



Canada-Brazil Cooperation in Ocean Science, Technology & Innovation





S&T Agreement

- The Canada-Brazil Framework Agreement for Cooperation in Science, Technology and Innovation was signed in São Paulo, Nov. 2008 and ratified in Spring 2010.
- The S&T Agreement was designed to promote greater collaboration in areas of mutual interest, allowing Canadian and Brazilian partners from industry, academia and government to collaborate on **joint R&D projects, conferences and workshops, equipment loans and student / researcher exchanges.**
- It was mandated in the S&T Agreement that a Joint Committee be established to provide strategic direction to the agreement including members from government, academia and industry. This Committee was established in 2011. DFAIT holds the executive secretariat role.



Joint Committee Members

Co-chairs

Jamshed Merchant, Assistant Deputy Minister, Agri-Environment Services Branch, Agriculture and Agri-Food Canada

Ambassador Benedicto Fonseca Filho, Director of the Department of Scientific and Technological Themes, Ministry of External Relations

Executive Secretaries

Peter MacArthur, Director General, Global Business Opportunities Bureau, Department of Foreign Affairs and International Trade

Ambassador Carmen Moura, Head of the International Affairs Secretariat, Ministry of Science, Technology and Innovation

Government Representatives

Anil Arora, Assistant Deputy Minister, Minerals and Metals Sector, Natural Resources Canada

Marcio de Castro Silva Filho, Director of International Relations of CAPES, Ministry of Education

Academic Representatives

Dr. Ted Hewitt, Vice-President, Research & International Relations, The University of Western Ontario

Dr. Helena Nader, President of the Brazilian Association for the Advancement of Science (SBPC)

Industry Representative

Greg Vanclief, Vice President, Business Development, Wesley Clover

Paulo Mol Jr., Director of Innovation, Brazilian Confederation of Industry (CNI)



Priority Sectors

Ocean Science & Technology

- Sensor technology & Ocean Platforms
- Ocean & Coastal Observing Systems, including data management

Life Sciences

- Neurodegenerative and infectious diseases
- Diagnostics tools & therapies, including pharmaceuticals & biopharmaceuticals

ICT

- Cloud Computing
- Wireless Broadband Networks
- Gaming

Clean Energy / Green Tech

- Hydroelectric & Hydrogen Resource Development
- Smart Grid
- Green mining
- Nanotechnology for Green Energy

Nanotechnology – cross-cutting theme



S,T & I Working Groups Leads



Information and Communications Co-Leads

Rômulo Neves, Head of the Division Information Society, Ministry of External Relations

Tom Jenkins, Executive Chair of the Board and Chief Strategy Officer, Open Text

Life Sciences Co-Leads

Dr. Luiz Henrique do Canto Pereira, General-Coordination of Biotechnology and Health/SEPED, Ministry of Science, Technology, and Innovation

Dr. Ted Hewitt, Professor, University of Western Ontario

Ocean Technology Co-Leads

Janice Trotte-Duha, Coordinator, Ocean and Antarctic Affairs, Ministry of Science, Technology and Innovation

Jane Rutherford, Trade Commissioner and Global Practice Lead, Foreign Affairs and International Trade Canada

Clean Tech/Green Energy Co-Leads

Eduardo Soriano Lousada, Coordinator, Energy, Ministry of Science, Technology and Innovation

Céline Bak, Partner, Analytica Advisors

Nanotechnology Points of Contact:

Vânia Gomes da Silva, Coordination of Biotechnology and Health, Ministry of Science, Technology, and Innovation

Dr. Arthur Carty, Executive Director of the Waterloo Institute for Nanotechnology ,University of Waterloo



Role of the Working Groups

To develop strategic *work plans* as part of overall **Action Plan** that will support both Canadian and Brazilian national strategies and leverage key Canadian and Brazilian strengths to aggressively pursue opportunities of mutual benefit to Canada and Brazil, with the objective of improved prospects to jointly commercialize technology for the market.



Canada-Brazil Oceans Working Group

- Lead for Canada: Jane Rutherford
- Members (Canada): Les O'Reilly, OceansAdvance; Scott McLean, Ocean Networks Canada; Marlon Lewis, Dalhousie/Satlantic; Carl Harris, NRC; Kevin Fitzgibbons, DFAIT; Bharat Rudra, ISTPCanada; Meena Bhullar, Canadian Consulate General, Rio de Janeiro
- Work Plan focus (so far): next generation sensor technology and ocean platforms; and ocean and coastal observing systems, including data management. 'Polar' flagged as a shared interest



PM Deliverable:

A Joint Science & Technology Action Plan Focused on Innovation



“(Leaders) signalled the strategic importance of the newly established Canada Brazil Joint Committee for Cooperation on Science, Technology and Innovation. (Leaders) agreed on the development of an Action Plan focusing on the research, development and commercialization of joint projects in biotechnology and life sciences, ocean technology, information and communication technology, clean energy, green technologies, and nanotechnology.”

President Rousseff's & Prime Minister Harper's
Brazil-Canada Joint Statement, August 8, 2011



Inaugural Joint Action Plan on Science & Technology Launched 27 April 2012

- Launched during the Governor General's mission to Brazil with presidents of 30+ Canadian universities
- Supports both Canadian and Brazilian national strategies; **leverages key** Canadian and Brazilian **strengths** to pursue opportunities of **mutual benefit**
- Objective of improved prospects to jointly **commercialize technology** for the market.



The International Science and Technology Partnership Program

- DFAIT program with renewed funding in 2010 to fund international collaborative R&D
- **ISTPCanada** www.istpcanada.ca – an NGO that manages these funds for DFAIT
- Seed funding up to \$5 million over five years to be provided towards market oriented joint R&D projects with Brazil.
- Funding focused on 4 priority areas: including ocean technology
- Eligible applicant: Canadian industry; if working with Canadian university, NSERC can support
- Call for Expressions of Interest is open now! Deadline June 11th

Why Brazil?



- ✓ World's 5th largest population -185 million (14 cities over 1 million)
- ✓ World's 5th largest land mass (8,547,403 km²)
- ✓ World's 7th largest GDP (US\$2.1 trillion)
- ✓ World's 8th largest energy consumer (largest in Latin America's)
- ✓ World's 8th largest consumer of oil
- ✓ the 2nd largest proven oil reserves in South America (after Venezuela)

Ocean Tech in Brazil

- 3 key regions:
 - ✓ Northeast (Pernambuco)
 - ✓ Southeast (Rio de Janeiro and São Paulo)
 - ✓ South (Rio Grande do Sul)
- Coastline measures 7,491 km
- Sector centers around the Brazilian oil and gas industry



Canada-Brazil Comparisons

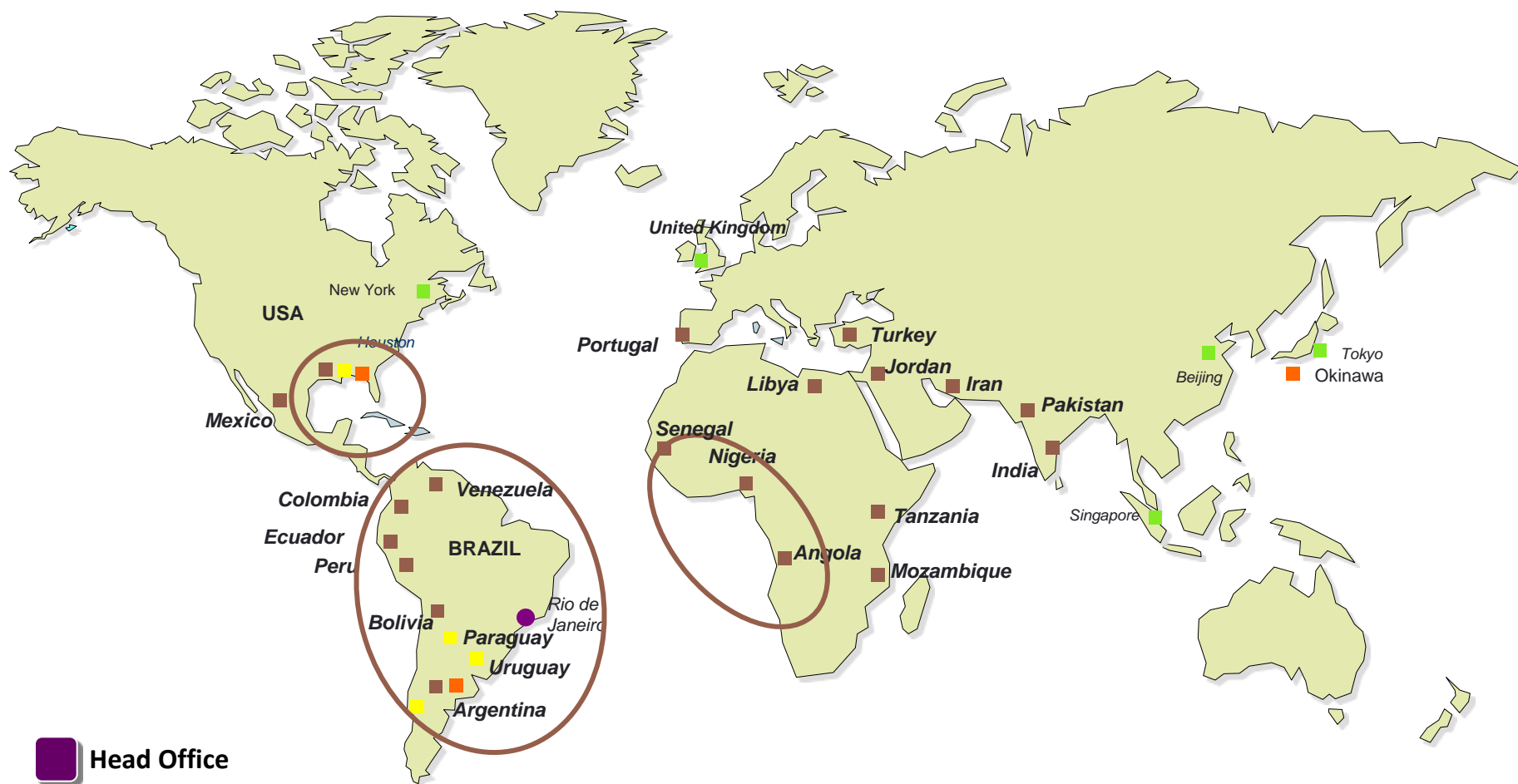


Total Area	8,511,965 Km ²	9,976,140 Km ²
Population	185 million	34 million
GDP	US\$1.6 trillion	US\$1.3 trillion
GDP Growth Rate	5.1%	0.4%
Inflation Rate	5.9%	2.4%
Unemployment Rate	7.9%	6.2%



Petrobras Cenpes

Leopoldo Américo Miguez de Mello
Research and Development Center



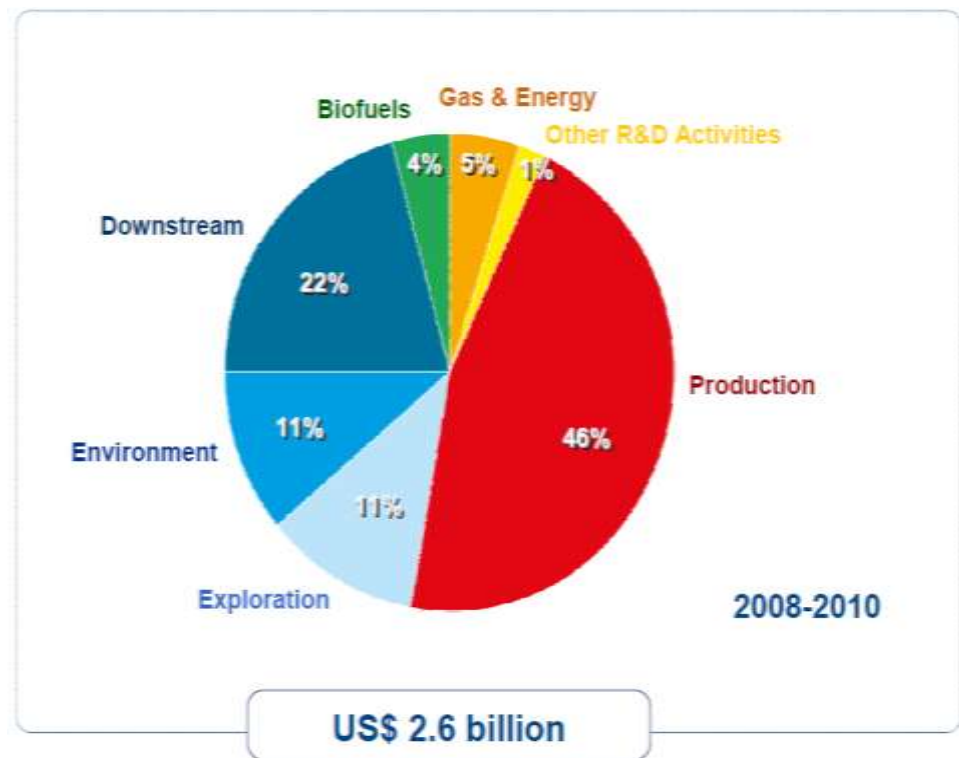
Gross Income 2011
US\$ 145.9 billions

Petrobras

- Created in 1953
- State-controlled oil company (Gov maintains controlling stakes with 55% of voting shares)
- Market value as of Dec 2010 - US\$237 billion (source: Petrobras)
- World's 8th largest company in market value (Petrobras)
- World's 3rd largest energy company (PFC Energy)
- Operates 22% of global deepwater production and 18% of all operating vessels (Petrobras)
- Ranks world's n° 01 in orders for construction of offshore platforms

CENPES

- Petrobras research facility
- Partnerships with over 100 universities and research centers
- Over 2006-10, had 8th largest R&D expenditure in the energy sector
- In 2010, 4 largest expenditure in the world (US\$1.2 billion – 4% on international partnerships)
- Expansion to 300 thousand m²



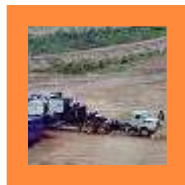
R&D Strategy

The Three Key Axes

Expanding the limits



New
Exploratory
Frontiers



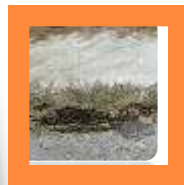
Maximizing
Recovery
Factor



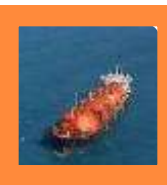
Sediments and
fluids
characterization
of complex
reservoirs



Development of
Subsea
Production
Systems



Production,
Operations
and Pre-salt
Logistic



Solutions for
Natural
Gas logistic



Operational
Optimization



Middle
Distillates
Maximization

Pre-salt

Adding value and Diversifying Products

Fuels,
lubricants and
Special
Products



Petrochemicals



Gas Chemic



Biofuels



Other
Renewable
energy
sources



Sustainability

Water
Management



CO2 and other
gases
management

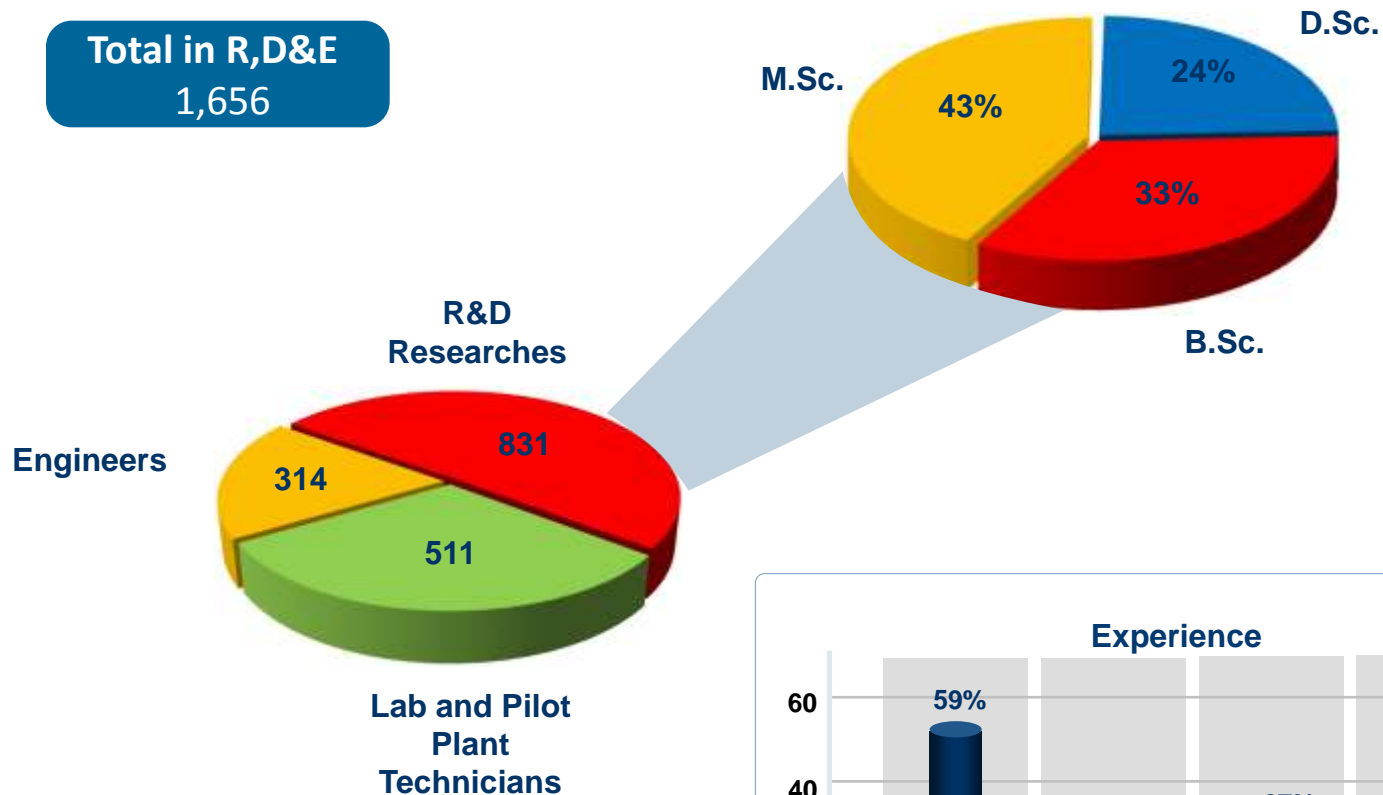


Energy
Efficiency



Cenpes People

Total in R,D&E
1,656

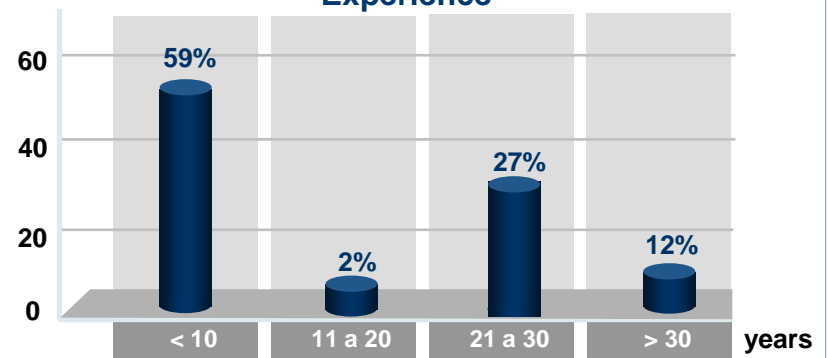


**Petrobras
Researchers**

**External
Researchers**

$$= \frac{1}{15}$$

Experience



Petrobras: Expanding the capacity of Brazilian R&D

World – Class Facilities

New Brazilian Technology Centers

Incubators



Partnerships with Brazilian R&D Institutions and Universities





ENCTI

Estratégia Nacional 2012 – 2015
Ciência, Tecnologia e Inovação

Science, Technology and Innovation Strategy for National Development

Ministério da
Ciência, Tecnologia e
Inovação

GOVERNO FEDERAL
BRASIL
PAÍS RICO É PAÍS SEM POBREZA

Sustainable Development

S,T&I as a structuring axis of development in Brazil

Confronting the Challenges

Reduction of the scientific and technological gap that still separates Brazil from more developed nations

Expansion and consolidation of the Brazilian leadership in the natural economy knowledge

Expansion of the basis for environmental sustainability and developing a low carbon economy

Consolidation of the new pattern of international insertion of Brazil

Overcoming poverty and reducing social and regional inequalities

Strengthening the Base Support for S,T&I Policy

Promotion of innovation

Capacity Building and training

Strengthening research and scientific and technological infrastructure - industry

Improvement of the instruments for S,T&I policy

Improvement of the regulatory framework to promote innovation

Improvement and expansion of the financing structure of the scientific and technological development

Strengthening the National System of S,T&I

➤ Information and Communication Technology

➤ Drugs and Health Industrial Complex

➤ Oil & Gas

➤ Defense Industrial Complex

➤ Aerospace

- Nuclear

- Innovation borders
 - Biotechnology
 - Nanotechnology

- Fostering the Green Economy

➤ renewables

- Climate Change
- Biodiversity



Oceans, Coastal Zones

- S,T&I for Social Development

- Popularization of S,T&I and Improvement of Science Teaching
- Productive Inclusion and Social Technology
- Technologies for sustainable cities

➤ Sectors - Plano Brasil Maior

Antarctica

Oceans, Coastal Zones and Antarctica

Goal:

To place the Brazilian oceanographic research in the international level and understand the role of the South Atlantic on climate change, projected for the end of this century.

Key strategies associated:

- increasing the number of research projects developed on the **ocean-atmosphere interactions** and **Antarctica**;
- promotion and expansion of the internationally recognized research of the Antarctic region and its adjacent areas, through the Brazilian Antarctic Program (PROANTAR) and its implications for the South Atlantic;
- establishment of **international cooperation instruments** for oceanographic research and development in **Antarctica** (POLAR RESEARCH).

Challenges In Ocean Science and Technology

- **Provide major research effort in the South and Tropical Atlantic, filling knowledge gaps and making information available for policy makers;**
- **Acquiring new research platforms, including vessels;**
- **Monitor and evaluate the South Atlantic role in the global climate system;**
- **Foster the private sector in providing ocean products and services, developing new technologies including equipments and instruments; and**
- **Promote initiatives for the better use of potential marine resources including renewable sources of energy and also bioprospection.**

NEED TO THINK GLOBAL.....

BRAZILIAN ANTARCTIC PROGRAM



Janice Trotte Duhá
General Coordinator for Ocean Affairs and Antarctica
Ministry of Science, Technology and Innovation

Ministério da
Ciência, Tecnologia e
Inovação



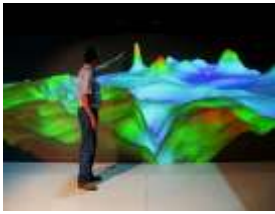
30th anniversary of Brazilian Antarctic program

R&D Infrastructure, Structure and Expertise:

- Research station (destroyed by fire February 2012); 2 vessels; 3 shelters;
- Individual research projects (18) and National S&T Institutes (INCT)
 - Earth Sciences, Oceanography, Life Sciences and Physical Sciences
- **INCT - ANTARCTIC ENVIRONMENTAL RESEARCH**
 - to monitor the environmental impacts, the connection with South America; education and outreach.
- **INCT - CRYOSPHERE**
 - to implement a national research program of the cryosphere, integrating seven laboratories dedicated to studying the variability of the different components of the planetary icemass (Antarctic sea ice, glaciers and Antarctic ice sheet, Andean glaciers, permafrost) and its response to climate change.

R&D COOPERATION BETWEEN CANADA AND BRAZIL – what is sought here:

- Peer-to-peer cooperation with major Brazilian Marine Research Groups, linked to Universities, Institutes and Industries;
- Develop further agreements that would ultimately lead to the setting up of a Bilateral Agreement at the Governmental level to advance cooperation and funding on different areas of Ocean Research and Technology among Canada and Brazil;
- Cooperation on Governance issues, such as the setting up of the National Institute for Ocean Research, including national capacities in ocean technology.





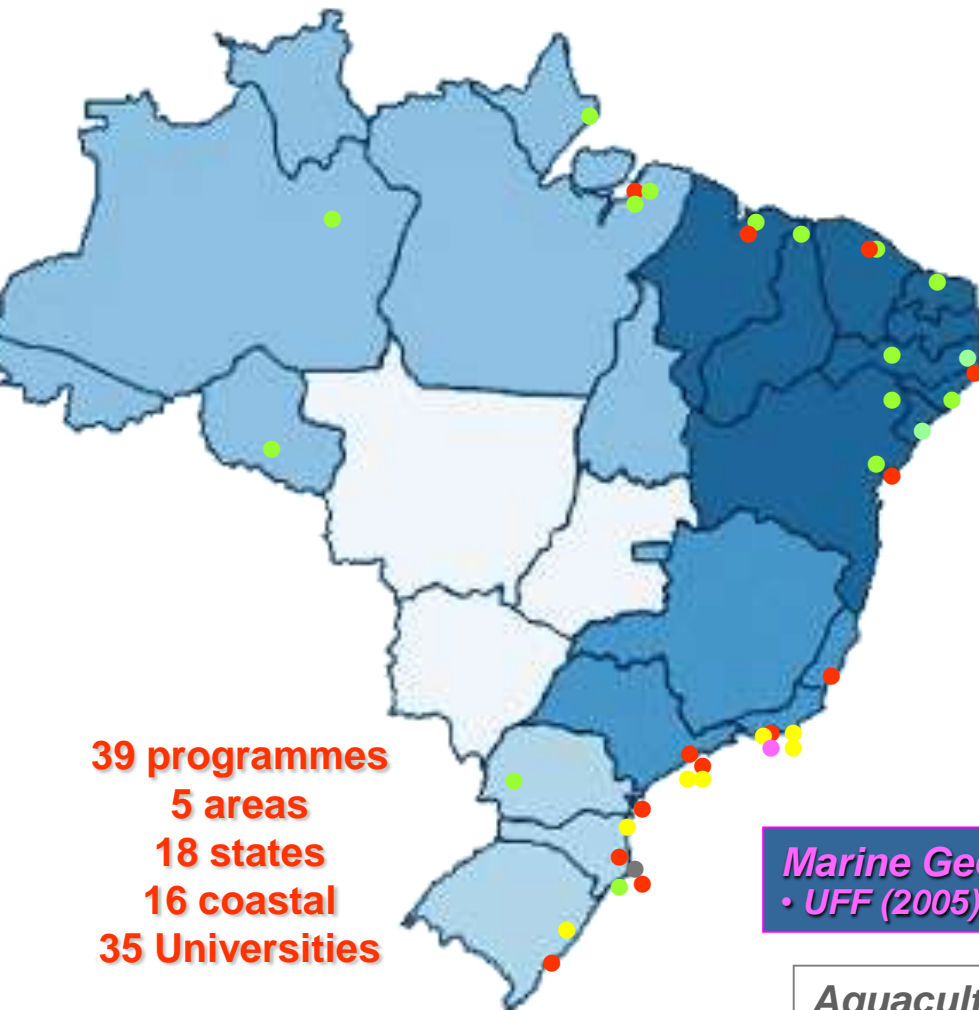
FIRST BRAZIL-CANADA JOINT WORKSHOP ON
OCEAN SCIENCE AND TECHNOLOGY
Rio de Janeiro, Brazil, 09-11 May 2012

OVERVIEW OF BRAZILIAN ACADEMIC ACTIVITIES ON OCEAN SCIENCE AND TECHNOLOGY

*José H Muelbert
Universidade Federal do Rio Grande
Instituto de Oceanografia*



UNDERGRADUATE PROGRAMMES IN MARINE SCIENCE



39 programmes
5 areas
18 states
16 coastal
35 Universities

Fisheries Engineering

- UFRPE (1971)
- UFC (1973)
- UFAM (1989)
- UNIOESTE (1997)
- UNEB (1999)
- UFRA (2000)
- UFRB (2005)
- UFPA (2005)
- UFRPE (2006)
- UEMA (2006)
- UFERSA (2006)
- UFPI (2006)
- UFAL (2007)
- UFS (2007)
- UEAP (2007)
- UNIR (2009)
- UDESC (2010)

Oceanography

- FURG (1971)
- UERJ (1977)
- UNIVALI (1992)
- UNIMONTE (1998)
- UFES (2000)
- UFPA (2000)
- USP (2002)
- UFBA (2004)
- UFPR (2004)
- UFC (2008)
- UFSC (2008)
- UFPE (2009)
- UFMA (2009)

Marine Biology

- UFRJ (1968)
- FAMATH (1982)
- UNISANTA (1987)
- UFF (2000)
- UNESP (2002)
- UNIVILLE (2002)
- UFRGS/UERGS (2006)

Marine Geophysics

- UFF (2005)

Aquaculture Engineering

- UFSC (1999)



OPPORTUNITIES AND CHALLENGES FOR A BRAZIL-CANADA COLLABORATION IN OCEAN SCIENCE

Ecosystem Based Approaches

- *Coastal implementation plan for GOOS (PICO) calls for observations to sustain EBAs for best access to ocean goods and services (e.g. Georges Bank)*

Observational Platforms

- *Provision of technology and knowledge to implement and foster observational systems along the coast*

University-Industry Partnership Model

- *Chair in Ocean Observations or Ocean Technology*
- *Establishment of “incubators”*

Government Ocean Science Structure/Functioning

- *Establishment of a government Oceans Institute (e.g. DFO)*

Capacity Building – Human Resources

- *Improvement of technical support*
- *Academic partnership (SwB, AUCC/ANDIFES)*

The INCT Program



The INCT is one of the biggest S&T Programs in Brazil

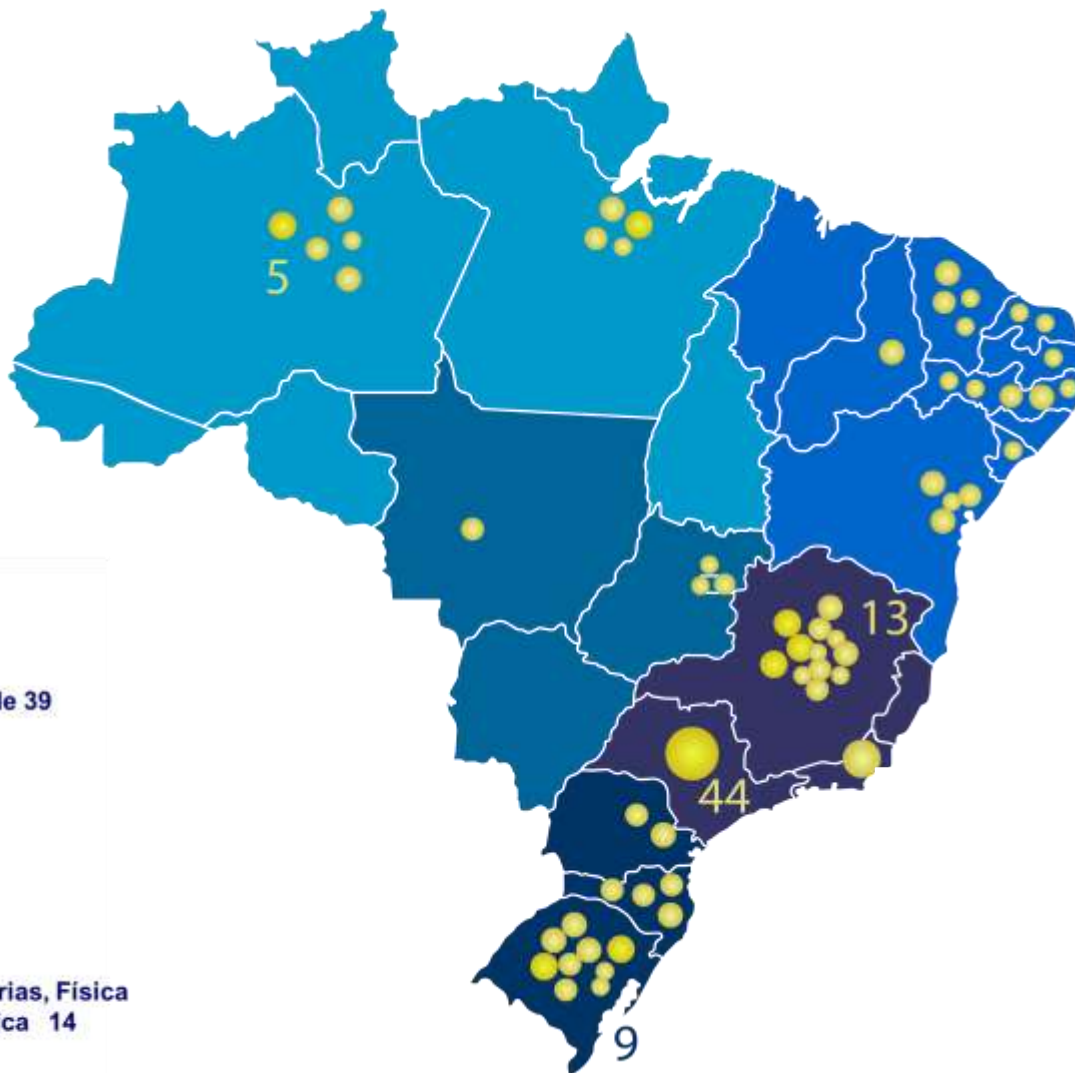
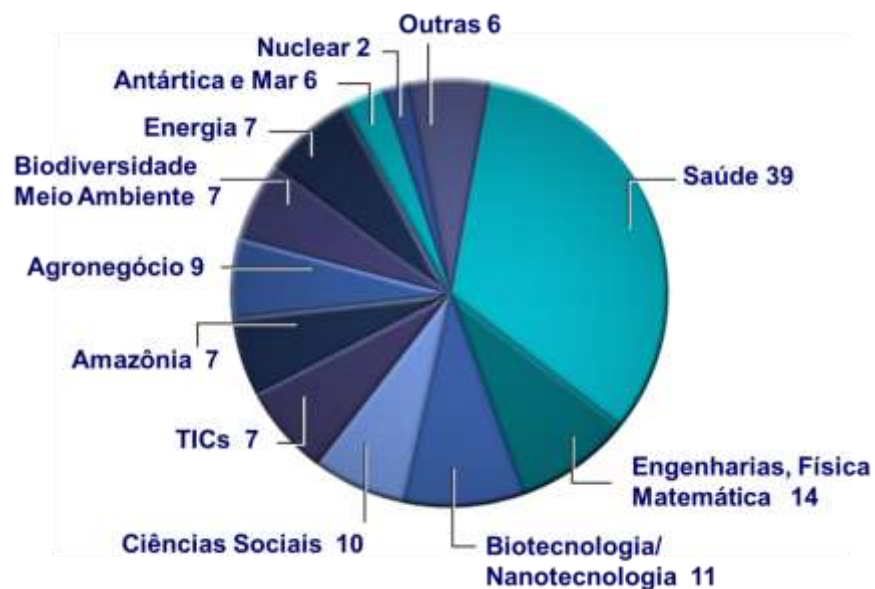
There are four INCT's in Marine Sciences and a few others that also include ocean related research and technological development in their programs



126
inct

institutos nacionais
de ciência e tecnologia

R\$ 607 million



Science Without Borders

A new international exchange and mobility program for Brazilian science, technology and innovation capacity development

Highlights:

- 100,000 scholarships; up to 12,000 for Canada
- Undergrad / grad / post-doc students spend 4-12 months at a foreign university or with a company (different funding model here)
- Funding for foreign researchers to spend time in Brazil (based on application from Brazilian host)
- Interested Canadian post secondary institutions need to liaise with CBIE, AUCC, MITACS or ACCC
- Still to sort out: what interested industry should do to signal interest (perhaps put together package with a partner university?)



Bilateral Workshop, Rio de Janeiro

May 9-11, 2012

- Objectives:
 - Flesh out thinking in priority areas for collaboration;
 - identify potential projects;
 - preliminary discussion on polar cooperation;
 - Identify possible other areas for collaboration
- 9 Canadian participants representing industry, academia and gov't (BC-3 people; PQ – 1; NS – 3; NL – 2)
- 15-20 Brazilian participants representing primarily academia, some industry (Petrobras & incubator companies) and government (states of Pernambuco, Rio de Janeiro, Sao Paulo, Rio Grande do Sul)



Results

Bilateral Ocean S&T Workshop

May 2012

- Science Without Borders – we need a strategy to attract Brazilians to Canadian ocean s&t opportunities
- Explore synergies between Brazilian National Ocean S&T Institutes and Canadian Centres of Excellence with marine theme; opportunities for industry
- Encourage activities between associations of early career scientists
- Consider looking at marine renewable energy and 'green' ships as other areas of collaboration
- Preliminary project ideas – to be further assessed:
 - Polar monitoring system



Results

Bilateral Ocean S&T Workshop

May 2012

- Preliminary collaboration ideas (cont.) – to be further assessed:
 - Development of new observation systems in Brazil – combine science with port monitoring. Potential in several states
 - Oil spill detection, assessment, tracking (incl. under ice)
 - Seafloor habitat mapping; new approaches for data acquisition and integration
 - Development of online platform for sharing ocean observation data
 - Network of sensors for study of Amazon river basin outflow
 - Modelling, prediction, forecasting of marine extremes



Upcoming...



- June 11 – deadline for expressions of interest to ISTPCanada
- Late June - Inbound mission to Atlantic Canada
- September 2012 - Rio Oil and Gas Show – Atlantic mission
- Autumn 2012 – new ocean tech Brazil market report – Canadian ConGen Rio de Janeiro
- Late 2012 – national ocean tech mission to Brazil lead by the Ocean Tech Alliance Canada (tbc)



Questions?

Comments?