行政院及所屬各機關出國報告
（出國類別：開　會）

出席第十屆國際河口與近岸海域物理研討會

服務機關：交通部中央氣象局
出國人 職　　稱：副主任
　　　 姓　　名：徐月娟
出國地區：美國
出國期間：民國 89 年 10 月 06 日
　　　　至民國 89 年 10 月 13 日
報告日期：民國 90 年 1 月 5 日

出席第十屆國際河口與近岸海域物理研討會

摘要

第十屆國際河口與近岸海域物理研討會於公元二千年十月七至十一日在美國諾福克舉行，約有一百位來自世界各地的專家學者與會。本人於六日中午抵達，便先登船參加 Chesapeake Bay 科學巡航。次日在大會中發表論文，題目是「Numerical simulations of tide around Taiwan」。大會期間使用一個大會議室，全體人員同時出席，彼此間有充分機會意見交流及討論，此行受益良多。建議本局應盡量補助同仁出席國際海象會議，促進本局與國際海洋界之技術交流。本人又抽空參訪在 Chesapeake 的美國海洋局現場作業組，了解該組織及工作內容，其推行之 PORTS 系統的經驗及多重傳播資訊管道，可作為我國未來發展海象災害預警系統之參考。

關鍵辭：國際研討會，河口，近海，美國海洋局，物理海洋學，即時系統

出席第十屆國際河口與近岸海域物理研討會

目次

出席第十屆國際河口與近岸海域物理研討會

壹、目的及行程

第十屆國際河口與近岸海域物理之研討會(The 10th International Biennial Conference on Physics of Estuaries and Coastal Seas，簡稱 PECS 2000)於公元二千年十月七至十一日在美國維吉尼亞州諾福克(Norfolk)舉行。此研討會每二年在美、歐、亞三大洲輪流舉行，提供物理海洋學家和海岸工程師之間一個座談機會，促進河口和近海物理學最新發展的技術交流，注重現場與實驗室的量測及診斷理論分析結果相對於數值技術應用結果的比對。本次研討會由 Center for Coastal Physical Oceanography, Department of Ocean, Earth and Atmospheric Sciences, Old Dominion University 和 the School of Marine Science, Virginia Institute of Marine Science, College of William and Mary 聯合主辦。主題是河口暫時性變化及其多樣應用，題目包括混合、鋒生、鹽交換過程、沉積物傳送等。其他有關河口和近岸海域的相關題目均包括在內。本人有幸獲得論文審查委員會接受論文發表，在本局出席國際海象會議預算項目資助下，前往美國參加 PECS 2000 國際研討會，一面將本局的發展成果公布於國際，促進本局與國際海洋界之技術交流；一面吸取最新海洋知識，作爲海象業務未來發展之參考。

本人於民國八十九年十月六日搭乘長榮航空赴美，經西雅圖於晚間抵達紐約。次日轉搭美國大陸航空於中午時分抵達諾福克，便登上研究船參加在 Chesapeake Bay 的現場觀測實習，當晚參加研討會前之破冰接待餐會。七日至十一日出席 PECS 2000 國際研討會，並抽空參訪在 Chesapeake 的美國海洋局現場作業組。研討會結束後又自費休假轉往華盛頓特區，參訪位於 Silver Spring 的美國海洋局、氣象局、海洋資料中心等。以及參訪位於 Camp Spring 的美國氣象局環境預報中心、海洋預報中心、氣候預報中心、環境衛星資料及資訊服務等作業單位。十四日搭乘美國大陸航空飛紐約，再轉搭長榮航空經西雅圖，於十七日返回台北。

貳、參加會議經過

PECS 2000 國際研討會在位於美國維吉尼亞州東南方的諾福克港邊的 Sheraton Norfolk Waterside Hotel 舉行，飯店面向 Chesapeake Bay 景色優美。沿 Chesapeake Bay 可上溯 Potomac River 至華盛頓特區，海灣開口則向著大西洋。許多現場觀測實驗計劃和數值模擬研究均在此海灣進行。本次會議由 Center for Coastal Physical Oceanography, Department of Ocean, Earth and Atmospheric Sciences, Old Dominion University 的 Arnoldo Valle Levinson 教授和 the School of Marine Science, Virginia Institute of Marine Science, College of William and Mary 的 Carl Friedrichs 教授共同主持，約有 100 位來自世界各地的專家學者與會。本人於十月六日中午抵達諾福克，便與其他 20 多位開會人員登上研究船，參加由 Arnoldo Valle Levinson 教授率領的科學巡航。研究船配備有 Echo-sounder 和 GPS (Global Position System)，探測資料不斷得展示在一台顯示器上，可看出水深的變化及通過的魚群或污染物。Arnoldo Valle Levinson 教授另在船上佈放 ADCP (Acoustic Doppler Current Profiler) 及拖曳一架 CTD (Conductivity Temperature Depth)橫越 Chesapeake Bay 灣口，現場觀測數據直接輸入一台連線之手提式電腦中，資料隨即經過處理後，將溫度、流況等時空剖面展示於電腦銀幕上。當晚參加大會安排之破冰接待餐會，一面欣賞海灣夜景，一面與其他學者專家見面交談。

PECS 2000 國際研討會自七日至十一日舉行，議程如附錄一。其中 63 篇報告論文， 29 篇張貼論文，收錄於大會論文摘要集，目錄如附錄二。大會期間每天更換當天領域之張貼論文。每天一開始先由各「張貼論文」作者上台報告 5 分鐘其論文重點；然後是各「報告論文」作者上台報告 15 分鐘論文及接受 5 分鐘問題答詢。研討主題涵蓋下列領域：1. 近海與陸棚流體動力學 (Coastal/Shelf Hydrodynamics)，2.河口混合過程和鋒面(Estuarine Mixing and Fronts)，3. 河口流體動力學(Estuarine Hydrodynamics)，4.海口和河口形態動力學 (Inlet and Estuarine Morphodynamics)，5.入海口和河床的潮汐

流體動力學(Tidal Inlet and Channel Hydrodynamics)，6.近海沉積物傳送和形態動力學(Coastal Sediment Transport and Morphodynamics)，7. 河口沉積物傳送(Estuarine Sediment Transport)。大會期間只使用一個大會議室，全體與會人員同時出席，所有意見交流及討論均十分透澈。本人發表的論文題目是「Numerical simulations of tide around Taiwan」如附錄三，被安排爲第一天「近海與陸棚流體動力學」的第四篇張貼論文。當上台報告 5 分鐘重點時，同時在銀幕上展示潮汐模擬動畫，給予現場聽眾深刻印象，在張貼論文和點心時間獲得迴響，也得到很多寶貴建議。本人的張貼海報是採用 CorelDRAW 9 軟體製作，並獲地震測報中心協助以其大型彩色印表機輸出，效果良好。

由於本局準備參考引進美國新一代自動觀測潮位系統，經由美國國家海洋局(National Ocean Services)資深工程師史興華博士的介紹，於十日下午就近順道參訪在 Chesapeake 的美國國家海洋局作業用海洋學產品和服務中心(Center for Operational Oceanographic Products and Services，簡稱 CO-OPS)的現場作業組(Field Operation Division)。由現場作業組 Michael C. O'Hargan 組長(Chief)親自介紹組織及工作內容。作業用海洋學產品和服務中心下分四個組，分別是需求和發展組(Requirements and Development Division)、現場作業組、產品和服務組(Products and Services Division)以及資訊系統組(Information Systems Division)。作業用海洋學產品和服務中心簡報資料如附錄四，現場作業組簡報資料如附錄五。現場作業組的三大任務是：1.操作及維護國家水位觀測計劃，主要是維護國家水位觀測網(National Water Level Observation Network)，2.保持航安及其他即時觀測系統正常運作，亦即維護物理海洋學要素的即時資訊系統(Physical Oceanographic Real-Time Systems，簡稱 PORTS)，3.管理及執行觀測系統的儀器組裝、測試、檢校、修改、更新、修理和建檔。其中 PORTS 簡介資料如附錄六。美國海洋局推行 PORTS 系統目的是作爲提高水上航行安全、增進港灣效益、以及海岸海洋資源保全之決策輔助工具。目前全美有五處完

整型 PORTS 系統，及七處規模較小型 PORTS Lite 系統，能整合現場水位、流、導電率、水溫、10m 高的風、氣壓、氣溫、能見度、降水等資料，由資料獲取系統(Data Acquisition System)每 6 分鐘透過 T-1 專線、無線電或標準化電話線取得遠端現場資料，然後加以品管、處理、儲存及展示。這些 PORTS 即時資料需經過連續性作業化即時監控系統(Continuous Operational Real-Time Monitoring System，簡稱 CORMS)，由富有經驗的品管操作員 24 小時輪班監控資料。PORTS 資訊以三種方式傳播，1.文字幕(text screens)能由網際網路(internet)看到即時海氣象資訊的文字敘述，2.語音資料回應系統(PORTS Voice Data Response System)能採用按鍵式電話來選聽電腦語音海氣象資訊，內容與上述文字幕相同，3.分項圖形展示系統(PORTS Imaging Component System，簡稱 PICS) ，能由網際網路或傳真回覆(Fax On Demand)看到各觀測項目的展示圖，諸如預報與觀測水位、流、風的時序列等展式圖。O'Hargan 組長又引導參觀現場作業組辦公室、各種儀器專屬的測試實驗室、以及現場作業專用設備。最後再與電子技師 Anthony C. Godette 討論水位計之超音波測距儀的率定過程。

參、與會心得與建議

國際河口與近岸海域物理之研討會出席者約有一百位，屬於規模較小的研討會。大會期間只使用一個大會議室，全體與會人員同時出席，食宿問題也大都代爲集中安排，所有與會專家學者能有充分機會意見交流及討論，故幾天下來彼此之間逐漸熟稔，此乃參加本研討會受益之處。建議本局應盡量補助同仁出席國際海象會議，一面將本局的發展成果公布於國際，促進本局與國際海洋界之技術交流；一面吸取最新海洋知識，作爲海象業務未來發展之參考。

美國海洋局推行 PORTS 系統作爲提高水上航行安全、增進港灣效益、以及海岸海洋資源保全之決策輔助工具。使用者如在船上等情形下無網際網路可用時，還可使用按鍵式電話，利用語音資料回應系統，來選聽所需要地區之電腦語音海氣象資訊。分項圖形展示系統(PICS)則可讓使用者在網際網路上查閱最近 6 分鐘的即時海氣象資訊，並且以圖形展式預報與觀測水位、流、風的時序列等。另外也可使用傳真回覆取得海氣象資訊展示圖。如此提供多重傳播資訊管道，讓使用者非常便利取得所需資訊。PORTS 的經驗及產品內容，可作爲我國未來發展海象災害預警系統之參考。

這些 PORTS 即時資料需經過連續性作業化即時監控系統(CORMS)，除自動化品管程式處理外，尚需由富有經驗的品管操作員 24 小時輪班監控資料，才能作爲水上航行安全等的決策輔助工具。我國要發展海象災害預警系統，也需注重即時資料的品管監控，才能有實質上的決策用途。然而以目前海象測報中心的人力是無法應付需求，實應加以改進。

SCHEDULE
PECS Meeting 7-11 October 2000

All events are at the Sheraton Norfolk Waterside Hotel, Norfolk, Virginia, unless otherwise noted

7 October, Saturday

19:00-21:00 Registration and Ice-breaker sponsored by OEAS-ODU

8 October, Sunday

07:30 Registration and Continental Breakfast

08:25 Opening remarks

08:30 Oral Presentation of ***Coastal/Shelf Hydrodynamics*** Posters
Arnoldo Valle-Levinson, Moderator

Variation in current structure in a ROFI induced by episodic increase of freshwater discharge-its effect on nutrient transport
Satoshi Yamao, A. Kasai, T. Fujiwara, Y. Sugiyama, and K. Harada

Physical process of coastal and offshore water exchange in the Kuroshio region
Shingo Kimura and T. Sugimoto

Short time scale water exchange process between the Kuroshio and the shelf water in the east China Sea
In-Seong Han, T. Matsuno, and K. Kamio

Numerical simulations of tide around Taiwan
Yueh-Jiuan G. Hsu

Simulation of North Sea thermal stratification: A comparison of modelling approaches
Karsten Bolding, M. H. Nielsen, H. Burchard, and M. St. John

Influence of horizontal advection and turbulence processes in the simulation of the thermal seasonal cycle of the North Sea
Georg Umgiesser and S. Carniel

Circulation in semiarid bays of Chile
Julio Moraga and A. Valle-Levinson

Wind, tide, and buoyancy-driven flows in Barataria Bay, Louisiana
Dongho Park, M. Inoue, and W. Wiseman Jr.

A nonlinear finite element method for wave propagation over gently varying depths
Conceição J. E. M. Fortes and J.L.M. Fernandes

A comparison of the Chesapeake Bay Outflow Plume Front evolution as observed with a Real Aperture Radar during COPE2 and COPE5
Mark Sletten, E. Twarog, X. Zhang, and D. McLaughlin

Coastal/Shelf Hydrodynamics (continued)
Carl Friedrichs, Moderator

09:00 Circulation and transports in shelf seas related to slope currents: application to the North Sea
Huib de Swart and M. Blaas

09:20 Baroclinic circulation associated with a cold pool in the Celtic Sea
Laura Carrillo, J. Brown, A.E. Hill,A. Souza, and L. Fernand

09:40 A cold dome in a gulf type of ROFI
Akihide Kasai and T. Fujiwara

10:00 Southeast Florida Shelf Circulation. Observations of Km-scale variability.
Brian Haus, J.D. Wang, and J. Martinez-Pedraja

10:20 BREAK

Estuarine Mixing and Fronts
William Boicourt, Moderator

10:40 Spring-Neap tidal variations of residual flow and estuarine front in Tokyo Bay, Japan
Tetsuo Yanagi, M. Shimizu, M. Nomura, and K. Furukawa

11:00 Remote sensing of estuarine outflow plumes with an airborne imaging radar
Xuehu Zhang and D. McLaughlin

11:20 Dynamics of tidal fronts in the Tay Estuary, Scotland
Simon Neill, G. Copeland, and A. Folkard

11:40 Convergence Fronts in Tidally Forced Rotating Estuaries
Robert Handler, R. Mied, T. Evans, and T. Donato

12:00 BUFFET LUNCH

Estuarine Mixing and Fronts (continued)
Jack Blanton, Moderator

12:50 An isohaline view of estuarine mixing
Parker MacCready and R. Geyer

13:10 A probabilistic characterization of tidal mixing in a coastal embayment
Michael Dowd, K. Thompson, Y. Shen, and D. Greenberg

13:30 GOTM and GETM: Integration of a water column turbulence model and estuarine transport model
Hans Burchard and K. Bolding

13:50 Comparison of measured and modelled turbulent dissipation: A case study from the North Sea
Karsten Bolding, A. Stips, H. Burchard, and P. Mathieu

14:10 BREAK

Estuarine Hydrodynamics
Charitha Pattiaratchi, Moderator

14:30 The cycle of tidal dissipation in a region of tidal straining
John Simpson, N. Fisher, and T. Rippeth

14:50 Direct stress measurements in a shallow, sinuous estuary
Harvey Seim, T. Gross, and J. Blanton

15:10 Vertical exchange in a Scottish Fjord, the Clyde Sea
Tom Rippeth and M. Inall

15:30 Dynamics of the Ebro River estuary and plume in the Mediterranean Sea
Joan Pau Sierra, J. Gonzãlez del Río, A. Sánchez-Arcilla, E. Movellán, M. Rodilla, C. Mösso, R. Martínez, S. Falco, I. Romero, and L. Marotta

15:50 Estuaries of Southwest England
Reginald Uncles and J. Stephens

16:10 Posters and refreshments

18:00-21:00 Reception on the American Rover, a 135 foot topsail schooner.

9 October, Monday

07:30 Continental breakfast

08:25 Announcements

08:30 Oral Presentation of *Estuarine Hydrodynamics*
Tetsuo Yanagi, Moderator

Hydrodynamics of shallow Mediterranean estuaries
Clifford Hearn and Barbara Robson

Hydrodynamic models of Chesapeake Bay in the Coastal Marine Demonstration Project
Thomas Gross

Wave measurement and modeling in Chesapeake Bay
Weiqi Lin and L. Sanford

The time-dependent response of estuarine circulation to wind forcing
Zhen Li, W. Boicourt, and L. Walstad

Response of the lower Chesapeake Bay to forcing from hurricane Floyd
Arnoldo Valle-Levinson, K.C. Wong, and K. Bosley

Stratification and Oxygen Depletion; Temporal and Spatial Variability in a Broad, Shallow, River Dominated Estuary
Amy Hunter and William Schroeder

Thermodynamics and hydrodynamics at Sand Shoal Inlet, VA
Chunyan Li, A. Valle-Levinson, L. Atkinson, K. Holderied, C. Reyes, A. Sepulveda, and R. Sanay

Hydrodynamic and sediment transport modeling in the Venice Channel Network
Georg Umgiesser and A. Massalin

Flow patterns in the vicinity of the mouth of a Chilean fjord.
Mario Cáceres, A. Valle-Levinson, A. Sepulveda

Telemac-2D application to the Lagoa Dos Patos Hydrodynamics during an El Niño event
Elisa H.L. Fernandes, K. Dyer, O. Moller

Physics of estuaries and coastal hydrodynamics of Indian Ocean: An analysis of major dimensions human impacts and transportation of terrestrial materials to freshwater and coastal ecosystems
S. Shanmuganandan

Estuarine Hydrodynamics (continued)

09:00 The Stommel Model of Shallow Coastal Basins
Clifford Hearn

09:20 Anatomy of Longitudinal Circulation in a Partially Mixed Estuary
William Boicourt, L. Walstad, Z. Li

09:40 Remote forcing of estuarine and shelf circulation in Western Australia by tropical cyclones
Charitha Pattiaratchi

10:00 The physical exchange between Delaware's Inland Bays and the adjacent continental shelf
Kuo-Chuin Wong

10:20 BREAK

Estuarine Hydrodynamics (continued)
John Simpson, Moderator

10:40 The response of saline intrusion to tidal range in partially stratified estuaries
Roy Lewis, R. Uncles, A. Riddle, J. Stephens, J. Lewis

11:00 Observations of estuarine adjustment to changes in tidal and river forcing
Robert Wilson

11:20 Tidal and subtidal motion in an estuarine tidal straight
Robert Chant

11:40 Influence of river outflow and tidal amplitude on the estuarine regime
Rocky Geyer

12:00 Tidal current asymmetry in estuaries and tidal creeks
Jack Blanton, G. Lin, S. Elston

12:20 BUFFET LUNCH

Estuarine Hydrodynamics (continued)
Kuo Wong, Moderator

13:10 Secondary circulation in curved and straight estuarine reaches
Susan Elston, J. Blanton, and H. Seim

13:30 Short period circulation dynamics in the shallow, micro-tidal Neuse River Estuary, North Carolina
Janelle Reynolds-Fleming, S. Carr, and R. Luettich

13:50 From fresh to brackish in five days: large scale field experiment on salt intrusion into a freshwater reservoir
P. Jacobs and Dik Ludikhuize

14:10 Effects of tidal current phase at the junction of two straits
John Warner, G. Schladow, D. Schoellhamer, and J. Burau

14:30 Application of HF Radar in San Francisco Bay for spatial mapping of tidal circulation
Ralph Cheng, D. Barrick, J. Gartner, N. Garfield

14:50 BREAK

Inlet and Estuarine Morphodynamics
Huib de Swart, Moderator

15:10 Contribution of non-linear mechanisms in the persistence of multiple tidal inlet systems
Paulo Salles, D. Aubrey, and G. Voulgaris

15:30 Analysis of the long term morphological behaviour of the Eastern Scheldt and the Grevelingen
S. Aarninkhof, T. van Kessel, and Jean Marie Stam

15:50 A comparison between process-based and idealized morphodynamic models for the Western Scheldt case
Harmen Verbeek, Z. Wang, and H. Schuttelaars

16:10 Morphodynamic equilibria in tidal embayments with decreasing cross-section
Henk Schuttelaars

16:30 Posters and refreshments

10 October, Tuesday

07:30 Continental breakfast

08:25 Announcements

08:30 Oral Presentation of *Sediment Transport and Morphodynamics* Posters
Rocky Geyer, Moderator

Effect of depth-dependent wave stirring on the final amplitude of the shoreface-connected sand ridges
Daniel Calvete

Modelling the development of sediment patterns by integrating the shallow water equations containing stochastic extensions of sediment transport parameterizations
Dieter Eppel and H. Kapitza

Sediment transport associated with tidal asymmetry in stratification, mixing and resuspension in the York River estuary
Carl Friedrichs, M. Scully, G. Battisto, and L. Schaffner

Tidally varying suspended particle populations in the lower Chesapeake Bay
David Fugate, C. Friedrichs, L. Schaffner and G. Battisto

Morphological modelling of a gas-drilled bottom depression in the North Sea
Suzanne Hulscher and C. Fluit

Spatial and temporal variability of suspended-sediment concentration in a shallow estuarine environment
Catherine Ruhl and D. Schoellhamer

Historical morphological change in the Mersey estuary (UK): The interaction between form and process
Chris Thomas, M. Dearnaley, J. Dennis

Limiting slopes and depth of ebb-tidal shoal features
Frank Buonaiuto, N. Kraus and H. Bokuniewicz

Phytoplankton distribution and survival in the Thermocline
J. Sharples, C. Moore, P. Holigan, T. Rippeth and J.H. Simpson

Balancing the books in the Menai Strait
E. Williams and T. Rippeth

Inlet and Estuarine Morphodynamics (continued)

09:00 Morphodynamics of tidal inlet systems: model results and field data
Sonja van Leeuwen

09:20 Tidal asymmetry in the Western Scheldt
Zheng Bing Wang, C. Jeuken, H. Gerritsen, H. de Vriend, and B. Kornman

09:40 Morphological modelling of intertidal mudflats: the role of tidal currents
David Pritchard, A. Hogg, and W. Roberts

10:00 BREAK

Tidal Inlet and Channel Hydrodynamics

Reginald Uncles, Moderator

10:20 Tidal, low-frequency and long-term mean transport through two channels the Florida Keys
Ned Smith

10:40 Analysis of transient tidal inlet momentum balances from high resolution circulation models
Jim Hench, B. Blanton, and R. Leuttich

11:00 Development and migration of inlet ebb jets and eddies: measurements and calculations
Adele Militello and N. Kraus

11:20 Temporal variability in salinity, temperature and currents in a tidal inlet: results from long-term ferry observations

Herman Ridderinkhof

11:40 Non-linear tidal waves in channels: on the role of cross-section geometry
Pedro Lomonaco, R. Medina and I. Losada

12:00 Several interfaces showing the land and ocean interactions in the Changjiang (Yangtze) Estuary
Huanting Shen, J. Wu and J. Zhu

12:20 BUFFET LUNCH

Coastal Sediment Transport and Morphodynamics
Nick Kraus, Moderator

13:10 Numerical modeling study of sediment dispersal by river plume
James Liu, S. Chao, and R. Hsu

13:30 Aggregation of suspended particles in shelf waters: mediation by plankton and turbulence
Colin Jago and S. Jones

13:50 Bottom friction and bedform dynamics on the southern flank of Georges Bank
Sandra Werner, R. Beardsley and A. Williams

14:10 Growth of large-scale bedforms due to storm-driven and tidal currents: a model approach
Marianne Walgreen

14:30 BREAK

Coastal Sediment Transport and Morphodynamics (continued)
James Liu, Moderator

14:50 Influence of wind-driven flow on the net sand transport in the North Sea
Johan van der Molen

15:10 Reservoir model of volume change, sediment exchange, and natural bypassing at tidal inlets
Nick Kraus

15:30 Prediction of sand transport rates by waves and currents
Alan Davies and C. Villaret

15:50 Modelling migration of sand waves in shallow shelf seas
Attila Németh, S. Hulscher, and H. de Vriend

16:10 Morphodynamics of a local bottom disturbance; an analytical approach
Sander Hoogewoning, J. van de Kreeke, and M. Verlaan

16:30 Posters and Refreshments

19:00-22:00 -- Banquet at Nauticus National Maritime Center, Norfolk

11 October, Wednesday

07:30 Continental Breakfast

08:25 Announcements

Estuarine Sediment Transport
Iris Grabeman , Moderator

08:30 Variability of suspended-sediment concentration at tidal to interannual time scales in San Francisco Bay, USA
David Schoellhamer

08:50 Flocculation behaviour within a partially stratified estuary
Charles Lemckert and S. Hunt

09:10 Salt wedge dynamics and suspended sediment balance in the Itajaí-açu Estuary -- Southern Brazil
Carlos Schettini

09:30 Sediment trapping at estuarine fronts
Gail Kineke, R. Geyer, and A. Ramsey

09:50 Suspended matter transport modeling in the Venice Lagoon
Georg Umgiesser

10:10 BREAK

Estuarine Sediment Transport (continued)
Gail Kineke, Moderator

10:30 Temporal development of the turbidity maximum and the mixing zone in the Weser Estuary within the past 15 years
Iris Grabemann and G. Krause

10:50 Particle trapping in two stratified, advection-dominated systems -- the Columbia and Fraser River estuaries
David Jay, A. Fain, P. Orton, and D. Wilson

11:10 Variability of SPM concentrations and fluxes in the ETM of the Elbe River
Jens Kappenberg

11:30 Temporal variability and dynamics of the turbidity maximum in the Gironde estuary (France)
Aldo Sottolichio, P. Le Hir, and P. Castaing

11:50 Processes controlling variability of suspended sediment transport in northern Chesapeake Bay
Larry Sanford

12:10 Closing Remarks

附錄二

10th International Biennial Conference on Physics of Estuaries and Coastal Seas

7 - 10 October, 2000

Sheraton Norfolk Waterside Hotel, Norfolk, Virginia, USA

Extended Abstracts Proceedings Volume

Edited by Carl T. Friedrichs and Arnoldo Valle-Levinson

Sponsored by the Center for Coastal Physical Oceanography, Department of Ocean, Earth and Atmospheric Sciences, Old Dominion University, and the Virginia Institute of Marine Science, School of Marine Science, College of William and Mary

SRAMSOE Report No. 366, Virginia Institute of Marine Science, Gloucester Point, VA, USA

CONTENTS

Coastal/Shelf Hydrodynamics

Numerical Simulations of Tide Around Taiwan

YUEH-JIUAN G. HSU

Marine Meteorology Center, Central Weather Bureau, Taipei, Taiwan, ROC

INTRODUCTION

Tides around Taiwan result from shoaling effects of tidal constituents in the Pacific Ocean propagated westward to the continental shelf. According to the spectral analyses of tidal data, the Lunisolar Diurnal (K_1) and the Principle Solar Diurnal (O_1) are the largest diurnal tidal components, and the Principle Lunar (M_2) and the Principle Solar (S_2) are the largest semidiurnal tidal components. The diurnal tidal component is of the same order as the semidiurnal component in the north and south of Taiwan, while the semidiurnal tidal components are larger in the middle of the west coast of Taiwan. The length of west coastline of Taiwan and the average water depth of 40m in the Taiwan Strait was proposed to cause the resonant phenomenon for the main semidiurnal tidal component, M_2. On the other side of the Taiwan Strait, Kelvin wave was proposed to travel southwestward along the Mainland coast. But mostly researchers theorized from tidal data analyses without the added clarity of model simulations. In this paper, a shallow water equations model is developed to simulate the physics of tides around Taiwan.

EXPERIMENTS DESIGNED FOR SENSITIVITY STUDIES

A tide model basically following the shallow water equations is used to study tidal characteristics around Taiwan. The model is focused on seas around Taiwan. The astronomical tidal forcing is installed in the model's open boundaries, including 9 to 16 tidal constituents of the deep ocean, so that the vertically integrated velocity in the model only represented the tidal current. A total of 5 experiments, different in water depth, number of tidal constituents, and Coriolis effect, were designed for sensitivity studies. These experiments were initialized at 1400 LST 24 May 1998 and were run for 96 h in which the first 48-h run used to reach quiescence from the cold start. The new moon appeared at 0332 LST 26 May and the moon was passing the perigee at 0800 LST 24 May. Thus I selected this spring tide of larger tidal range to study characteristics of tide around Taiwan.

Experimental Type	Water Depth	Tidal Constituent	Coriolis Effect
CNTL	<6000	16	Y
TDC4	<6000	M2 S2 K1 O1	Y
TDM2	<6000	M2	Y
DP40	=40	M2	Y
NF40	=40	M2	N

RESULTS AND DISCUSSIONS

Evaluation of simulated water levels

Experiment CNTL was the control run, including near-true sea bottom topography (Fig 1), 16 tidal constituents at open boundaries, and Coriolis effect. Time series of simulated water surface elevations at selected grid points were compared with their neighboring tidal observation data in 26-27 May 1998. The semidiurnal tides were significant on west and east coasts of Taiwan, while the diurnal tides were obvious on the southwest coast and northeast coast. Along the west coast, tidal ranges gradually increased from north and south ends and reached the maximum more than 5m in Taichung. Along the east coast, tidal ranges were similar and smaller than 2m. Larger tidal ranges were to the west of the Taiwan Strait, and the maximum tidal range reached 6m in Matsu.

Sea level fields and tidal current fields

The control run simulated the evolution of tide reasonably well. The approximate 6-h reversal of water levels and tidal currents due to dominating semidiurnal tides were shown around Taiwan. Water mass flowing out of the Strait in ebb tide at 1500 LST 26 May (Fig 2a) and into the Strait in flood tide at 2100 LST (Fig 2c). The minimum water level occurred on Wuchiou waters at 1800 LST 26 May 1998 (Fig 2b). After six hours, it became the maximum water level at 0000 LST 27 May (Fig 2d). The maximum or minimum water levels propagated southwestward along the Mainland coast. Fig. 3a and 3b show sea levels and alongshore currents along the Mainland coast at 1500 LST 26 May and 2100 LST 26 May corresponding to the solid lines on Fig 2a and 2b respectively. We can see that along the Mainland coast, the maximum currents were accompanied by the extreme water levels with higher levels on the right in the downstream direction. Larger tidal ranges were to the west of Taiwan Strait. Fig 3c shows sea levels across the Taiwan Strait at 2700 LST 27 May corresponding to the solid line on Fig 2d. This shows a slope of sea surface such that the wave amplitude falls off exponentially as one moves away from the Mainland coast. This proves tidal waves acted as Kelvin waves traveling southwestward along the Mainland coast. However, on the opposite side of the Strait, minimum currents were always off Hsinchu and Taichung coexistent with extreme water levels. Standing waves appeared on the west coast of Taiwan. The natural period of Taiwan Strait is close to the semidiurnal tidal period. Experiments with various numbers of tidal components, including the main semidiurnal tidal component M_2, showed similar tidal phases but smaller amplitudes when considering fewer tidal components. The experiment including M_2 and a constant water depth of 40m still showed standing waves along the west coast of Taiwan. Tidal currents to the southwest of Taiwan were more uniform due to flat bottom topography. The progressive Kelvin waves along the Mainland coast no longer existed in a similar experiment without Coriolis force.

Tidal current ellipses

Tidal currents were weaker in open ocean regions deeper than 200m in east and southwest Taiwan. Rotary tidal currents were located in northwest Taiwan and Taiwan Tan; however, reversing tidal currents occurred in restricted waters such as Penhu channel and Kuanyin Depression. Major axes of tidal current ellipses were essentially parallel to the central line of the Taiwan Strait and became more or less parallel to the shore in near shore regions. Westward propagating tides from the Pacific Ocean encounter Taiwan and cause diffraction. The counterclockwise ellipses were in the northern part of Taiwan Strait, while the clockwise ellipses were in the southern part. The boundary between them was about at the contour of 40m located at the northern rim of Taiwan Tan. Close to the Mainland coast, the boundary extends further south to 23^0N because of the progressive Kelvin waves. On Taiwan's southwest coast, the boundary ends in the Penhu Channel. The 6-h reversal current direction of ebb and flood tides may explain the long-term balance of the bottom topography in the Taiwan Strait.

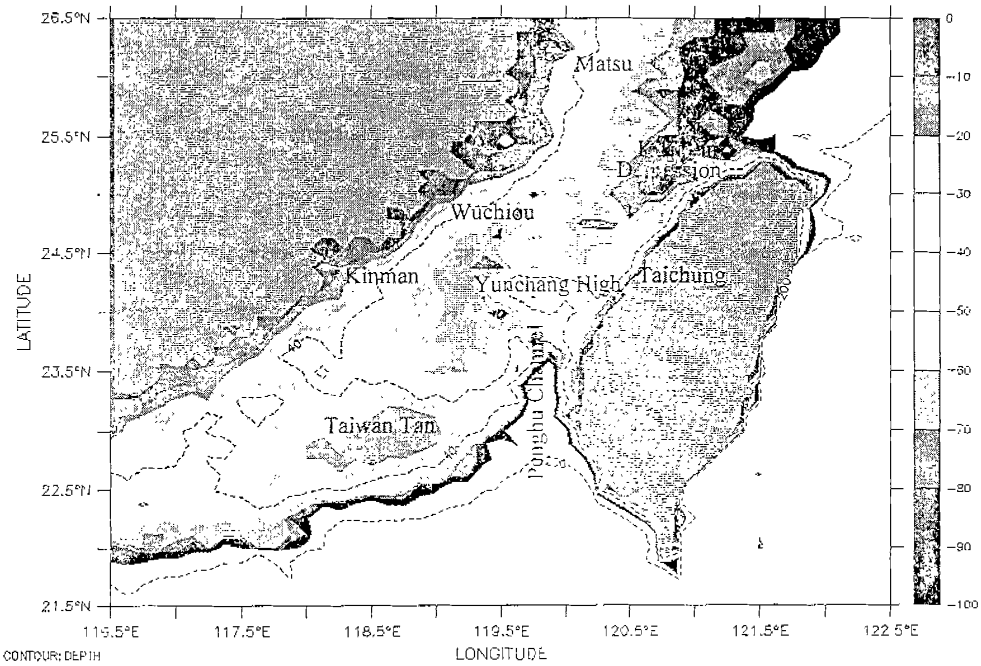


Fig.1. Sea bottom topography in the model domain.

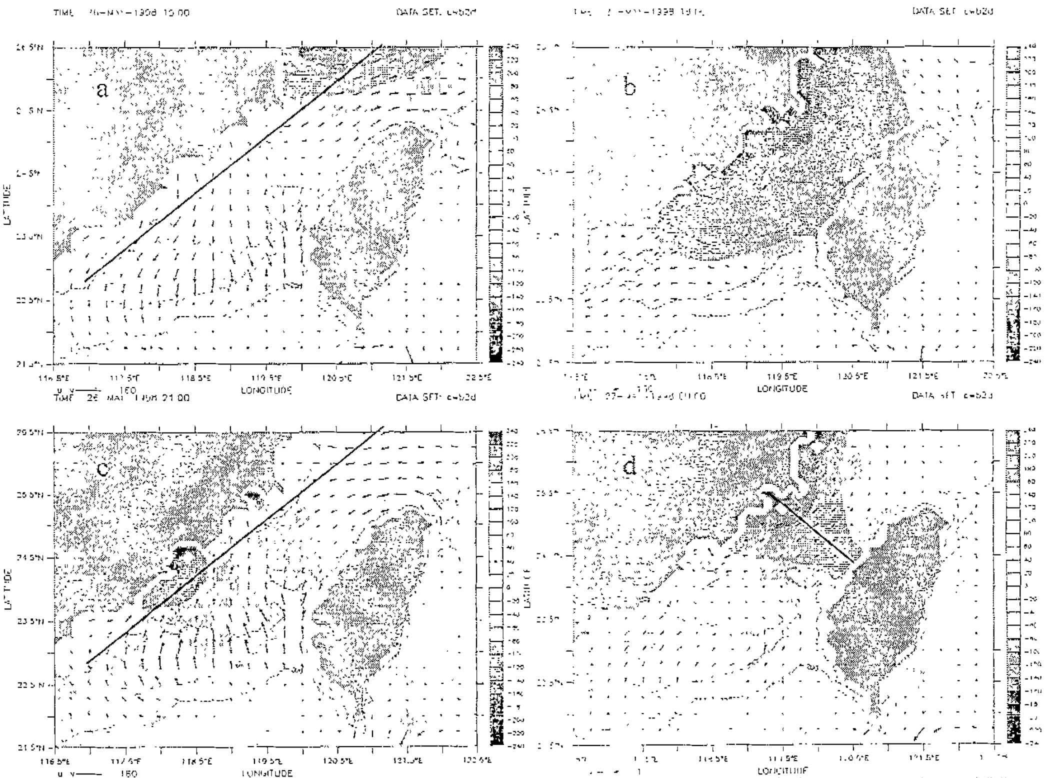


Fig.2. Evolution of tide at (a) 1500 LST 26 May (b) 1800 LST 26 May (c) 2100 LST 26 May (d) 0000 LST 27 May.

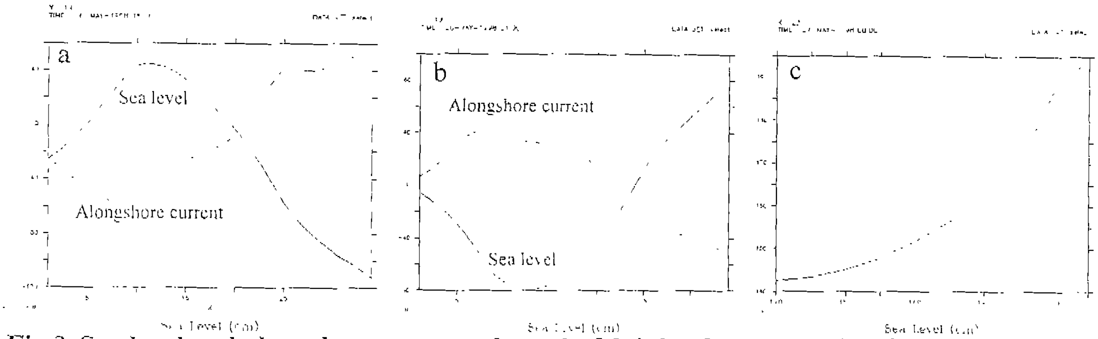


Fig.3. Sea level and alongshore current along the Mainland coast at (a) 1500 LST 26 May (b) 2100 LST 26 May. (c) Sea level across the Taiwan Strait at 2700 LST 27 May.

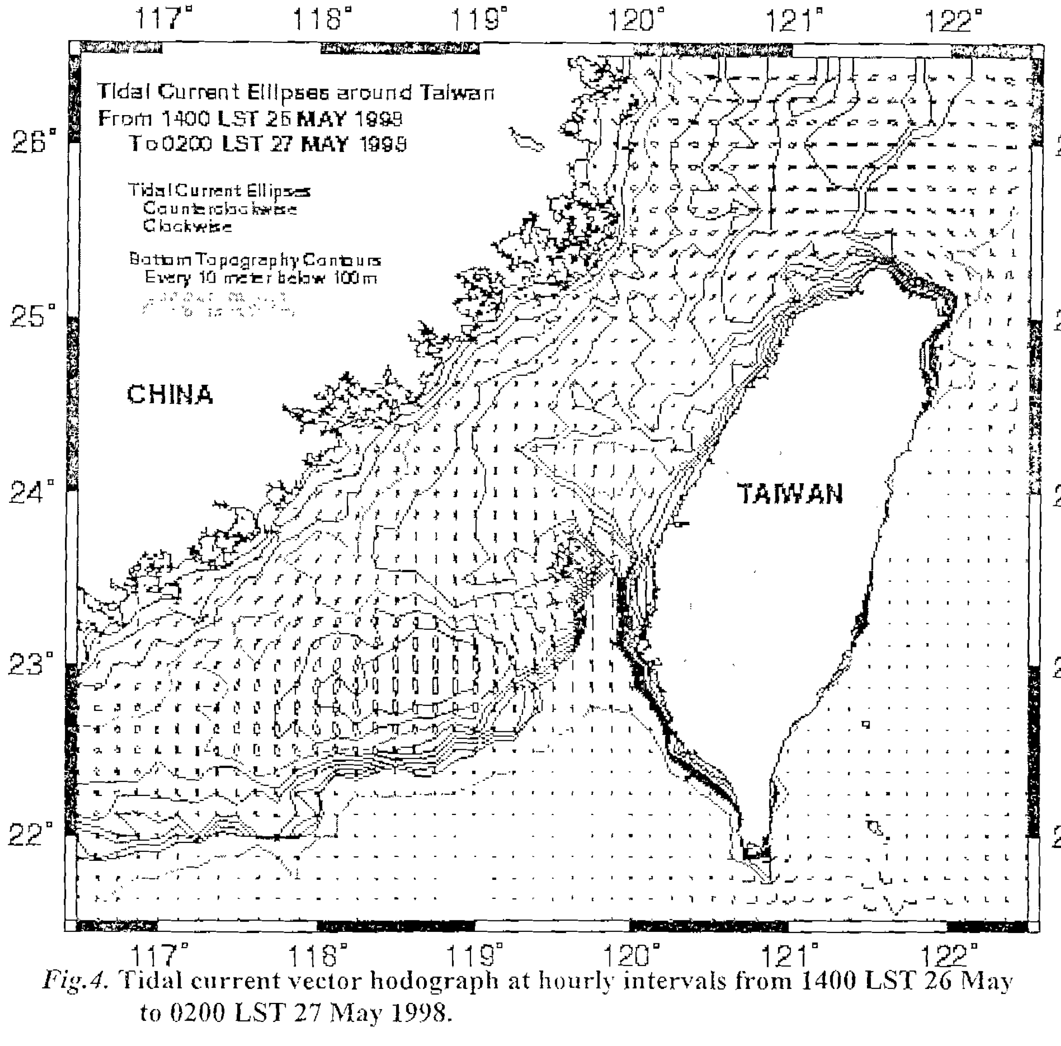
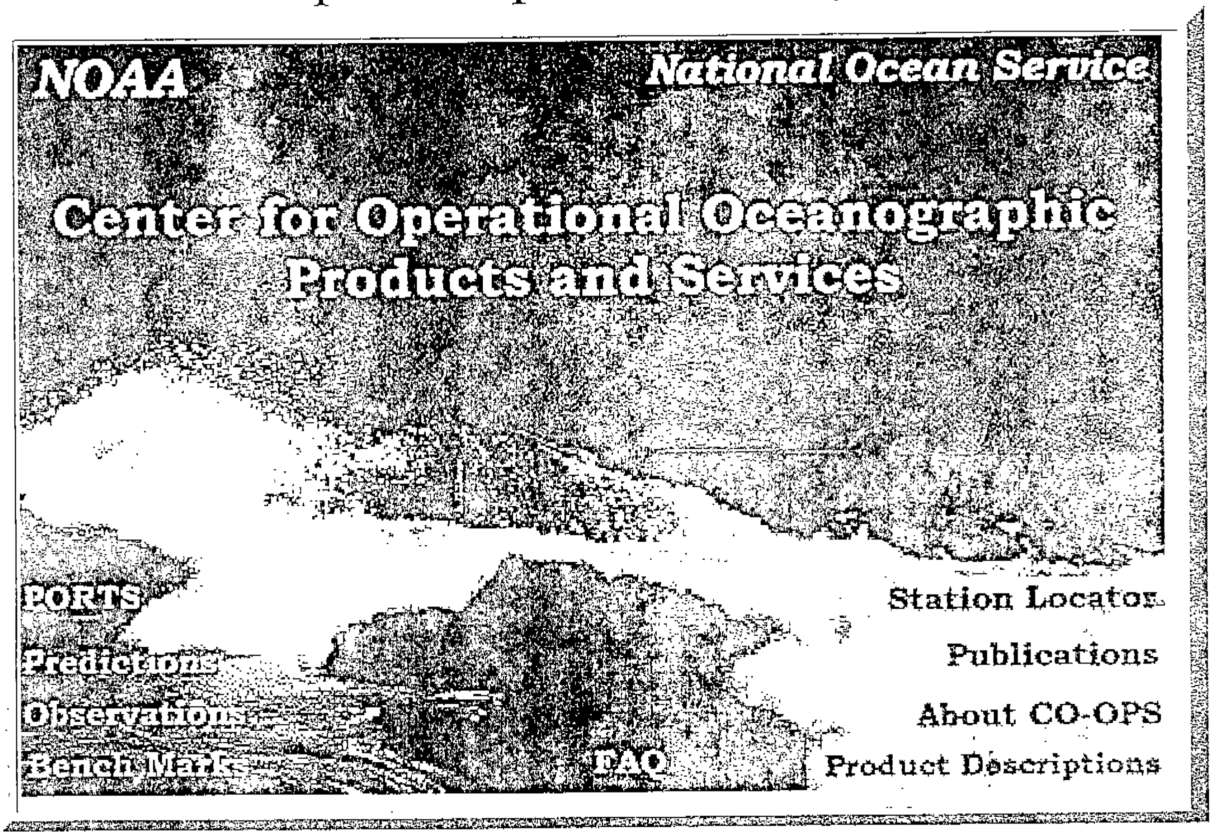


Fig.4. Tidal current vector hodograph at hourly intervals from 1400 LST 26 May to 0200 LST 27 May 1998.

http://co-ops.nos.noaa.gov 附錄四



Center for Operational Oceanographic Products & Services

MISSION STATEMENT

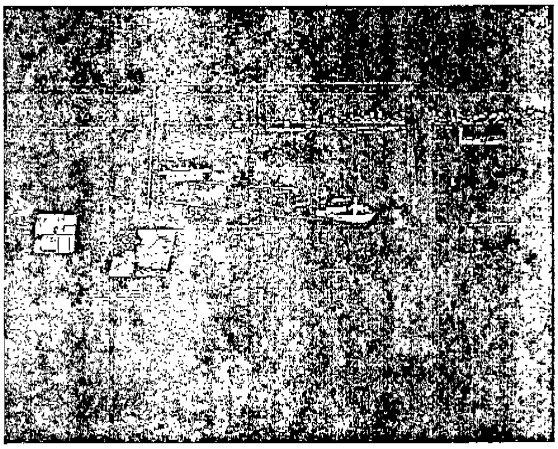
Provide the National infrastructure, science, and technical expertise to monitor, assess, and distribute tide, current, water level, and other coastal oceanographic products and services necessary to support NOAA's mission.

OUR SEAS AND OUR SKIES

Years

OF EXCELLENCE AT NOAA

NAVIGATION



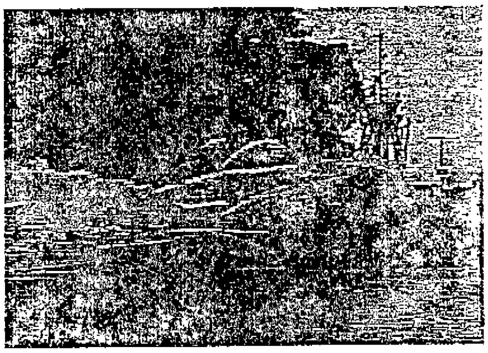
Navigation Products

- Increase the maritime industry's efficiency and economic productivity by providing real-time water levels and currents, predictions and forecasts.

- Expand the utility of ECDIS and similar technologies by establishing standards for tides and other time varying objects.

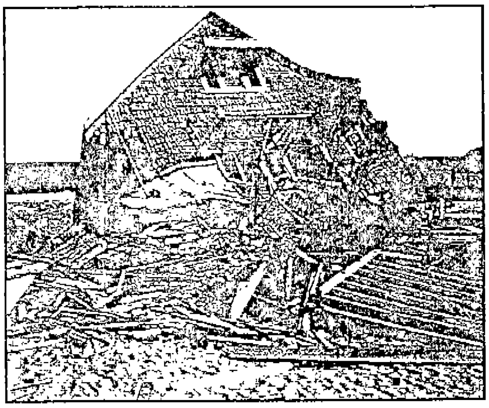
HABITAT

Enhance Preservation/Restoration of Coastal/Ocean Environments.



- Provide operational tide & current information for spill response needs.
- Monitor/evaluate climate change on sea level rise in U.S. coastal regions

HAZARDS



Improved Storm Surge/Tsunami Information

Reduce Risks Associated with Natural Hazards

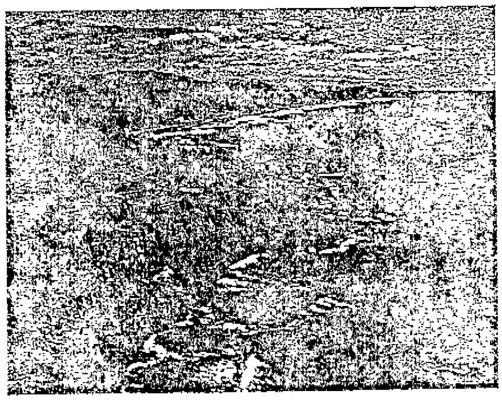
- Provide timely & accurate storm surge/tidal flood information, and tsunami information

- Establish Federal/State partnerships to improve coastal flood warning and assessment capabilities.

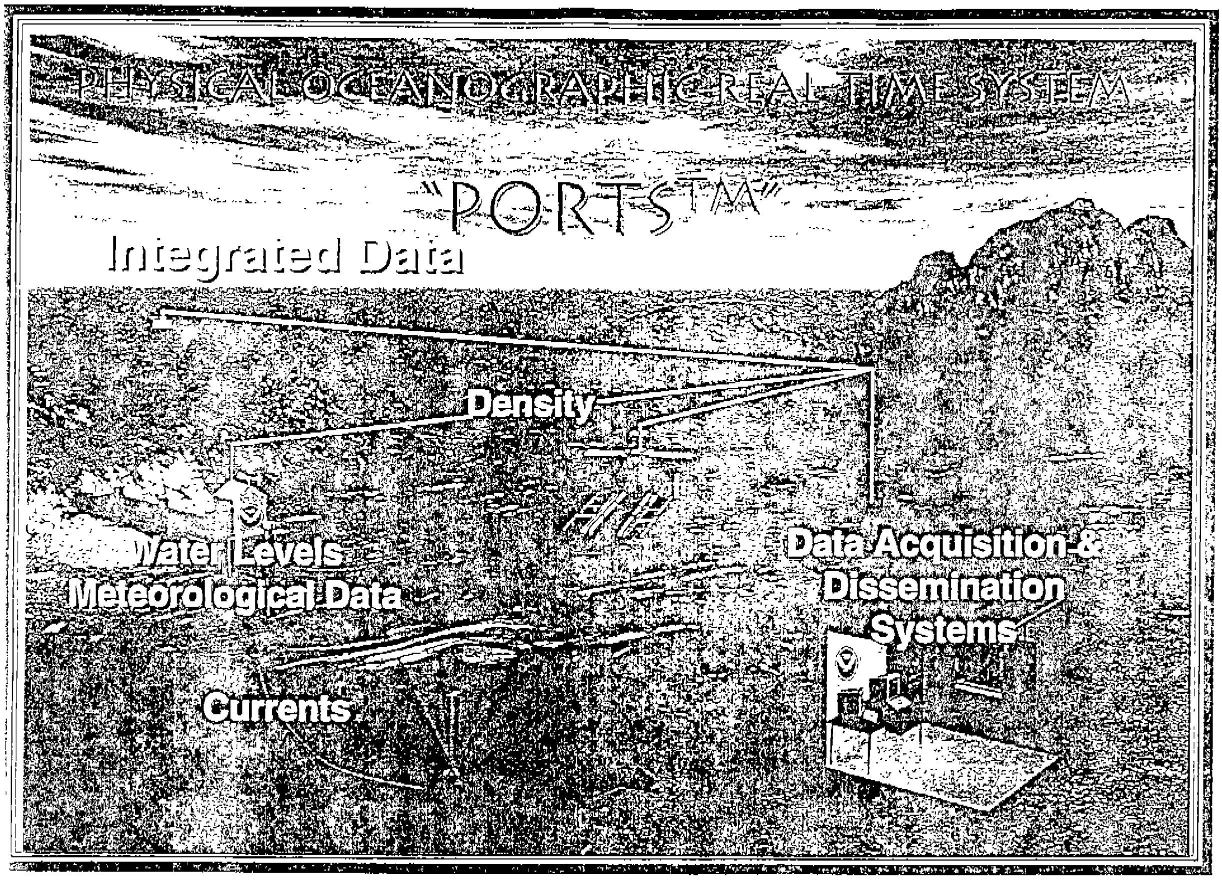
COASTAL COMMUNITIES

Supporting Coastal Communities

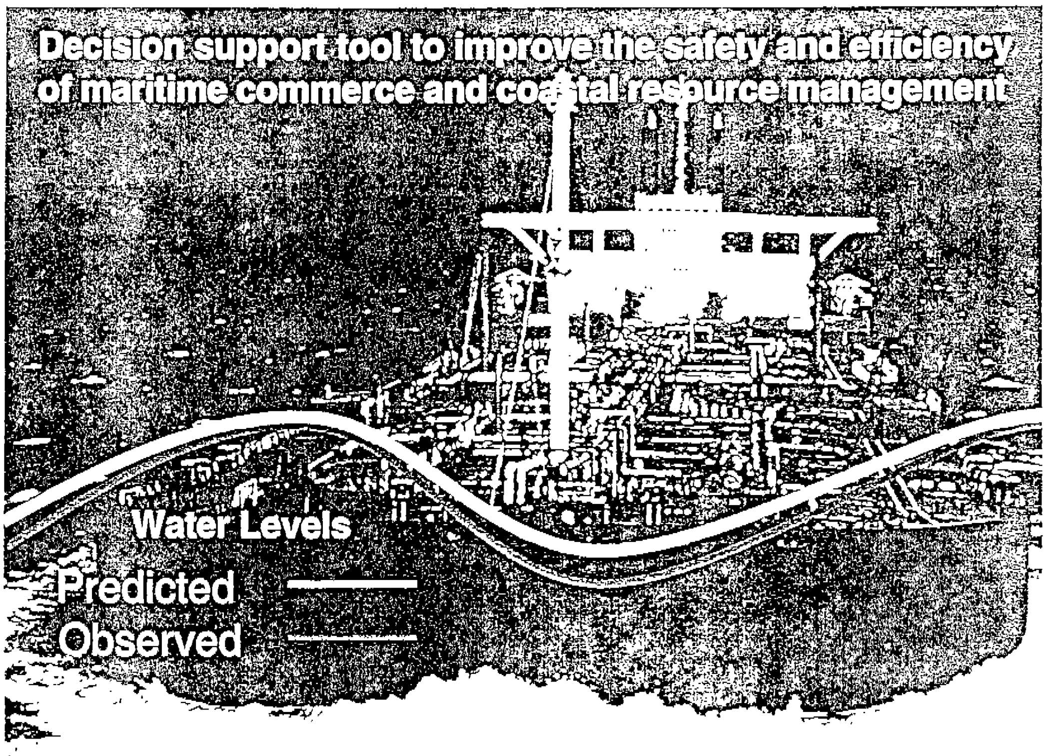
Provide the nation with accurate tidal datums in support of shoreline delineation and marine boundaries



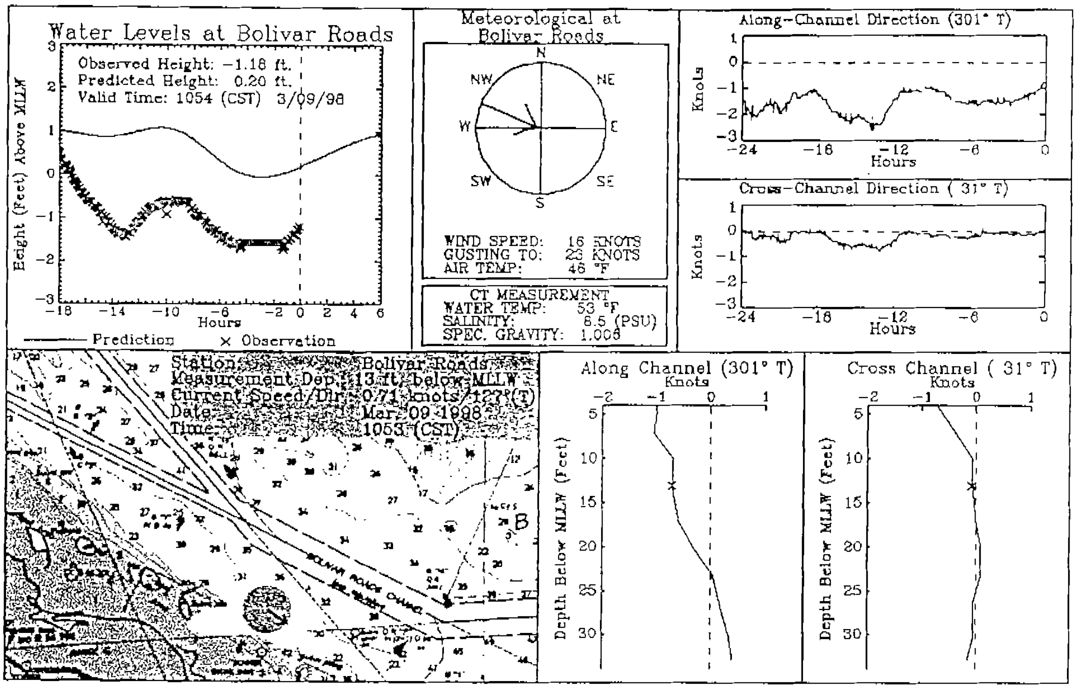
Shoreline/Marine Boundaries


PHYSICAL OCEANOGRAPHIC REAL TIME SYSTEM
"PORTS™"
Integrated Data
Density
Water Levels
Meteorological Data
Currents
Data Acquisition & Dissemination Systems

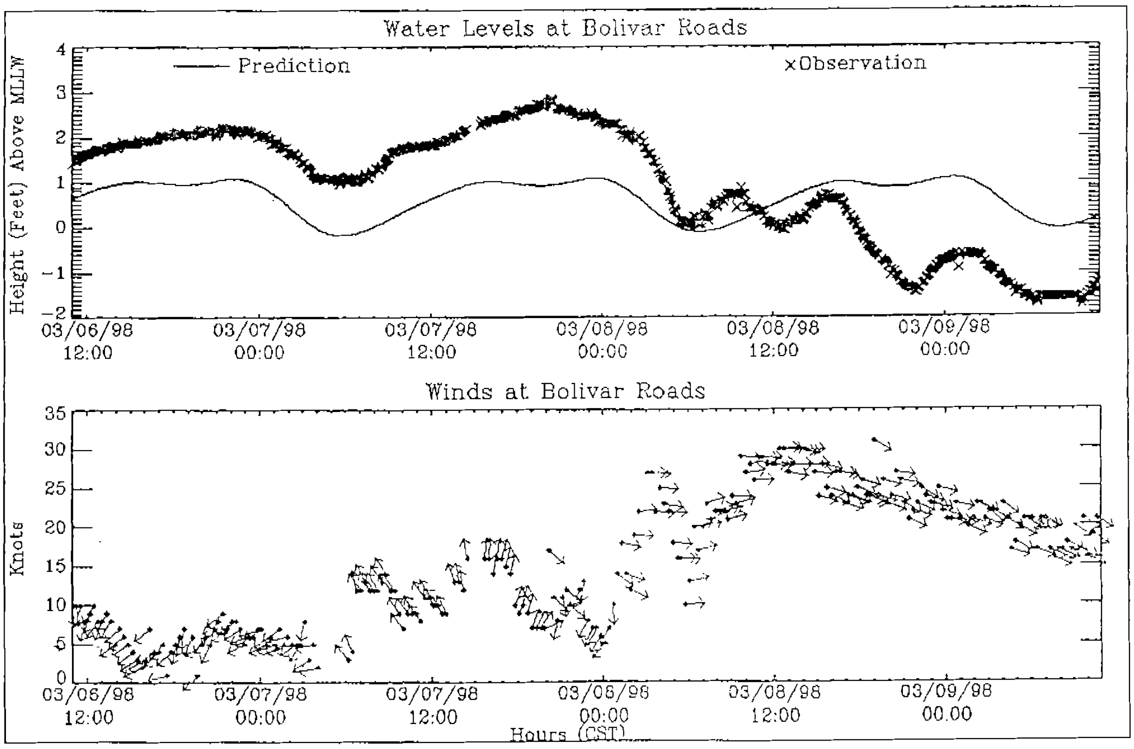
PORTS™

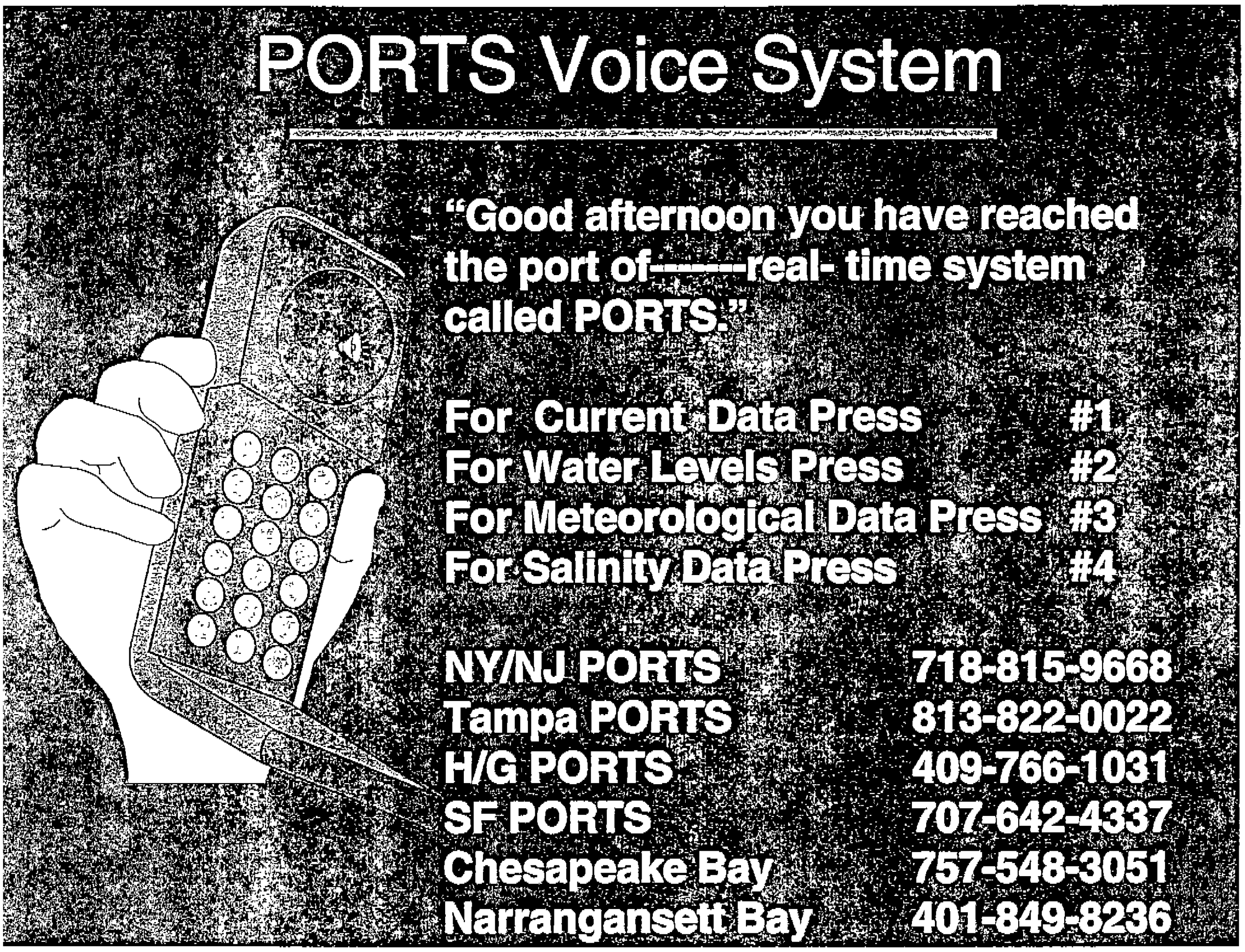

Decision support tool to improve the safety and efficiency of maritime commerce and coastal resource management
Water Levels
Predicted
Observed

Houston/Galveston Bay PORTS
PICS



Houston/Galveston Bay PORTS
3 Day Water Levels & Winds

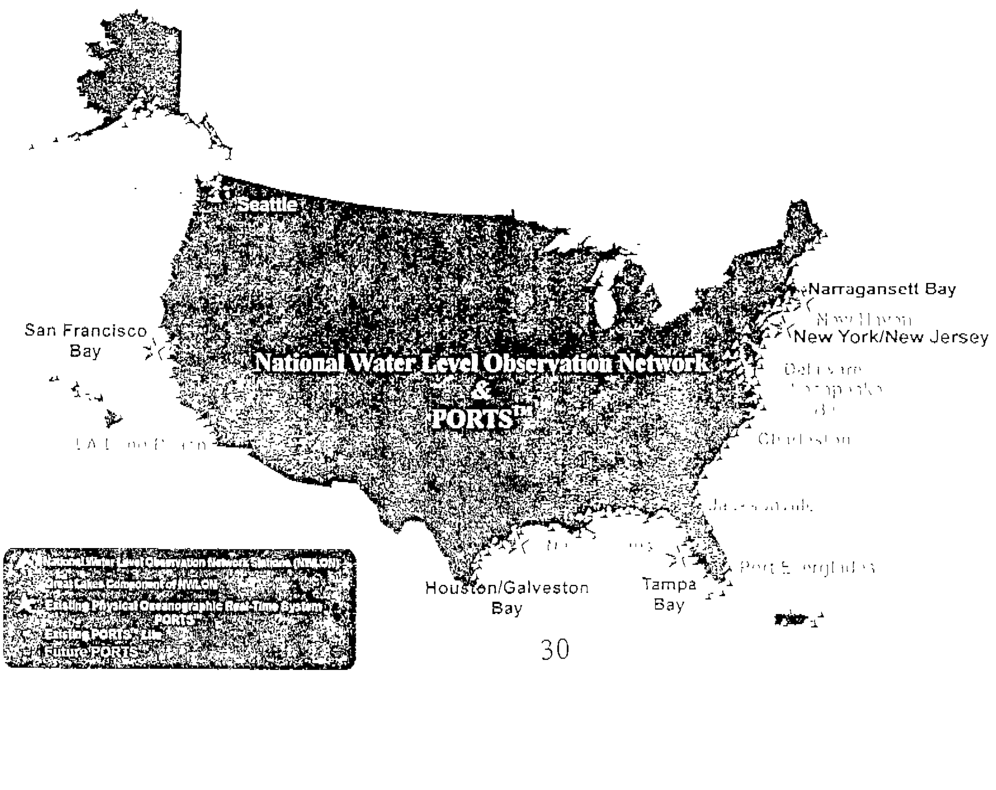




National Water Level Observation Network

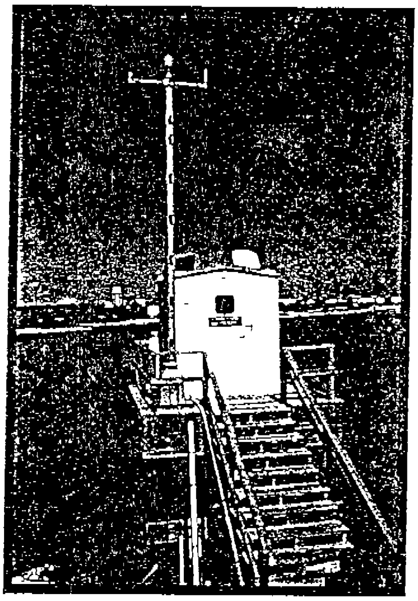
&

PORTS™

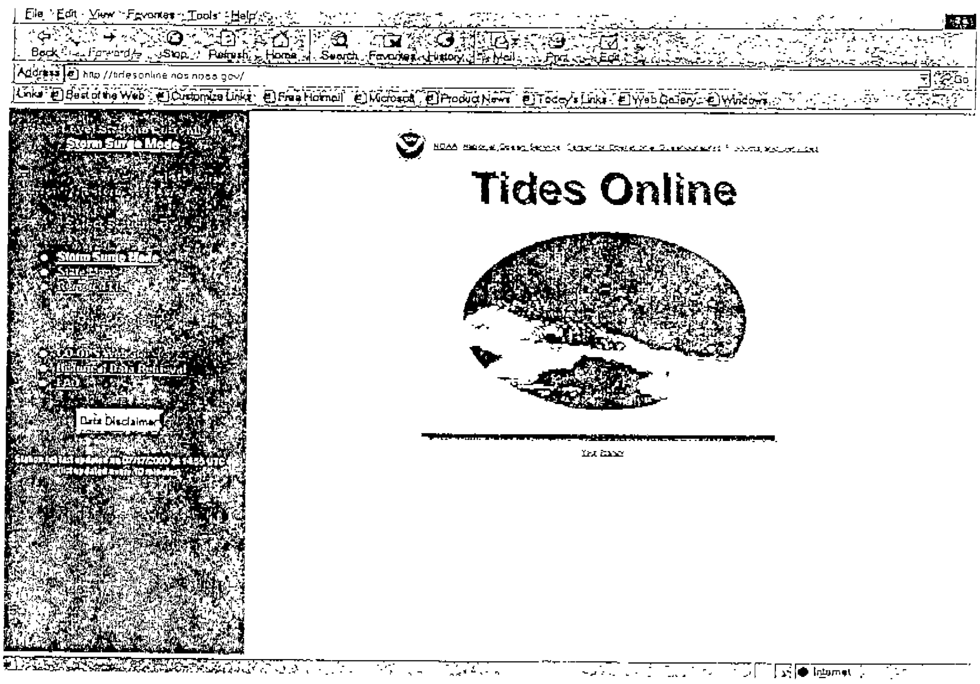


National Water Level Observation Network

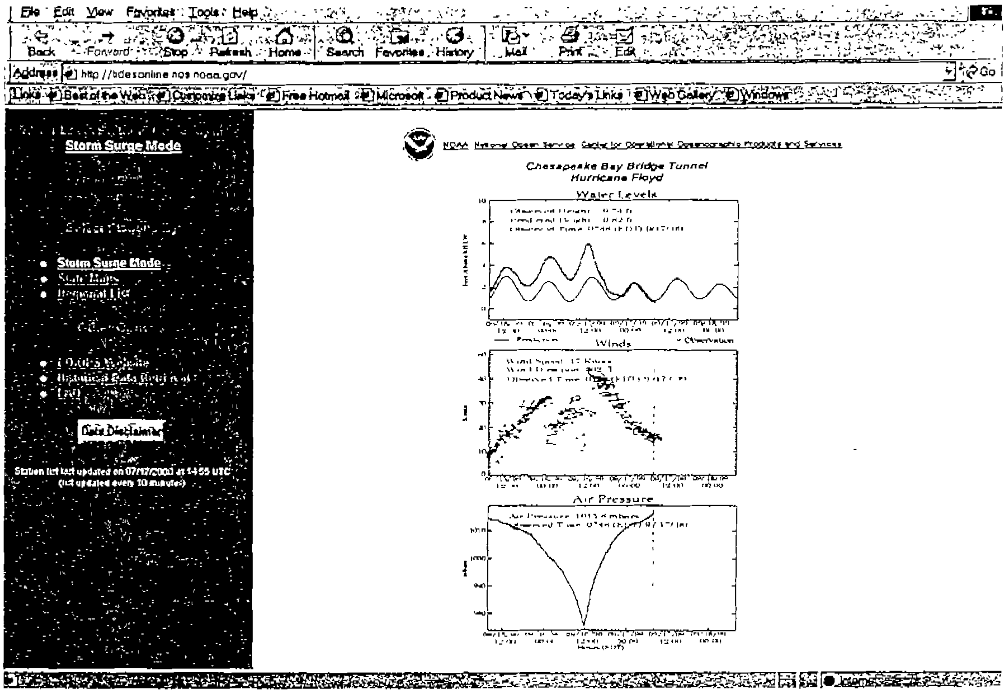
- Water Level
- Wind Speed/Direction
- Barometric Pressure
- Air/Water Temp.
- Conductivity/Temp
- MLLW Datum



Tides Online
http://tidesonline.nos.noaa.gov

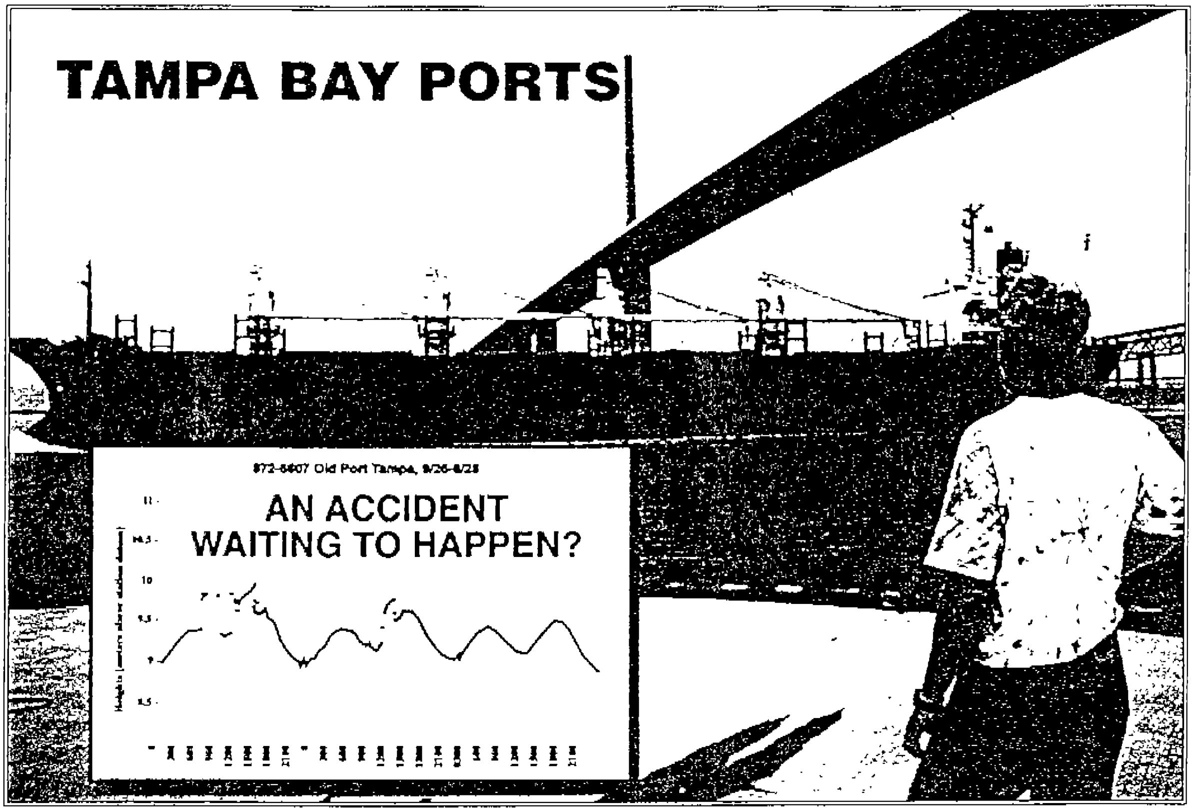


Tides Online
Hurricane Floyd

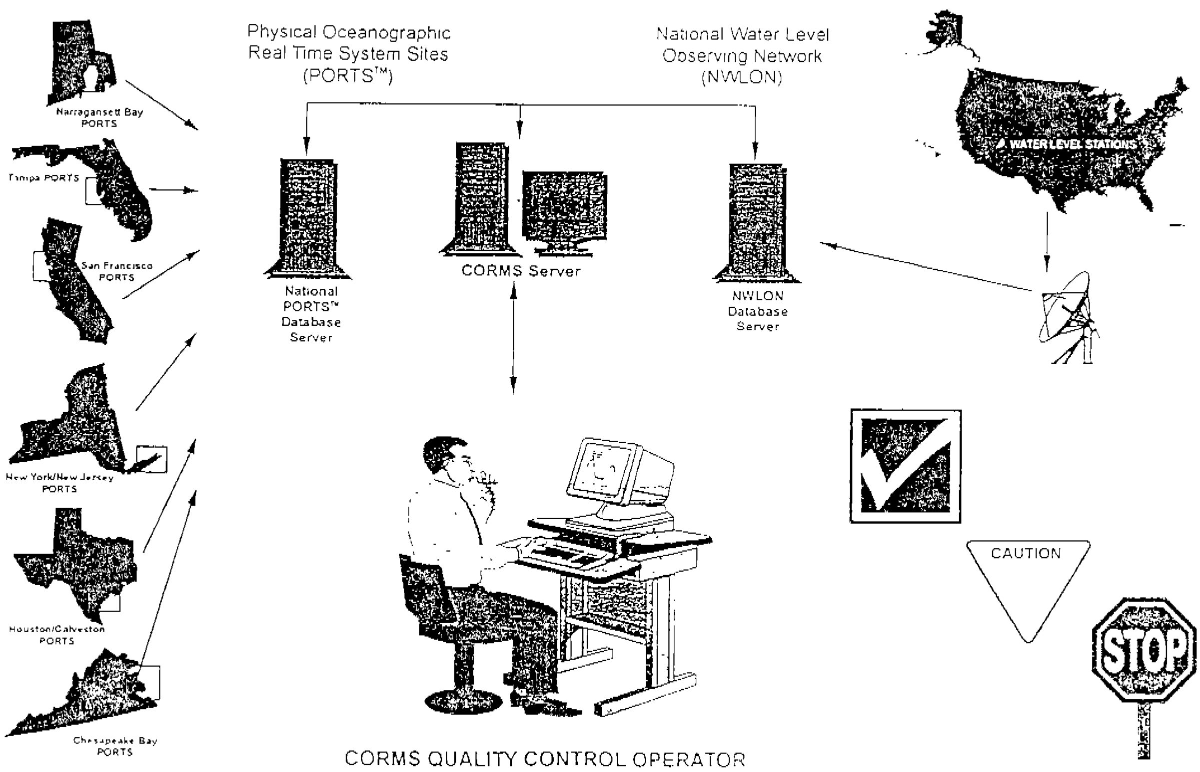


Continuous Operational Real-Time Monitoring System

CORMS

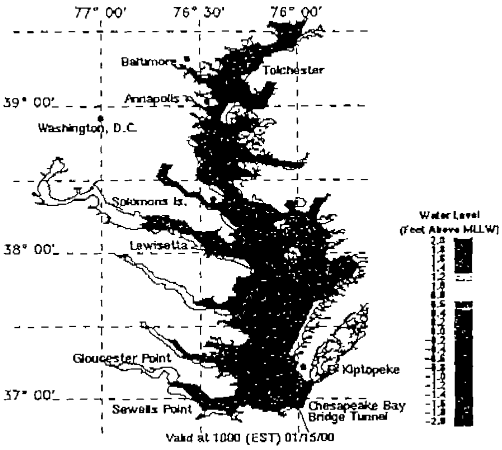


CONTINUOUS OPERATIONAL REAL-TIME MONITORING SYSTEM ENVIRONMENT (CORMS)

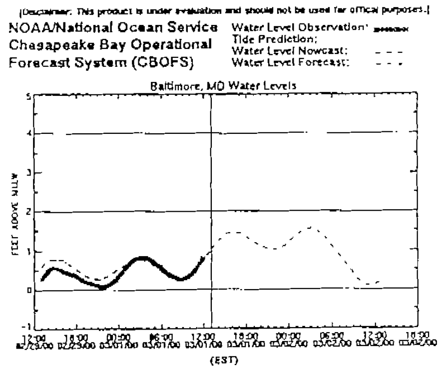


Tools For The Future

Operational Nowcasting/Forecasting
CBOFS
(Chesapeake Bay Operational Forecasting System)

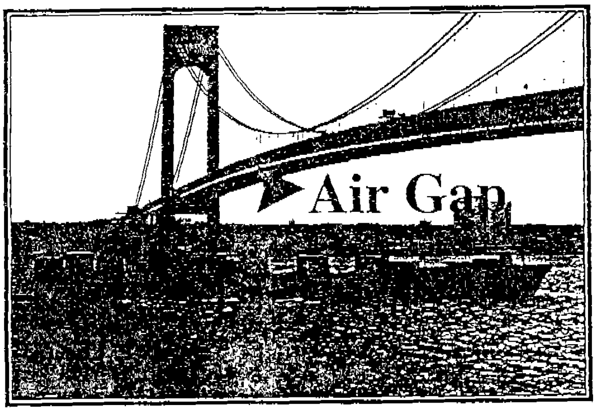


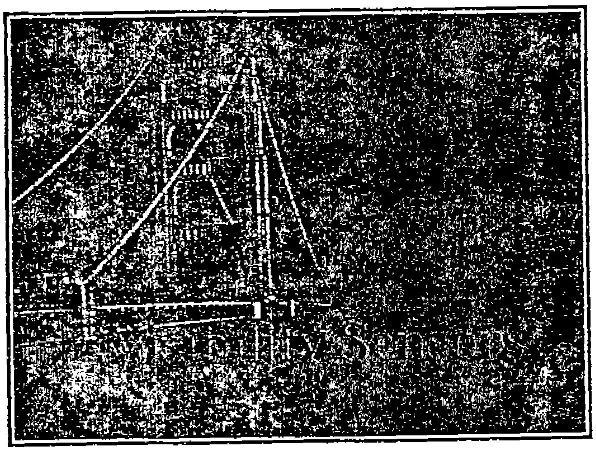
WATER LEVEL NOWCAST



WATER LEVEL NOWCAST/FORECAST

Tools For The Future





附錄五

U.S. Department of Commerce

National Oceanic and Atmospheric Administration

National Ocean Service

Center for Operational Oceanographic Products and Services

Field Operations Division

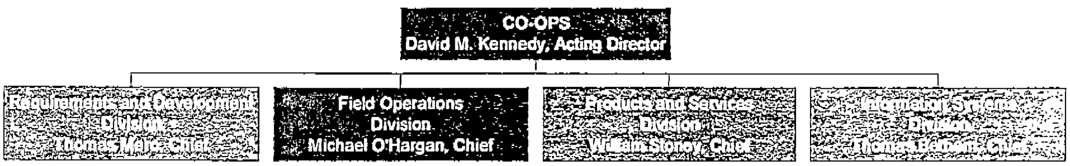
OUR SEAS AND OUR SKIES

NOAA

Years

OF EXCELLENCE AT NOAA

Center for Operational Oceanographic Products and Services



OUR SEAS AND OUR SKIES

NOAA

Years

OF EXCELLENCE AT NOAA

Field Operations Division

- Michael O'Hargan, Chief
  - Telephone 757-436-0200
  - e-mail Mike.Ohargan@noaa.gov

- Pacific Regional Operations
  - Mickey Moss
  - Telephone 206-526-6360
  - e-mail Mickey.Moss@noaa.gov

- Atlantic Regional Operations
  - Larry Neeson
  - Telephone 757-436-0200
  - e-mail Larry.Neeson@noaa.gov

OUR SEAS AND OUR SKIES

Years

OF EXCELLENCE AT NOAA

Field Operations Division Objectives

- Operate and maintain the National Water Level Observation Program
  - Long term stations (National Water Level Observation Network)
  - Short term stations (for hydrographic, photogrammetric, and boundary determinations)

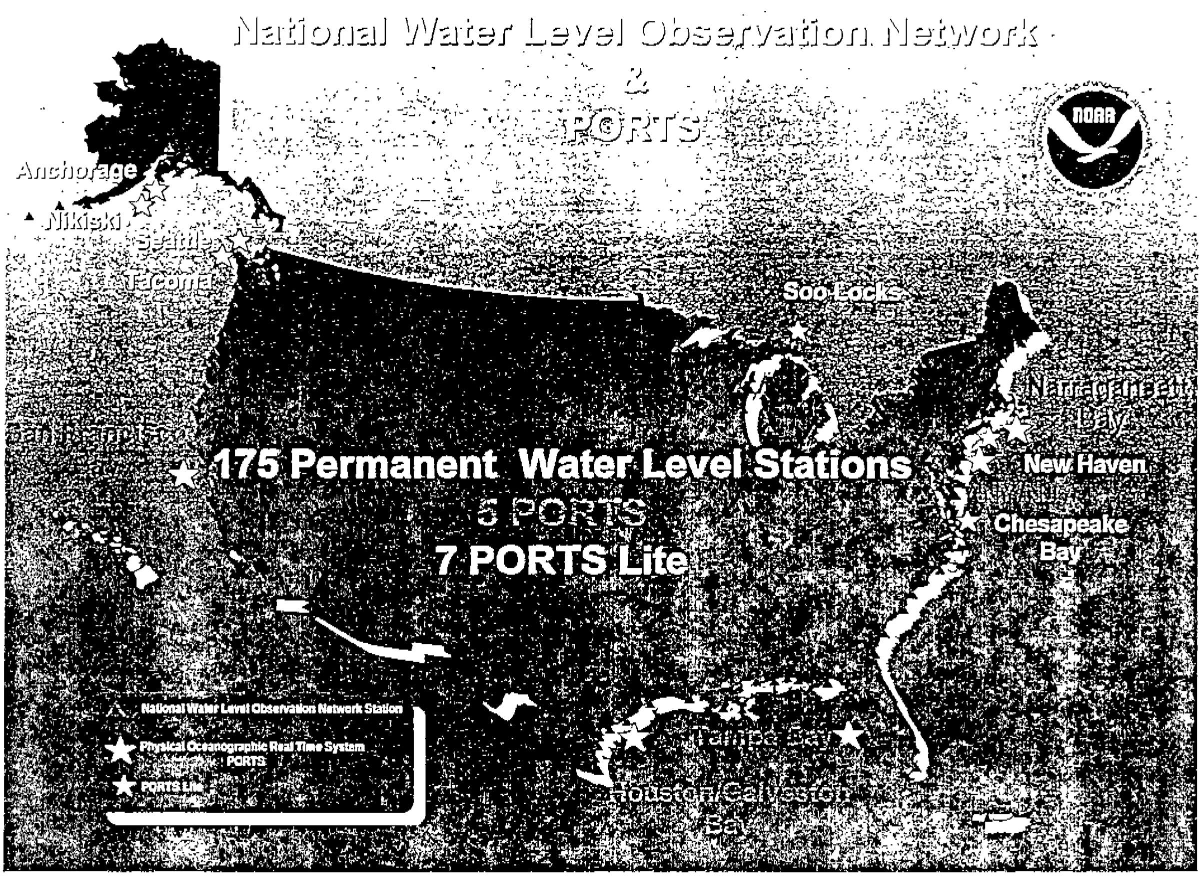
- Ensure continuous operations of navigation and other real time observing systems
  - Physical Oceanographic Real-Time Systems (PORTS)
  - PORTS Lite

- Conduct instrumentation integration, testing, calibration, modification, upgrade, repair, and documentation of observing systems

OUR SEAS AND OUR SKIES

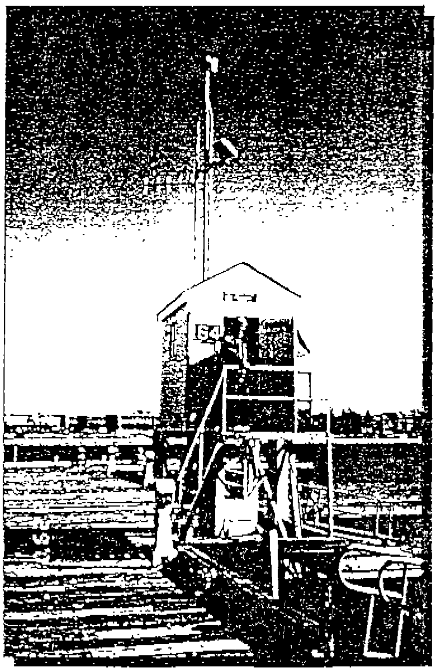
Years

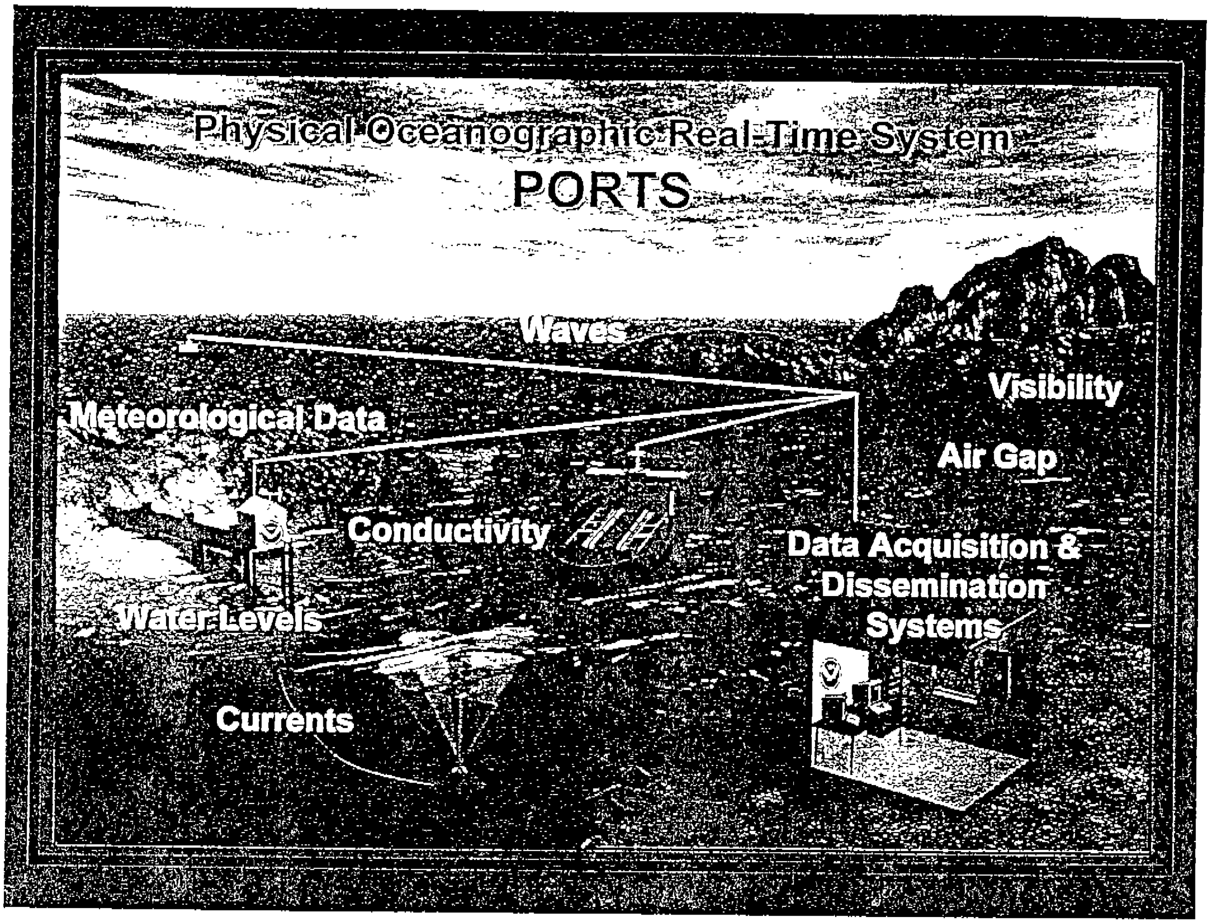
OF EXCELLENCE AT NOAA



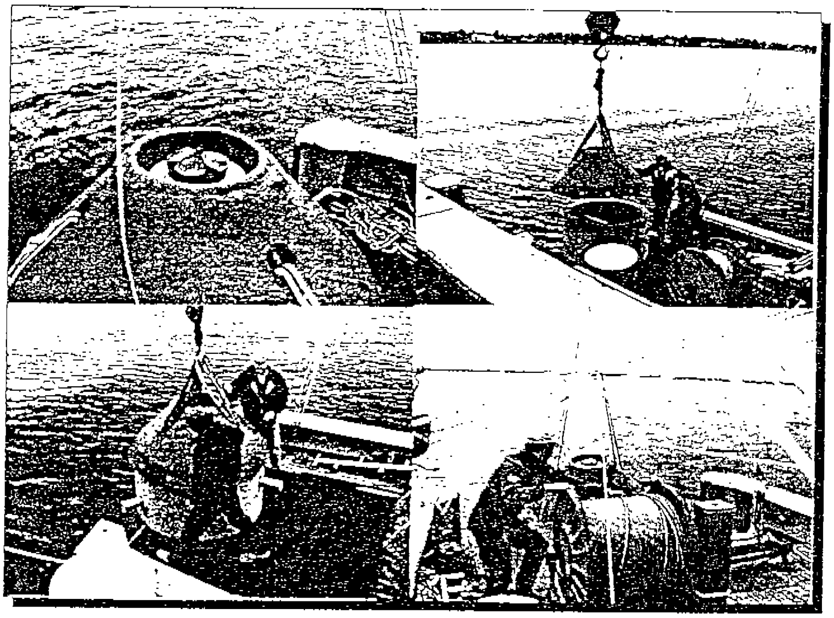
National Water Level Observation Network

- Water Level
- Wind Speed/Direction
- Barometric Pressure
- Air/Water Temp.
- Conductivity/Temp
- Chart Datum
- Tsunami/Storm Surge

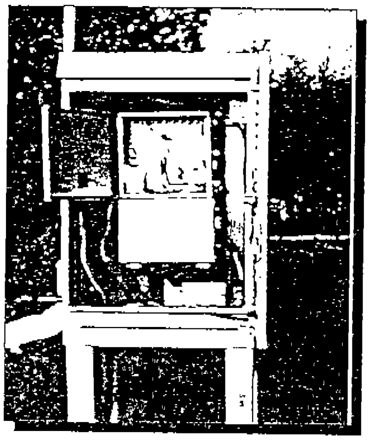




Field Operations

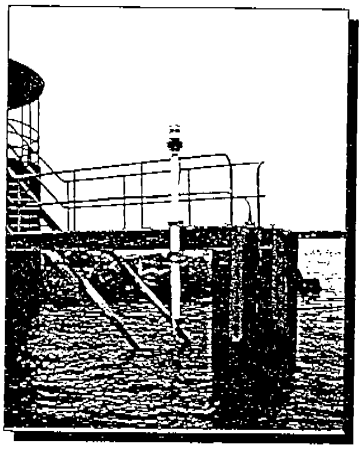


Deployment of an Acoustic Doppler Current Profiler
On the Sea Floor and an Underwater Cable to Shore

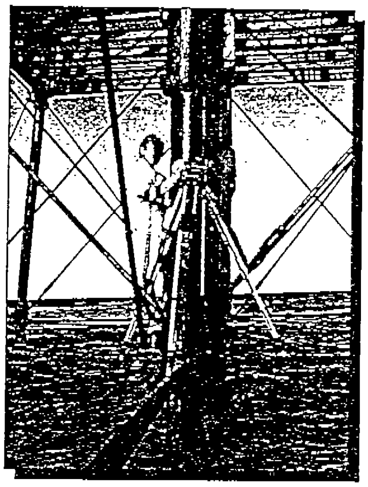


Field Operations

Electronic Instrumentation Installation

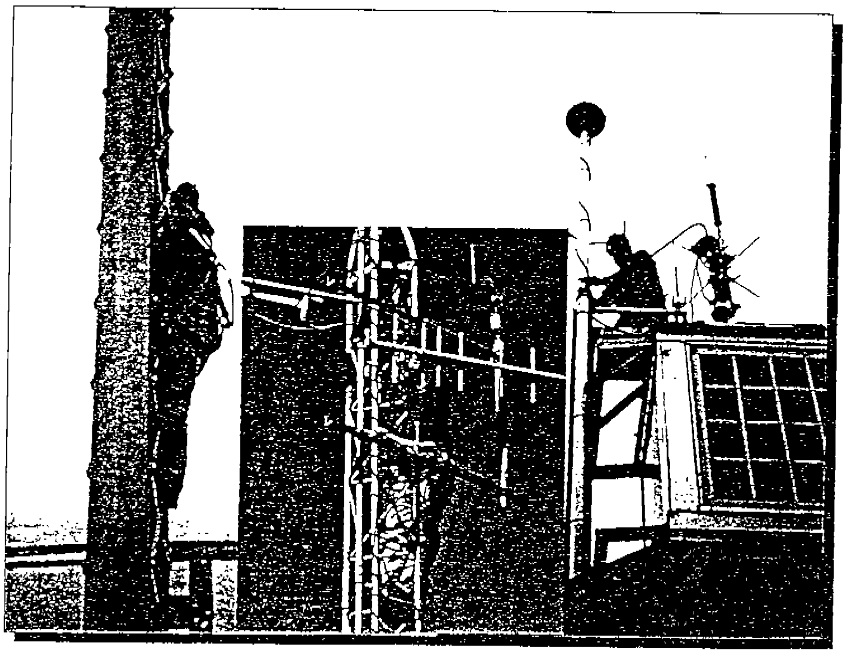


Operation and Maintenance
of Sensors and Systems



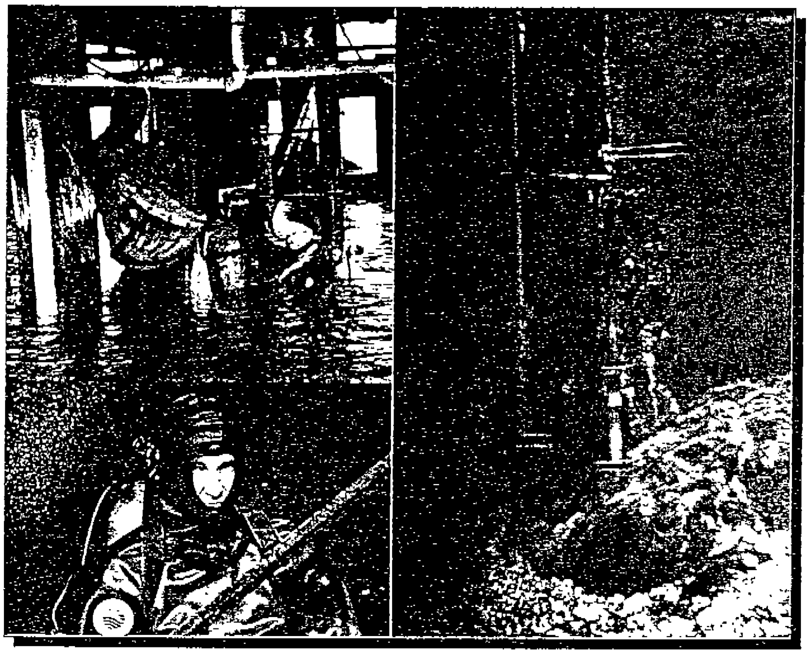
Surveying and GPS Observations

Field Operations



Installation of Meteorological Sensors for Wind Speed
and Direction, Barometric Pressure, and Air Temperature

Field Operations



Installation and Maintenance of Underwater Sensors for
Water Level, Conductivity, and Water Temperature

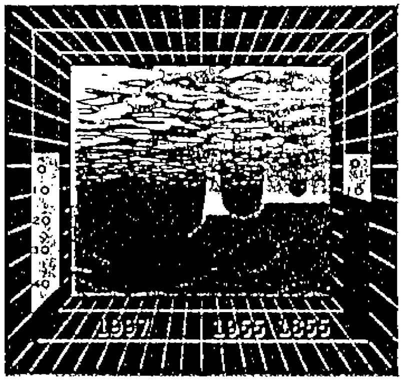
Physical Oceanographic Real-Time System

National Ocean Service

INTRODUCTION

The National Ocean Service, (NOS) is responsible for providing real-time data and other navigation products to promote safe and efficient navigation within U.S. waters. The need for these products is great and rapidly increasing. Maritime commerce has tripled in the last 50 years and is continuing to grow. Ships are getting larger, drawing more water, and pushing the channel depth limits to derive benefit from the last inch of cargo draft. Ninety-eight percent by weight of the Nation's international trade moves through U.S. ports and harbors, with fifty percent of these goods being hazardous materials.

DECREASING MARGIN OF ERROR



Draft Over the Years

A major challenge facing the Nation is to improve the economic efficiency and competitiveness of U. S. maritime commerce, while reducing the risks to life, property, and the coastal environment. With increased marine commerce come increased risks to the coastal environment making marine navigation safety a serious national concern. For example, from 1980 to 1988, tankers in the United States were involved in 468 groundings, 371 collisions, 97 rammings, 55 fires and explosions, and 95 deaths.

In order to provide for the Nation's economic prosperity and environmental well being, NOS has developed the Physical Oceanographic Real-Time System (PORTS).

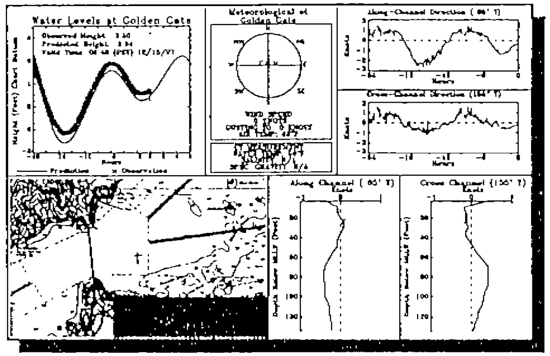
PORTS

PORTS is a decision support tool which improves the safety and efficiency of maritime commerce and coastal resource management through the integration of real-time environmental observations, forecasts and other geospatial information. PORTS measures and disseminates observations and predictions of water levels, currents, salinity, and many meteorological parameters (e.g., winds, atmospheric pressure, visibility, etc.) needed by the mariner to navigate safely.

PROGRAM OBJECTIVES

The objectives of the PORTS program are to: promote navigation safety, improve the efficiency of U.S. ports and harbors, and ensure the protection of coastal marine resources.

Navigation Safety: The real-time tide and current data provided through PORTS represent one component of NOS' integrated program to promote safe navigation. PORTS data, when combined with up to date nautical charts and precise positioning information, can provide the mariner with a clearer picture of the potential dangers that can threaten navigation safety. NOS fulfills its navigation safety mission in close concert with other Federal agencies, such as the U.S. Coast Guard (USCG).



San Francisco Golden Gate PORTS Information Display

Improved Economic Efficiency: Our nations' waterfronts, ports and harbors have historically been centers of rapid industrial and urban growth, and have advanced critical national objectives by promoting energy exploration, fishery production, commerce, and recreation. In 1991 alone, the commercial shipping industry supported 1.5 million jobs, provided $52 billion in personal income, and generated approximately $20 billion in Federal, state and local taxes.

Increasingly, shipping companies are implementing new navigation systems aboard ships to maximize cargo load while reducing uncertainties in underkeel clearances. These new system require the availability of real-time tide/current and other information. One additional foot of draft may account for between $36,000 and $288,000 of increased profit per transit. Knowledge of the currents, water levels, winds, waves, visibility, and density of the water can increase the amount of cargo moved through a port and harbor by safely utilizing every inch of dredged channel depth.

Coastal Resource Protection: Most ports are at the mouth of major estuaries which provide critical habitat for many important biological resources. For example, coastal waters provide nurseries and spawning grounds for 70 percent of the U.S. commercial and recreational fisheries. Commercial fishing employs over 350,000 people in vessel and shore-related fisheries work. An additional seventeen million people participate in recreational saltwater fishing, spending $7.2 billion annually. Activities at these ports can greatly affect these critical resources. Dredging is but one such activity.

In addition, prevention of maritime accidents is the most cost effective measure that can be taken to protect fragile coastal ecosystems. In 1996 alone, NOS' Hazardous Materials Response and Assessment Division responded to 69 spills including the release of 1.9 million gallons of caustic soda in Florida and a spill of 825,000 gallons of diesel fuel in Rhode Island. One major oil spill (e.g., EXXON VALDEZ) can cost billions of dollars and destroy sensitive marine habitats critical to supporting coastal marine ecosystems. PORTS provides information to make navigation safer, thus reducing the likelihood of a maritime accident, and also provides the information necessary to mitigate the damages from a spill, should one occur.

PORTS provides accurate real-time oceanographic information, tailored to the specific needs of the local community. PORTS systems come in a variety of sizes and configurations, each specifically designed to meet local user requirements. The largest of NOS' existing PORTS installations is comprised of over 26 separate instruments. The smallest consist of a single water level gauge and associated meteorological instruments (i.e., winds, barometric pressure, etc.). These smaller PORTS installations are referred to as "PORTS Lite."

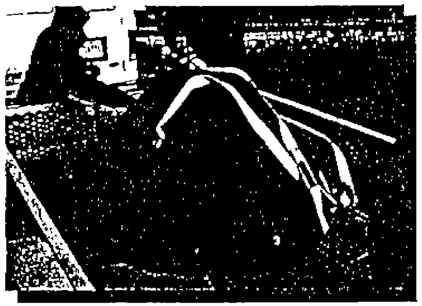
Full systems are presently installed in Tampa, New York, San Francisco, and Houston/Galveston. PORTS Lite systems are presently installed at Anchorage and Nikiski, Alaska; Seattle and Tacoma, Washington; Baltimore, Maryland; and Hampton Roads, Virginia. Regardless of its size, each PORTS installation provides information that allows shippers and port operators to maximize port throughput while maintaining an adequate margin of safety for the increasingly large vessels visiting U.S. ports.

PORTS Measurement and Dissemination Capabilities Include the Following:

Current Measurements

Acoustic Doppler current profiler (ADCP) are used to measure water currents from the near bottom to the near surface. Their remote sensing technique and low-profile allows non-obtrusive placement in the shipping channels.

The ADCP operates by transmitting high-frequency acoustic pulses into the water at preprogramed intervals. The acoustic energy is reflected off particles in the water and scattered in various directions. After transmission of a pulse, the ADCP then listens for the reflected signal. This return signal is analyzed to determine the frequency shift from the original signal. Using the Doppler effect and basic trigonometry, the water current velocity is computed.



ADCP Bottom Mount

The ADCP's are mounted in low- profile platforms which provide protection and necessary weight to hold the instruments on the harbor bottom.

Water Level Measurements

PORTS uses a downward-looking air acoustic water level sensor as the primary water level measurement sensor. The sensor is fixed at a known elevation, and all measurements are referenced to water level datums established through standard NOAA procedures and methods. An acoustic pulse is sent through a sounding tube from the transducer, down to the water. The two-way travel time is measured for the reflected signal from both a calibration point in the tube, and the water surface. The calibration signal provides the sensor with a means of correcting each water level measurement for variations in air column sound speed due to changes in temperature and humidity.

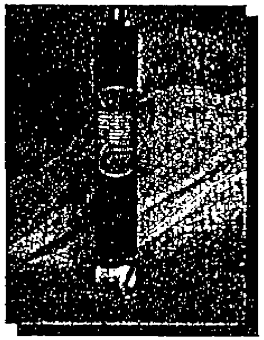
A multi-processor based data collection platform (DCP) collects water level measurements at one second intervals over a three minute period. These samples are processed to derive a single value at six minute intervals.

Backup water level measurements are made at each site by an electronic pressure transducer integrated into a dry-purge "bubbler" system. Nitrogen gas is regulated to slowly purge through an open orifice mounted below the water surface. The transducer senses pressure change in the system as water level changes. This information is collected into a data recorder, which then transfers a six minute value to the DCP.

All data are stored as six minute data values in the DCP. These data are transmitted via GOES satellite every three hours to NOAA headquarters. The latest value is retrieved by PORTS every six minutes by packet radio, T-1 line and/or phone modem connections.

OTHER OCEANOGRAPHIC MEASUREMENTS

PORTS collects other oceanographic data specified by user defined needs. These data are usually collected at the water level recording stations. A variety of oceanographic measurements, can be collected including water conductivity, and water temperature (CT's) used to derive salinity/density values.

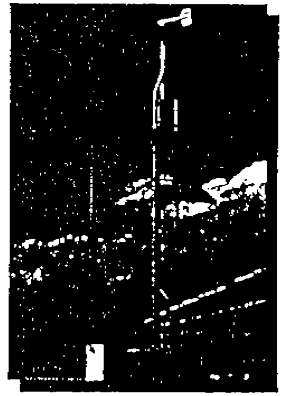


Falmouth CT Sensor

METEOROLOGICAL MEASUREMENTS

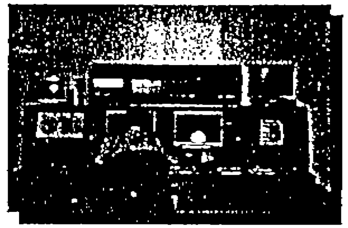
PORTS meteorological data include wind speed, wind direction, wind gusts, air temperature, and barometric pressure. Additional types of data (e.g. visibility, rainfall, etc.) can be added.

Instruments are typically mounted on a 10-meter tower.



Meteorological Tower

DATA TRANSMISSION



NY/NJ PORTS DAS

Data transmission from the remote data collection sites to the PORTS DAS is accomplished in a variety of ways.

- PORTS utilizes special high-speed, dedicated data lines (T-1) whenever possible. U. S. Coast Guard (USCG) T-1 lines provide a convenient method of transmitting remote data to the DAS if these lines are nearby and available. Asynchronous data interfaces are used to interface PORTS equipment with T-1 line multiplexors.

- PORTS uses line-of-site (LOS) radio modems to provide wireless data communication whenever wire line communication are not reliable or feasible. These systems allow point-to-point application with simple 3-wire RS232 interface connections. Line-of-site radios may be used to transmit data directly to the DAS, or to nearby T-1 lines.

- Standard telephone lines are installed at each water level recording station to allow administrative communication to the NGWLMS. The DAS may be programmed to pole the NGWLMS every six minutes to retrieve the latest data. Other means of communication between the DAS and the remote systems are usually preferred. The phone line is typically used as a backup method when necessary.

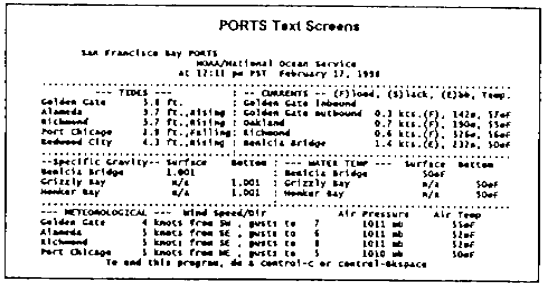
Data Acquisition System

The data acquisition system (DAS) consists of a microcomputer, communications hardware, custom-written application software, and the Unix operating system environment. The DAS receives remote data, determines data type, and initiates the appropriate processing program for that data type. Various programs perform quality control tasks, archive the data, and format the data for output.

Information Dissemination

Three primary modes of PORTS data dissemination are employed.

PORTS information are provided through strategically located text screens. Information on these screens are updated every six minutes and are also accessible over the internet.

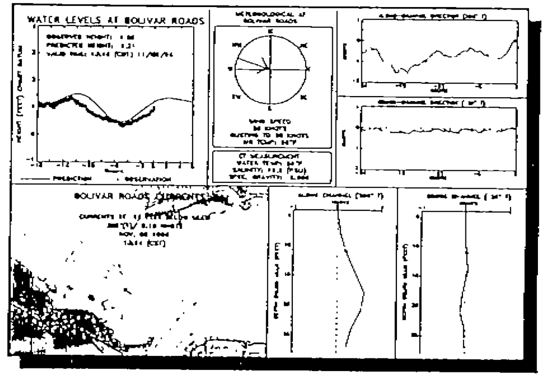


PORTS Text Screens

```
San Francisco Bay PORTS
              NOAA/National Ocean Service
          At 17:11 pm PST  February 17, 1998
...............................................................................
     --- TIDES ---                : -- CURRENTS -- (F)lood, (S)lack, (E)bb, Temp.
Golden Gate      3.8 ft.          : Golden Gate Inbound
Alameda          3.7 ft.,Rising   : Golden Gate Outbound   0.3 kts.(F), 142m, 57oF
Richmond         3.7 ft.,Rising   : Oakland                0.7 kts.(F), 190m, 55oF
Port Chicago     3.8 ft.,Falling  : Richmond               0.6 kts.(F), 326m, 56oF
Redwood City     4.3 ft.,Rising   : Benicia Bridge         1.4 kts.(E), 233m, 50oF
...............................................................................
--Specific Gravity-- Surface   Bottom : --- WATER TEMP ---  Surface  Bottom
Benicia Bridge       1.001            : Benicia Bridge      50oF
Grizzly Bay           N/A      1.001  : Grizzly Bay         N/A      50oF
Honker Bay            N/A      1.001  : Honker Bay          N/A      50oF
...............................................................................
--- METEOROLOGICAL ---  Wind Speed/Dir             Air Pressure    Air Temp
Golden Gate      4 knots from SW , gusts to  7      1011 mb        55oF
Alameda          5 knots from SE , gusts to  6      1011 mb        52oF
Richmond         5 knots from SE , gusts to  8      1011 mb        52oF
Port Chicago     5 knots from NE , gusts to  5      1010 mb        50oF
          To end this program, do a control-c or control-backspace
```

The information displayed on the text screen is also available remotely through a touch tone phone, including cell phones. This is made possible through the PORTS Voice Data Response System that allows a user to choose information options from a selectable menu through a touch tone phone.

Information is also made available through the PORTS Imaging Component System (PICS). This software/hardware system was developed by NOAA to graphically display predicted vs. observed water levels, currents, and other PORTS information. PICS displays can be placed in strategic locations and are also available over the internet and by fax on demand.



Houston/Galveston Bolivar Roads PICS

NATIONAL PORTS POLICY

PORTS is a partnership program based on extensive collaboration between NOS and the local maritime community to identify local needs. The enhancements that PORTS brings to both navigation safety and efficiency can result in significant local economic benefits. Consequently, it is the policy of NOS to require that all costs to operate existing PORTS be provided by the local user community. In addition, absent special Congressional appropriation or clearly defined Federal Government needs, all future PORTS installations will be paid for in their entirety (both installation and local operation) by the local user community. The requirement for local sponsorship of PORTS operations and maintenance underscores the importance of user commitment to the partnership.

The PORTS partnership is founded on the principle that there are both local and National responsibilities. The local sponsor's responsibilities include, but are not limited to, the following:

- Design/installation costs, including the purchase of all equipment and contractor support.

- Local operating/maintenance costs to include repair/preventive maintenance for all locally resident instrumentation and computer equipment.

- Telephone lines/communications equipment costs for local distribution of PORTS information.

- Spare parts/supplies, and the amortized costs to replace all equipment at the end of their expected life.

National PORTS Program responsibilities include, but are not limited to, the following:

- Development of PORTS National Standards - Standardized data formats, data dissemination, and baseline accuracy requirements will enable the maritime community to utilize PORTS data with confidence and anticipate seamless transitions when transiting between PORTS. Standardization also enables manufacturers of digital charts, vessel traffic information systems, and other related private sector products to hold down equipment costs by not having to address variable, or proprietary, data formats.

- Development of User Agreements - NOS will develop and maintain co-operative agreements between NOS and the local organization responsible for the operation of a PORTS. These agreements will contain details regarding O&M requirements and the responsibilities for each organization.

- Installation of PORTS - Utilizing funds provided by the local user community, NOS will design and implement new PORTS systems. Installations will be accomplished through the use of, or in partnership with, private sector contractors.

- Data Quality - NOS is responsible for the accuracy of the information products and services that it provides to ensure safe navigation. Conducting a centralized data quality assurance system on a national scale is an appropriate role for the federal government, as well as an equitable contribution for NOS' participation in the PORTS partnership.

- NOS will provide the necessary quality control through the establishment of the Continuous Operational Real-time Monitoring System (CORMS). CORMS is a centralized quality control and decision support system that: ingests real-time data (every 6 minutes) from all sensors for each PORTS system; determines data quality and evaluates each PORTS system's performance; identifies and communicates the presence of invalid or suspect PORTS data to real-time users who rely on PORTS data to ensure navigation safety; and provides decision making information needed by maintenance crews to affect repairs to PORTS systems.

SUMMARY

The challenges facing NOS as it endeavors to provide national leadership to advance the sustainable use of the coastal marine environment are complex and hold potentially significant consequences for the Nation if solutions are not found. No one component of NOAA or the Federal Government can address these problems alone. Balancing the two national priorities of economic prosperity and environmental well being requires the integration of federal, state, and local government agencies, the academic community, public interests groups, and the strong support and participation by the private sector to ensure the health, safety and sustainable use of our country's coastal areas.

This document has defined and described the development and operation of NOS' National PORTS Program. PORTS is but one component of NOS' integrated Navigation Services Program within NOS' Coastal Stewardship mission. In this time of diminishing federal resources, partnerships with other federal, state, and local organizations, in conjunction with the private sector, represent the only viable solution to address these National needs. The partnerships created through the PORTS Program activities described above serve as a model for the proper role of the Federal Government, acting in concert with the user community, to meet National needs.

ACCESS TO PORTS DATA

Voice Data Response Systems

New York / New Jersey PORTS
718-815-9668
718-815-9684

Tampa Bay PORTS
813-822-5836
813-822-0022

Houston / Galveston PORTS
409-740-4975
409-740-4976

San Francisco Bay PORTS
707-642-4337

Chesapeake Bay PORTS Lite
757-548-3051

Internet

www.co-ops.nos.noaa.gov
Physical Oceanographic Real-Time Systems
PORTS

FOR MORE INFORMATION, CALL OR WRITE:

National PORTS Program Manager
Oceanographic Products & Services Division
NOAA/NOS - N/CS4
SSMC4, Sta. 6633
1305 East-West Highway
Silver Spring, MD 20920-3233
301-713-2981
fax 301-713-4392
Mike.Szabados@noaa.gov

National Ports Outreach Manager
NOAA at NAUTICUS
One Waterside Drive
Norfolk, VA 23510
757-436-4064
fax 757-312-8608
e-mail Jim.Dixon@nauticus.noaa.gov

Internet Web Site

View Real-Time PORTS

http://www.co-ops.nos.noaa.gov