Center for Coastal and Ocean Mapping
NOAA/UNH Joint Hydrographic Center
Operations Began ~ Jan 2000

~$1.9 M earmark from Senator Gregg

JHC becomes line item in President’s budget

2009 - A Joint Hydrographic Center authorized under PL111-11

2013 - Part of
School of Marine
Science and
Ocean Engineering

2010 competed for and awarded 5 yr JHC grant

May 2015 - submitted proposal for 2016-2020 JHC competition
November 2015 - awarded 2016-2020 grant

New addition... 2018 - 9 new offices and 85 seat amphitheater
classroom/seminar room
Center Goals

• **To be a world leader in the development of hydrographic & ocean mapping technologies and approaches**

• **To expand the scope of ocean mapping clients and constituencies through the development of innovative applications and collaborative work with both the private sector and government labs**
Industrial Associates (46)

ACOUSTIC IMAGING PTY, LTD
AIRBORNE HYDROGRAPHY AB
ALIDADE HYDROGRAPHIC
AML OCEANOGRAPHIC
ANTHROPOCENE INSTITUTE
ASV GLOBAL, LTD
BLUEFIN ROBOTICS
CHESAPEAKE TECHNOLOGY, INC
CLEARWATER SEAFOODS
EDGETECH
EIVA MARINE SURVEY SOLUTIONS
ESRI
EXXON MOBIL
FUGRO PELAGOS
HIGGS HYDROGRAPHIC TEK
HYDROID
HYPACK
IFREMER
IIC TECHNOLOGIES
INSTITUTO HIDROGRAFICO (IH)
KONGSBERG
KLEIN ASSOCIATES

LEIDOS
NORBIT SUBSEA
NOVATEL
OCEAN HIGH TECHNOLOGY INSTITUTE
OCEANIC IMAGING INC
PHOENIX INTERNATIONAL
QPS US
R2 SONIC
ROLLS ROYCE
SEA MACHINES ROBOTICS
SEVENCs
SMT KINGDOM
SUBSTRUCTURE
SURVICE ENGINEERING COMPANY
TELEDYNE BENTHOS
TELEDYNE CARIS
TELEDYNE OCEAN SCIENCE
TELEDYNE ODOM HYDROGRAPHIC
TELEDYNE OPTECH
TELEDYNE RESON
TRITON IMAGING INC
TYCOM LTD
YSI, INC
Center Goals

• To educate a new generation of hydrographers and ocean mappers that can meet the growing needs of both government agencies and the private sector.
Educational Programs

• M.Sc. and Ph.D.
  • Multiple tracks:
    • Ocean, Electrical, Mechanical Engineering
    • Earth Sciences/Computer Science/Oceanography/Natural Resources

• Graduate Certificate Program

• Nippon Foundation/GEBCO Training Program

• Non-Degree Programs
  • Short Courses and Seminars
  • SURF Scholars
  • Hollings Scholars
Educational Programs

Nippon Foundation GEBCO Training Program in Bathymetric Sciences

• Beginning 12th year – 72 scholars to date
Educational Programs

• Forum for the Future of Ocean Mapping – Monaco 15-17 June
  • 175 leaders in the field of ocean mapping from academia, government and industry plus 47 alumni of our GEBCO program

Nippon Foundation announced – GEBCO Alumni Fund & commitment to see ocean completely mapped by 2030
Educational Programs

IHO CAT A Certification
- July 2001

RENEWED JUNE 2011
RENEW AGAIN NEXT YEAR!

Restructure of Ocean Mapping Curriculum

1st year of new BS Ocean Engineering!!
Complementary Centers

• NOAA/UNH Joint Hydrographic Center (JHC)
  • A Government and University Organization

OCS

OAR – Ocean Exploration, NGS, NCEI, Sanctuaries, IOOS, CO-OPS, NCCOS, OR&R, NMFS…….
Complementary Centers

UNH Center for Coastal and Ocean Mapping (CCOM)

Provides for participation of private sector and other government agencies

NSF, ONR, NRL, DARPA, CICEET, USGS, Tyco, ACoE, U.S. Coast Guard, Nippon Foundation/GEBCO, BBN, EPSCOR, NHIRC, IHO, NE Consortium, NP Research Bd, GoM Research Institute, Jet Propulsion Lab, Blodgett Foundation, Conoco Phillips, National Park Service, 3001 Inc, Sea Grant, Exxon Mobil, Woods Hole Oceanographic, University of Delaware, NH Coastal Programs, UNH Advance Collaborative Scholarship, Schmidt Ocean Institute, Ocean Exploration Trust, Teledyne Benthos, NH Dept. of Env. Services, UCAR, Consortium of Ocean Leadership, Maine Natural Resources, Sloan Foundation, BOEM, PNSY, United Kingdom, NERACOOS, Kongsberg Maritime, Swedish Polar Research/Stockholm University, IOGP

$~3.60 M this year from non-NOAA sources
Who are we?

Research and Teaching Faculty:


Research Staff and Scientists:

Roland Arsenault, Jason Greenlaw, Tianhang Hou, Kevin Jerram, Paul Johnson, Carl Kammerer, Carlo Lanzoni, Erin Nagel, Val Schmidt, Briana Sullivan, Firat Eren (Post-doc), Kerri Seger (Post-doc)
Who are we?

**Support Staff:** Ben Smith, Andy McLeod, Mike Tuttle, Will Fessenden, Jordan Chadwick, Jon Hunt, Emily Terry, Colleen Mitchell, Tara Johnson, Irene Blinn, Abby Pagan-Allis, Linda Prescott, Wendy Monroe, Dan Tauriello

**NOAA/IOCM/OER/SSS:** Glen Rice (OCS), Meme Lobecker (OER), Lindsay McKenna (OER), Sarah Wolfskehl (OCS), Derek Sowers (OER), Juliet Kinney, Cassie Bongiovanni, Michael Bogonko, Michael White
Who are we?

Visiting Scholars:

Jorgen Eeg-Danish Hydro Office
Don House-Texas A&M Univ.
Ralf Doerner-Fraunhofer Inst. Germany
Goran Alm-Univ. of Stockholm
Ron Boyd-Newcastle Univ., Australia
John Hall-Geological Survey of Israel
Martin Jakobsson-Univ. of Stockholm
LCDR Tony Withers-RAN, Australia
Walter Smith, NOAA-NESDIS
Lysandros Tsoulos-National Tech. Univ of Athens
Jean Marie Augustin-IFREMER
Xavier Salsamendi Guinda-IH Cantabria Spain
Sanghyun Suh – KORDI-Korea
Xavier Lurton-IFREMER

Seonjeong Lee-Korean Maritime Univ.
Gideon Tibor-IOLR and Univ. of Haifa
Xavier Lurton-IFREMER
Angelia Vanderlaan -U. Mass Amherst
Ann Albright-Blomberg-Univ. of Oslo
Julian Le Deunf-CIDCO
Rabine Keyetieu-CIDCO
Christian Stranne-Stockholm Univ.
Tor Inge Birkenes Lønmo-Kongsberg
Who are we?

22 Current Students-- MSc and PhD:
Mashkoor Malik (PhD), Glen Rice (PhD), Derek Sowers (PhD), Ashley Norton (PhD), Ricardo Freire (PhD), Scott Loranger (PhD), Kelly Nifong (MS), Massimo Di Stefano (PhD), Onni Irish (MS), John Kidd (MS), Andersen Pecanha (MS), Andrew Stevens (MS), Matthew Birkebak (MS), Salme Cook (PhD), Erin Heffron (MS), Shannon Hoy (MS), Igor Kozlov (MS), Tiziana Munene (MS), Alexandra Padilla (MS), Samuel Reed (MS), Kevin Rychert (MS), Elizabeth Weider (MS), Damian Manda (MS)

6 GEBCO Scholars 2015-2016
Evgenia Bazhenova-Russia, Brandon Maingo-Barbados, Renzo Menacho-Peru, Wasim Muhammad-Pakistan, Azmi Rosedee-Malaysia, Chikara Tsuchiya-Japan
# Graduates 2001-2016 (138) -- PhD(6) + MS(50) + NOAA MS(15) + Certificate(2)+ GEBCO(65)

<table>
<thead>
<tr>
<th>Name</th>
<th>Degree</th>
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<tbody>
<tr>
<td>Shep Smith</td>
<td>MS</td>
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<tr>
<td>Briana Sullivan</td>
<td>MS</td>
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<tr>
<td>Caleb Gostnall</td>
<td>MS</td>
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<tr>
<td>Daniel Brogan</td>
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<td>Arsen Zoksimovski</td>
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<td>Carthid Nathan</td>
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<td>Jim Glynn</td>
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<td>Peter Mitchell</td>
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<td>Stephen Schaeffer</td>
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<td>Ed Sweeney</td>
<td>MS</td>
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<tr>
<td>Val Schmidt</td>
<td>MS</td>
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<tr>
<td>Brian O'Donnell</td>
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<td>Janice Felzenberg</td>
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<td>Bert Franzheim</td>
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<td>Sam Greenaway</td>
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<tr>
<td>Mashkoor Malik</td>
<td>MS</td>
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<td>Nick Forfinski</td>
<td>MS</td>
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<td>Brian Heap</td>
<td>Cert/MS</td>
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<tr>
<td>Lynn Morgan</td>
<td>MS</td>
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<td>Luis Soares Rosa</td>
<td>MS</td>
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<tr>
<td>Michelle Weirathmueller</td>
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<td>Marc Moser</td>
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<td>Nathan Wardwell</td>
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<td>Tyler Clark</td>
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<td>Rachel Soraruf</td>
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<td>Gerd Glang</td>
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<td>Nikki Kuenzel</td>
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<td>Rachot Osiri</td>
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<td>Jorge Alavera</td>
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<td>Anastasia Abramova</td>
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<td>Tami Bedhun</td>
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<td>Sean Denny</td>
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<td>Carlo Lanzoni</td>
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<td>Anna Berry</td>
<td>Cert</td>
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<td>David Pilar</td>
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<td>Matthew Wilson</td>
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<td>Chukwuma Azuike</td>
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<td>Olumide Fadahunsi</td>
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<td>Maddie Schroth-Miller</td>
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<td>Kittisak Nilrat</td>
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<td>Giuseppe Masetti</td>
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<td>Christy Fandel</td>
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<td>Lindsay McKenna</td>
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<td>Kevin Jerram</td>
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<td>Briana Welton</td>
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<td>Fang Yao</td>
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<td>Carmen St. Jean</td>
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<td>Mezgeb Mehtsentu</td>
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<td>Felipe Barios Burnett</td>
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<tr>
<td>Ashton Flinders</td>
<td>MS</td>
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<tr>
<td>John Heaton</td>
<td>MS</td>
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<tr>
<td>Dandan Miao</td>
<td>MS</td>
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<tr>
<td>Katrina Wyllie</td>
<td>MS</td>
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<tr>
<td>Han Hu</td>
<td>MS</td>
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<td>Eric Bajor</td>
<td>MS</td>
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<tr>
<td>Cesar Borba</td>
<td>MS</td>
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<tr>
<td>Liam Pillsbury</td>
<td>MS</td>
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<tr>
<td>Damian Manda</td>
<td>MS</td>
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<tr>
<td>Josh Humberson</td>
<td>MS</td>
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Joint Hydrographic Center Annual Review • July 26–29, 2016
Real-time data transmission, processing, and ship-board support – with OER
Panoramic Display

TOOL FOR HUMAN FACTORS STUDIES

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Acoustic and Wave Tank Test Facilities

Acoustic Calibration Tank

Wave and Tow Tank

60' x 40' x 20'

120' x 12' x 8'
R/V Coastal Surveyor

Customized bow ram for mounting sonars
Hydraulic stabilizers
Odom Echo-Track profiler and Digibar
Trimble RTK GPS
POS-MV 320 V4
Dell server with and GPS displays
Available for install:
Seabird CTD
C-NAV
Omnistar
Knudsen 320P/320M
NOAA Launch 3401

R/V Cocheco

Multipurpose vessel with open aft deck Hydraulic A-Frame and winch for towing (1000 lbs tow load)

- 300 ft of 10 conductor coax
- 10 conductor slip-ring
- Trimble DSM212H GPS

Available for install:
- Grab Samplers
- RTK GPS
- Omnistar
- C-NAV
- Echotrac SBES
- Knudsen 320P/320M
New Build

R/V Gulf Surveyor
New Purchase

Zego Boat

Lippmann in collaboration with Higgs Hydrographic Inc.
Research Themes

- Sensor Technology
- Data Processing
- Seafloor and Habitat Characterization - Water Column Mapping
- Visualization
- Chart of the Future
- Law of The Sea Mapping
- IOCM
FEDERAL FUNDING OPPORTUNITY

FOUR PROGRAMMATIC PRIORITIES

5.1 Innovate Hydrography (4)
5.2 Transform Charting and Change Navigation (3)
5.3 Explore and Map the Continental Shelf (3)
5.4 Develop and Advance Hydrographic and Nautical Charting Expertise (4)

Fourteen Research Requirements

60 Individual Projects
INNOVATE HYDROGRAPHY

Data Collection

Innovative Platforms

ASVs -

Add-on sensors and Hydro Applications – Schmidt, McLeod and others (11)

C-Worker 4
TRANSFORM CHARTING AND NAVIGATION
Chart Adequacy and Computer-Assisted Cartography
Information Supporting Situational Awareness
Chart Adequacy and Re-survey Priorities – Calder, New Hire and Masetti – (38)
Under-Keel Clearance, Real-time and Predictive Decision Aids – Calder and Vis. Lab (41)
HYDROGRAPHIC EXPERTISE

Acoustic Propagation and Marine Mammals
Modeling Radiation Patterns of MBES – Weber and Lurton (54)
Impact of Sonars on Marine Mammals – Miksis-Olds (56)
EDUCATION AND OUTREACH
Hicks, Mitchell

Cub Scouts “Floats and Boats” badge

~900 students from local schools

Ocean Discovery Day in September