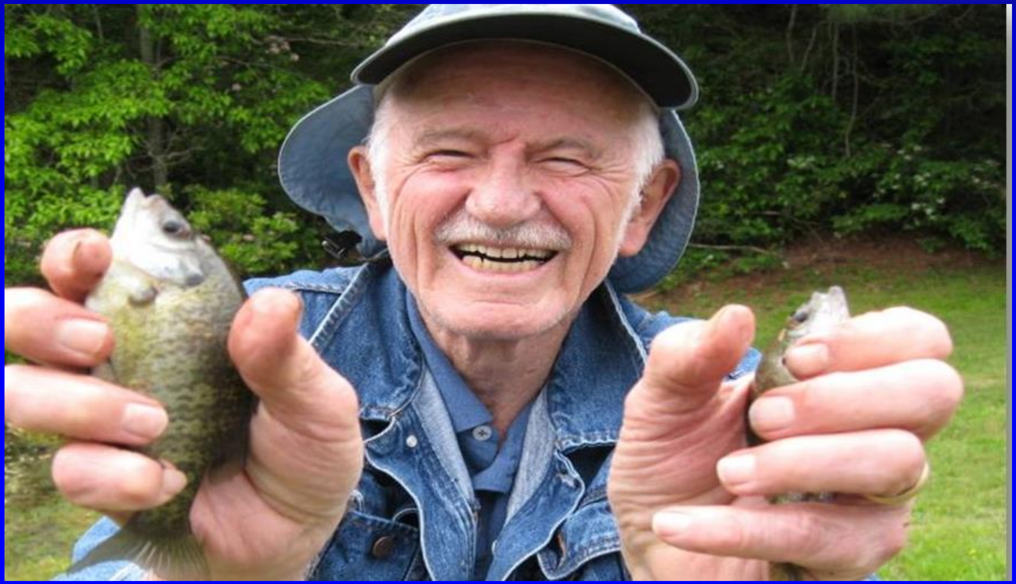
The Legacy of Dr. Robert G. "Bob" Dean



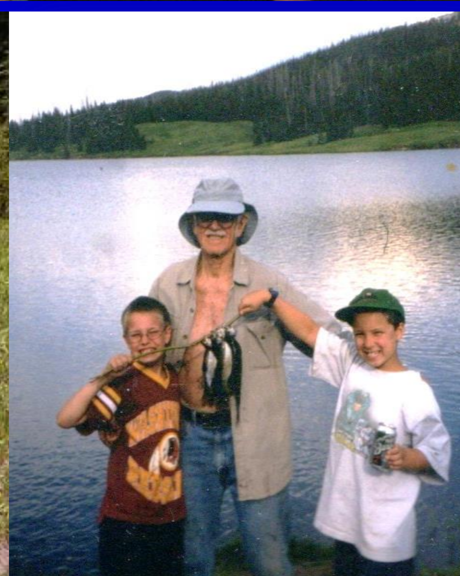


Wife – Phyllis

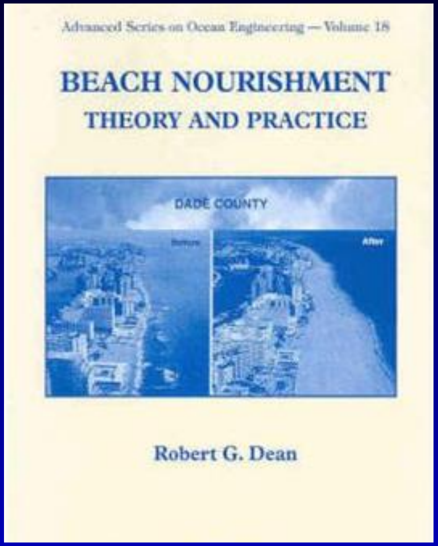
Wedding
Sept 12, 1954

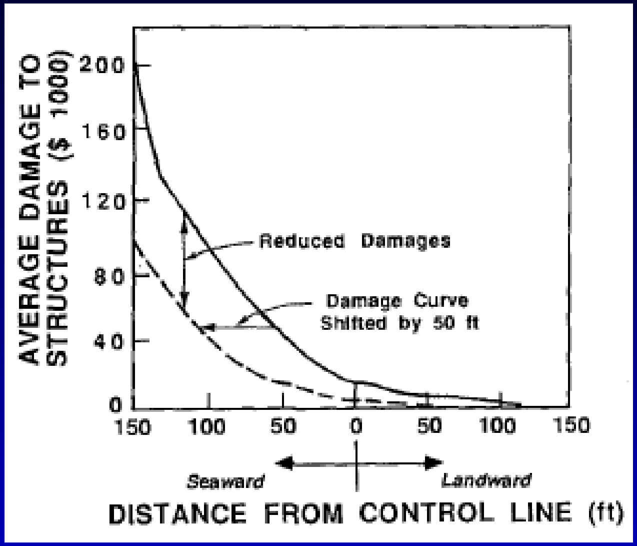
60th Anniversary
Sept 12, 2014

Family

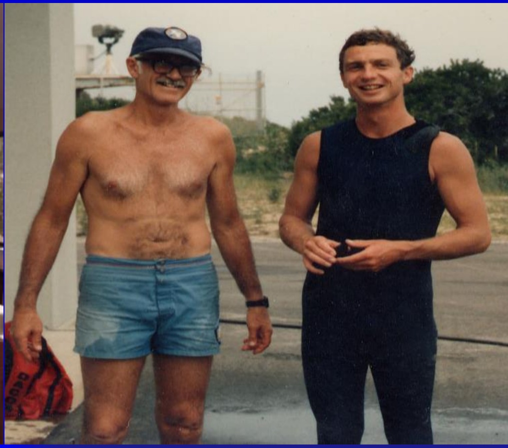


The Legacy of Bob Dean



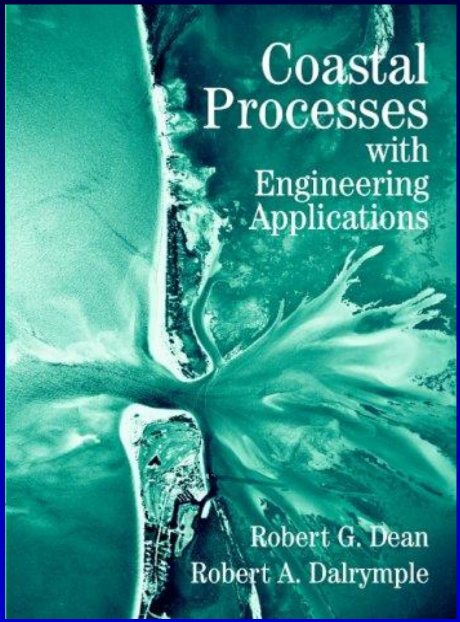


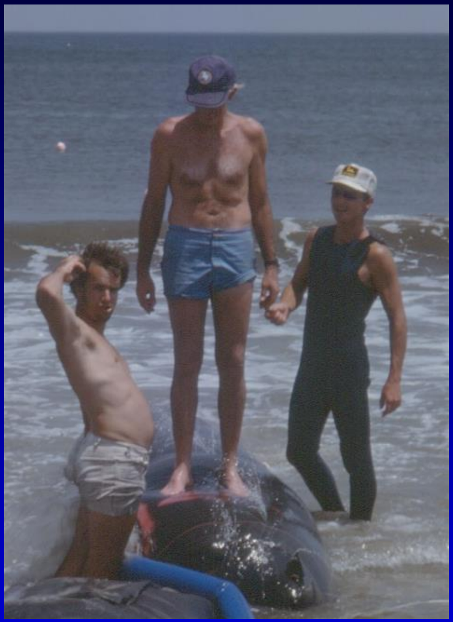
Contributions to Coastal Engineering, Profession, State, and FSBPA

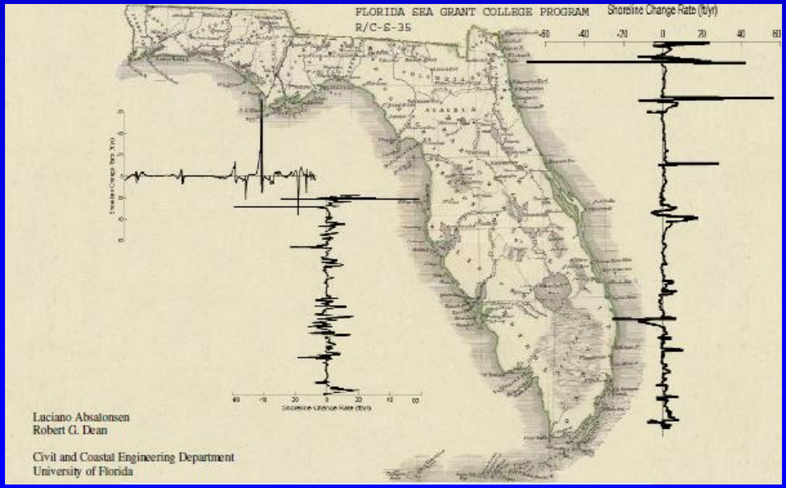


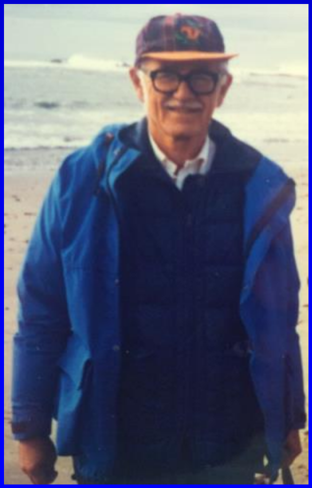
Students - His Living Legacy

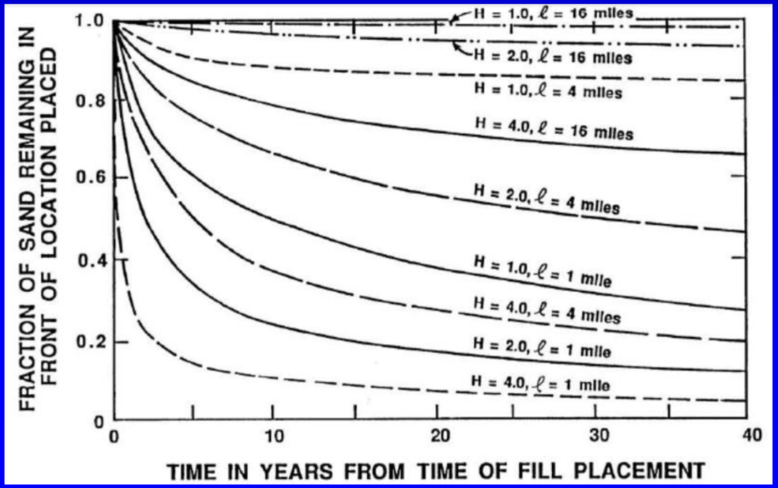
Contributions to Coastal Engineering





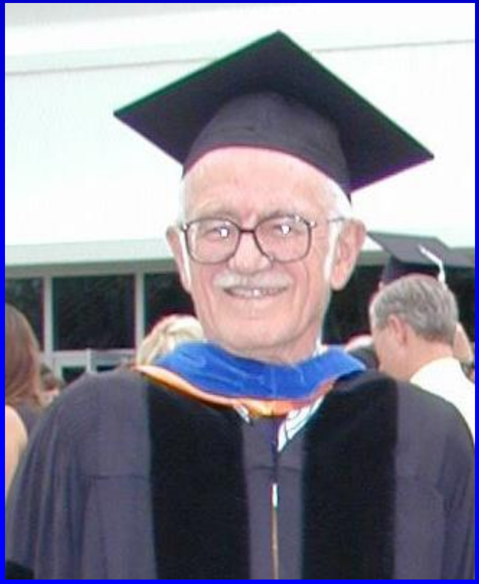






56-Year Career (42 years in Florida)

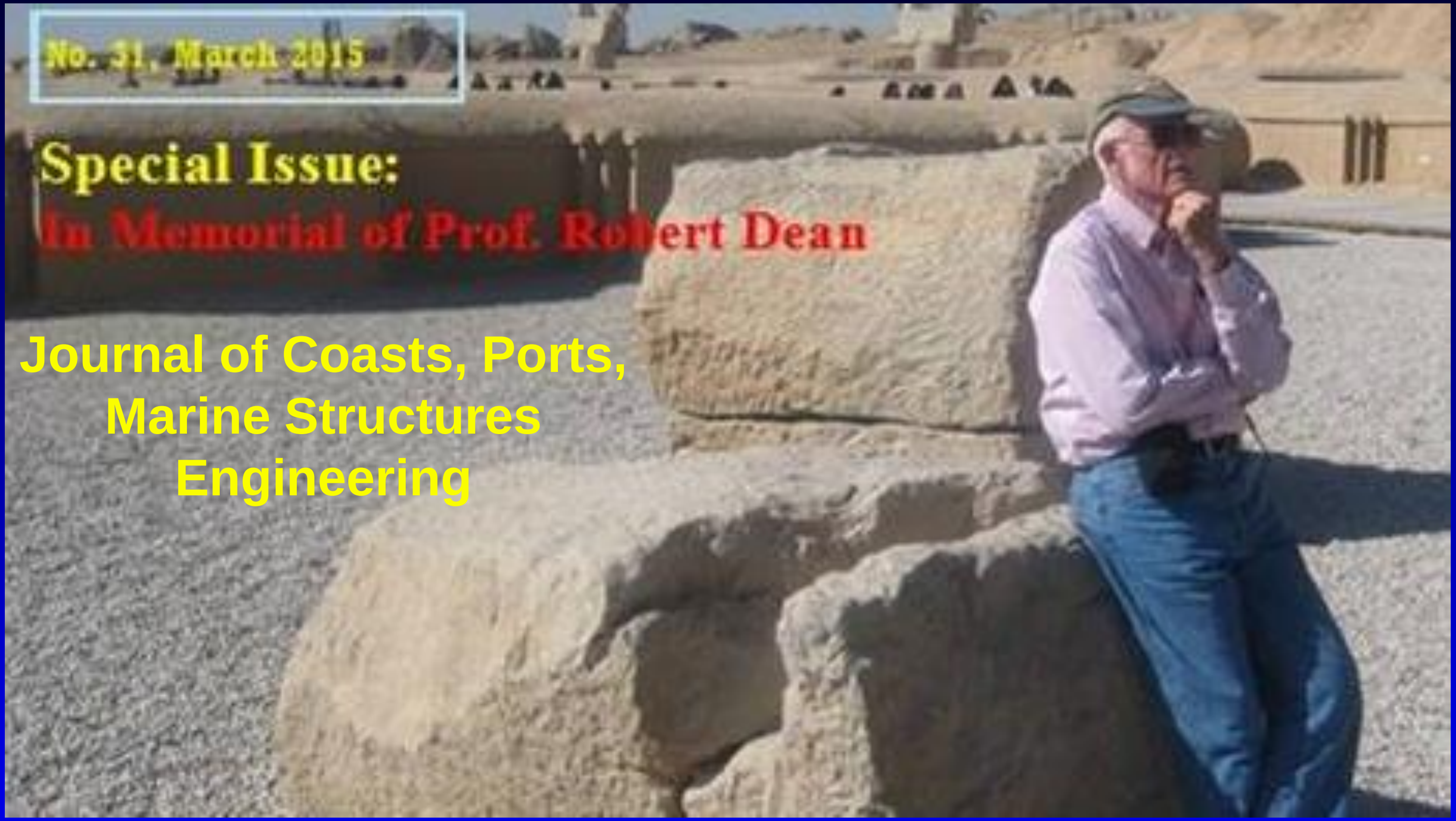
- **1959 - 1960 Assistant Professor, MIT**
- **1960 - 1965 Senior Researcher, Chevron Corp**
- **1965 - 1966 Associate Professor, U of Washington**
- **1966 - 1975 Chair, Coastal and Oceanographic Engineering Department, University of Florida (UFL)**
- **1975 - 1982 Professor, University of Delaware**
- **1985 - 1987 Director, Beaches and Shores, FDNR**
- **1987 - 2015 Professor, UFL**



Tributes

- *“The techniques he advanced are routine today almost everywhere on developed coastlines; without them, many beach towns would be without beaches”*
  - New York Times
- *“His research, writing, and teaching made him the most influential US coastal engineer.”*
  - Boston Globe
- *“Robert G. Dean’s research, writing and teaching made him the most influential coastal engineer in the United States.”*
  - Chicago Sun Times
- *“He was world renowned in coastal engineering.”*
  - American Society of Civil Engineers
- *“Professor Robert G. Dean, known to most of us as a world leader of coastal engineering, …”*
  - Professor, Bijan Mohammadi, Iran

Iran Tribute



عمر حرفه ای ایشان در دانشگاه های فلوریدا، ام آی تی، واشنگتن و دلویر

صرف انجام تحقیقات مختلف در زمینه های رسوبگذاری و فرسایش سواحل، مناطق جزر و مدی، امواج و نیروهای آن و تغییر تراز سطح آب شد.

پروفسور دین سالیان متمادی سمت ریاست برگزاری همایش بین المللی مهندسی سواحل ICCE به عنوان مهمترین رویداد بین المللی در این حوزه را بر عهده داشت و بسیاری از متخصین و محققین از کتب ارزنده ایشان همچون مکانیک امواج، فرآیندهای ساحلی از دیدگاه مهندسی و تئوری و عملیات تغذیه سواحل کسب علم نموده اند.

World-Wide Influence

Spain Norway South Africa India Russia

Australia

New Zealand

Netherlands

United Kingdom

Denmark

Iran

China

Portugal

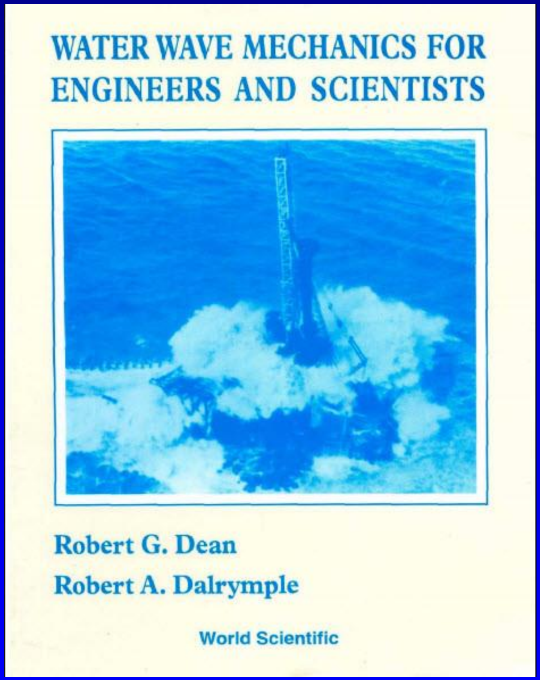
Japan Germany Canada United States Italy Taiwan

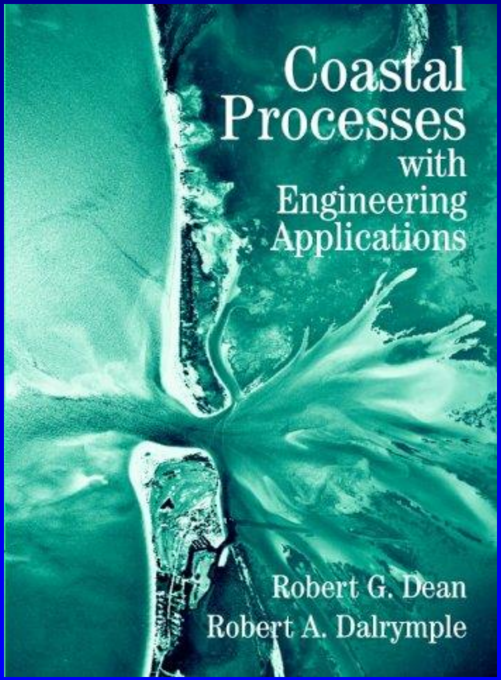
Professional Service

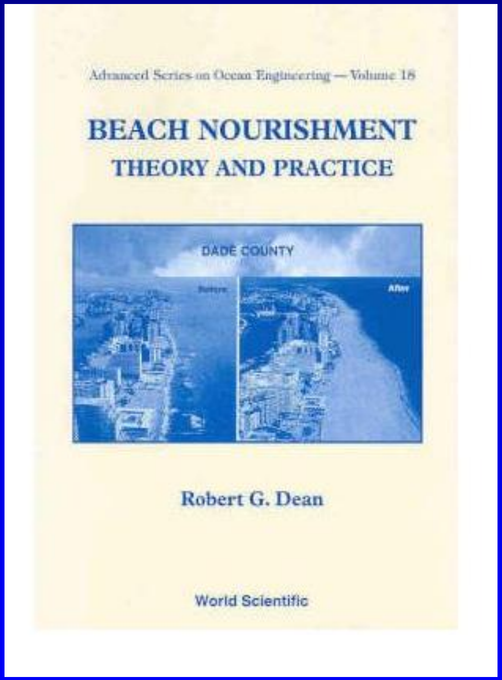
- Chair Emeritus, FSBPA
- Director, ASBPA
- Chair, Coastal Engineering Research Council, American Society of Civil Engineers
- Chair, Florida Coastal Engineering Technical Advisory Committee
- Member for 18 years on the Coastal Engineering Research Board of the Corps of Engineers

Publications and Consulting

- **Publications**
  - Over 300, including over 80 journal papers
  - 80 students as co-authors on 180 publications
  - 3 textbooks for a generation of students







- **Consultant to over 100 companies and government agencies**

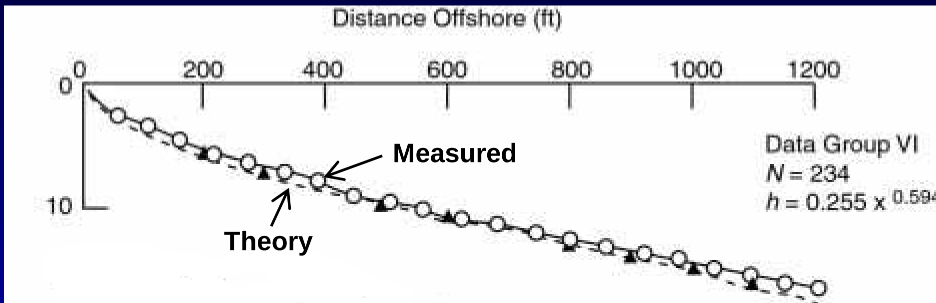
Awards

- Jim Purpura Award, FSBPA, 1979
- National Academy of Engineering, 1980
- International Coastal Engineer Award, ASCE, 1983
- Moffatt-Nichol Coastal Engineering Award, ASCE,1987

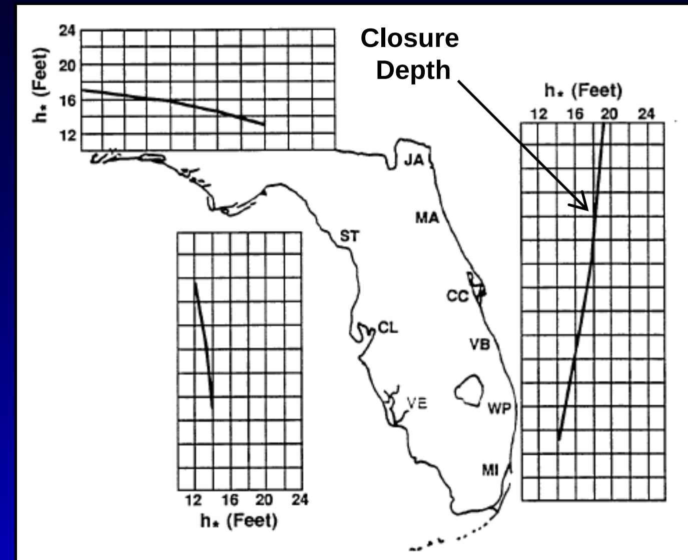
- Special Gold Medal Award FSBPA, 1987
- ASCE Award, Significant Contributions in Coastal Engineering, 1990
- Bill Carlton Award, FSBPA, 1996
- Morrough P. O'Brien Award, ASBPA, 2001
- Lifetime Achievement Award, FSBPA, 2003

- Golden Anniversary Scientific & Tech Award, FSBPA, 2007
- Outstanding Civilian Service Medal for forensic studies of Hurricane Katrina, 2008

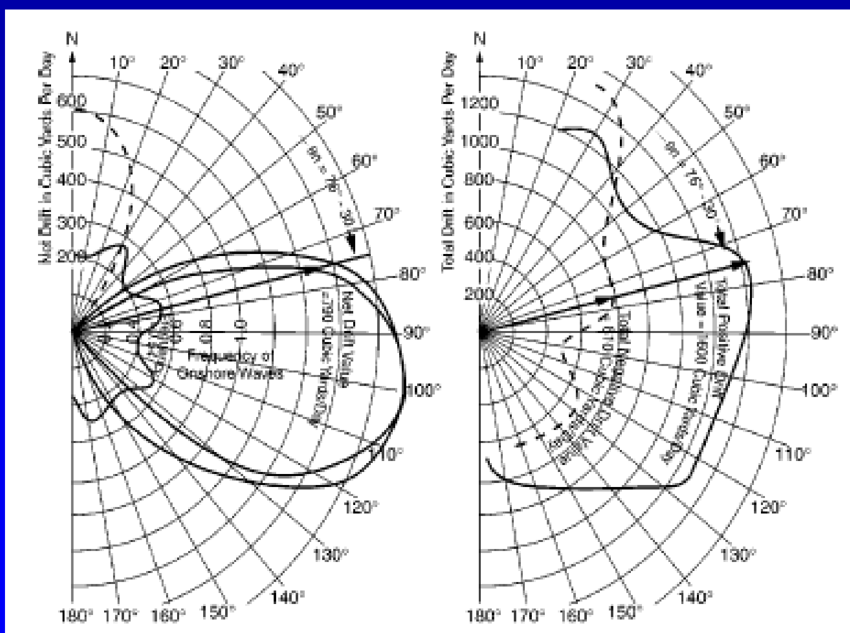
Some Concepts He Popularized



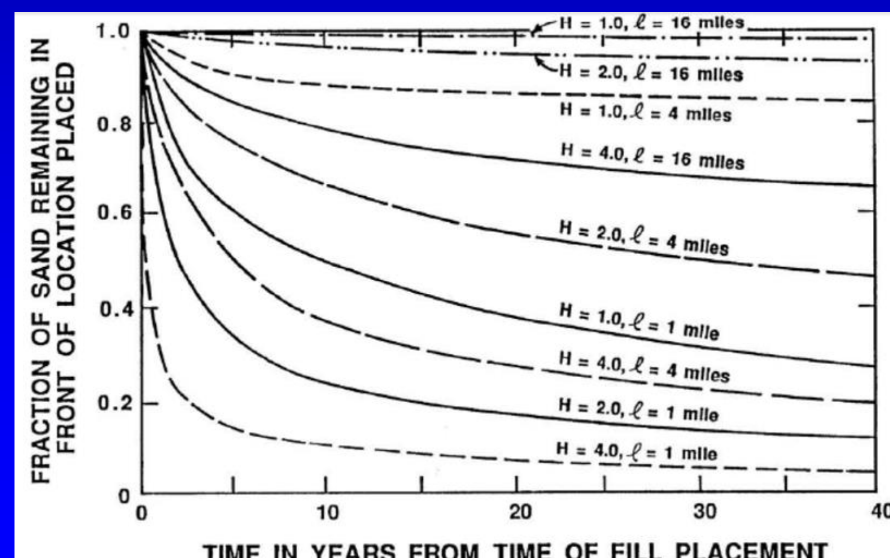
Equilibrium Profiles



Closure Depth



Littoral Drift Roses



Beach Nourishment Design

Ability to Cast Complex Phenomena into Understandable Terms

Complex Equations

$$\frac{V_1}{BW_*} = \frac{\Delta y}{W_*} + \frac{3}{5}\frac{h_*}{B}\left(\frac{\Delta y}{W_*}\right)^{5/3}\frac{1}{\left[1-\left(\frac{A_N}{A_F}\right)^{3/2}\right]^{2/3}} \qquad (2.3)$$

in which B is the berm height, W_* is a reference offshore distance associated with the breaking depth, h_*, on the original (unnourished) profile, i.e.

$$W_* = \left(\frac{h_*}{A_N}\right)^{3/2} \qquad (2.4)$$

and the breaking depth, h_* and breaking wave height, H_b are related by

$$h_* = H_b/\kappa$$

For non-intersecting profiles, Figures 2.3b and 2.5b,c and d, the corresponding volume V_2 in non-dimensional form is

$$\frac{V_2}{W_* B} = \left(\frac{\Delta y}{W_*}\right) + \frac{3}{5}\left(\frac{h_*}{B}\right)\left\{\left[\frac{\Delta y}{W_*} + \left(\frac{A_N}{A_F}\right)^{3/2}\right]^{5/3} - \left(\frac{A_N}{A_F}\right)^{3/2}\right\} \qquad (2.5)$$

It can be shown that the critical value $(\Delta y/W_*)_c$ for intersection/non-intersection of profiles is given by

$$\left(\frac{\Delta y}{W_*}\right)_c = 1 - \left(\frac{A_N}{A_F}\right)^{3/2} \qquad (2.6)$$

with intersection occurring if $\Delta y/W_*$ is less than the critical value.

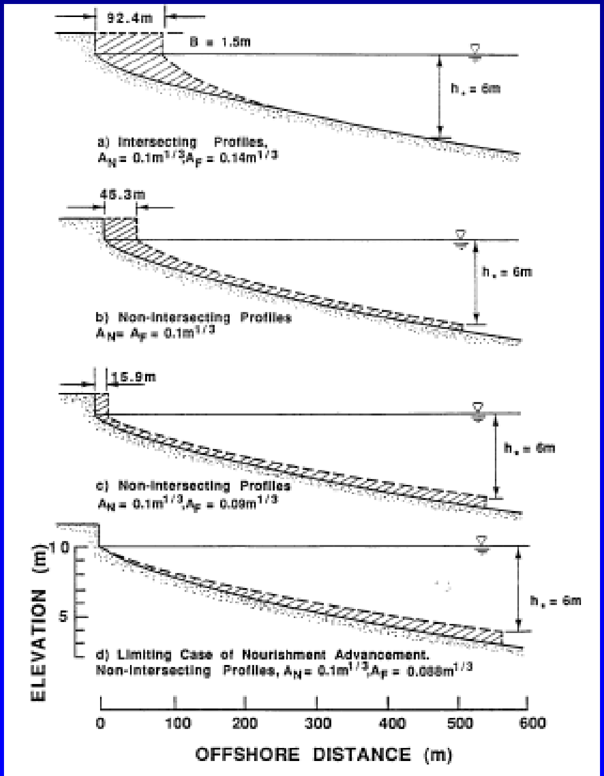
The critical volume associated with intersecting/non- intersecting profiles is

$$\left(\frac{V}{BW_*}\right)_{c1} = \left(1 + \frac{3}{5}\frac{h_*}{B}\right)\left[1 - \left(\frac{A_N}{A_F}\right)^{3/2}\right] \qquad (2.7)$$

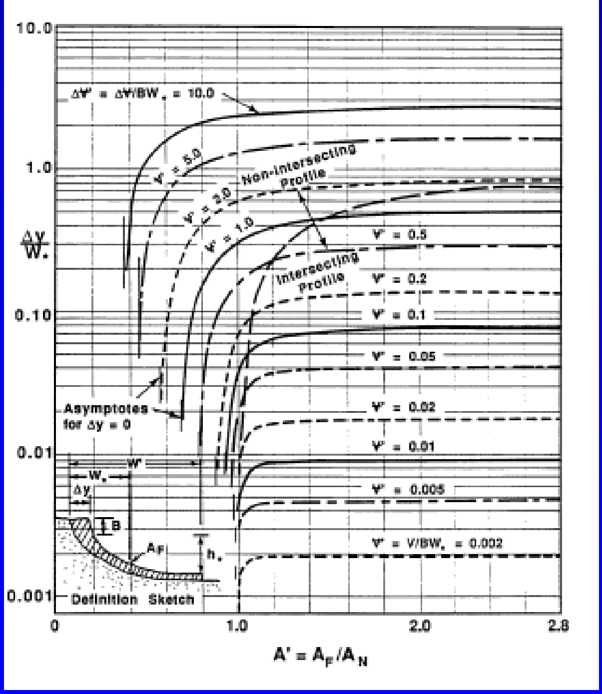
and applies only for $(A_F/A_N) > 1$. Also of interest, the critical volume of sand that will just yield a finite shoreline displacement for non-intersecting profiles $(A_F/A_N < 1)$, is

$$\left(\frac{V}{BW_*}\right)_{c2} = \frac{3}{5}\frac{h_*}{B}\left(\frac{A_N}{A_F}\right)^{3/2}\left\{\frac{A_N}{A_F} - 1\right\} \qquad (2.8)$$

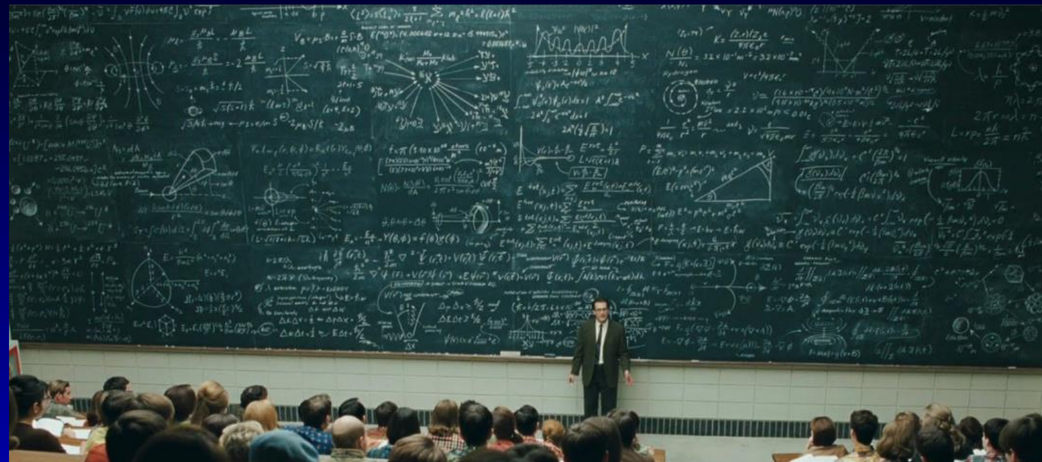
Visualization

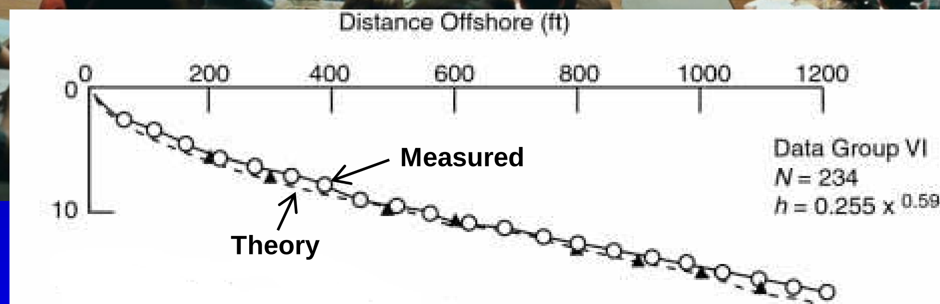


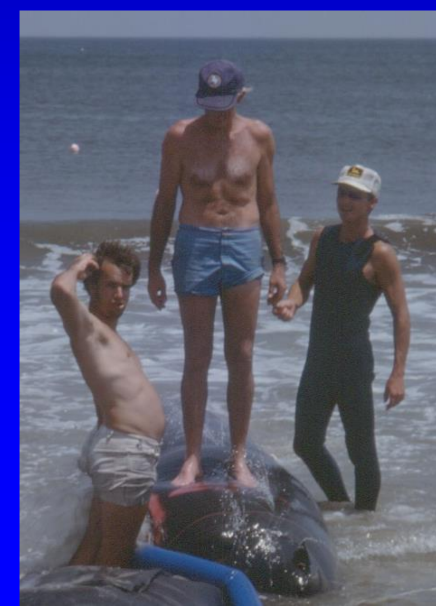
Design Curves



Field Measurements







Non-Linear Waves

- **PhD dissertation at MIT on non-linear waves**
- **Major professor, Fritz Ursell, a British mathematician famous for the Ursell number in non-linear wave theory**


- **"*Bob Dean was also assigned by Ippen (Department head) to help Fritz buy a car and to teach him how to drive*"**

  - Royal Society Proceedings, Life of Fritz Ursell

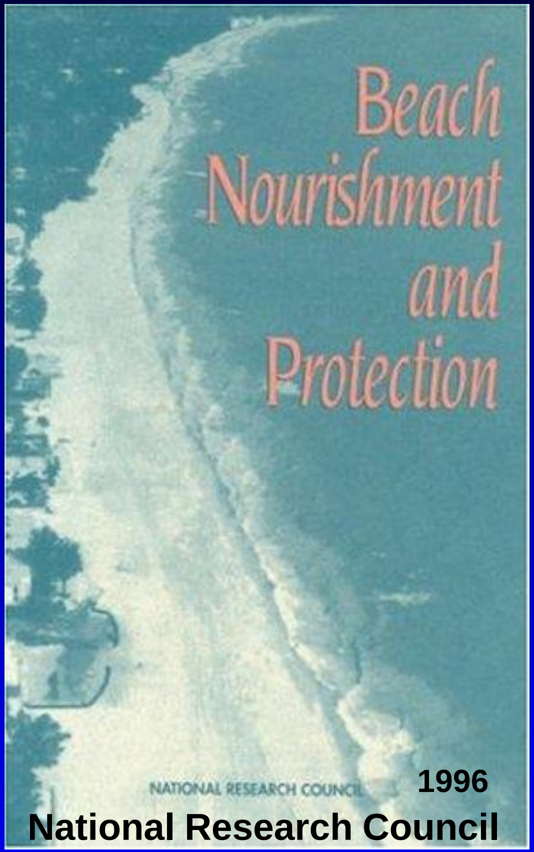
- **"*A very harrowing experience*" - Bob Dean**

Non-Linear Waves

- 5 years at Chevron Research. Offshore oil platforms failing when hurricane wave heights below design levels

- Developed stream function wave theory – a breakthrough still used 50 years later for offshore platform design
- Published over 70 papers on waves and their engineering applications

Beach Nourishment



- "Is It Worth It to Rebuild a Beach?"

"Now an expert panel convened by the National Research Council has settled the matter. In a long-awaited report, the panel said recently that artificial beach-building offered worthwhile protection to coastal towns and could be a boon to tourism, positions that advocates of beach nourishment have long advanced."

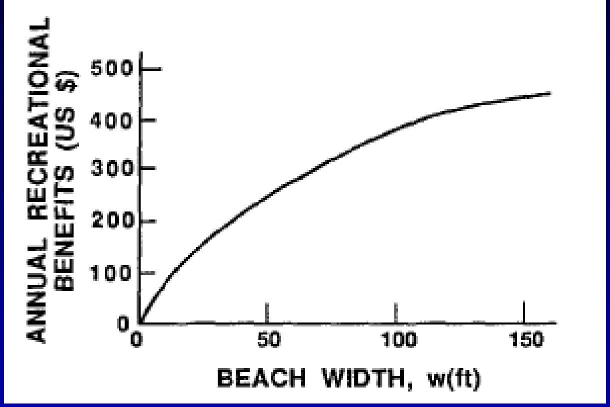
- New York Times, 1996

- "Prof. Robert Dean praised it; Prof. Orrin Pilkey said it was 'terrible.' They debated the report at a conference sponsored by the Florida Shore and Beach Preservation Association."

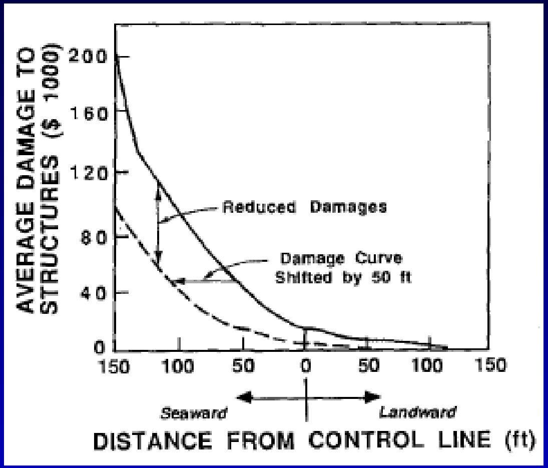
- New York Times, 1996

Beach Nourishment

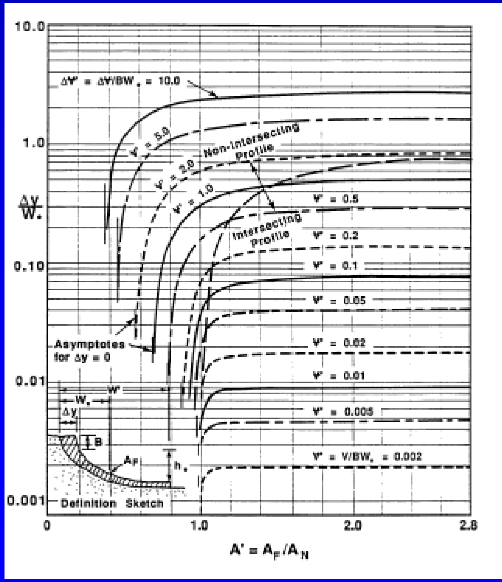
- Published over 50 papers on beach nourishment



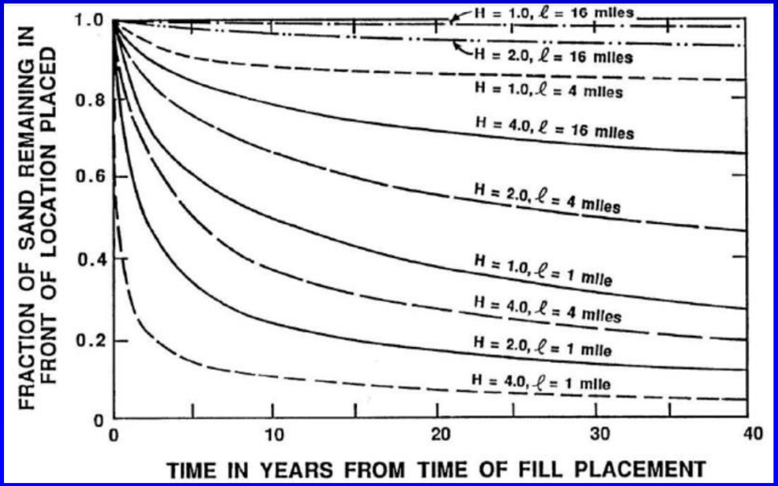
Recreational Benefits Versus Beach Width



Damage Reduction Versus Distance from Control Line



Fill Versus Native Sand Size



Fill Longevity Versus Length

Inlets

- Over 20 papers on inlets including the seminal reports:

  - "Florida's East Coast Inlets, Shoreline Effects and Recommended Action" (Dean and O'Brien, 1987)

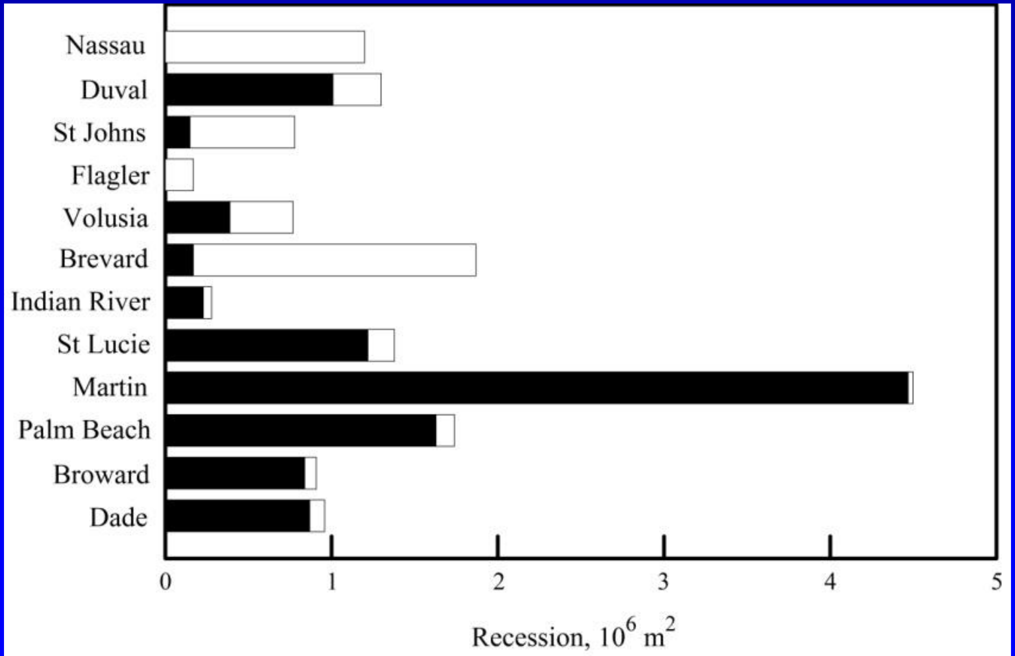
  - "Florida's West Coast Inlets, Shoreline Effects and Recommended Action" (Dean and O'Brien, 1987)

- ***"Inlets cause 80 - 85% of the erosion on the east coast of Florida."***

  - Bob Dean, 1987

Inlets

- “Erosional Impacts of Modified Inlets, Beach Enroachment, and Beach Nourishment on the East Coast of Florida” (*Journal of Coastal Research*, accepted, July 2015)
- Modified inlets have caused 70% of the erosion and 75% - 85% if counties without modified inlets causing downdrift erosion are excluded.



Black is erosion caused by modified inlets

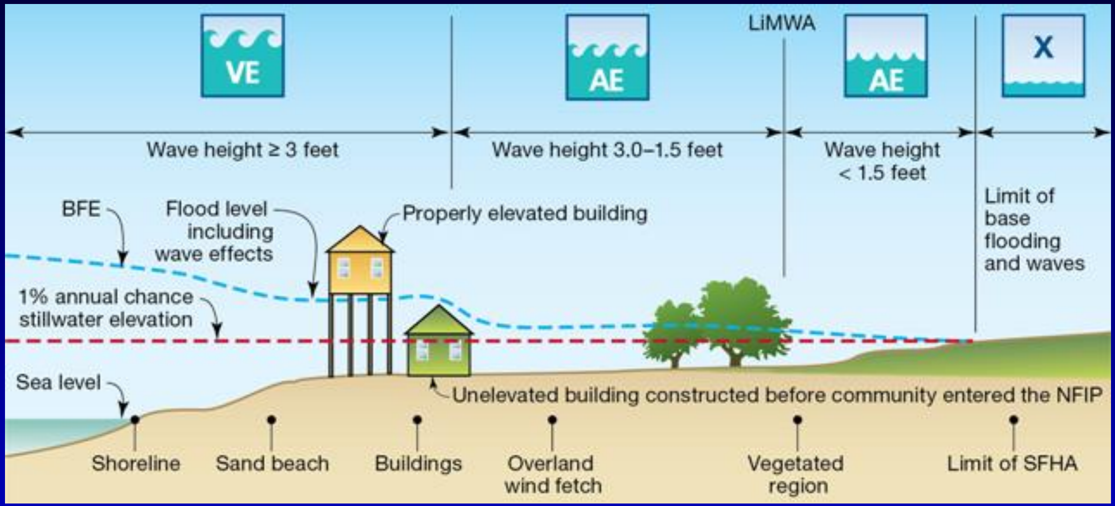
White is erosion caused by other phenomena

Coastal Structures

- Interaction of Navigation Structures with Adjacent Shorelines
- Criteria for Evaluating Coastal Flood-Protection Structures
- Performance of Erosion Control Structures
- Coastal Structures and Their Interaction with the Shoreline
- Terminal Structures
- Evaluation Prefabricated Erosion Prevention (PEP) Reef

Coastal Hazard Delineation

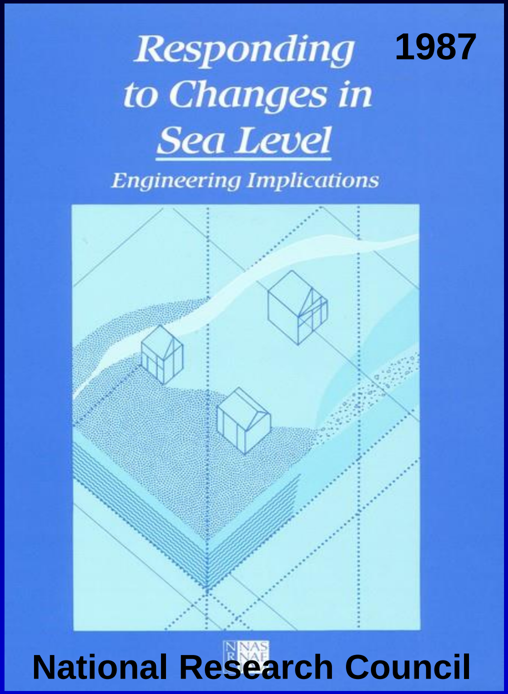
- Developed the Federal Insurance Administration Criteria for Coastal Flood Protection Structures



- Developed Methodologies to Delineate
  - Coastal Hazard Zones
  - Construction Setback Lines
  - Hazards from Sea Level Rise

Sea Level Rise

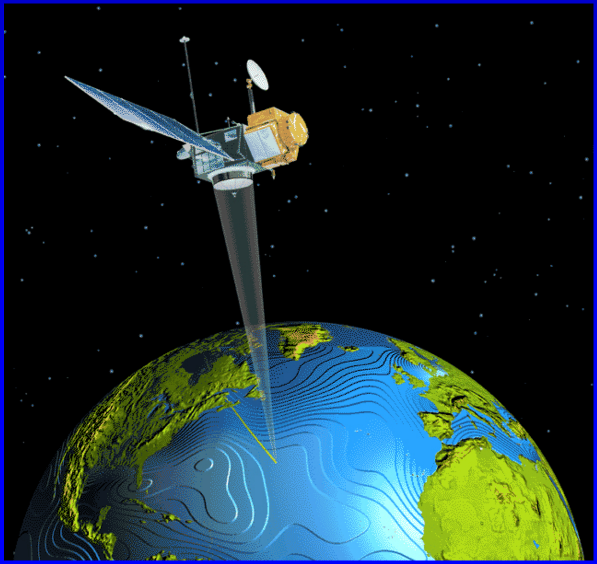
- Chaired, National Research Council committee that published a sea level rise report in 1987 - 3 years before the 1st report of the IPCC



- 28 years later the Corps uses the report for its sea level rise scenarios

- 2011 paper on sea-level acceleration is the most downloaded paper ever of the *Journal of Coastal Research* – as many as the next 4 papers combined

- 2013 journal paper verified satellite altimeter recordings of sea level rise versus 456 tide gauges



Sea Level Rise

- **Bob was not involved in the 2010 North Carolina Sea-Level Rise Assessment Report that was parodied on national TV**

"We were the laughing stock of the nation"

- NC Coastal Commissioner

- **Was an "interactive" reviewer for the 2015 update**
- **"*The report is accepted because Dr Dean's credibility impacted the Science panel.*"**

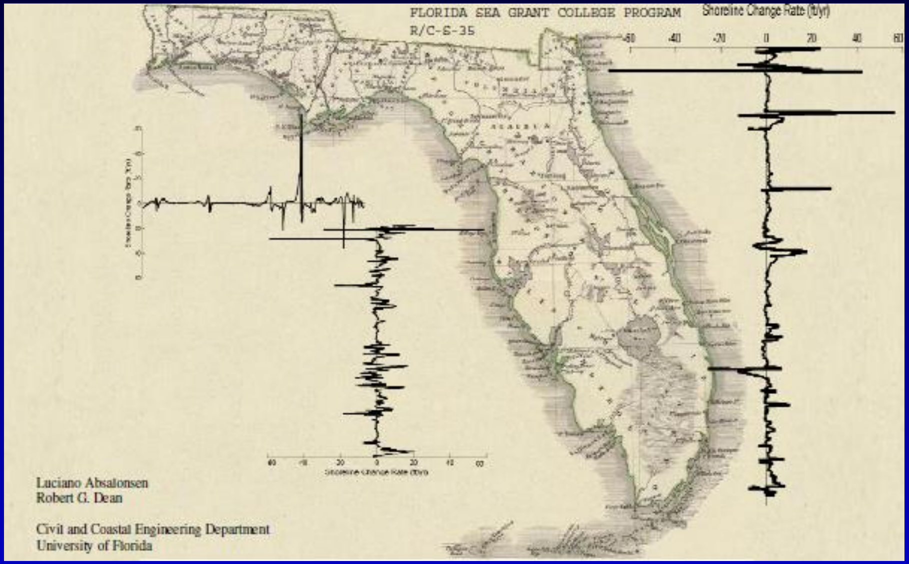
- Frank Gorman, Chair, NC Coastal Commission

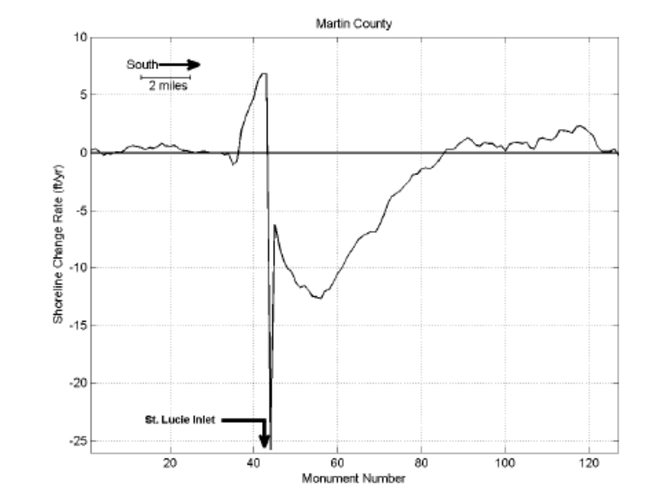
- ***"NC sea-level forecast is a cause for relief this time"***

- The North Carolina News and Observer *newspaper*

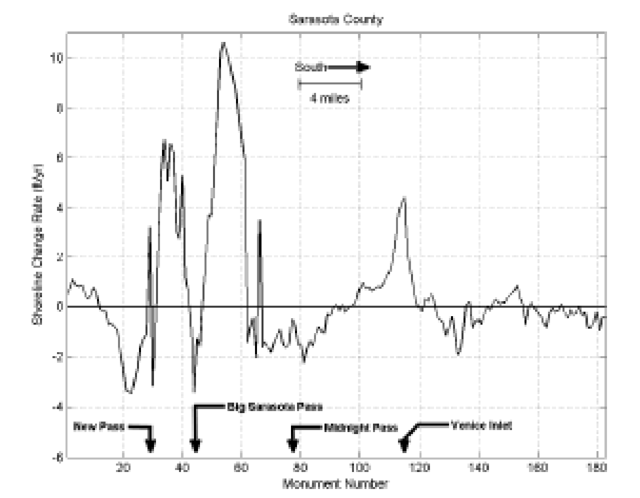
Shoreline Change

- Several shoreline change studies for coasts from New York to Louisiana
- Atlas of Florida shoreline change since the 1800s (Absalonsen and Dean, 2010)

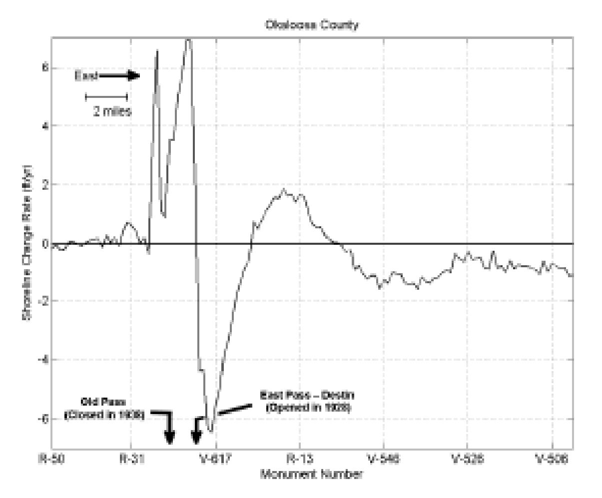




Martin, 1883 - 2008



Sarasota, 1883 - 2008



Okaloosa, 1871 - 2008

Shoreline Response to Sea Level Rise

- **United the Bruun Rule and Dean Equilibrium to determine shoreline response to sea level rise (to be published, *Coastal Engineering*, 2016)**

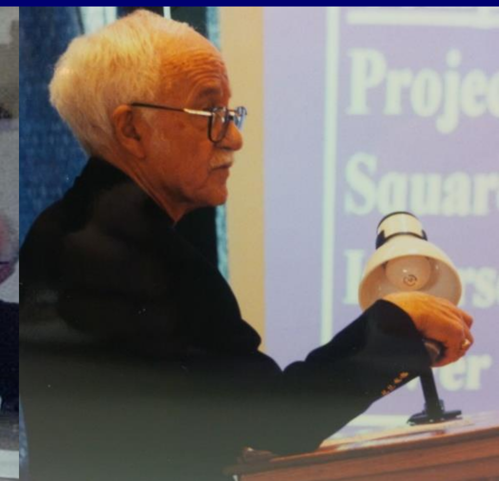
$$\frac{dy_T}{dt} = \frac{1}{(h_* + B)} \left\{ -\frac{dS}{dt}[W_* + \Delta W_L] + F + G_{\pm} - \frac{dQ}{dx} - \frac{(h_* + B)}{L}\frac{dV_1}{dt} + \frac{(h_* + B)}{L}\frac{dV_2}{dt} \right\}$$

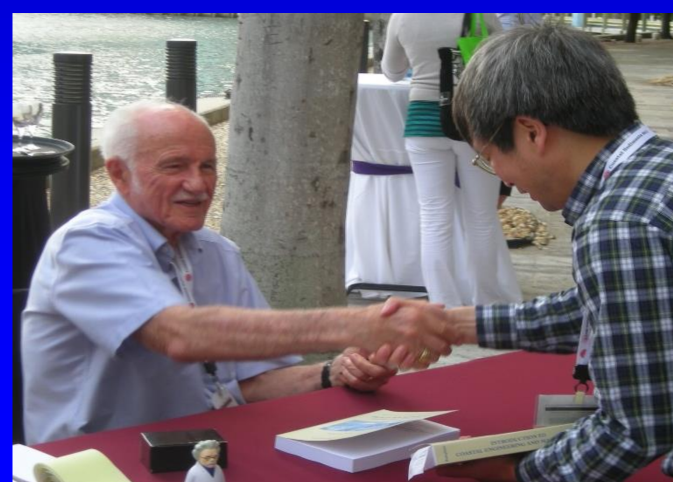
Equation uniting Bruun Rule and Dean Equilibrium

- **Method predicts beach nourishment requirements to maintain stable shorelines with rising sea level**

"His research, writing and teaching made him the most influential coastal engineer in the United States."

- Chicago Sun Times





Professor Robert G. "Bob" Dean

Husband, Father, Scholar, Mentor, Friend, Genius