

TRANSATLANTIC OCEAN SYSTEM SCIENCE & TECHNOLOGY  
HELMHOLTZ OCEAN SYSTEM SCIENCE & TECHNOLOGY



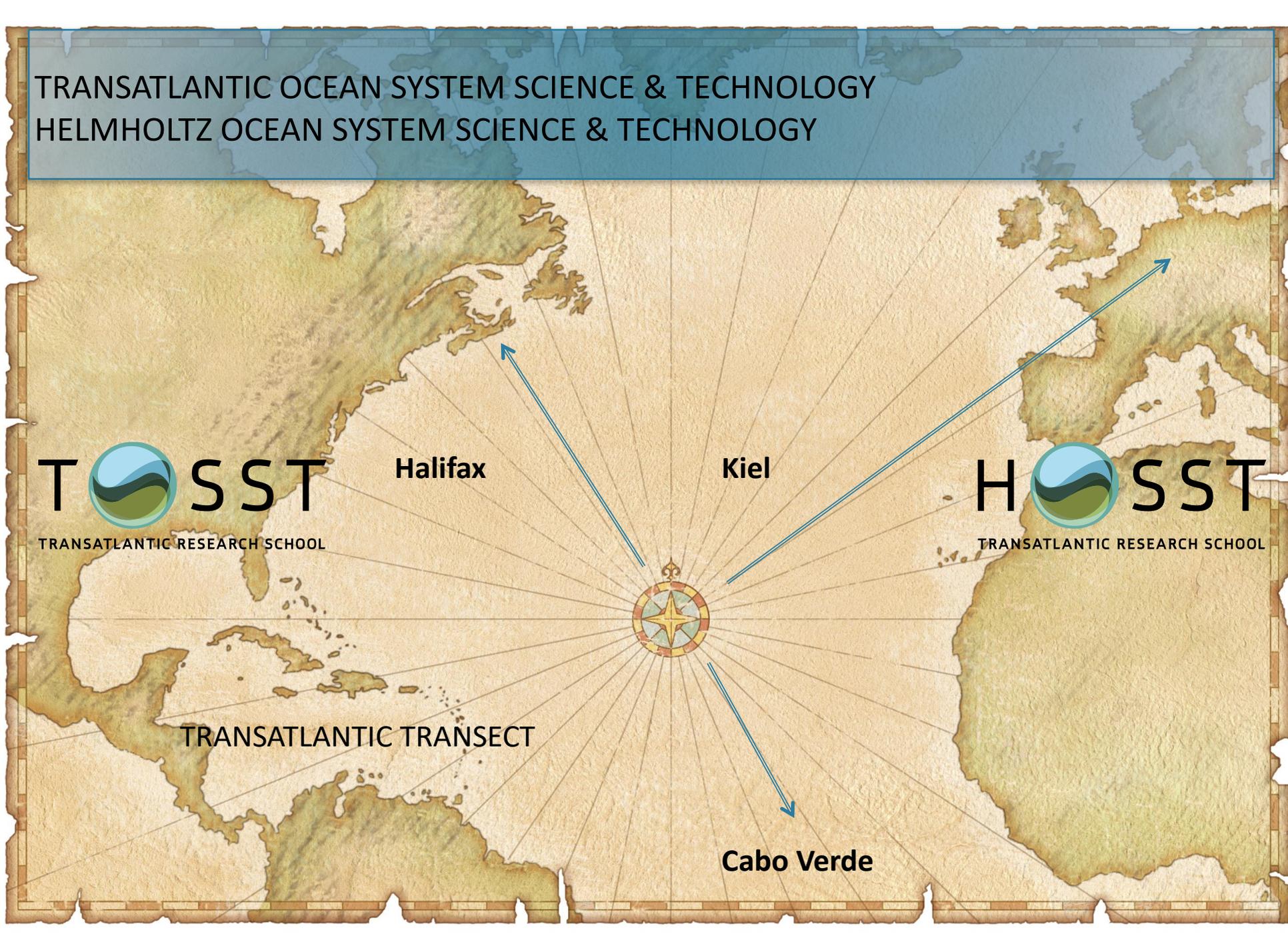
Halifax

Kiel



TRANSATLANTIC TRANSECT

Cabo Verde



# Origin: German-Canadian Workshop on Cooperative Research in the North Atlantic Ocean

Dalhousie University, Halifax, Nova Scotia, Canada  
June 3-4, 2011



## Working Groups – Identified Strong Collaboration Needed!

- The Labrador Sea, Carbon and Climate Variability
- Sub-Arctic Ecosystems: Sensitivity to Change
- Climate Change and Atlantic Overturning in the Past
- The North Atlantic Seafloor: Resources and Risks
- Ocean Governance and Ecosystem Management

# The workshop revealed.....

- ◆ Large amounts of common scientific interest
- ◆ Strong interest in closer, project-level cooperation
- ◆ Researchers were largely connected, but the programs and students were not
- ◆ Mutual benefit of coordination, sharing and planning of logistics, and large infrastructure

# Chancellor Angela Merkel's Visit to Dalhousie University



“Marine science in particular, but science in general, can only succeed with international collaboration”

August 2012; Dalhousie University

# NSERC (Canada) - Collaborative Research and Training Experience Program Helmholtz Association (Germany) – Helmholtz Research School

- TOSST-HOSST is a joint, transatlantic graduate research school, linking two major centres of ocean research on opposite sides of the Atlantic Ocean, in Maritime Canada and northern Germany
- Research addresses key issues facing the North Atlantic under the three themes of: Ecosystem Hotspots, Seafloor Structures, and Ocean Dynamics

Funding from 2013-2019



<b>HOSST</b> 	\$1.8 million Euros (Stipends, summer schools, internships overseas, housing, workshops, conferences, student exchange)
<b>TOSST</b> 	\$3.2 million CA (Stipends, summer schools, internships overseas, workshops, conferences, publications, student exchange)

# TOSST-HOSST Link to Cabo Verde

- Building upon the GEOMAR-Cabo Verde long-term cooperation and scientific investment
- Provide students with a very different perspective on science and technology and society/management issues, than what they see in Europe or North America
- Additional support of exchange of technology and research expertise, and students, between Germany, Canada and Cabo Verde
- Common research projects: ocean conservation, biogeochemical studies, marine management, ocean-atmosphere interfaces, and fisheries





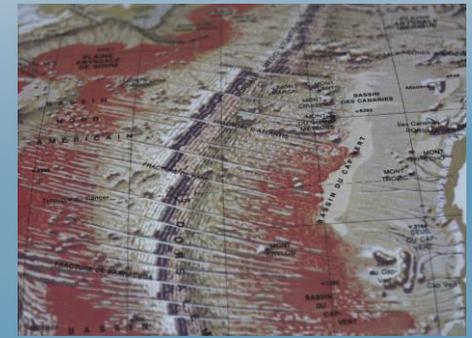
### 4D Ocean-Atmosphere Dynamics

- Past and present climate changes
- Ocean circulation dynamics
- Main areas of research include NW Atlantic and NW Africa.
- Ocean-atmosphere exchange



### Ecosystem Hotspots

- Commercial Aquaculture
- Marine Protected Areas
- Hydrothermal vents
- Seamounts
- Population connectivity of deep-sea ecosystems
- Fisheries



### Seafloor Structures

- Volcanic and sedimentary processes
- Influence of geohazards and mineral resources on ocean circulation and mixing.
- Remote imaging of sediment and crustal structures.

# Program Goals and Structure

2013-2019

## Main Goal

1. Convey technical and research skills in ocean science and advanced technologies, and promote informed management of deep sea and open ocean environments.

## Secondary Goals

1. Prepare trainees for an increasingly internationalized research and business environment
2. Provide innovative training in business skills and knowledge of private-sector applications of marine science and technology
3. Provide training at the interface between science and policy and its relevance to ocean management



## Number of Trainees



PhD = 22



PhD = 23

MSc = 3

Undergrad = 9

## Number of PIs



Supervisors = 22



Supervisors = 22

# TOSST-HOSST Features

## TRAINEES:

1. Participation in 3 summer schools (Halifax, Kiel, and Cabo Verde)
2. Bilateral cohort structure
3. Intensive professional development training: business development, management skills, leadership and policy
4. Internships in industry, government, and NGOs (TOSST)
5. Interdisciplinary research using state-of-the-art facilities in Canada, Germany, and Cabo Verde;
6. Co-supervision in Canada and Germany with international research stays

# 1<sup>st</sup> TOSST-HOSST PhD Cohort (25)

## Countries

- Russia, Poland, Iran
- China, United States
- Germany, Switzerland
- Italy, Canada

## Research Topics

- Marine Management, Conservation
- Microbiology, Bio-physical
- Ocean Technology
- Chemical & Physical Oceanography
- Biology, Fisheries, and Aquaculture
- Volcanology and Seafloor Structures

# 2<sup>nd</sup> TOSST-HOSST PhD Cohort (22)

## Countries

- Canada
- Germany;
- Phillipines
- Greece
- Lithuania
- Holland
- Cuba
- China
- Switzerland
- France
- Spain
- Iran

## Research Topics

- Paleocenaography; Marine Geology
- Biological Oceanography
- Marine Geophysics
- Atmospheric Physics
- Coastal communities
- Biogeochemistry/ sensors
- Autonomous vehicles
- Fisheries and fishery policy
- Sediment dynamcs
- Marine acoustics

# 1<sup>st</sup> Transatlantic Summer School 'Ocean Technology & Observation'

Halifax, Nova Scotia 2013



- 2 week intensive school
- Visited over 10 ocean technology and observation companies
- Expert panels
- Networking events
- Dragon's Den
- Exposure to science in industry



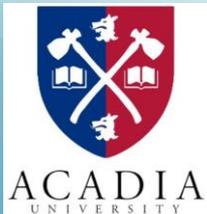
**FORCE**

**MetOcean**

Data Collection and Communication Experts



**WELAPTEGA**  
MARINE LIMITED



# 2<sup>nd</sup> Transatlantic Summer School 'Ocean Seafloor Structures & Dynamics

Kiel, Germany 2014



- 2 week intensive school
- Visited MPA sites in the North Sea
- Expert panels on seafloor structures and MPAs
- Networking events
- Offshore energy visit
- Students developed a theoretical MPA

# 3<sup>rd</sup> Transatlantic Summer School 'Ocean Biodiversity and Management'

Mindelo, Cabo Verde 2015



- 2 week intensive school
- Visited active volcanic island -Fogo
- Visited fishing communities and processing plants
- Participated in an island-wide beach clean up!
- Developed a 10-year business plan for the ocean science centre

# 4<sup>rd</sup> Transatlantic Summer School 'Ocean Technologies and Observations'

Halifax, Nova Scotia, 2016



- 2 week intensive school
- Visited active volcanic island -Fogo
- Visited fishing communities and processing plants
- Participated in an island-wide beach clean up!
- Developed a 10-year business plan for the ocean science centre



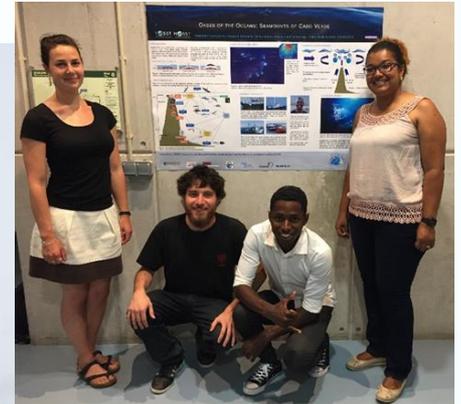
5th Transatlantic Summer School:  
“Multi-use conflicts in an industrialized coastal zone”

Kiel, Germany, 2017



# 6<sup>th</sup> and Final Transatlantic Summer School 'Cabo Verde: Life on a Volcano'

Sao Vicente and Fogo, Cabo Verde, 2018.



## Some Challenges and **Our Responses or Lessons Learned:**

1. Coordination of funding in two nations for joint training program:  
**We wrote 2 separate but excellent proposals (and/or we got lucky)**
2. Differing degree requirements and timing of PhD studies  
(e.g. Germany: 3 years; Canada: 5 years)  
**We did not attempt joint degrees; we focussed on networking of PhD candidates and their research. This limited approach worked.**
3. Recruitment of candidates into cohorts. Recruitment was a major challenge in Canada, predominantly; delays disrupted establishment of cohorts.  
**We did not fully resolve the recruitment problem in Canada**
4. Establishment of a PhD network across the Atlantic.  
**This worked. Face-to-face meetings + joint projects at summer schools required to develop personal contacts; maintained by videoconferencing. The bilateral, long-term connections allowed networks to build.**
5. “Value-added” program requirements place an extra burden on PhD candidates and risk delays in graduation  
**This was a problem; academic credit should be sought for these important activities (e.g. Summer Schools and regular seminars)**
6. Supervisors view “value-added” activities as diverting PhD candidates from their research tasks; (some) supervisors do not engage with program  
**This was a problem in some cases. Funding should be restricted to supervisors who see the (non-financial) benefits of the program and commit.**

## **Additional lessons-learned**

A complex, international training program of this nature requires a very stable funding environment and an appropriate, internationally-coordinated review mechanism; these aspects were problematic on the Canadian side

The complexity of international networking, especially involving mobility across the Atlantic, requires full-time, dedicated coordinators working together on both sides of the Atlantic. Again this was problematic on the Canadian side where program funding for coordination was limited to the first 2 years only.

## **Some Program Benefits:**

Creation of an international peer network

Exposure to broad multidisciplinary topics

Broader cultural exposure/ awareness

Exposure to diverse research cultures and opportunities

Expanded research opportunities (e.g. research locations; infrastructure; complementary scientific input)

Value-added training and experience beyond the academic: including business skills; policy issues

Awareness of challenges facing researchers in different countries, including developing nations

Thank you!

