



Naval Science and Technology

Gold Coast Small Business Conference

August 2012



Revolutionary Research . . . Relevant Results

O F F I C E O F N A V A L R E S E A R C H

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Who is ONR?

- The Office of Naval Research invests in innovative operational concepts to develop the science and technology (S&T) that ensures our warfighters always have the technological edge.



- ONR Mission— “to plan, foster, and encourage scientific research in recognition of its paramount importance to future Naval power and national security.” — Public Law 588 of 1946



The Office of Naval Research

- Naval Research Laboratory (Appropriations Act, 1916)
“[Conduct] exploratory and research work...necessary ...for the benefit of Government service, including the construction, equipment, and operation of a laboratory....”
- Office of Naval Research (Public Law 588, 1946)
“...plan, foster, and encourage scientific research in recognition of its paramount importance as related to the maintenance of future of naval power, and the preservation of national security...”
- Office of Naval Research - London Office (1946)
“...reporting on the latest developments and to assist visiting American scientists to make contact with their colleagues in Europe...”
- Transitioning S&T (Defense Authorization Act, 2001)
“...manage the Navy’s basic, applied, and advanced research to foster transition from science and technology to higher levels of research, development, test, and evaluation.”

ONR Mission

- As the Department of the Navy's science and technology provider, ONR provides technology solutions for Navy and Marine Corps needs. ONR's mission – defined by law – is to plan, foster and encourage scientific research in recognition of its paramount importance as related to the maintenance of future naval power and the preservation of national security.
- ONR manages the Navy's basic, applied and advanced research to foster transition from science and technology to higher levels of research, development, test and evaluation.

Who We Are

- To meet current and emerging warfighter needs and deliver future force capabilities, ONR invests 90% of its portfolio in mid- and long-term research while allowing for responsive, limited, near-term technology insertions.
- Our “directorates” oversee portfolios for discovery and invention, future naval capabilities, innovative naval prototypes and more. And at the “department level”, ONR investigates, researches and supports technology focus areas to meet current and emerging warfighter needs and to deliver future force capabilities.

Organization



Code 30
 Expeditionary
 Maneuver Warfare &
 Combating Terrorism

*Focus Area:
 Expeditionary & Irregular
 Warfare*

Mr. George Solhan

Code 31
 Command, Control Communications,
 Computers, Intelligence, Surveillance,
 and Reconnaissance (C4ISR)

*Focus Area:
 Information Dominance*

Dr. Bobby Junker

Code 32
 Ocean Battlespace
 Sensing

*Focus Area:
 Assure Access to
 Maritime Battlespace*

Dr. Frank Herr

Code 33
 Sea Warfare
 and Weapons

*Focus Areas:
 Platform Design & Sustainment
 Power & Energy*

Dr. Rich Carlin

Code 34
 Warfighter
 Performance

*Focus Area:
 Warfighter Performance*

Dr. Terry Allard

Code 35
 Naval Air Warfare
 and Weapons

*Focus Area:
 Power Projection
 & Integrated Defense*

Mr. Mike Deitchman

**Office of Research
 (O3R)**
 Dr. Michael Kassner

*Science, Technology,
 Engineering and
 Mathematics (STEM)*

**Office of
 Innovation (O3I)**
 Dr. Lawrence Schuette

*Focus Area:
 Autonomy and Unmanned
 Systems*

**Office of
 Transition (O3T)**
 Dr. Joseph Lawrence

*Focus Area:
 Total Ownership Cost*

STEM is a critical enabler across all Focus Areas



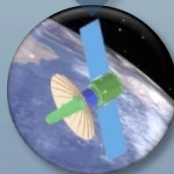
Basic & Applied
 Research



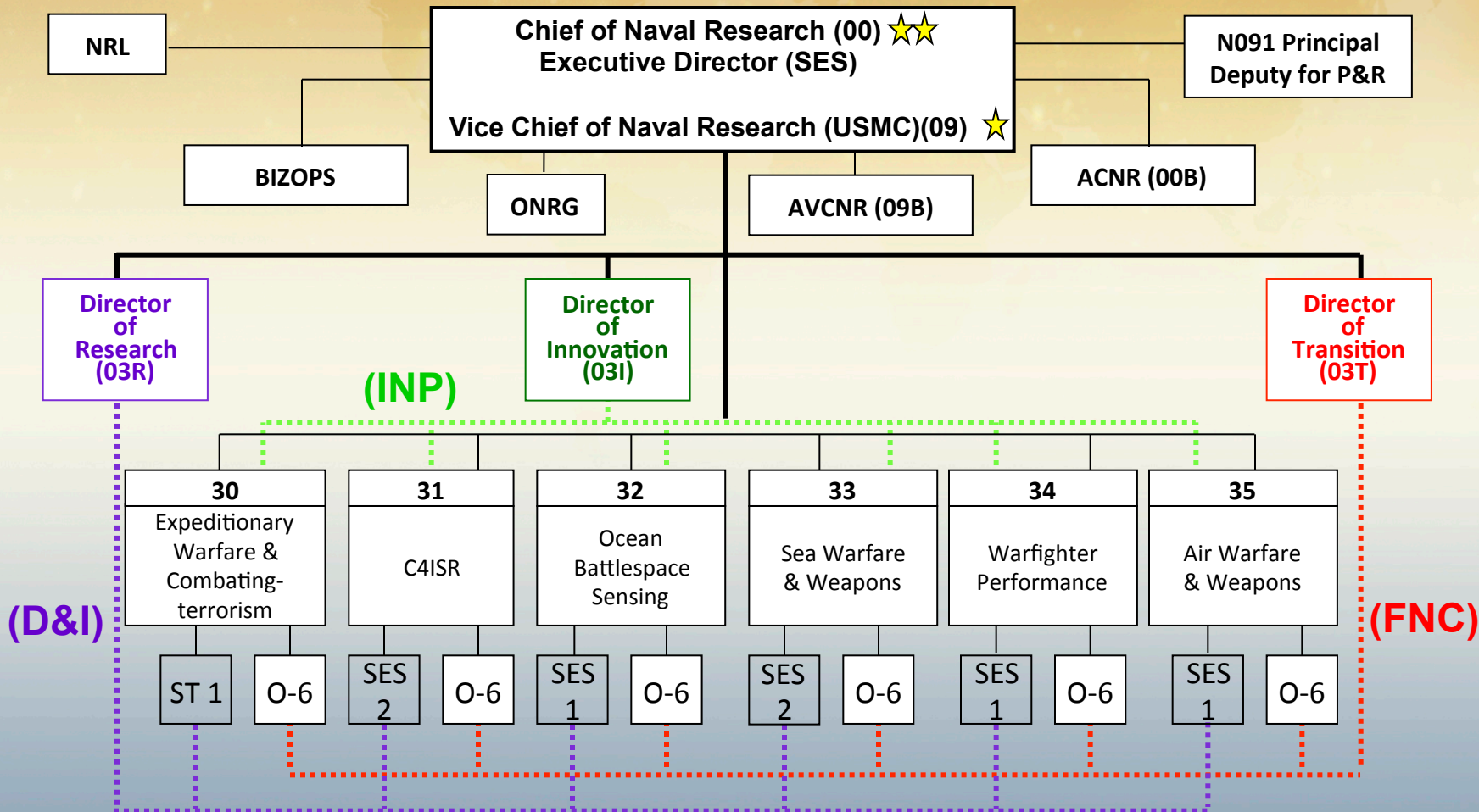
Innovation
 Quick Reaction
 Disruptive Technologies



Transition Products
 Enabling Capabilities



ONR Org Chart



Directorates

- Directorates:

ONR's three (3) Directorates, Offices of Innovation, Research and Transition, balance a robust S&T portfolio, allocating funds to meet the warfighter's requirements in all three major phases of development funding:

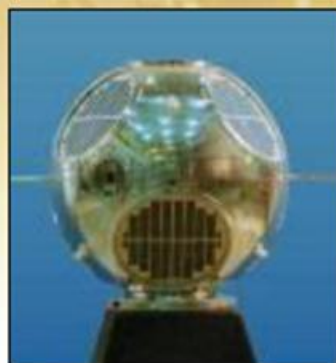
- *Basic Research (6.1)
- *Applied Research (6.2)
- *Advanced Technology Development (6.3)

Basic Research

- Diverse portfolio
- Fosters innovation
- Long-term
- Investment in people
* 55 Nobel laureates



EW

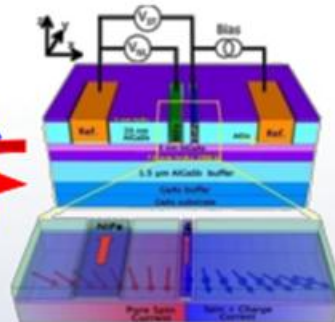


1st U.S. Intel satellite
GRAB



Semiconductors
GaAs, GaN, SiC

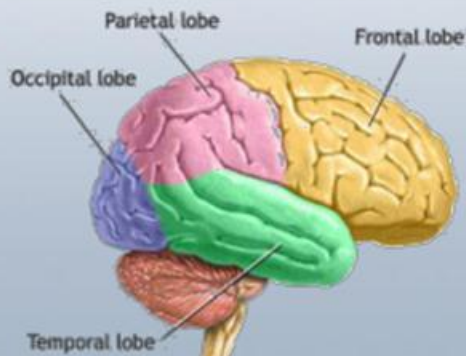
Spintronics



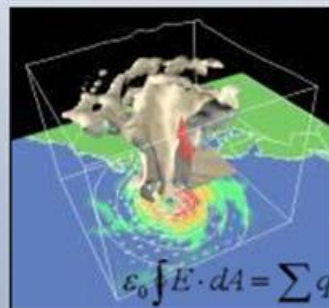
GPS



Arctic Research

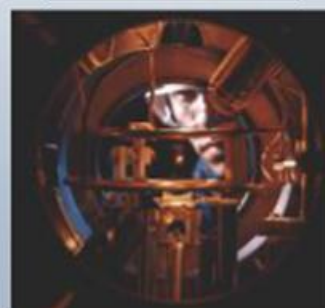


Weather Modeling



$$\epsilon_0 \oint E \cdot dA = \sum q$$

Laser Cooling



ONR Directorates

- **03R Research (Discovery & Invention)** – The Discovery and Invention portfolio makes broad investments in basic and applied research that will increase fundamental knowledge, foster opportunities for breakthroughs in technology options for future naval capabilities and systems.
- Discovery and Invention programs nurture creativity and seek a balance between risk, opportunity and potential naval impact through:
 - Education & Outreach
 - Laboratory Research
 - National Naval Responsibility
 - Sponsored Research

ONR Directorates

- **03I Innovation** - The Office of Innovation cultivates innovative science and technology approaches that support the DON and facilitate rapid and agile responses to our changing national security environment. 03I promotes, fosters, and develops innovative science, technology processes & policies that support the overall DON through various programs:
 - Innovation ('IN') Network
 - Innovative Naval Prototypes
 - SwampWorks
 - TechSolutions

Innovative Naval Prototypes



- High Risk / High Payoff
- Innovative and game-changing
- Approved by Corporate Board
- Delivers prototype



Tactical
Satellite



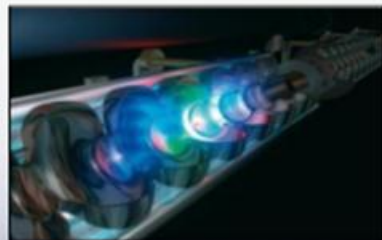
EM Railgun



Persistent Littoral
Undersea Surveillance



Sea Base
Enablers



Free Electron Laser



Integrated Topside



Large Displacement
UUV



AACUS

ONR Directorates

- **03T Transition** – The Office of Transition effectively manages the Future Naval Capabilities (FNC) portfolio and facilitates technology transition to the fleet, force and acquisition community. 03T accomplishes its mission through a comprehensive portfolio of programs:
 - Future Naval Capabilities
 - Joint Concept Technology Demonstrations
 - Manufacturing Technology Program
 - SBIR-STTR Program
 - Navy Technology Transfer Program
 - Transition Initiatives Program

Future Naval Capabilities



Surface Warfare:

- Affordable Common Radar
- Next-Generation Air Defense systems
- Efficient Desalinization



Aviation:

- Turbine Engine Efficiency Improvements
- Next-Generation Electronic Warfare technology
- Air Defense Countermeasures



Submarine Warfare

- Vector Sensor Towed Array
- Advanced Material Propeller
- Hyper-spectral Scanning Imager



Expeditionary

- Immersive/virtual training
- Hostile Fire Detection and Response
- Counter IED



Cyber

- Information Assurance
- Intrusion Detection
- Pro-active Computer Network Defense



ONR Departments

- From the development of sophisticated computer algorithms for aircraft and ship electronics to the fielding of lightweight armor for the Marine Corps, ONR's six S&T departments coordinate and execute the research investment strategy as outlined in the Naval S&T Strategic Plan:
 - Code 30 – Expeditionary Maneuver Warfare & Combating Terrorism
 - Code 31 – Command, Control Communications, Intelligence, Surveillance & Reconnaissance (C4ISR)
 - Code 32 – Ocean Battlespace Sensing
 - Code 33 – Sea Warfare & Weapons
 - Code 34 – Warfighter Performance
 - Code 35 – Naval Air Warfare & Weapons

ONR Departments

- Code 30 – Expeditionary Maneuver Warfare & Combating Terrorism: Develops and transitions technologies to enable the Navy-Marine Corps team to win and survive on the battlefield.
- Code 31 – Command, Control Communications, Intelligence, Surveillance & Reconnaissance (C4ISR): Focuses on experimental & theoretical research & technology in these areas with applications across near-, mid- and far-term applications
- Code 32 – Ocean Battlespace Sensing: Explores S&T in the areas of oceanographic and meteorological observances



EXPEDITIONARY & IRREGULAR WARFARE

ONR Departments

- Code 33 – Sea Warfare & Weapons: Develops & delivers technologies that enable superior warfighting & energy capabilities for naval forces, platforms and undersea weaponry
- Code 34 – Warfighter Performance: Enhances warfighter effectiveness & efficiency through bioengineered and biorobotic systems
- Code 35 – Naval Air Warfare & Weapons: Development of naval aircraft, structures, propulsion, autonomy, energetics, directed energy and electric weapons

Power and Energy





Medical Technology





DIRECTED ENERGY & HYPERSONICS



ONR Business Operations & Services Directorate

- ONR's Business Operations Department is responsible for the day-to-day operations of SYSCOM's business functions:
- -Command Business Office
- -Office of General Counsel
- -Corporate Strategic Communications Office
- -Human Resources Office
- -Legislative Affairs Office
- -Office of Small Business Programs

ONR Business Operations & Services Directorate

- -Acquisition Department –
 - Acquisition Computing Environment Division
 - University Business Affairs
 - Contract and Grants Awards Division
- -Corporate Logistics Department –
 - Management Services Division
 - Security Division
 - Management Services Division
 - Security Division
 - Chief Information Officer (CIO)
- Office of the Comptroller

Naval Research Lab



Navy and Marine Corps' Corporate research laboratory

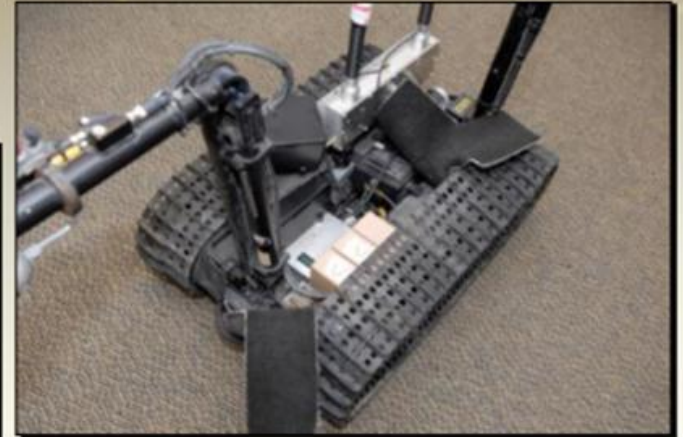
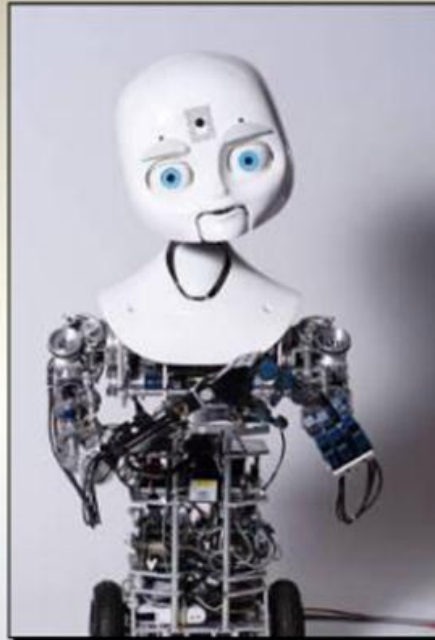
Naval Research Lab

- The Naval Research Laboratory (NRL) conducts a broad program of scientific research, technology and advanced development. NRL has served the Navy and the nation for over 85 years and continues to meet the complex technological challenges of today's world.
- NRL is comprised of the following Directorates:
 - Code 5000 – Systems Directorate
 - Code 6000 - Materials Science & Component Technology
 - Code 7000 - Ocean & Atmospheric Science & Technology
 - Code 8000 - Naval Center for Space Technology

NRL Directorates

- Systems Directorate – Code 5000
- From basic research through engineering development, the Directorate Expands operational capabilities and provides materiel support to Fleet and Marine Corps missions. The emphasis is on technology, devices, systems, and know-how to acquire and move warfighting information and to deny these capabilities to the enemy.
- The Directorate also provides Laboratory support in technical information collection and distribution; and coordination of Lab-wide efforts in signature technology, counter-signature technology, theater missile defense, and the Naval Science Assistance Program.
- Divisions:
 - Radar
 - Information Technology
 - Optical Sciences
 - Tactical Electronic Warfare

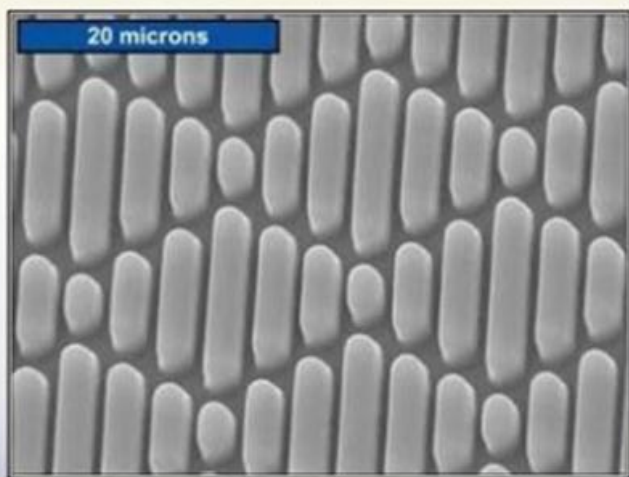
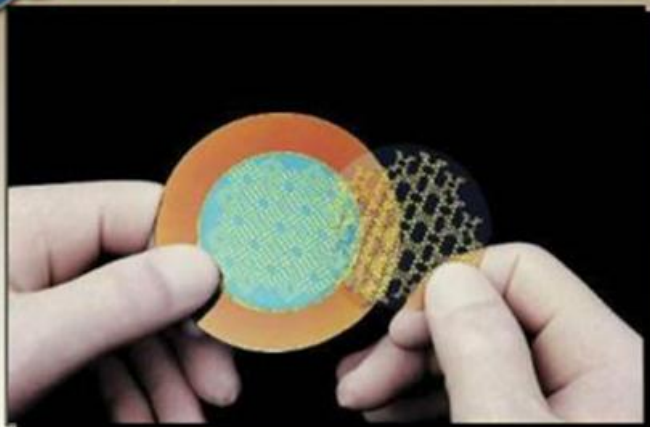
Autonomy and Robotics



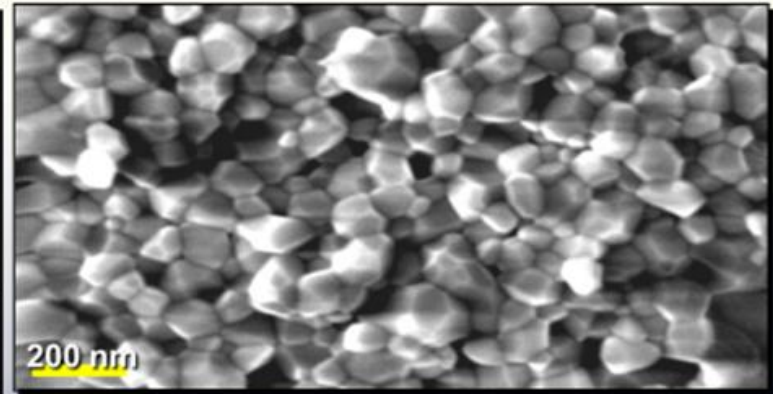
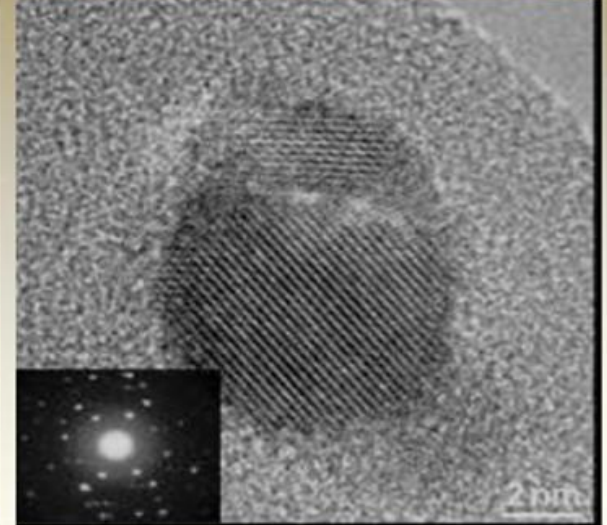
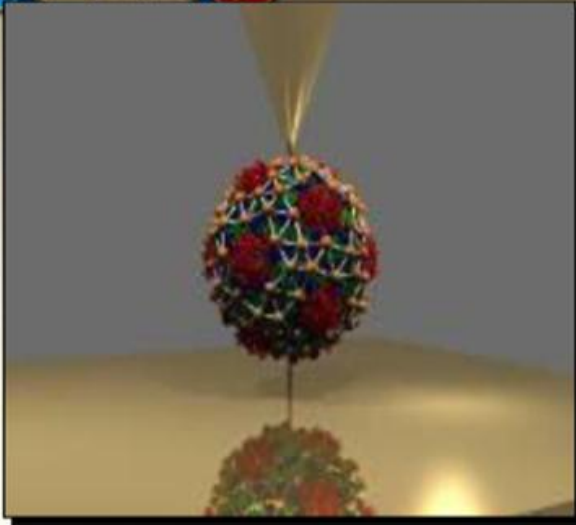
NLR Directorates

- Materials Science and Component Technology Directorate – Code 6000
- The Materials Science and Component Technology Directorate carries out a multidisciplinary research program to discover and exploit new improved materials, generate new concepts associated with materials behavior, and develop advanced components based on these new and improved materials and concepts. Scientists perform theoretical and experimental research to determine the scientific origins of materials behavior and to develop procedures for modifying these materials to meet naval needs for advanced platforms, electronics, sensors, and photonics.
- Divisions:
 - Chemistry
 - Material Science & Technology
 - Laboratory for Computational Physics & Fluid Dynamics
 - Plasma Physics
 - Electronics Science & Technology
 - Center for Biomolecular Science & Engineering

Materials



Nanotechnology

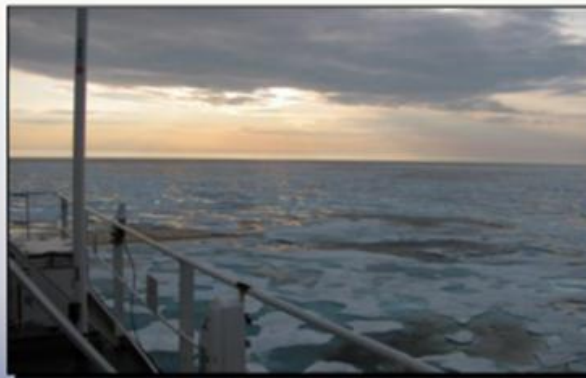


NRL Directorates

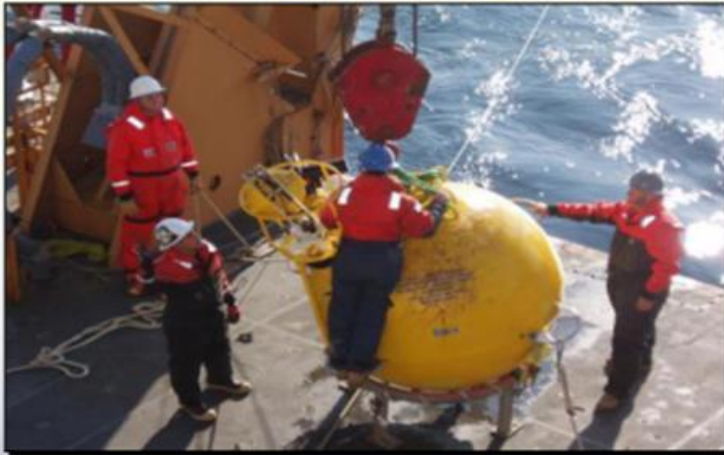
- Ocean & Atmospheric Science Directorate – Code 7000
- The Ocean and Atmospheric Science and Technology Directorate performs research in the fields of acoustics, remote sensing, oceanography, marine geosciences, marine meteorology, and space science. Research studies in marine meteorology include prediction systems and forecast support. Space science research includes ultraviolet measurements, x-ray astronomy, upper atmospheric physics, gamma and cosmic rays, solar physics, and solar terrestrial relationships.
- Divisions:
 - Acoustic Division
 - Remote Sensing
 - Oceanography
 - Marine Geosciences
 - Marine Meteorology
 - Space Science



Environment: The Arctic



Environment: The Arctic



NRL Directorates

- Naval Center for Space Technology – Code 8000
- The Center is a focal point and integrator for NRL divisions whose Technologies are used in space systems. The Center also provides systems engineering and technical direction assistance to system acquisition managers of major space systems. In this role, technology transfer is a major goal that motivates a continuous search for new technologies and capabilities and the development of prototypes that demonstrate the integration of such technologies.
- Divisions:
 - Space Development
 - Space Engineering

Space

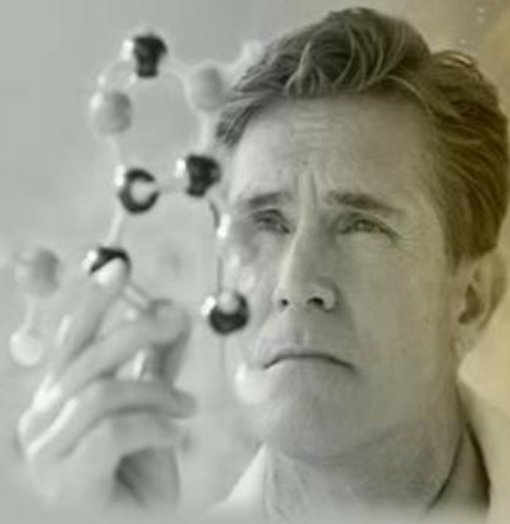


Innovation Driven Process

I have an
Idea!

CAPABILITY

That's a
Good Idea!



THE HOME OF INNOVATION



**Concepts that can deliver
“The Next Big Thing”
are out there right now...
We want to hear from you!
www.onr.navy.mil**

