ATLANTIC CENTRE COURSE REPORT

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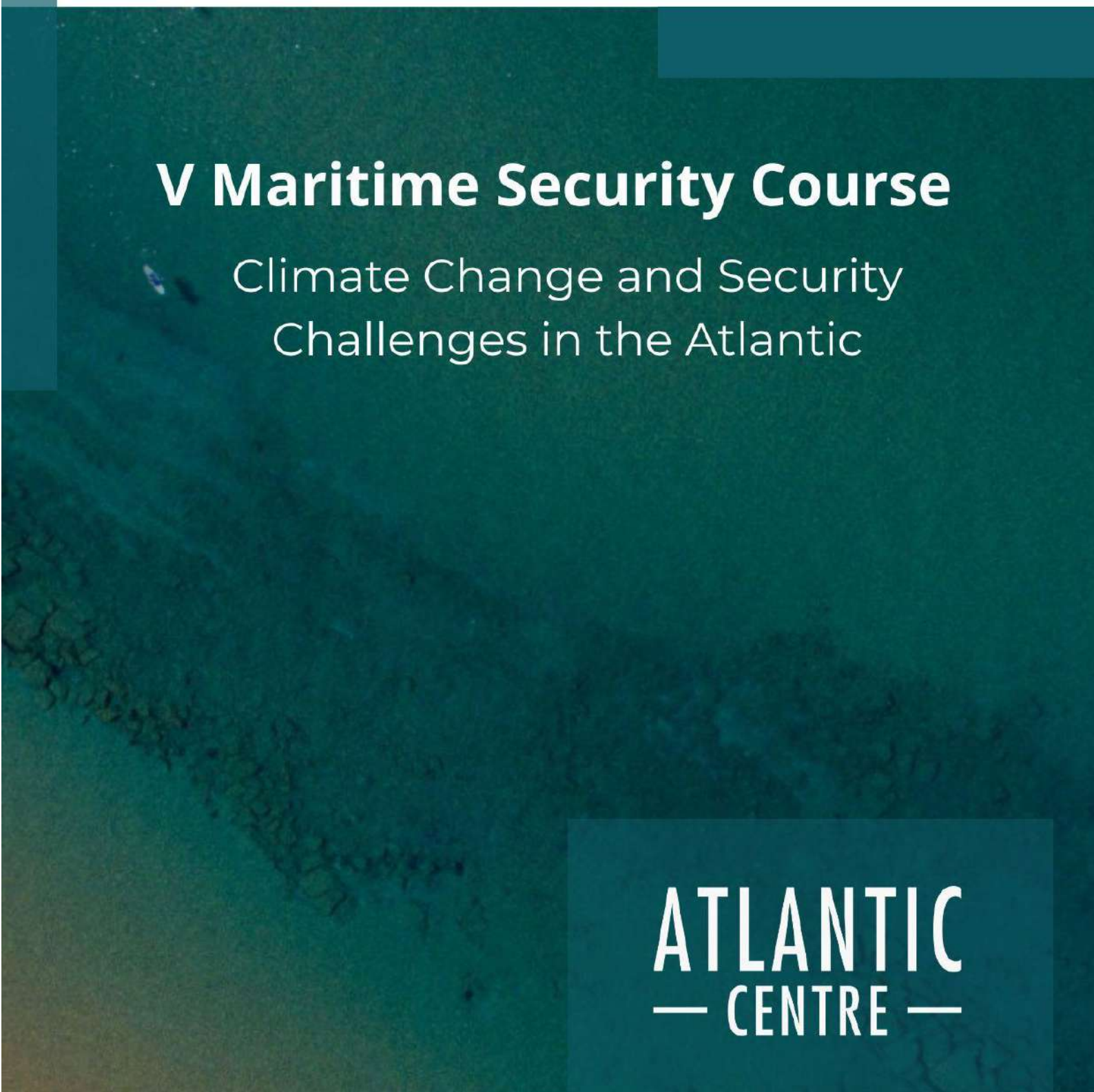

V Maritime Security Course

Climate Change and Security Challenges in the Atlantic

ATLANTIC CENTRE

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Foreword

As the Atlantic Centre finalized preparations for the IV Maritime Security Course, which focused on "Illegal, Unreported, and Unregulated Fishing in the Atlantic," a natural question arose: what would next year's topic be? What theme could possibly mirror the transnational essence of the "Whole of Atlantic" concept?

Areas such as Emerging Technologies, Maritime Critical Infrastructure, Terrorism and Narcotrafficking sparked our debate, et, reflecting on the IUUF framework and the broader international and national contexts of our signatory states, it became clear for us that the theme for 2025, "Climate Change and Security Challenges in the Atlantic" managed encompass all of these topics under one umbrella. This proposal was unanimously endorsed by our 23 signatory states at the time, now 27.

And so enters the V Maritime Security Course (V MSC) to the stage. In the first week of June, participants from 36 nationalities came together in São Miguel, Azores, to listen, learn, and engage with one of the most pressing challenges of our time. In one week in the island of São Miguel, Azores, all corners of the Atlantic space were represented. This diversity both in uniform and civilian attire was visually striking and also warmly reassuring.

In the Azores, an archipelago and outermost region of the European Union, Climate Change is sparing no one, with visible immediate impacts. Coastal erosion, sea-level rise and ocean acidification foreshadow a challenging future for islands and coastal states across the Atlantic basin. The lessons from the V MSC reaffirm a fundamental truth: these are collective challenges that require collective responses.

With the knowledge of experts and the engagement of the participants, the V MSC reignited critical conversations on the nexus of climate and security. Because we cannot change what we do not know, throughout this report, the Atlantic Centre summarized the multidisciplinarity of climate change and security challenges in the Atlantic by pointing, with the assistance of all our partners and friends present at the course, a feasible and palpable path forward to our communities.

The V Maritime Security Report encapsulates the knowledge of an intense week of work in the Azores, but above all else, it embodies the spirit of cooperation and mutual growth that makes the Atlantic Centre and its community, a *de facto*, Atlantic Community of interests.

Rear-Admiral Nuno de Noronha Bragança,

Atlantic Centre Coordinator

Executive Summary

The V Maritime Security Course, organized by the Atlantic Centre, took place in Ponta Delgada, São Miguel, from June 2 to 6, bringing together experts, policymakers, and civil society representatives from 36 nations. This year's theme, "Climate Change and Security Challenges in the Atlantic," underscored the growing recognition of climate change as a pressing, multidimensional threat that transcends environmental concerns to affect stability, development, and human security across the Atlantic region.

The Atlantic Centre, as a platform for cooperation among Atlantic nations, emphasized that climate change is inherently a security issue, demanding coordinated, informed, and cross-sectoral responses. This course served as a multidisciplinary effort to address how climate change impacts maritime security, highlighting the systemic and interconnected nature of its challenges.

Key Themes and Challenges

The course panels explored various dimensions of the climate-security nexus in the Atlantic, including:

1. **International Law and Maritime Boundaries**: Climate-induced changes necessitate revisiting legal frameworks related to maritime boundaries, state responsibilities, and the protection of climate-displaced populations.
2. **Resilience of Critical Infrastructure**: Rising sea levels, extreme weather, and coastal erosion are testing the resilience of infrastructure vital to human security and economic stability.
3. **Climate-Induced Human Mobility**: Forced displacement due to environmental degradation poses significant governance and humanitarian challenges.
4. **The Role of Emerging Technologies**: Innovations in science and technology offer tools for mitigation and adaptation but require effective integration with governance and local needs.
5. **Local and Regional Initiatives**: The unique vulnerabilities of Atlantic Island nations highlight the importance of locally grounded, justice-centered responses.

The course emphasized that climate change in the Atlantic is not a distant threat but an evolving reality. Urgent action is required to simultaneously mitigate its causes and adapt to

its effects through integrated solutions grounded in science, technology, governance, and social justice, and cooperation.

Strategic Insights and Recommendations

A recurring theme throughout the course was the need for collective, structured, and solidaristic action to transform vulnerability into resilience. The discussions culminated in several strategic recommendations:

1. **Adopt Integrated Climate Strategies**
   Treat mitigation, adaptation, and prevention as complementary dimensions of a coordinated response.
2. **Develop Cross-Sectoral Action Plans**
   Align scientific research, governance, and technology to address systemic climate challenges effectively.
3. **Invest in Sustainable Technologies**
   Focus on renewable energies and sustainable solutions tailored to the needs of vulnerable coastal, island, and maritime communities.
4. **Strengthen Support for Vulnerable Populations**
   Provide financial, technical, and institutional support to address food insecurity, displacement, and infrastructure resilience in the most affected regions.
5. **Anchor Climate Policies in Climate Justice**
   Ensure that marginalized and frontline communities lead and benefit from climate responses, fostering equity and inclusivity.
6. **Revise International Legal Frameworks**
   Adapt legal frameworks to reflect new climate realities, including redefining maritime boundaries and creating legal protections for climate refugees.
7. **Empower Local Communities and Island States**
   Recognize civil society, local communities, and Atlantic Island nations as strategic actors in shaping localized, justice-centered solutions.
8. **Engage the Private Sector and Academia**
   Involve businesses and higher education institutions as partners in innovation, policy development, and knowledge dissemination.

Building Resilience Through Cooperation

The course underscored the importance of coordinated action that bridges scientific research, public policy, civil preparedness, and military readiness.

Key proposals included:

- Strengthening early warning systems to enhance disaster preparedness.
- Integrating climate-related risks into national security strategies.
- Promoting sustainable development and renewable energy to build resilience.
- Deepening international cooperation to address shared challenges.

Strategic communication and education were also highlighted as essential for fostering public awareness and mobilizing political will. Societies and decision-makers must grasp the urgency of the climate-security nexus to drive meaningful action.

The Role of the Atlantic Centre

Participants reaffirmed the role and value proposition of the Atlantic Centre as a key platform for dialogue, knowledge exchange, strategic foresight, capacity development and training. It emphasized that maritime security cannot be decoupled from the environmental pressures shaping the future of the Atlantic region.

Conclusion

The Atlantic region, as a shared space, entails a collective responsibility. Addressing climate change requires an inclusive governance architecture anchored in regional cooperation, strengthened institutional capacities, and political commitment to sustainable development and human security.

Through collective action, informed by the insights of this course, the region can transform challenges into opportunities, ensuring a safer, more equitable, and resilient future for all Atlantic states and their societies.

Dr. Jon-Hans Coetzer,

Senior Programme Specialist,

Online Learning and Education Unit,

Division for Peace, UNITAR

Introduction

The V Maritime Security Course, promoted by the Atlantic Centre, took place in the island of São Miguel, in the city of Ponta Delgada during the 2nd to the 6th of June. It brought together national and international participants and experts to reflect on the main challenges affecting maritime security across the Atlantic region. A total of 32 nationalities were present at this year's edition, which was dedicated to the topic of "Climate Change and Security Challenges in the Atlantic", acknowledging that climate change has become an increasingly pressing and multidimensional threat to stability, development, and human security.

The Atlantic Centre, as a strategic platform for cooperation and dialogue among Atlantic nations, plays a growing role in addressing these complex challenges, recognizing that climate issues are no longer solely environmental concerns but critical security matters that demand coordinated, informed, and cross-sectoral responses. Therefore, climate change represents one of the most pressing and complex challenges of our time, taking on a cross-cutting nature that transcends geographic, political, disciplinary, and sectoral boundaries. Its manifestation in the Atlantic space clearly illustrates the systemic and interdependent nature of its impacts.

In this sense, this report stems from the V Maritime Security Course, held as part of a multidisciplinary effort to examine the multiple linkages between climate change and maritime security in the Atlantic region. The panels brought together experts from diverse fields, policymakers, and civil society representatives, enabling a comprehensive approach to emerging challenges and potential solutions. The topics under discussion ranged from the evolution of international law to maritime security, including the resilience of critical infrastructure, the role of emerging technologies, climate-induced human mobility, and the importance of local and regional initiatives.

Across all discussions, a clear message emerged: climate change in the Atlantic is a present and growing reality that demands urgent, coordinated, and structured responses. Overcoming this challenge requires not only mitigating its causes but also adapting to its effects, through integrated solutions grounded in science and technology, regional cooperation, and climate justice.

This report therefore aims to synthesize the main contributions presented throughout the course, highlighting strategic recommendations and pathways for collective action toward an effective, resilient, and inclusive response to the climate crisis in the Atlantic. It is a summarized effort of all the panels and discussions that took place in Ponta Delgada, beginning with a summary of the roundtable discussion and ending with the last panel of the course, namely, the Atlantic Centre Research project.

Opening Ceremony

At the opening ceremony of the V Maritime Security Course in Ponta Delgada, Rear Admiral Bragança, Coordinator of the Atlantic Centre, emphasized the urgent and growing importance of climate change as a security challenge across the Atlantic.

Thanking institutional and international partners, highlighted the critical role of cooperation among Atlantic nations, coastal and island states alike, in addressing shared risks and recent extreme weather were cited as concrete examples of the increasing vulnerability of Atlantic regions. The interconnection between land and maritime security was underscored, with a call for enhanced scientific research, digital innovation, and multi-agency coordination.

Closing on a note of unity and shared responsibility, called for a renewed Atlantic commitment, grounded in science, driven by dialogue, and focused on resilience. The message was clear as no country can face these challenges alone, and collective action is the only viable course forward. Rear Admiral Bragança thoughtfully expressed:

– *"Let us leave these waters with renewed purpose, anchored in political dialogue, supported in science and knowledge, guided by cooperation, and driven by the conviction that together, we can turn the tide."*

Subsequently, the President of the Government of the Azores, José Manuel Bolieiro, reaffirmed its strong commitment to ocean stewardship and international cooperation in the Atlantic space. Set against the backdrop of global uncertainty and climate change, the speech highlighted the Azores' unique maritime identity and strategic role within Portugal's vast Exclusive Economic Zone. With a strong connection to the sea, the Azorean people recognize the ocean as both an economic asset and a shared responsibility.

It emphasized then the multidimensional risks posed by climate change and the need for a coordinated international response. The Azores' initiatives, including the Blue Azores Programme and the expansion of Marine Protected Areas, were presented as examples of effective regional action based on science and collaboration.

The speaker stressed that maritime security today transcends traditional defence as it also concerns sustainable development, biodiversity, and the enforcement of international law. The speech concluded with a call for unity, in which safeguarding the ocean requires cooperation across borders, especially among Atlantic coastal states, and a shared sense of duty to future generations. As the President Bolieiro aptly stated:

– *"The future of our seas depends on our ability to cooperate and our determination to protect this vital resource for humanity."*

Roundtable: “Climate Change in the Atlantic: A threat without borders”

The official launch of the V Maritime Security Course began with the roundtable moderated by Navy Captain João Fonseca Ribeiro and counted with the participation of Prof. Dan Hamilton, Vice-Admiral Issah Yakubu, Suzi Barbosa and Prof. Andreas Kraemer.

This session highlighted the cross-border and multifaceted nature of climate change impacts on the Atlantic Ocean and its coastal and island nations, emphasizing its geographically and politically transnational character. These impacts affect various regions regardless of their level of development and involve interconnected challenges related to energy, food security, water resources, mobility, and information sharing. A central point was the urgent need for integrated and cooperative responses to atmospheric and oceanic environmental changes, through bottom-up strategies tailored to regional specificities. Concern was raised over the observed decline in engagement with international climate initiatives, which has created significant governance and assistance gaps, particularly in the development sphere, complicating coordinated pan-Atlantic climate action.

Prof. Andreas Kraemer while embodying the voice of the Ocean, made a compelling contribution by articulating the critical yet vulnerable role of the oceans in the Earth's climate system and the urgent need for action. He underscored the consequences of fossil fuel combustion, rising pollution, overfishing, and ecosystem degradation, all of which threaten the oceans’ vital functions in climate regulation and sustaining life. These disruptions, he warned, could lead to serious consequences, such as sea level rise that would inundate coastal infrastructure worldwide.

Vice Admiral Issah Yakubu echoed these concerns, focusing on the Gulf of Guinea as a frontline region already experiencing climate-induced changes in rainfall, ocean currents, and storm patterns. Given the region's dependence on rain-fed agriculture and fisheries, climate variability **threatens food security, livelihoods, and coastal ecosystems**, further worsened by pollution and invasive species. He also highlighted the tension between economic development needs and environmental protection, advocating for stronger regional cooperation in data sharing, resilient infrastructure, early warning systems, and sustainable blue economy initiatives, emphasizing that community empowerment through education and support is essential for effective adaptation.

Suzi Barbosa on the other hand, contextualized climate change within the broader nexus of diplomacy and maritime security, stressing that inclusive capacity-building and knowledge-sharing are vital to ensuring that all stakeholders, especially vulnerable African nations, can

participate **equitably** in climate action. She further emphasized that conferences and knowledge-exchange platforms must translate into actionable policies to effectively address the shared challenges facing the Atlantic.

The panelists also addressed the shifting global geopolitical landscape, emphasizing the growing need to diversify partnerships. South-South cooperation between African and South American states was identified as a promising path to strengthen regional integration and resilience and practical initiatives such as maritime spatial planning and enhanced maritime domain awareness were highlighted as effective, non-political tools for advancing cooperation. In addition, the growing role of local actors, including coastal cities and regional authorities, was emphasized as key to implementing concrete solutions that complement national government efforts.

Energy transition was also a core point, with a strong call to accelerate **the adoption of renewable, accessible, and sustainable energy sources, particularly in island economies** and vulnerable regions. The strategic potential of solar energy, especially in West Africa, was underscored, alongside the need for policies that support its integration, such as enabling excess energy to be fed into national grids. The importance of sharing the best practices on the regional level, as well as the need for technology transfer and local capacity-building to ensure that all countries can equitably benefit from the energy transition was also emphasized.

Overall, the roundtable affirmed the Atlantic as a shared resource space facing a borderless crisis. It called for coordinated, science-based, and inclusive policies driven by regional cooperation, capacity-building, and practical initiatives to safeguard environmental integrity, economic development, and security in the face of unprecedented climate challenges. Prof. Kraemer as "Mr. Ocean" eloquently placed:

- "I cannot take much more. We are coming to the limit of my absorption; I can no longer absorb. I will release it back to you… and the increase temperature that that will create, will create changes. 12 meters above the current sea level are now unavoidable. It is up to you to make sure I don't grow beyond that"

Check the full open ceremony and the roundtable here:

https://www.youtube.com/watch?v=6Dq4wplm4xA

Panel 1: "Mitigation, Prevention or Adaptation? What does Science tell us?"

The first panel of the course started with the logic and fact-based analysis of science in understanding Climate Change. Hence, the panel brought 3 different voices across the Atlantic, namely Prof. Larissa Basso from Brazil, Prof. Tannecia Stephenson from Jamaica and Prof. Stefan Rahmstorf from Germany. This panel was moderated by Rear-Admiral João Marreiros from Portugal's Hydrographic Institute.

Considering the challenges analysed in the roundtable, this panel looked at a scientific analysis of how to respond effectively to accelerating climate disruption, highlighting that **science no longer sees mitigation, prevention and adaptation as separate paths,** but as interconnected and urgent priorities that must move forward simultaneously.

To that end, one parameter analyzed was the **Atlantic Meridional Overturning Circulation** (AMOC), a vital ocean current that stabilizes the Earth's climate by redistributing heat, highlighting clear evidence that it is **weakening and potentially approaching a critical point**. Driven by the Anthropocene effect, the weakening of this natural mechanism will potentially lead to abrupt and irreversible changes in global climate systems, leading to a **convective collapse** in key regions of the North Atlantic. The consequences of this significant slowdown will not be limited to climate, but also affect geopolitical tensions, food security, migration dynamics, regional and global stability as a whole.

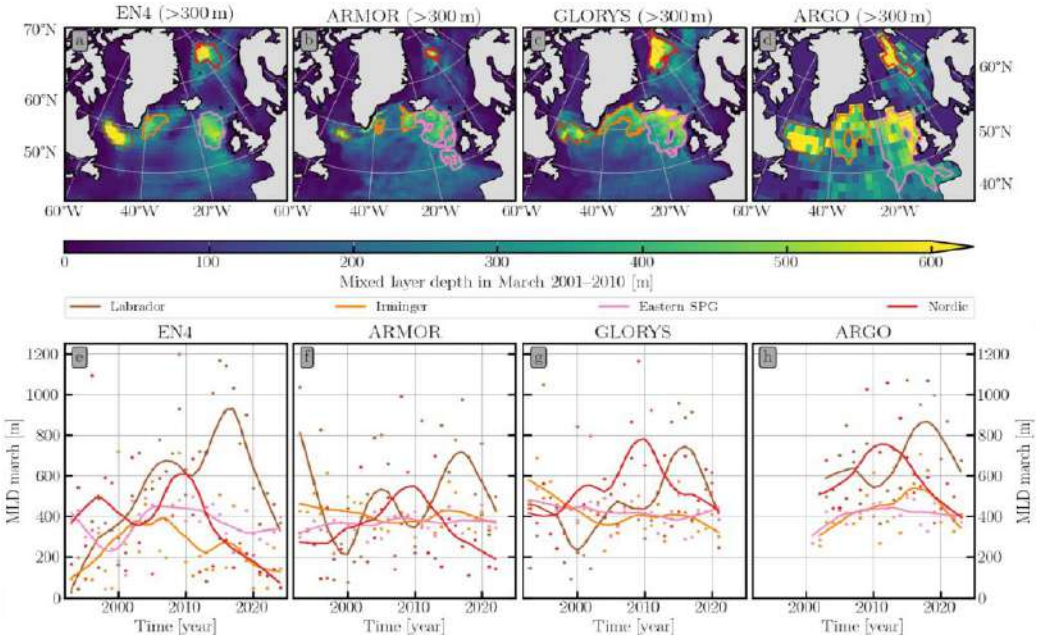

FIGURE 1 – AMOC COLLAPSE IN CONVECTIVE REGIONS AND CONVECTIVE DEPTH

In this line of thought, the discussion focused on the grounds that **climate stability has become inseparable from global security,** where the risks posed by the weakening of the AMOC have become multi-sectoral and universal, disrupting governance and human security, and that there is an urgent need to consider climate change as a high-impact security threat that requires international strategic coordination, long-term investment in resilience and proactive emergency planning.

In addition, the growing number of planetary boundaries already crossed was addressed, including those related to land use, freshwater systems, the integrity of the biosphere and climate change itself. These transgressions are accelerating the arrival of what is called "**the era of multiple hazards**", i.e. a period defined by compounded and overlapping climate shocks that increasingly defy climate prediction and anticipation, resulting in more frequent and intense extreme weather, higher sea levels and greater ocean acidification, contributing to an increasing cost of inaction and a diminishing capacity for preparedness and action.

Vulnerable regions, such as the Caribbean, have been highlighted as trench zones for climate disruption, since their exposure is intensified by geographical and socio-economic factors such as low and mountainous terrain, dependence on natural resources and economic isolation. Thus, in this region, **climate unpredictability has become the norm,** compromising efforts to guarantee basic human development such as in education, health, energy security and economic growth, and this development is increasingly delayed or even reversed, especially in communities least equipped to adapt.

International climate negotiations must therefore reflect an urgency, where efforts must continue around carbon markets, verification and climate finance, and increase the pace of political response that falls short of science. Effective diplomacy requires what was described as a "two-level game", where national plans and international agreements must be aligned in terms of both ambition and implementation.

The panel thus transmitted a clear message that some climate impacts are now unavoidable and, in some cases, irreversible, but that the **degree of future damage depends on the speed and scale of today's decisions.** Rapid and deep reductions in greenhouse gas emissions, extensive adaptation planning, investment in sustainable technologies and strong support for vulnerable regions are not optional but minimum requirements for a secure future. The era of unpredictable climate has arrived, but science still offers a roadmap to resilience, if we are willing to act decisively.

Panel 2: “Emerging Technologies & Extreme Weather Events”

Continuing the line of thought and the resulting findings of the scientific analysis and focusing on the growing role of emerging technologies in the forecasting, monitoring, and response to extreme weather events, which are becoming increasingly frequent and intense due to climate change, the panel brought together experts in marine science, space technologies, artificial intelligence, and defense systems. The panel was moderated by Navy Captain Luís Cabral from the Atlantic Centre and counted with the presentations of Josué Barão from Tekever, Dr. Mafalda Carapuço from Air Centre, Eng. Arturo Ojeda Demaria and lastly, Prof. Luca Longo. The aim was to highlight innovative solutions to strengthen the resilience of the Atlantic region through international cooperation and technological integration.

One of the first issues that were highlighted was the importance of long-term ocean observation and data-driven sustainable management. With references to initiatives such as the AIR Centre and the Atlantic Cloud (a high-performance transatlantic computing network) and the Internal Waves Service, a digital platform that uses satellite imagery and artificial intelligence algorithms to detect and analyze internal ocean waves, emerging technologies can be the missing bridge that enables our societies to tackle climate change. These initiatives have a significant impact on monitoring the climate change impacts on biodiversity, and the safety of maritime infrastructures, serving as an example of the role of applied science in ocean governance.

Furthermore, technological devices to combat extreme weather events, which have worsened due to climate change, were also presented. Examples such as the use of thermal sensors, synthetic aperture radar (SAR), long-range drones such as the AR3 VTOL, and communication technologies like Bluetooth, are closer in enabling rapid detection and providing real-time information on these events to authorities. These tools clearly demonstrate their value by significantly enhancing the efficiency and effectiveness of large-scale monitoring and response operations across various domains.

Although not directly linked to climate change, new approaches to tsunami early warning systems were also discussed, including technologies such as SMART (Science Monitoring And Reliable Telecommunications) and DAS (Distributed Acoustic Sensing), which use existing underwater fiber optic cables to detect seismic activity. These technologies are being tested in regions such as Portugal and Vanuatu and offer significant improvements in threat anticipation and response, with potential future applications in Antarctica.

The linkage between climate change and intensification of extreme weather events was evident. An example of such a linkage is the case of wildfires which are steadily increasing across the globe, due to climate change, land-use change (and other phenomena). To that effect, Tekever presented a case study on the Canada's wildfires and to what extent the usage of UAV technology helped mitigate, fight and prevent it. Indeed, beyond traditional methods patent in fire fighter brigades or even early warning systems (like the Copernicus Emergency Management Service, in the case of Europe), private sector companies such as Tekever can, with the usage of new technologies, provide meaningful contribution to fighting this example of extreme event (see Figure 2).

Figure 2 – Support of Tekever in fighting an extreme event. Source: naturecanada.ca

The panel further highlighted the growing relevance of Artificial Intelligence (AI) in addressing climate change, contributing to the refinement of forecasting models, the detection of environmental anomalies, and decision-making support in complex scenarios such as wildfires or ocean modelling. The importance of explainable and ethical AI models was also stressed, especially in critical applications related to public safety and crisis management.

In conclusion, the panel emphasized that the **integration** of space technologies, advanced data infrastructures, and artificial intelligence **is not merely a technical advancement but a strategic priority**. As extreme events intensify, it becomes essential to promote collaboration

between science, public authorities, and the private sector across the Atlantic. Only through shared innovation and sustained investment in emerging technologies will it be possible to ensure the resilience of ecosystems, infrastructure, and communities in the face of escalating climate risks.

Panel 3: "Climate Change and Challenges for International Law"

Opening the 2nd day of the course, the panel on international law was moderated by Bernardo Brito e Abreu and included the participation of Rear Admiral Moreno Oliveros from the Colombian Navy, Prof. Patrícia Galvão Telles and Prof. Aldino Santos Campos. The panel analyzed the emerging legal challenges posed by climate change, highlighting concerns related to sea-level rise, the redefinition of maritime boundaries, and the international responsibility of States.

One of the key issues discussed focused on sea level average rising, which threatens the baseline delineation used to define maritime zones under the United Nations Convention on the Law of the Sea (UNCLOS), thereby undermining the extent of States' sovereignty over areas such as the Exclusive Economic Zone and the continental shelf. In this context, Article 5 of UNCLOS and Article 121 (regime of islands) were examined, revealing the fragility of the current legal framework regarding the delimitation of national maritime territories.

Other relevant instruments were also referenced, such as the Vienna Convention on the Law of Treaties (1969), which in Article 62(2)(a) prevents climate change from being invoked as grounds to revise treaties that establish boundaries, and the Montevideo Convention (1933), which defines territory as an essential element of state sovereignty, also challenged by this new scenario.

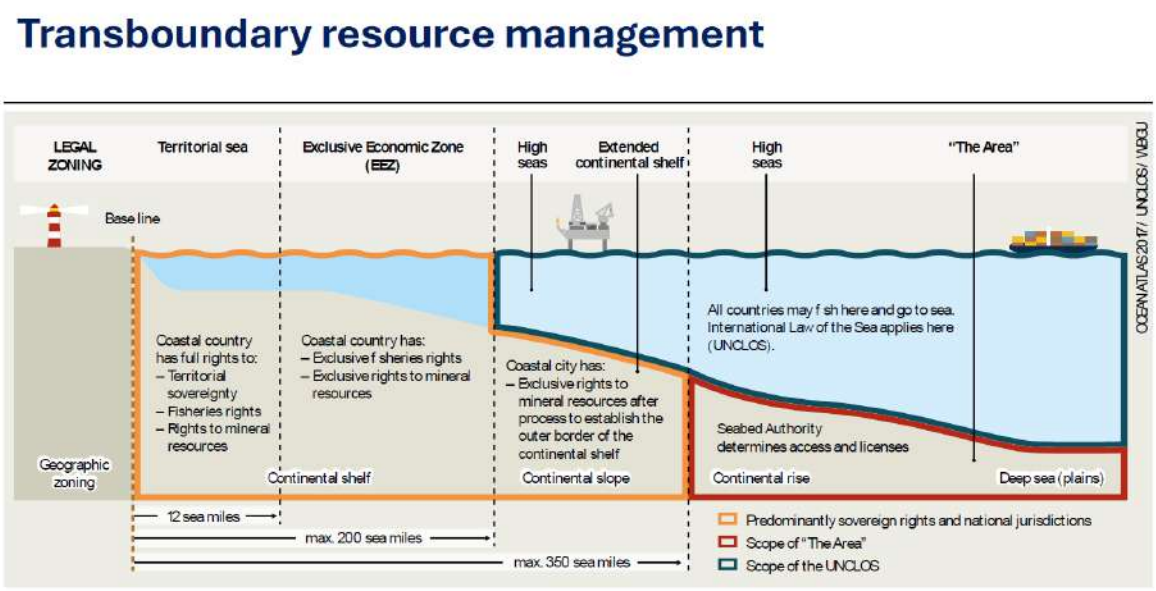

Figure 3 – Transboundary resource management. Source: UNCLOS

Furthermore, the panel specified examples of the specific impacts of Climate Change in Latin America and the Caribbean, emphasizing the region's vulnerability to phenomena such as coastal erosion, hurricanes, and loss of marine biodiversity.

To that end, the case of the San Andrés and Providencia archipelago in Colombia was used as a concrete example of the legal and human effects of climate change, especially regarding the protection of indigenous communities and the resolution of territorial disputes such as the Quitasueño case. The discussion also included the historic decision of the International Tribunal for the Law of the Sea (ITLOS) in May 2024, which recognized greenhouse gas emissions as a form of marine pollution, establishing concrete obligations for States to prevent, mitigate, and cooperate internationally in protecting the marine environment. Finally, the commitments made by Colombia under the Paris Agreement and at COP16 on Biodiversity were presented, reflecting the growing alignment between international law, environmental protection, and climate change adaptation from this specific state.

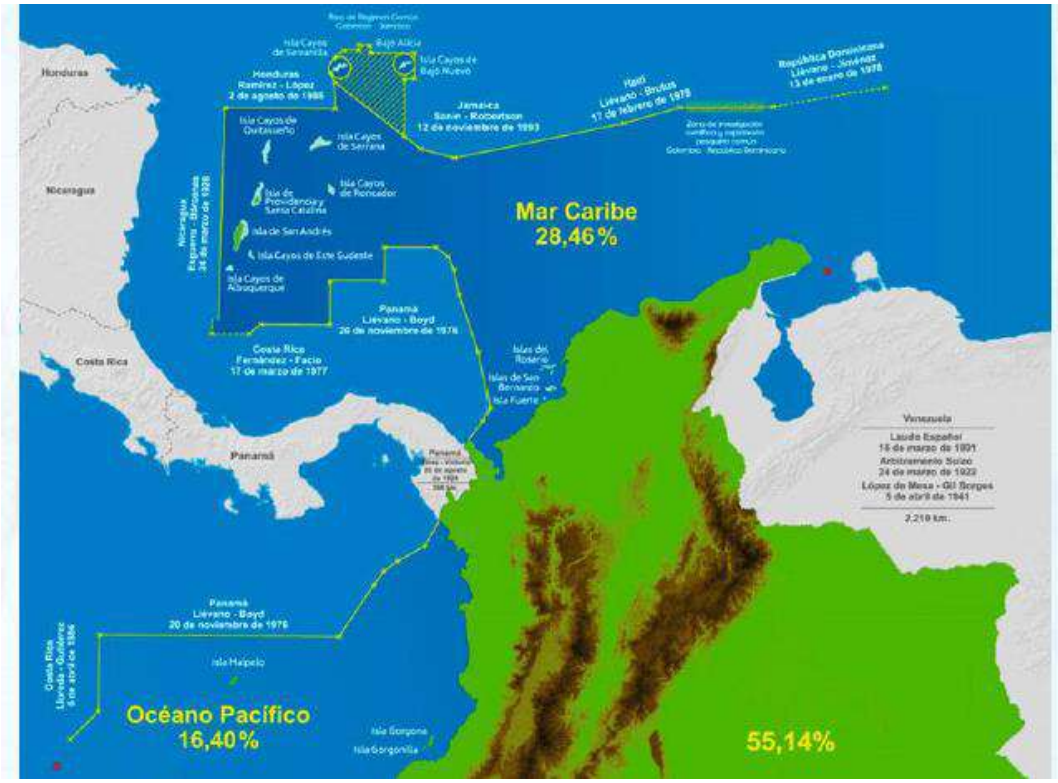

FIGURE 4- SCHEMATIC MAP OF COLOMBIA. SOURCE: COMISIÓN COLOMBIANA DEL OCÉANO

Thus, the panel demonstrated the urgent need to rethink and adapt the current international legal frameworks such as the international law of the sea and the law of state responsibility which is currently confronted with realities that was not prepared, demanding a coordinated and global legal response.

Climate change represents a major challenge, where international law must evolve to address both the causes and consequences regarding adaptation to impacts, and address challenges related to peace and security, including climate-induced migration and food insecurity, where States should take measures to reduce their greenhouse gas emissions and fulfill their commitments under the Paris Agreement (global warming to be below 2 degrees Celsius, and ideally to 1.5 degrees Celsius, compared to pre-industrial levels). International law should additionally strengthen monitoring mechanisms to ensure compliance with climate-related agreements and obligations, and international cooperation becomes essential to tackle climate change challenges, particularly in terms of financing and technology transfer. Ultimately, the panel underscored the urgent need to update and adapt international law, currently confronted with realities it was not designed for, requiring a comprehensive and coordinated legal response from the international community.

Panel 4: "Climate Change and Migration: An Atlantic Displacement"

Arriving to panel 4, shared between Navy Captain Mamadou Ndiaye from Senegal, Ambassador Tarik Iziraren from the Marrocan Initiave the Africa Atlantic States Process, Prof. Susana Ferreira and moderated by David Willima, this panel addressed the increasingly urgent links between climate change and human migration, particularly in the most affected regions of Africa and the Caribbean.

The **last decade has been the hottest and driest on record,** mainly affecting the African continent with increasingly frequent and intense extreme weather events and disruptions to marine ecosystems, threatening the food security of coastal communities and causing the displacement of hundreds of thousands of people.

One major concern raised by Captain Ndiaye was food security, namely fishing. Fishing is essential to the diet and livelihoods of millions of people, and looking at the example of Senegal, the migration of fish stocks due to warming waters, along with overfishing and acidification, is **driving young fishermen to seek opportunities abroad**. This environmental and economic crisis is also fueling organized crime, illegal fishing and maritime trafficking, underlining the need for sustainable fisheries management, regional partnerships and alternative livelihoods to curb this emerging security threat.

In addition, it is noteworthy that the majority of climate-related migration continues to be internal rather than cross-border. The World Bank estimates that more than 100 million Africans could be forced to move within their countries by 2050 if urgent action is not taken. These displacements are often involuntary responses to the loss of basic security and **disproportionately affect the most vulnerable, namely women, children** and rural workers. It is therefore understood that climate-induced migration is not taking place on an equal level playing field, where those most affected are often the least responsible for emissions and the least equipped to deal with them or to move safely.

There is, therefore, a need to reform current legal frameworks, which fail to protect climate-displaced populations, where the 1951 Refugee Convention does not recognize environmental causes as grounds for asylum and climate migration continues to be addressed only indirectly in international agreements. Institutional fragmentation between bodies such as the United Nations High Commissioner for Refugees (UNHCR), the International Organization for Migration (IOM) and the United Nations Framework Convention on Climate Change (UNFCCC), has thus led to duplication, gaps in coordination and competition for resources.

One of the main concerns raised continues to be the **securitization of climate migration**, as countries receiving climate migrants increasingly view displacement as a threat, focusing on border control, surveillance and outsourcing migration management. This approach, while politically convenient, undermines long-term resilience. For instance, in the Atlantic, in regions such as the Caribbean or in states such as Senegal, **there is pressure to act as "buffer zones"** for Europe or North America, diverting attention and funding away from adaptation and human protection.

The panel therefore advocated a human security perspective, seeing climate mobility as causal adaptation strategies rather than threats, with migration being integrated into national adaptation plans and supported through regional frameworks that offer protection and mobility pathways.

Ultimately, the panel also called for a shift from fear to solidarity and from containment to cooperation, where addressing climate-related migration as a matter of justice means protecting dignity, ensuring equity in mobility and holding the international community accountable for a crisis that many did not cause but are now forced to bear.

Panel 5: "Competition at the Poles: the Arctic and the Antarctic"

Following the debate on migration, this panel explored the growing geopolitical, environmental, and economic significance of the Arctic and Antarctic regions in the context of global climate change. Moderated by Dr. Vanessa Rei and with the presentations of Dr. Dwayne Menezes, Prof. Katja Lindsov Jacobsen and Ambassador Paola di Chiaro, the discussion underscored how both poles are increasingly at the heart of international attention, whether for their environmental fragility or strategic potential.

Although the discussion focused more extensively on the Arctic, it is equally important to consider the Antarctic's role in global climate dynamics and international cooperation. Starting with the Arctic, the region has emerged as a critical theater, warming nearly four times faster than the global average.

This rapid change has profound consequences, as **land and sea ice are melting at an alarming rate**, causing global sea levels to rise. Should Greenland's ice sheet melt completely, sea levels could increase by 7.4 meters globally, and **since 1978, Arctic Sea ice has diminished by approximately 78,000 km²** annually, and projections suggest **the first ice-**

free summer may arrive as early as the 2040s. Meanwhile, thawing permafrost is releasing large amounts of greenhouse gases, further intensifying global warming.

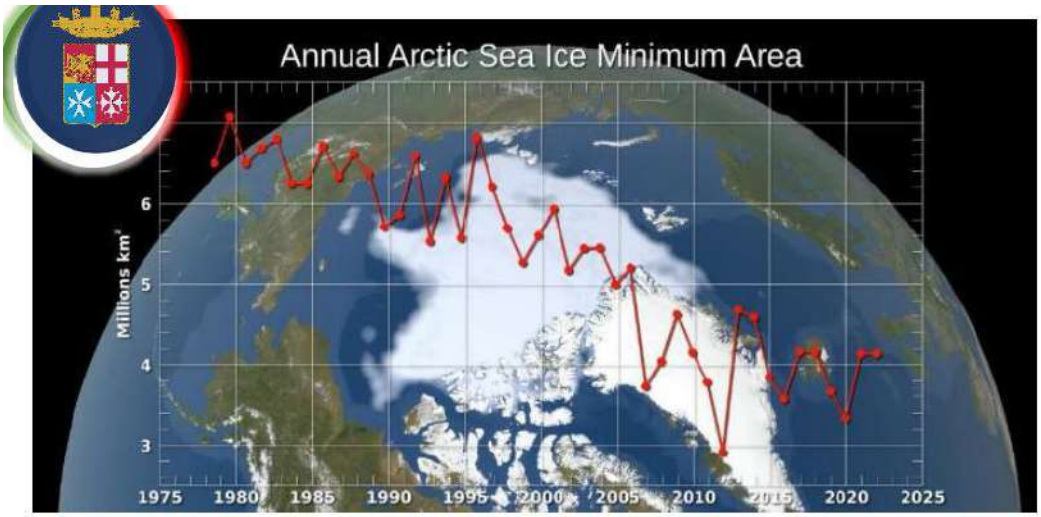

FIGURE 5- ANNUAL ARTIC SEA ICE MINIMUM AREA. SOURCE: NASA

This environmental transformation is not only limited to regional impacts, since **what happens in the Arctic increasingly affects the entire planet**, contributing to extreme weather events such as wildfires, floods, and heatwaves in North America, Europe, and Asia. The 2024 floods in Spain and 2025 floods in Mumbai were cited as examples potentially linked to Arctic changes.

Public health risks were also addressed, particularly those posed by thawing permafrost which may release ancient pathogens and contaminants like heavy metals and microplastics. Moreover, the erosion of Arctic coasts and the destabilization of permafrost threaten critical infrastructure and force community displacement. Ecologically, the Arctic is seeing shifts in marine biodiversity, with boreal fish species migrating north, native Arctic species in decline, and invasive species like the red king crab threatening local ecosystems and economies. Fisheries have already suffered, as seen in the collapse of the snow crab population in the Bering Sea.

Despite these threats, the panel also explored the region's strategic opportunities. The Arctic contains vast reserves of oil, gas, and rare earth minerals essential for global energy and technological development. It is also a region rich in marine resources, such as cod, salmon, and shrimp which is critical to European food security, particularly for countries like Portugal,

Spain, and Italy. **Melting sea ice is opening new maritime routes like the Northern Sea Route and the Northwest Passage**, which could **shorten global trade journeys by up to 40%.** However, these developments come with risks such as maritime accidents, pollution, and disruption of marine life due to increased traffic and human activity.

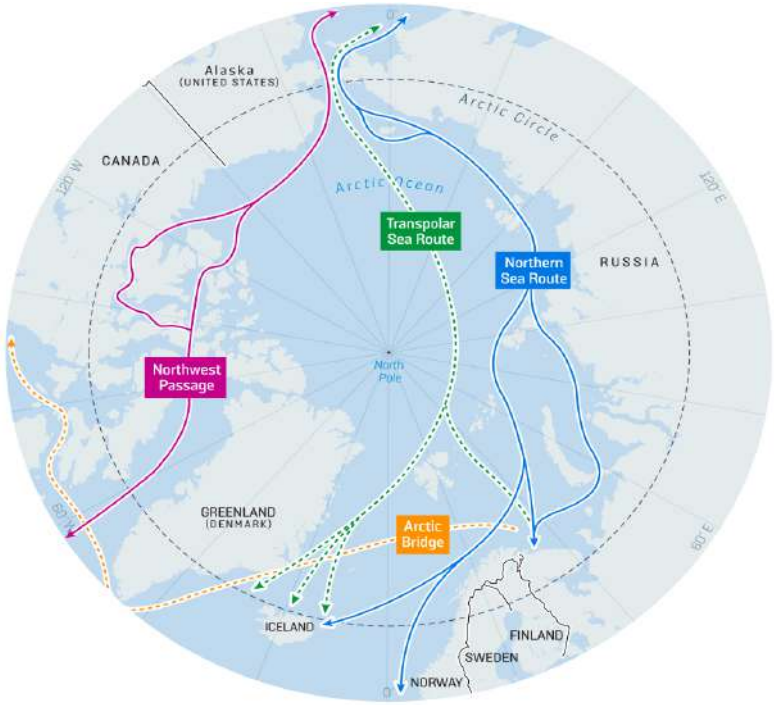

FIGURE 6 - POTENTIAL SHIPPING ROUTES. SOURCE: FOREIGN POLICY

Renewable energy also features prominently in the Arctic's future, with countries like Iceland and Norway already harnessing hydroelectric and geothermal power to meet nearly 100% of their electricity needs.

In stark contrast, now writing on the Antarctic, this region remains a demilitarized and cooperative zone governed by the Antarctic Treaty, dedicated exclusively to scientific research. Although it does not face the same level of exploitation or geopolitical contest as the Arctic, the **melting of Antarctic ice may** eventually open new sea routes and contribute significantly to **global sea-level rise**, while also supporting unique ecosystems and biodiversity that merit continued protection.

In conclusion, this panel emphasized that the Arctic and Antarctic are no longer a distant frontier, being now a central arena where climate change, strategic competition, and environmental urgency converge. Addressing the challenges and seizing the opportunities in

both poles requires renewed international cooperation, sustainable governance, and a recognition that these regions are not isolated as they are intimately connected to the global future. As highlighted throughout the panel, the Arctic and Antarctic serve not only as indicators of environmental change but as testing grounds for our collective capacity to respond to it.

Panel 6: "Climate Change and Critical Infrastructure in the Atlantic: Adaptation Measures in the Atlantic"

Following what was previously analysed, climate change has brought various challenges to critical infrastructures in the Atlantic, particularly due to rising sea levels, coastal erosion, and increasingly frequent extreme weather events.

These pressures threaten ports, roads, energy systems, and essential services across the region. Storms and heatwaves disrupt supply chains, damage infrastructure, and impact the provision of basic goods and the rising sea levels and coastal erosion are already undermining transport networks, protection systems, and coastal production facilities.

With the valuable insights of Ana Aguilar, Prof. Maria Ana Baptista, Tantoh Rowland and Prof. Bruce Howe, this panel therefore emphasized the urgent need for adaptation to strengthen the resilience of these systems and reduce their vulnerability to climate-related impacts, adopting measures such as reinforcing roads and ports, installing early warning systems, and integrating climate risk into infrastructure planning to protect communities and economies. Successfully addressing these challenges demands not only coordinated action but also sustained collaboration among governments, businesses, scientists, and civil society, each contributing unique expertise and resources.

Drawing on lessons from history, the panel reminded that environmental change has long shaped the fate of civilizations and past societies either adapted early or collapsed when change outpaced their capacity to respond.

Today, however, the consequences are just as severely more global. In recent years, Atlantic countries have experienced a growing number of climate-related disasters that have triggered power outages, transport disruptions, and billions in damage. Globally, **around 60% of GDP is tied to infrastructure exposed to climate risks,** underlining the need to distinguish between natural hazards and risks, the latter being shaped by exposure and vulnerability.

In this sense, in addition to physical upgrades like seawalls, elevated bridges, and storm-resistant power lines, the panel stressed the value of **nature-based solutions**, such as **restoring mangroves, wetlands and urban green infrastructure** to mitigate heat and flood risks, while contributing to livable, climate-resilient cities.

However, innovation and cross-sector collaboration are also central to long-term resilience. One standout example presented was SMART Cables, undersea telecommunications cables equipped with sensors to monitor ocean temperature, pressure, and seismic activity, with multipurpose systems that serve science, early warning, and infrastructure protection, and contribute to our understanding of ocean conditions critical to climate forecasting (see Figure 7).

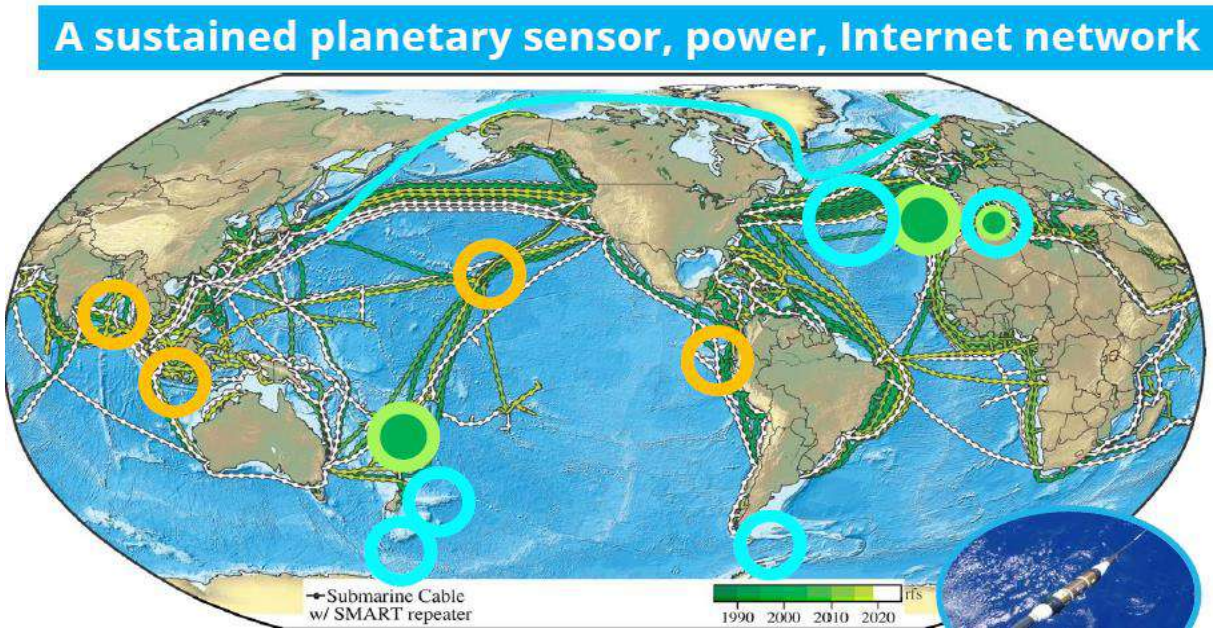

FIGURE 7 - THE DISTRIBUTION OF CURRENT AND PLANNED CABLES. THE SMART CAM ATLANTIC CABLE FROM PORTUGAL AND THE SMART VANUATU-NEW CALEDONIA CABLE (GREEN CIRCLES) WILL BE READY FOR SERVICE IN 2026. OTHER SYMBOLS SHOW CABLE SYSTEMS THAT ARE BEING CONSIDERED. SOURCE: SMART CABLES

On a different line of thought but with prevalence in the core argument of the panel, the Tsunami Ready Recognition Program was also highlighted as a model for coastal preparedness. This model presented by Prof. Maria Ana Baptista, promotes early warnings, evacuation plans, and local engagement to minimize loss of life and livelihoods, since sea levels rise and coastal barriers erode, communities become more vulnerable to tsunamis.

In short, **climate-proofing Atlantic infrastructure** is not only possible, but also **urgently necessary**. The panel called for a **Pan-Atlantic Resilience Strategy** grounded in data

sharing, sustainable finance, expert training, and community inclusion. As history shows, societies that adapt with foresight and cooperation are more likely to thrive. Climate resilience is no longer a distant goal, it is a present imperative, and a shared responsibility.

Panel 7: "Role of Higher Education and International Organisations"

Deepening the discussion, opening the 3rd day of the course, was the panel dedicated to Higher Education and International Organisations. With active moderation from Prof. Pedro Seabra, Jon-Hans Coetzer and Prof. Bernardo Ivo Cruz, the panel addressed the strategic importance of higher education institutions and international organisations in strengthening maritime security in the context of climate change, with a particular focus on the Atlantic. It highlighted the need to **anticipate risks and prepare future professionals** for complex and dynamic challenges, **adopting an integrated and multidisciplinary approach**.

Higher education (HE) and international organisations play a crucial role in combating climate change, as through education and research, they help train professionals and citizens who are aware and capable of addressing climate-related challenges. HE also facilitates international cooperation, policy development, and the mobilisation of resources for climate action while building capacity to develop and implement technical and scientific solutions for climate change mitigation and adaptation, as well as raising awareness on climate issues. Lastly, HE enables the creation of innovative systems and mechanisms to combat and adapt to climate change by promoting the sharing of scientific knowledge and by providing scientific and technical advice to governments for climate policy development.

Prof. Ivo Cruz pointed to several essential foresight methodologies that were presented for future analysis and planning, such as the STEEPV analysis, which examines Social, Technological, Economic, Environmental, Political, and Values-based trends; and scenario planning, which helps test strategies under different future conditions, increasing institutional resilience. He also pointed to the Three Horizons model complements these tools by mapping current conditions, transitional innovations, and long-term transformations, while the Delphi Method facilitates consensus-building among experts, avoiding bias and groupthink. To integrate these approaches into education, the incorporation of foresight tools into the curriculum of defence academies, civil service schools, and other training institutions was proposed, as well as the creation of **permanent laboratories in collaboration with**

universities. Practical proposals included the creation of ***Atlantic Foresight Hubs*** as university-based centres dedicated to strategic simulation and interdisciplinary research, and permanent transatlantic academic cooperation networks for knowledge exchange and scenario development.

Moreover, the nexus between climate change and maritime security was also explored-recognising that environmental impacts such as sea-level rise and extreme weather events directly affect the governance and stability of maritime spaces. In this context, maritime security was viewed as an adaptive system that requires an integrated approach involving geopolitical, economic, operational, environmental, and sociocultural perspectives. The importance of building inclusive partnerships and collaborative networks that promote education, applied research, and capacity development was underlined, along with the need to train professionals with cross-cutting skills, including systems thinking, anticipation, critical thinking, collaboration, self-awareness, and integrated problem-solving.

It was emphasised that the new paradigm for education and training in maritime security must be transformative, promoting deep and reflective learning experiences, oriented towards innovation and real-world impact in addressing climate and security challenges in the Atlantic and beyond.

This panel reinforced the urgency of coordinated action among academic institutions, governments, and international organisations to ensure that higher education plays a central role in building a sustainable and secure future for maritime spaces in the face of climate change and global challenges.

Panel 8: "Climate Change and Civil Society: The value of local and regional initiatives"

Moving from a global theoretical point to a more practical and local framework, the fight against climate change must be based on an integrated approach that also includes civil society alongside policymakers and large corporations.

Thus, civil society emerges as an essential agent, not only because it **fills gaps left by organizations**, but because it challenges maladjusted structures and **proposes alternatives**

rooted in local reality. The direct involvement of communities in building solutions presents itself as an act of resistance and a fight against marginalization, affirming a hope for a sustainable future and a continuous practice of cooperation. Civil society organizations not only implement projects, they also **reconfigure power relations** and give a voice to those who feel the effects of the climate crisis the most.

A testimony to that, is AMANZI's experience in South Africa. This initiative exposes the connections between climate injustice, educational exclusion and structural poverty, where the lack of water in schools in the Eastern Cape is not only a consequence of the drought, but also of the exposure of vulnerable communities. By guaranteeing sustainable access to water in schools, seen as a center of community, AMANZI solves a technical and climatic problem that affects peripheral populations. The organization also shows that climate solutions need to be ecological, yes, but above all inclusive and holistic. By involving schools in the choice of solutions, AMANZI strengthens local autonomy and promotes dignity and hope in the context of crisis.

➔ Check out AMANZI - Water to Schools - Amanzi.life

TINIGUENA, in Guinea-Bissau, goes beyond environmental conservation, linking biodiversity with food sovereignty and long-term sustainability systems. Their work revolves around the restoration of mangroves and promoting climate-adapted family farming. The organization tackles not only the effects of climate change, but also its systemic causes, such as the exploitation of resources and the exclusion of local populations from decision-making processes. It's work shows that without climate justice, without valuing traditional knowledge and without a critical analysis of development models, the ecological transition can deepen fragilities and jeopardize the environmental and social security of the most vulnerable populations.

➔ Check out Tiniguena - Esta Terra é Nossa - Tiniguena - Esta terra é nossa

Another representative from civil society was Nana Kweigyah from Ghana. Nana brought the voices of the fishing community of Ghana, which in his view suffers from debatable regulation, marked by contradictions, where practices imposed in the name of conservation end up weakening coastal ecosystems by also disregarding the strategic role of local communities in marine management. The FAO Guidelines for Small-Scale Fisheries reinforce that there can be no real sustainability without guaranteeing access and the direct involvement of fishermen in the protection of marine resources and that protecting the ocean means, above all, protecting interdependent natural systems that are essential to climate resilience**. Ignoring the practical knowledge of coastal communities and failing to integrate them into ecological adaptation** strategies **compromises the effectiveness of the response to climate change** and weakens long-term environmental security.

This panel, moderated by Lt. Francisco de Arantes e Oliveira, underscored another method of tackling climate change. It underlined, through the examples of AMANZI, Tiniguena and Ghana's fishing community that civil society must be heard and considered when discussing climate change since the solutions that are raised are rooted in local realities and show that by including civil society mitigation and adaptation are indeed possible.

At the end of the panel, the moderator asked the speakers to define the role of civil society and its relationship to climate change. *Luta (Fight*), *Hope* and *Collective* were the three words chosen.

Panel 9: "Climate Change and Atlantic Island States: A regional overview"

Maintaining the spotlight on the regions that arguably feel climate change the most, this panel provided an analysis of the unique challenges faced by Atlantic Island nations in the context of worsening climate change impacts and their particular vulnerability to rising sea levels, extreme weather events, and ocean acidification, which threaten their environment, food security, livelihoods, and ecosystems.

The panel brought together speakers directly connected to these realities: Tonya Ayow from Caricom Impacs, Daniela Costa from CCRUP and Ambassador Esterline Género from São Tomé

e Príncipe. The distinct feature of these states is their geographical determinism, patent on the inherent periphery and exposure they have when met with extreme weather events. The panel emphasized the importance of regional collaboration to share knowledge, coordinate climate action efforts, and seek international support for adaptation and mitigation, where coastal protection measures, including seawalls, dune construction, and coastal revegetation, were highlighted as essential strategies to combat shoreline erosion.

In the case of São Tomé e Príncipe, the frontline experience of a small island developing state confronting the climate crisis was highlighted with the rising sea levels, coastal erosion, biodiversity loss, and increased frequency of extreme weather events that are causing significant social and environmental disruptions. With the majority of the population dependent on subsistence agriculture and fisheries, the region faces vulnerabilities exacerbated by limited technical and financial capacities to fight climate change effects. Despite these constraints, **the country has integrated climate action into its National Development Plan** and is implementing in through the FAO-supported TRI Project, the WACA program and national plans, exemplifying solidarity with global climate goals. The panel called for strengthened international cooperation, equitable access to climate finance, technology transfer, and enhanced climate diplomacy to address the disproportionate impacts faced by island states.

From a regional security perspective on **climate change in the Caribbean**, it was examined how intensifying hurricanes, droughts, and environmental stressors **exacerbate existing vulnerabilities**, fueling irregular migration, transnational organized crime, illegal fishing, and human trafficking. Drawing on case studies such as Hurricane Maria's devastation of Dominica and Haiti's prolonged cycle of environmental degradation and social unrest, the complex interaction between climate shocks and security threats was illustrated. CARICOM IMPACS is addressing these challenges by integrating climate considerations into regional security strategies, establishing intelligence units focused on environmental crimes, and advocating disaster management frameworks that incorporate security planning, defending the need to improve data collection, technology deployment, and regional collaboration to build resilience and sustainability.

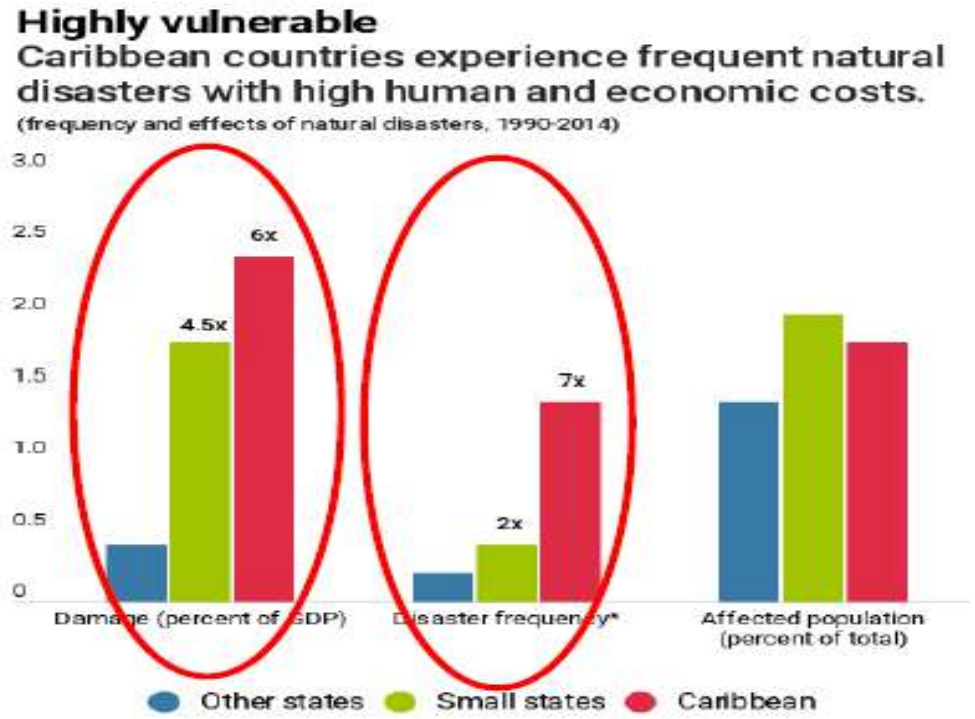

FIGURE 8 – VULNERABILITY TO EXTREME WEATHER EVENTS. SOURCE: IMF STAFF CALCULATIONS.

Additionally, the panel presented an overview of the outermost Atlantic regions of the European Union, where rising ocean temperatures and shifting marine ecosystems threaten the fisheries sector and coastal communities. The importance of tailored, region-specific approaches balancing ecological conservation with economic development was underscored, alongside the call for enhanced inter-regional cooperation among Atlantic Island states to share best practices, promote sustainable blue economies, and effectively represent their interests in international policy.

Overall, the panel emphasized that Atlantic Island states, despite their vulnerabilities, are strategic actors requiring tailored support and their unique challenges **demand equitable access to climate finance, technology transfer, capacity building, and strengthened climate diplomacy**. Only through coordinated regional and international collaboration, grounded in local expertise and political commitment, can these states effectively address the interconnected challenges of climate change, economic development, and security, ensuring a resilient and just future for their communities.

Panel 10: "Impacts of Climate Change and the Role of Industry and Private Sector"

Closing the 3rd day of the course, Navy Captain Pedro Amaral Frazão, Eng. António Nunes and Dr. Manuel Aguiar reflected on the way climate change is reshaping the private sector and industries across the Atlantic. As extreme weather events, rising sea levels, and warming oceans intensify, companies are increasingly affected, but also positioned to lead the transition toward resilience and sustainability. The scale and influence of the private sector is undeniable, and it can be central in this transformation.

The primary sector, including fisheries, agriculture, and forestry, is already under pressure due to shifting fish stocks, warming waters, and ocean acidification. Illegal, unreported, and unregulated (IUU) fishing is rising. Yet innovation is emerging: West Africa is advancing resilient aquaculture, Portugal and Spain, for example, are applying agri-tech to optimize water use, and satellite ocean monitoring is improving marine resource management.

In the secondary sector, industrial zones and ports face mounting threats from storms and sea-level rise. At the same time, global decarbonization efforts, driven by EU and IMO policies are pushing industries towards greener models. Initiatives like the **green shipping corridor between Rotterdam and Brazil**, and offshore wind and hydrogen projects, show the **potential for climate-aligned growth**, provided they are supported by resilient infrastructure and strong public-private cooperation.

The tertiary sector: tourism, logistics, finance, and insurance, are increasingly exposed to infrastructure disruptions and climate-related risks. Businesses are responding with stress-testing tools, green investment funds, and improved cyber and digital resilience, aiming not only to adapt but to lead the shift toward more sustainable economies.

The discussion further emphasized that **companies must embrace sustainable practices, invest in clean energy, and prepare for growing climate risks**. The private sector also plays a key role in **financing the ecological transitions** supporting green infrastructure and innovation. The Atlantic region is emerging as a platform for cooperation and transformation, examples include marine robotics in Senegal and Portugal, public-private partnerships in the Azores. For instance, local initiatives like Dombe Grande and long-term efforts by Fondation Ondjyla, promoting entrepreneurship and education in rural communities since 2014, highlight how resilience can also grow through a "bottom up" approach.

Although climate change carries serious threats, it also creates opportunities. This panel showed that by working together, across sectors and borders, the private sector can help shape a safer, more resilient, and more sustainable Atlantic future.

Panel 11: "Extreme Weather Events and Crisis Response Operations"

The eleventh panel of the course brought together military and civillian representatives from across the Atlantic aimed at showcasing the different strategies and response mechanisms when dealing with climate change and related extreme weather events. Moderated by Jennifer Bélanger, and with presentations from Argentina, France, Ghana and Portugal, the panel also explored the strategic role of the armed forces and other key stakeholders.

As extreme weather events increase in frequency and intensity, the need for effective, coordinated, and resilient response mechanisms becomes more urgent. The panel highlighted how climate-induced disasters, such as floods, storms and wildfires, are no longer isolated events but part of a broader security challenge affecting populations, infrastructure, and ecosystems.

Hence, crisis response operations are critical tools in addressing these challenges. It encompasses immediate humanitarian relief such as the provision of clean water, food, medical care, shelter and sanitation, as well as longer-term risk management, infrastructure reinforcement, and early warning systems. These actions are essential for saving lives and reducing the vulnerability of affected communities.

A central theme of the discussion was the **key role of the armed forces** in these operations. Due to their mobility, logistical capacity, and organizational readiness, **military units are often the first to respond, especially in hard-to-reach or severely affected areas.** Their responsibilities extend beyond emergency relief to include environmental monitoring, data sharing, and support for national and international adaptation efforts. These capabilities make them vital actors in both the response to and mitigation of climate-related risks.

The panel also emphasized the **importance of interagency coordination and multi-stakeholder collaboration**. Effective crisis response relies on joint efforts between governmental bodies, military forces, civil society, and the private sector. Integrating technology, such as drones, satellite monitoring and real-time communication systems, can significantly improve operational awareness and effectiveness (as we have learned with the

example from Tekever on panel 2). Additionally, ensuring proper equipment, trained personnel, and flexible response structures is essential to maximize impact and ensure safety.

On the strategic level, climate change is reshaping the security landscape. Rising sea levels, extreme temperatures, and environmental degradation threaten military infrastructure and operational readiness. Institutions like the **NATO Climate Change and Security Centre of Excellence** play a **key role** in supporting adaptation, raising awareness, and promoting sustainable practices within defense frameworks ensuring that climate considerations are integrated into security planning and operations.

Climate change is not only an environmental issue but a multidimensional security challenge that requires proactive, coordinated, and inclusive responses. Crisis response operations must be part of a broader resilience strategy that combines military preparedness, civil cooperation, infrastructure adaptation, and policy innovation. The discussion reaffirmed the need for **long-term investment in climate adaptation and the crucial role that maritime forces and institutions** can play in safeguarding both people and the environment in an era of increased uncertainty.

Panel 12: "Extreme Weather Events: Examples from the Atlantic"

This panel explored the escalating impact of climate change on global security, with a particular focus on case studies from Atlantic states. Moderated by the William Lyons from Norwich University, speakers from Brasil, Italy and Cabo Verde underscored each regional understanding of the topic of climate change.

In 2023, the North Atlantic recorded unprecedented surface temperatures, highlighting the urgency of the climate crisis. Coastal populations across continents now face more frequent storms, floods, and droughts, as well as the slow-onset effects of environmental degradation. These impacts are not confined to any single region or political system; they are global in nature and demand collective responses.

Across the Atlantic, countries are already grappling with these realities. Brasil, with its vast territory and ecological diversity, exemplifies both the vulnerabilities and the potential of climate action. Deforestation, irregular urbanization, and social inequality intensify the effects of heatwaves, droughts, and heavy rainfall. Yet Brazil also holds significant capacity for renewable energy development and ecosystem-based solutions, particularly through preservation of the Amazon Rainforest. However, as with many nations, **progress is often**

slowed by fragmented governance, competing national interests, and the prioritization of short-term needs over long-term resilience.

Similarly, courtesy of Col. Amadou Sow which gave us a short brief for this report, the Republic of Guinea illustrates the human dimension of climate insecurity. With a 300 km Atlantic coastline, Guinea faces growing environmental pressures that directly impact living conditions and contribute to internal migration. Climate change acts as both a trigger and accelerator of displacement. Responding to this, the International Organization for Migration (IOM) has partnered with national and local authorities to strengthen community resilience, support sustainable livelihoods, and integrate environmental and gender considerations into public policy. This approach reinforces the panel's overarching message: no country is immune, and climate threats demand solidarity beyond borders.

Adding another layer to this picture, the Italian Navy offers a compelling example of how military and scientific institutions can work together to monitor, adapt to, and mitigate climate impacts. **Italy's long-standing presence in Antarctica** and its **active operations in the Arctic** provide critical data on oceanographic and ice evolution trends. Domestically, Italy applies an integrated emergency response system combining planning, early warning, public education, and advanced technologies such as drones and artificial intelligence. These initiatives demonstrate the value of coordinated national action rooted in international cooperation and technical expertise.

FIGURE 9- EXTREME WEATHER EVENTS IN THE MEDITERRANEAN BASIN. SOURCE: MEDEC

Throughout the panel, it became clear that climate change is a systemic challenge with wide-reaching security implications. The discussions emphasized the need to strengthen early warning systems, invest in resilient infrastructure, and ensure that armed forces and civilian institutions collaborate effectively in crisis prevention and response. Crucially, the panel highlighted the importance of strategic communication and public engagement informing and mobilizing all sectors of society to act.

In conclusion, climate change is not a distant threat, it is a present, evolving reality. Addressing it requires integrated solutions that bridge science, policy, education, and operational capacity. Maritime actors, from navies to coastal communities, have a vital role to play in building resilience and securing a more sustainable future for all.

Panel 13: "Atlantic Centre Research Project: Climate Change and Security Challenges in the Atlantic"

Closing the V Maritime Security Course, this panel featured research by four researchers who are collaborating on the Atlantic Centre Research Project. Elizabeth Nwarueze who is researching the intersection between International Law and climate change, identified a structural gap in international governance. The absence of specific binding legal obligations, combined with the lack of consensus on fundamental concepts such as shifting environmental baselines and the legal status of persons displaced by climate events, reveals a normative vacuum that limits the effectiveness of multilateral responses.

On the other hand, existing **legal instruments** such as **the United Nations Convention on the Law of the Sea (UNCLOS), United Nations Framework Convention on Climate Change (UNFCCC),** and the **recent Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction (BBNJ Agreement)** offer opportunities and **platforms for cooperation**, despite not establishing clear mechanisms to directly address the dimension of climate security at sea, revealing a disconnect between the recognition of the problem and regulatory capacity. This is reflected in regional strategies, which, while recognizing the interdependence between security, the blue economy, and climate change, still lack robust accountability mechanisms and effective resources for policy implementation.

On another spectrum, the national policies analyzed, exemplified by the United States, Nigeria, and Brazil, reflect the complexity of operationalizing adaptation and mitigation, showing diversity in priorities and capacities. This heterogeneity exposes difficulties in promoting a unified and integrated agenda in the region, especially in the face of technical and institutional challenges for information sharing and technological cooperation, further aggravated by the often-voluntary nature of international commitments, which compromises consistent implementation and progress assessment.

The issue of climate-displaced people also stands out as a paradigmatic challenge, since despite growing recognition of transboundary impacts and related human rights, the lack of adequate legal protection for these populations limits humanitarian and political responses. This signals a tension between state sovereignty and the need for regional and international solidarity, which remains without practical solution in the current legal framework.

Thus, the panel revealed that addressing the challenges of c**limate change in the Atlantic requires not only strengthening existing legal framework**s but, above all, **developing integrated governance that fills current gaps.** Such governance should articulate national and regional efforts, promoting binding obligations, context-specific technical capacity building, and an **inclusive approach that considers diverse actors and the socio-environmental specificities of the region**. Without these advances, the Atlantic will remain vulnerable to environmental and security crises whose consequences cross borders, impacting populations and economies systemically.

Conclusion and Recommendations

The reflections gathered in this report confirm that climate change in the Atlantic is a present, growing, and cross-cutting reality, whose effects transcend geographical, political, and sectoral boundaries. The systemic nature of this crisis demands integrated and cooperative approaches that connect science, governance, technology, and social justice, recognizing the complexity of the challenges faced by coastal, island, and maritime communities in the Atlantic region. It is demonstrated that mitigation, adaptation, and prevention should not be seen as separate paths, but as complementary dimensions of a coordinated and urgent response. The panels highlighted the need to drastically reduce greenhouse gas emissions, invest in sustainable technologies, and strengthen support mechanisms for the most vulnerable populations and territories.

The intensification of extreme weather events, coastal erosion, food insecurity, and forced displacement presents significant challenges to the resilience of critical infrastructure, human security, and regional stability. These developments demand an urgent revision of international law to address emerging realities, particularly in relation to maritime boundary redefinition, state responsibilities, and the protection of environmentally displaced populations. At the same time, civil society, local communities, and Atlantic Island states are increasingly recognized as strategic actors in shaping locally grounded responses centered on climate justice. The active involvement of all sectors, including the private sector and higher education institutions is essential to ensure a just, inclusive, and knowledge-driven ecological transition.

In response to these complex and interconnected threats, the course underscored the importance of coordinated action that bridges scientific research, public policy, civil preparedness, and military readiness. Key proposals included the strengthening of early warning systems, the integration of climate-related risks into national security strategies, the promotion of sustainable development and renewable energy to build resilience, and the deepening of international cooperation.

Equally vital is the role of strategic communication and education in fostering public awareness and mobilizing political will, ensuring that societies and decision-makers alike comprehend the urgency of the climate-security nexus. In this context, the Atlantic Centre reaffirmed its commitment to serve as a platform for dialogue, knowledge exchange, and strategic foresight recognizing that maritime security today cannot be separated from the environmental pressures shaping our common future.

Bringing all these considerations together**,** the Atlantic as a shared space, entails a common responsibility, where responding to climate change requires a new climate governance architecture, anchored in regional cooperation, strengthened technical and institutional capacities, and political commitment to sustainable development and human security. Only through collective, structured, and solidaristic action will it be possible to transform vulnerability into resilience, challenges into opportunities and ensure a safer and more equitable future for all Atlantic states and their societies.

Thus, based on the reflections, discussions and expertise of the speakers, participants that attended the V Maritime Security Course, the Atlantic Centre recommends the following:

I. Adopt integrated climate strategies that treat mitigation, adaptation and prevention as complementary rather than separate efforts.

II. Develop cross-sectoral action plans that align science, integrated governance and technology to address systemic climate challenges.

III. Invest in sustainable technologies and renewable energies, with a particular focus on coastal, island and maritime communities vulnerable to climate impacts.

IV. Strengthening financial, technical and institutional support for the most vulnerable populations and territories, addressing food insecurity, displacement and infrastructure resilience.

V. Anchor climate policies in climate justice, ensuring that marginalized and frontline communities lead and benefit from climate responses.

VI. Revise international legal frameworks to reflect the new climate realities, including the redefinition of maritime boundaries through international law and considering the changes and legal protection and creation of a status for climate refugees.

VII. Empower civil society, local communities and Atlantic Island States as strategic actors in justice-centered and locally grounded climate solutions.

VIII. Involve the private sector and higher education and research institutions as partners in climate innovation, policy development and knowledge dissemination.

ANNEX I - Biographies of The Panelists

Roundtable: "Climate Change in the Atlantic: A threat without borders"

Navy Captain (Ret) João Fonseca Ribeiro served more than 25 years in the Portuguese Navy and Defence, in NATO and bilaterally in the US DoD, largely dedicated to naval operations, joint and combined forces and staffs, communications and information systems and international and interdepartmental cooperation and, more recently, focused on the sustainable development of the ocean and coastal zones. He served as Director General of Maritime Policy, responsible for coordinating and implementing the National Ocean Strategy and, since May 2016, has been CEO of Blue Geo Lighthouse Ltd.

Suzi Barbosa is a Bissau-Guinean politician, currently Special Adviser to the President of the Republic on Foreign Affairs. She will be Minister of Foreign Affairs from 2019 to 2023, having been appointed Minister four times. Previously, she was Secretary of State for International Cooperation and Diplomatic and Political Advisor to Prime Minister Aristides Gomes. From 2014 to 2023 she was an elected member of parliament 3 times and also President of the Network of Women Parliamentarians of Guinea-Bissau.

Prof. Andreas Kraemer, is Founder & Director Emeritus of Ecologic Institute, and Chairman of Ecologic Institute US, Special Advisor in the Board of Directors of the Oceano Azul Foundation, Chairman of the Supervisory Board of Agora Think Tanks, and Co-Chairman of the Investment Committee of the investment fund (or mutual trust) Ökovision of OekoWorld Lux S.A. He is a keen practitioner and scholar on the roles of policy institutes or "think tanks" in various political systems. For many years, taught European integration and environmental policy as Visiting Assistant Professor and Adjunct Professor in the Duke in Berlin Program of Duke University, and now also climate strategies for business and investors as Faculty of Competent Boards. He is also Senior Fellow of the Centre for International Governance Innovation (CIGI) and serves on a

number of advisory boards, including the Flemish Institute for Technical Research (VITO), and The Arctic Institute.

Vice Admiral Issah Yakubu has served in the Ghana Navy for 35 years. Trained in several naval institutions across the world and served in various positions at operational and strategic levels. Has handed over command of the Ghana Navy since 2021 and is Director of the Gulf of Guinea Maritime Institute. Notably, he was awarded the Rear Admiral Joseph C. Strasser International Leadership Prize during his attendance at the Naval War College in Rhode Island, US. He has also been honoured with medals for his participation in peace operations such as the ECOWAS Ceasefire Monitoring Group (ECOMOG) in Liberia and the United Nations Mission in Ethiopia and Eritrea (UNMEE).

Daniel Hamilton is a nonresident senior fellow at the Brookings Institution's Center on the United States and Europe, president of the Transatlantic Leadership Network, senior fellow at the Foreign Policy Institute of Johns Hopkins University's School of Advanced International Studies (SAIS) and founding director of the SAIS Center for Transatlantic Relations. For 15 years he served as executive director of the American Consortium on European Union Studies, has directed the Global Europe Program at the Woodrow Wilson International Center for Scholars and senior associate at the Carnegie Endowment for International Peace. Hamilton has held a variety of senior positions in the U.S. Department of State and has been presented with Germany's Cross of the Federal Order of Merit; France's Knighthood of the Ordre des Palmes Académiques; Sweden's Knighthood of the Royal Order of the Polar Star; Poland's Officer's Cross of the Order of Merit; and the State Department's Superior Honor Award.

Panel 1: "Mitigation, Prevention or Adaptation? What does Science tell us?"

Rear Admiral Ramalho Marreiros specializes in Hydrography, holds a master's degree in Geodesy and Geomatics from the University of New Brunswick, Canada, and a PhD in Geographical Engineering from the University of Porto. He was Commander of the Hydrographic Ship NRP 'D. Carlos I, and served at the Hydrographic Institute, the Naval Command, the Naval School and the Military University Institute. He is currently Director General of the Hydrographic Institute, since 25 October 2022.

Prof. Larissa Basso is a researcher at the Institute for Advanced Studies, University of São Paulo, holds a PhD in International Relations (University of Brasilia) a master's in environmental policy (MPhil in Environmental Policy, University of Cambridge) and International Law (University of São Paulo) and bachelor's in law (University of São Paulo). Larissa has teaching experience in International Law, International Relations and interdisciplinary programs and research experience in international trade, international politics and development, environmental and energy policy.

Prof. Tannecia Stephenson is an Environmental Physicist and Head of the Department of Physics, Faculty of Science and Technology at The UWI, Mona Campus and key researcher of the Climate Studies Group. She is recognized internationally as a climate studies expert and currently serves as a contributor and lead author for the United Nations' Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report. Professor Stephenson's contribution as a young scientist and now Co-Director in the Climate Studies Group at the Mona Campus brought a significant understanding of climate change and its impact in the Caribbean region.

Prof. Stefan Rahmstorf is Professor of Physics of the Oceans at the University of Potsdam and heads the Earth System Analysis Department at the Potsdam Institute for Climate Impact Research in Germany. Rahmstorf

served on the German government's Scientific Advisory Council on Global Change (WBGU) from 2004-2013. In 2024 he was awarded the European Geosciences Union's Alfred Wegener Medal for his scientific achievements, and he has received several awards for climate communication, including the Climate Communication Prize of the American Geophysical Union and the Stephen H. Schneider Award.

Panel 2: "Emerging Technologies & Extreme Weather Events"

Navy Captain Luís da Costa Cabral graduated from the Portuguese Naval Academy in 1993, specializing in Information Technologies. He also holds a degree in Public Law from the Lisbon Law University and completed the Joint Staff Course at the Portuguese Military University Institute. Over his career, he commanded the Patrol Boat NRP Andorinha and served as Executive Officer on the NRP Zaire, NRP Limpopo, and NRP Afonso Cerqueira. He also worked in the cabinet of the State Secretary for National Defence and Maritime Affairs during the XVIII Constitutional Government.

Internationally, he served at NATO's Joint Force Command Naples in the J5 Plans Division. Since 2016, he has been with the Ministry of National Defence's Defence Policy Directorate, contributing to initiatives such as the Support to West Africa Integrated Maritime Security (SWAIMS) project and defence cooperation. In 2019, he became Deputy Coordinator of the Atlantic Centre, where he continues to serve.

Dr. Mafalda Carapuço holds a BEng degree with a major in Environmental Engineering, an MSc in Marine and Coastal Systems and a PhD in Geology from the Faculty of Sciences of the University. After working in coastal geomorphology (research) and as an environmental manager (private sector), she was the coordinator of the Research Vessels and Ocean

Observatories Group of the Portuguese Institute for Sea and Atmosphere. She is an external collaborator of the Dom Luiz Institute and serves as Secretary of the Assembly of Member of the European Multidisciplinary Seafloor and Water Column Observatory. Currently works at the Atlantic International Research Centre as Deputy Executive Director for Operations and Development.

Dr. Josué Barão is a Business Developer at TEKEVER, where he plays a role in the strategic growth of the company's space and defence activities, particularly in the areas of satellite communications, Earth observation, and unmanned aerial systems. He works in driving international partnerships and aligning innovative technologies with operational and market needs. Josué is currently pursuing a PhD at Instituto Superior Técnico, researching business models for the space industry. He holds a master's in economics and management of science, Technology and Innovation from ISEG, and has been actively engaged in several European programmes and consortia in the space and security sectors

Dr. Luca Longo is a doctor in Artificial Intelligence from Trinity College in Dublin lecturer in Computer Science and leader of a team of post-graduated talented individuals working in Artificial Intelligence. For the last 20 years have been designing and developing software solutions at various levels adopting different programming languages, technologies and methodologies and is actively engaged in the dissemination of scientific material, as the TEDx talks.

Eng. Arturo Ojeda Demaria holds a MSc in Guided Weapons Systems and other supporting qualifications in Project Management, Operations, Logistics and Supply Chain Management, Arturo Ojeda Demaria is a Engineer with more than 20 years that worked globally with defence companies and Armed Forces including in Europe, North America and The Middle East. Has experience in the United Nations, in the defence industry

and in the Chilean Navy serving on board, on land and overseas and is an experienced manager in the field of complex systems.

Panel 3: "Climate Change and Challenges for International Law"

Luís Bernardo Brito e Abreu is an advisor to the President of the Government of the Azores, with the portfolios of the Sea and Fisheries and Government Representative and Coordinator of the Blue Azores Program. He has a degree in Naval Military Sciences from the Portuguese Naval School and a master's degree in architecture from the University of Lisbon. He served as an officer in the Navy for 21 years, holding various management and leadership positions in the areas of navigation, oceanography, fisheries inspection, search and rescue and naval communications. Since July 2022, he has been coordinating Blue Azores' activities between the Regional Government, partners and stakeholders, sitting on the programme's high-level management.

Dr. Patrícia Galvão Teles is a member of the United Nations International Law Commission, where she is one of the co-chairs of the Study Group on Sea Level Rise and International Law. She is Director of the Legal Affairs Department of the Ministry of Foreign Affairs and Associate Professor at the Autonomous University of Lisbon.

Prof. Aldino Campos is a Navy Officer (CDR, Ret.) and holds a degree in Naval Military Sciences, a master's degree in Geodesy and Geomatics Engineering (University of New Brunswick), a PhD in Territory Engineering (IST) and a PhD in International Relations (FCSH-NOVA). He teaches in the Naval Academy (GIS and Geospatial Data Management) and is also a researcher at the Research Center of the Institute of Political Sciences of the Portuguese Catholic University (Sea Affairs). In June 2017 he was elected to the Assembly of States Parties of the United Nations Convention on the Law of the Sea as a member of the Continental Shelf Limits Commission (United Nations) for the 2017-2022 term, being

reelected for the term 2023–2028 in the same Commission. In June 2023 he was elected Chair of the Commission.

RAdm. Omar Moreno Oliveros is currently the Chief of the Comprehensive Naval Education Department. Over his military career, he has served as Naval Attaché in Peru and held command positions on multiple submarines. He was also Commander of the Naval Fleet Readiness Command and Deputy Director of the Superior War School. He holds a Master's degree in National Security and Defense and Project Management from the University of Quebec at Chicoutimi and currently pursues a Doctorate in Management Sciences at the University of Rosario. He has received several prestigious awards, including the Naval Merit Order "Admiral Padilla" and the Military Merit Order "Antonio Nariño."

Panel 4: "Climate Change and Migration: An Atlantic Displacement"

David Willima is a Research Officer on maritime security in the Institute for Security Studies, in Pretoria, promoting maritime security and blue economy as policy priorities in Africa and links local, regional and global climate programs and capacities to deliver effective anticipatory and response action. Joined Caritas-Zambia as an election monitoring provincial coordinator for the Democracy and Governance Unit and worked for the Environmental Learning and Research Center at Rhodes University in South Africa as a research assistant on the One Ocean Hub Project.

Ambassador Tarik Iziraren is Deputy Director for Policy and Strategic Partnership at the UNOSSC. He has more than 20 years of experience with the Moroccan diplomatic service, including 8 years at the Permanent Mission of Morocco to the UN in New York. Served as Head of the Economic and Sustainable Development Section at the Permanent Mission

of Morocco in New York and served as Vice-President of the Executive Board of the UNDP/UNFPA and UNOPS (2012), and Vice-Chair of the Second Committee of the 69th Session of the UN General Assembly. He participated in the negotiations of the 2030 Agenda for Sustainable Development and the Addis Ababa Action Agenda on Financing for Development. He was also member of the African Group Team of negotiators for 2030 Agenda, member of the Moroccan delegation to the Security Council (2012, 2013) and led the substantive secretariat of the 2nd High-level UN Conference on South-South Cooperation (BAPA+40) as well as the development of the United Nations System-wide Strategy on South-South and Triangular Cooperation.

Prof. Susana de Sousa Ferreira is Professor of International Relations at the Faculty of Political Science and Sociology of the Complutense University of Madrid. She is a researcher at the Complutense Institute of International Studies, an associate researcher at the Portuguese Institute of International Relations and the National Defence Institute. She was awarded the FLAD Atlantic Security Award in its first edition in 2021.

Navy Captain Mamadou Ndiaye is since 2022 the HASSMAR's Secretary General, overseeing the Coordination of State action at sea and implementation of the National Marine Emergency Response Plan (PNIUM) and was Director of the Directorate of Fisheries Protection and Surveillance.

Panel 5: "Competition at the Poles: The Arctic and the Antarctic"

Dr. Vanessa Rei is an advisor on bilateral cooperation at the Directorate-General for National Defence Policy, was a member of the Commission for the Implementation of the Atlantic Centre and collaborates with the Portuguese Air Force Academy, teaching and supervising final-year dissertations and serving as a jury member. In January 2012, she took part in the inaugural Antarctic research campaign of the Portuguese Polar

Program (PROPOLAR), becoming the first Portuguese researcher in social sciences to carry out a research project in Antarctica as part of her PhD in History, Security and Defence Studies from ISCTE-IUL, with doctoral thesis titled "Antarctica in the South Atlantic Geopolitical Space." Her doctoral research led to several publications, a book release and participation in international seminars.

Dr. Katja Lindskov Jacobsen is a senior researcher and Interim Director at the Centre for Military Studies, at the University of Copenhagen's Department of Political Science. Part of her intervention research explores piracy and related crimes, with a specific focus on the Gulf of Guinea. She has published extensively, including policy reports and academic publications.

Ambassador Paola Di Chiaro is the Secretary for the Malvinas Islands, Antarctica, and South Atlantic. She is a political scientist and educator with an extensive career in public service. She graduated with a degree in Political Science from the University of Buenos Aires (UBA) and holds a diploma in International Relations from the Latin American Faculty of Social Sciences (Flacso). She is a founding member of Argentina Global, a foundation that works towards the country's integration into the regional and global agenda through sustainable development. She is also the coordinator of the Diploma in National Security at the University of Belgrano (UB).

Dr. Dwayne Ryan Menezes is the Founder and Managing Director of Polar Research and Policy Initiative (PRPI), Director of the All-Party Parliamentary Group for Greenland in the UK Parliament, the Vice-President of Arctic Today, the Founder and Director of Human Security Centre, and a member of the board of various other Arctic and media organizations, including JONAA (Journal of the North Atlantic & Arctic) and Think-Film Impact Production (TFIP). He completed his education at the LSE and the University of Cambridge, graduating from the latter with a PhD in History, and has held postdoctoral, associate or visiting fellowships since at the universities of Oxford, Cambridge and London.

Panel 6: "Climate change and Critical Infrastructure in the Atlantic: Adaptation measures from the Atlantic"

Navy Captain (Ret) João Fonseca Ribeiro served more than 25 years in the Portuguese Navy and Defence, in NATO and bilaterally in the US DoD, largely dedicated to naval operations, joint and combined forces and staffs, communications and information systems and international and interdepartmental cooperation and, more recently, focused on the sustainable development of the ocean and coastal zones. He served as Director General of Maritime Policy, responsible for coordinating and implementing the National Ocean Strategy and, since May 2016, has been CEO of Blue Geo Lighthouse Ltd.

Ana Aguilar is an engineer, climate policy wonk, and researcher focused on climate change adaptation working to improve the accuracy of climate projections to strengthen climate decision-making in the global south and young empowerment. She is co-Founder & Managing Partner at Climate Resilient and formerly served as the Sectoral Measures Coordinator at the Ministry of Environment of Panama where designed and managed several projects together with civil society to reduce GHG emissions and at age 22 participated as a climate negotiator to Paris Agreement negotiations.

Prof. Maria Ana Baptista is Professor at the Lisbon Higher Institute of Engineering and a researcher at the Dom Luiz Institute of the Faculty of Sciences of the University of Lisbon, specializing in tsunamis. She was president of the Intergovernmental Coordination Group for the Implementation of the Tsunami Early Warning System in the North-East Atlantic and Mediterranean of the UNESCO Intergovernmental Oceanographic Commission, and vice-president of the Joint Tsunami Commission of the International Union of Geodesy and Geophysics. He collaborated with the Portuguese Institute of the Sea and Atmosphere in the implementation of the Earthquake and Tsunami Warning System, which has been in operation since 2017. She is also consultant for the Earthquake Monitoring Centre at Sultan Qaboos University in Oman on the same subject and is currently working with the NEAMTWS group to establish

'Tsunami Ready Communities' in the North-East Atlantic and Mediterranean.

Prof. Bruce Howe is Chair of the international Joint Task Force (JTF) SMART Cable initiative, (Science Monitoring and Reliable Telecommunications). At Station ALOHA, he operates the world's deepest cabled observatory at 4728 m depth. His past work includes ocean acoustic tomography and projects like NEPTUNE and OOI, focusing on fixed and mobile ocean observing platforms. After obtaining engineering and oceanography degrees at Stanford University and the University of California, he worked at the Applied Physics Laboratory, University of Washington, and since 2008, at the University of Hawaii, Department of Ocean and Resources Engineering.

Tantoh K. Rowland is the Senior Project Manager at the Port Management Association of West and Central Africa (PMAWCA), coordinating port data harmonization, infrastructure projects, and stakeholder workshops across 16 member countries at PMAWCA's Secretariat in Lagos, enhancing port management and connectivity in West and Central Africa through policy support and regional cooperation.

Panel 7: "Role of Higher Education and International Organisations"

Prof. Pedro Seabra is a Professor at ISCTE and Deputy Director of the Centre for International Studies (CEI-Iscte). He is co-editor of the Portuguese Journal of Social Science (PJSS) and Director of the PhD in History, Security and Defence Studies. He worked as an Advisor in the Cabinet of the Minister of National Defence and was an Advisor at the National Defence Institute, Nuclear Security Fellow at the Getúlio Vargas Foundation School of International Relations (FGV), SUSI Fellow at the US State Department, and Leibniz-DAAD Research Fellow at the German Institute for Global and Area Studies (GIGA). In 2022 he was selected as a Paris Young Defence Leader by the Institut de Recherche Stratégique de l'Ecole Militaire (IRSEM) and as a Marshall Memorial Fellow by the German Marshall Fund of the US (GMF).

Dr. Jon-Hans Coetzer is a seasoned higher education leader with over 30 years of experience, specialising in curriculum design, quality assurance, and strategic partnerships across global institutions. He has served as the Chief Academic Officer and Dean of universities in Switzerland, Germany, and Spain. He currently leads Online Learning and Education at UNITAR's Division for Peace. With a strong focus on peace and security studies, his research explores innovative approaches to fostering positive change in international classrooms within the framework of the UN 2030 Agenda and the UN.2.0. - Quintet of Change.

Prof. Bernardo Ivo Cruz is a strategic consultant in the areas of Public Policy and International Relations, a corresponding academic of the International Academy of Portuguese Culture, a member of the Editorial Board of the Public Policy Portuguese Journal of the Public Policy Monitoring Unit of the University of Évora, and an associate researcher at the Research Centre of the Institute of Political Studies of the Portuguese Catholic University. He was Deputy Under-Secretary of State and Head of Cabinet of the Minister of State and Foreign Affairs in the 17th Constitutional Government and Counsellor at the Permanent Representation of Portugal to the European Union during the Portuguese Presidency of the 2021 Council.

Panel 8: "Climate Change and Civil Society: The value of local and regional initiatives"

Lieutenant Francisco de Arantes e Oliveira serves as Advisor for External Relations and Cooperation at the Atlantic Centre, within the Ministry of National Defence, after joining the Portuguese Navy as a Naval Senior Technician, specialising in International Relations. He has a bachelor's in political science and international Relations, a Postgraduate Degree in Intelligence and Security at the Higher Institute of Social and Political Sciences (ISCSP) and a master's in international law with specialisation in Conflict and Security at Utrecht University, the Netherlands. Additionally, he completed the Crisis Management Course at Military University Institute, the Cybersecurity and Crisis Management in Cyberspace Course

at the National Defence Institute and the African Studies Course at the Military University Institute. He is fluent in german, english and spanish.

Eng. Jailson Pereira is Coordinator of the Project Protection and Restoration of Mangroves and Productive Landscapes to Strengthen Food Security and Mitigate Climate Change funded by the Global Environment Facility (GEF) in Tiniguena. He is an Agronomist graduated from the University of International Integration of Afro-Brazilian Lusophony, UNILAB, Redenção, Brazil. He is involved in several projects implemented by the organization in the agricultural field, having contributed to technical assistance in the projects Compras local, Resiliência Cantanhez, funded by the WFP (World Food Programme).

Julia Heemstra founded AMANZI - Water to Schools in 2022, an humanitarian organization that exclusively utilizes climate-smart technology to establish sustainable water and sanitation systems at no-fee schools in the Eastern Cape of South Africa. Prior to establishing AMANZI, Julia orchestrated a series of large Rotary International projects impacting close to 10,000 children and adults in South Africa. In 2024, Julia completed a master's degree with distinction in humanitarian action with UNITAR and Oxford Brookes University in the United Kingdom.

Nana Kweigyah is an artisanal fisher, a canoe owner, and a fisher leader. He is currently the National President of the Canoe and Fishing Gear Owners Association of Ghana (CaFGOAG). He is also a Steering Committee Member of KASA Initiative Ghana, representing the Fisheries Coalition, and previously, he has been the Youth Leader representing Ghana at the African Confederation of Professional Organization of Artisanal Fisheries (CAOPA). He has been at the forefront of advocating for rights of small-scale fishers, and their effective participation in fisheries management and governance.

Panel 9: "Climate Change and Atlantic Island States: A regional overview"

Bernardo Calheiros is a Senior Policy Advisor at the Atlantic Centre. He previously served as Director of Bilateral Relations at the Portuguese Ministry of National Defence, and as Team Manager at Kyron Consultores SA. He is completing his PhD research in International Relations: Geopolitics and Geoeconomy, and he is a researcher at OBSERVARE – Universidade Autónoma de Lisboa (UAL). He has a bachelor's in international relations at the Higher Institute of Social and Political Sciences (ISCSP), a Master's in Strategy at ISCSP, a Postgraduate Degree in Advanced Geopolitical Studies (UAL/National Defence Institute - IDN) and the National Defence Course (IDN). He is member of the board of the Luso-African Culture Foundation (FLAC) and Museu Zero/Instituto Lusíada de Cultura.

Ambassador Esterline Gonçalves Género is Doctor in Social Sciences from the Technical University of Lisbon and Master in Diplomacy and International Relations from the Madrid Diplomatic School, he has served as Chargé d'Affaires in Belgium, Luxembourg, the Netherlands and Permanent Representative to the European Union (2013-2014); Permanent Representative of the Economic Commission for Africa to the African Union, and Chargé d'Affaires in Ethiopia (2020-2023) and Secretary General of the National Commission for UNESCO (2022). He currently serves as Ambassador to Portugal (since 2024) and was the first Ambassador of the Democratic Republic of São Tomé and Príncipe to the Holy See.

Tonya Ayow has over 20 years of experience in the CARICOM region, beginning her career at the CARICOM Secretariat. She held roles such as Project Officer for Crime and Security and Conference Services, and contributed to the Regional Security Plan for Cricket World Cup 2007. In 2008, she joined CARICOM IMPACS, serving as Head of Secretariat and later Assistant Director, Support Services, overseeing HR, finance, and administration. She became Acting Director of IMPACS in 2019 and was confirmed as Deputy Executive Director in 2022. She leads collaborations with regional and hemispheric entities like SICA and the OAS and provides policy and technical support to CARICOM security projects. Ms. Ayow

holds degrees in Latin American Studies, International Relations, and Terrorism Studies from institutions in the USA and Scotland.

Daniela Costa was selected to start the secretariat of the Outermost Regions Advisory Council (CCRUP) in Praia da Vitória (Azores), as General Secretary, and for the last years has represented CCRUP and defended the 9 European outermost regions, namely their basins and communities and exchanging opinions of the opportunities and problems of these territories.

Panel 10: "Climate Change impacts and the role of Industry and Private Sector"

Eng. António Nunes is President of 4Spiro and also leads ANTOSC and Anglobal Cabo Verde in telecom infrastructure, as well as Proef Energias Angola in the energy sector. He studied at the Technical University of Dresden in Germany and contributed to the construction of the Macau and Hong Kong international airports. As Infrastructure Director at UNITEL, he led the deployment of 2G, 3G, and 4G networks and as CEO of Angola Cables successfully positioned the company as a global leader by delivering major projects like the WACS, Monet, and SACS submarine cables and data centers in Luanda and Fortaleza. His leadership helped Angola Cables become the first operator to create a transatlantic cable ring, significantly reducing internet latency between Africa and the Americas.

Dr. Manuel Aguiar is the CEO of Fondation Ondjyla since 2014 (Switzerland), Director of Consilium, SGPS, S.A., since 2015 (Portugal); Member of the Remunerations Committee of Banco Millennium Atlântico, S.A., since 2016 (Angola), Member of the Advisory Board of Keyou GmBH, since 2019 (Germany), Director of AIMFR - Association Internationale des Mouvements Familiaux de Formation Rural, since 2021 (France), and Chairman of Instituto CRIIA – Asociacion para la Promocion del Conocimiento y el Desarrollo Sostenible, since 2023 (Spain). Previously he was CEO of Exictos, lectured in AESE School, in Lisbon and Oporto, and ASM School, in Luanda and gave training programs in business subjects to AEP (Business Association of Oporto) and to Sociedade Portuguesa de Investimentos.

Navy Captain (Ret) Pedro Amaral Frazão served in several posts in the Navy and NATO missions, onboard and ashore, and as Adviser to the Minister of National Defense. In 2013 joined Grupo Sousa, one of the largest Portuguese corporate groups in the maritime sector. Currently, Pedro Amaral Frazão is Adviser to Grupo Sousa Chairman, Secretary-General of the Portuguese Shipowners' Association, Vice-President of the Board of GRACE – Responsible Business Association, member of advisory boards related to energy, maritime economy and decarbonization, and a frequent speaker at conferences on shipping, sustainability and corporate social responsibility.

Panel 11: "Extreme Weather events and Crisis Response Operations"

Jennifer Bélanger is an External Relations and Partnership Officer at NATO's Climate Change and Security Center of Excellence and is one of the Canadian representatives at the CCASCOE. Priorly worked on Cabinet affairs, export and foreign investment reviews, and economic security at Canada's Department of National Defence. She was also a desk officer in the Directorate of Bilateral Relations with Western and Central Africa at Canada's Department of Foreign Affairs. Before entering public service, Jennifer worked with the United Nations Office on Drugs and Crime in Vienna, Austria, on advocacy and public information.

Eléonore Duffau is a researcher at The French Institute for International and Strategic Affairs in the Climate, Environment and Security programme, where she specialises in strategic and security issues related to climate change. She has a master's degree in European Affairs from the Institut d'Etudes Politiques de Paris (Sciences Po), where she studied the European Union's external action and, in particular, European policies in the Middle East.

Lt. General César da Silva Rodrigues is the Operational Commander for the Azores. He trained in the USA and Germany and worked at the NATO flying school as an instructor pilot and Senior National Representative and was deployed in Afghanistan. He was on mission at REPER as a Military Adviser as well as serving other adjunct functions. He has received several

commendations and decorations, including a Gold Medal for Exemplary Behaviour and a foreign decoration in the framework of NATO In Service of Peace and Freedom.

Navy Captain Gastón Nicolás Grasso is a senior officer of the Argentine Navy with over 30 years, distinguished by his leadership in operational, strategic, and academic roles. He currently commands the Amphibious Marine Infantry Brigade and has previously led key units such as the 1st Field Artillery Battalion. His operational experience includes deployments in UN peacekeeping missions in Cyprus and Haiti, as well as strategic roles like Deputy Chief of Presidential Security and Navy Liaison Officer at the Ministry of Defense. Captain Grasso completed advanced military education, including the Naval Command and Staff Course and the Senior Strategy Course at the Joint Armed Forces War College. He also holds a master's degree in international relations and has contributed significantly as a military instructor and postgraduate thesis advisor, demonstrating strong leadership in both operational and academic spheres.

Vice Admiral Issah Yakubu has served in the Ghana Navy for 35 years. Trained in several naval institutions across the world and served in various positions at operational and strategic levels. Has handed over command of the Ghana Navy since 2021 and is Director of the Gulf of Guinea Maritime Institute. Notably, he was awarded the Rear Admiral Joseph C. Strasser International Leadership Prize during his attendance at the Naval War College in Rhode Island, US. He has also been honoured with medals for his participation in peace operations such as the ECOWAS Ceasefire Monitoring Group (ECOMOG) in Liberia and the United Nations Mission in Ethiopia and Eritrea (UNMEE).

Panel 12: "Extreme Weather Events: Examples from the Atlantic"

Col. (Ret) William Lyons is a licensed attorney and professional engineer, focused on the nexus between climate resilience, sustainability, and human

security. and is the Associate Dean for Security, Diplomacy, and Defense Programs for the College of Graduate & Continuing Studies at Norwich University in Northfield, Director of the Center for Global Resilience & Security, the Site Director for the New England University Transportation Center and Professor of Practice in Engineering.

Rear Admiral Nélio de Almeida graduated from the Naval School in 1978 as a Brazilian Marine Corps officer. During his career he held many positions in the Brazilian Navy's Operational and Administrative Sectors , particularly working on Doctrine Development and Force Planning. Promoted to Admiral in 2009, he was Fleet Marine Force Chief of Staff, Commanding Officer of the Training Center and Chief of Marine Doctrine Development Center, a position he currently holds.

Commander Massimo Tozzi has held the position of Geometoc Officer (Geography, Meteorology, Oceanography) at the Italian Navy General Staff in Rome, since 2022. He spent years on board of the Frigate EURO, Maestrale Class, (Comms Officer and Navigator) and on board of Hydro-oceanographic Vessels. Commanded the ITS Aretusa hydrographic vessel and the Offshore Patrol Vessel ITS Cigala FULGOSI, Comandanti Class. Carried out 2 participations in scientific expeditions in Antarctica and a deployment in Iraq, Bassora in 2003. He attended a 2 year course "A" Class Hydrographer at the Italian Hydrographic Office/University of Genoa and the Senior Officer Staff College in Rome. He also spent 6 years as a teacher of navigation and oceanography at the Naval Academy of Livorno and 4 years in Germany as Liaison Officer and Teacher at the German Senior Staff Course School in Hamburg.

Dr. Maurino Évora is the National Defense Director of the Ministry of National Defense of Cape Verde. He holds a PhD in International Relations with a specialization in Security Studies and Strategy and a master's degree in political science and international Relations from the New University of Lisbon. He has lectured at the University of Cape Verde and the University of Santiago, as well as previously working at the Ministry of Education, the Ministry of Finance, the Ministry of Family, Inclusion and Social Development and the Head of Government.

Panel 13: "Atlantic Centre Research Project: Climate Change and Security in the Atlantic"

Prof. Sandra Balão is Associate Professor and Director Strategy & Strategic Studies Department at ISCSP, Universidade de Lisboa. She is also Co-Chair of the NATO Science & Technology Organization (STO) on Human Security and Military Operations, Associate Professor in the Portuguese Air Force Academy, National Representative of the International Arctic Science Committee.

Col. (Ret) William Lyons is a licensed attorney and professional engineer, focused on the nexus between climate resilience, sustainability, and human security. and is the Associate Dean for Security, Diplomacy, and Defense Programs for the College of Graduate & Continuing Studies at Norwich University in Northfield, Director of the Center for Global Resilience & Security, the Site Director for the New England University Transportation Center and Professor of Practice in Engineering.

Juliet Obeng is Research Manager in Gulf of Guinea Maritime Institute, Research Officer in Africa Blue Economy Institute and Graduate Research Assistant in USAID Women Shellfishes and food security project, University of Cape Coast. She holds a Master in Fisheries Science from University of Cape Coast and has previously worked as Research Assistant in School of Biological Sciences at University of Cape Coast.

David Willima is a Research Officer on maritime security in the Institute for Security Studies, in Pretoria, promoting maritime security and blue economy as policy priorities in Africa and links local, regional and global climate programs and capacities to deliver effective anticipatory and response action. Joined Caritas-Zambia as an election monitoring provincial coordinator for the Democracy and Governance Unit and worked for the Environmental Learning and Research Center at Rhodes University in South Africa as a research assistant on the One Ocean Hub Project.

Elizabeth Nwarueze is a lawyer, Rhodes Scholar and doctoral researcher in International Law at University of Oxford. Her research interests are on the legal frameworks of maritime security and the role of private actors in the law of the sea. She participated in the final negotiations for the BBNJ Agreement and currently advises African States at the International Maritime Organisation for the NetZero Framework negotiations and adoption.

Muito obrigado a todos,

Thank you all,