ATCM-CEP Joint Session on Climate Change: Portugal´s research and policy activities on climate change

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Information Paper submitted by Portugal

*Summary*

This paper outlines the research and policy activities undertaken by Portugal related to climate change. Portugal recognizes the importance of climate change and its implications worldwide, including in the Antarctic region. High emissions of greenhouse gases, linked with warming, has produced substantial impacts in Antarctic ecosystems. The provision of science-based information for Antarctic policymaking is essential. Portuguese research teams, in cooperation with various Antarctic Treaty Parties, Observers and Experts, have contributed scientific information to advance the work of the Antarctic Treaty. Portugal supports an urgent and effective response to address SCAR´s Antarctic Climate Change and the Environment: A Decadal Synopsis and Recommendations for Action (Resolution 4 (2022); Decision 4 (2022)). Portugal also advocates maximizing communication between those engaging in Antarctic science, policy and education/outreach, under an international cooperative context, particularly anticipation of the planned International Polar Year (2032-33).

*Relevance of climate change*

Portugal acknowledges the Committee for Environmental Protection (CEP) and Antarctic Treaty Consultative Meetings (ATCM) as excellent forums for international cooperation on science diplomacy, and education and outreach in relation to climate change. Some Antarctic regions are among those that have changed faster in recent decades than any other region on the planet. The consequences are reflected in changes in the physical and biological elements of the Antarctic marine and terrestrial ecosystems. Additionally, climate change puts pressure on Antarctic ecosystems alongside other factors (e.g., pollution, habitat loss, introduced species, etc.) that collectively can have substantial cumulative impacts. Projections show that greenhouse emissions are likely to continue, resulting in on-going and potentially increasing negative impacts in Antarctic ecosystems. In response to this situation, urgent action is needed.

*Contributions of Portugal*

Portugal signed the Antarctic Treaty in 2010, and since then has submitted > 30 papers to the ATCM/CEP, thereby demonstrating its commitment to conducting international and multi-disciplinary Antarctic research (Xavier et al. 2018; ATCM XXXVIII/IP3). Antarctic climate change research undertaken by Portuguese teams (often in collaboration with scientists from other Parties) has focused on a wide range of topics, including those that have:

* assessed the status of climate change effects on marine ecosystems based on the SCAR Horizon Scan (Xavier et al. 2016) (ATCMXL/IP24);
* identified climate change impacts in biological processes (Constable et al. 2014, Gutt et al. 2015, Gutt et al. 2021);
* identified approaches to improve climate models (Cavanagh et al. 2017),
* evaluated long-term impacts on pelagic marine organisms (Abreu et al. 2020) (ATCM XLIV/IP2);
* projected distribution changes on seabirds and fisheries due to climate change (Krüger et al. 2018) (ATCM XLII/IP70);
* Identified biodiversity hotspots relevant to conservation (Hindell et al. 2020, Ropert-Coudert et al. 2020); and
* informed important scientific methodologies for monitoring/conservation/management (ATCM XLII/IP10; ATCMXL/BP20).

Contributions have been made to identify mechanisms to improve the links between science and policy needs (Hughes et al. 2018) and discuss future scenarios of the effects of climate change in Antarctica in relation to governance (Rintoul et al. 2018). Efforts have also been made to improve the provision of information relevant to issues of interest to the Antarctic Treaty Consultative Meeting with other organizations, including the UN Ocean Conference 2022 (ATCM XLIV/IP3) and UN Southern Ocean Decade (ATCMXLIV/IP107). Much of this work has been undertaken under the auspices of SCAR Scientific Research Programmes (SRPs) and Expert/Action groups, and participation in the ATCM/CEP Intersessional Contact Groups (ICG) (i.e., the Subsidiary Group on Climate Change Response (SGCCR) and the ICG on ‘Development of a Specially Protected Species Action Plan for the Emperor Penguin’).

In terms of education and outreach, out of the 200 ATCM papers related to “educational issues” submitted to ATCM since 1961, “climate change” is mentioned in only 31%. We suggest that much work is still needed on education and outreach on this topic by Parties, Observers and Experts, including the need to note the level of urgency for actions and the need for greater access to scientific evidence. Portugal is an active Party within the ICG on Education and Outreach. Working with many Parties, it has recognized the imperative to provide for greater visibility of Parties’ public education and outreach activities, including those related to climate change, and has reinforcing the increased interest in education and outreach activities by ATCM participants (Xavier et al. 2019; ATCM XXXVII/WP9; ATCM XXXVIII/BP26, ATCM XXXIX WP24, ATCM XL WP24, ATCM XLII WP33) including with the support of Polar Educators International (PEI; ATCM ATCMXXXVII/IP2; ATCMXXXIX/IP7; ATCMXLII//IP95). Moreover, there is an increasing need to also improve the levels of capacity building of early career researchers (e.g., working with the Association of Polar Early Career Scientists (APECS)).

Under the context of the ATCM-CEP Joint Session on Climate Change, we highlight Portugal’s role in:

* making known the need for high-quality science and actions to minimise environmental impacts related to climate change, including through international cooperation.
* delivering access to the best available science, data sharing and provision of information to advance policies to tackle climate change. Portugal has submitted various ATCM papers, based upon peer-reviewed research delivered by Portuguese research teams, often in collaboration with researchers from around the world.
* contributing to long-term research programmes (e.g., under an international framework, including with SCAR programmes and with the support of COMNAP) to provide more reliable information on trends relating to climate change.
* promoting more actions on capacity building, equity, inclusion, diversity, education and outreach.

*Final considerations*Portugal has delivered research related to climate change in Antarctica, often in collaboration with researchers from other Parties, including Argentina, Brazil, Bulgaria, Chile, France, Germany, Italy, Korea, New Zealand, Poland, the Russian Federation, Spain, the United Kingdom and the United States of America, and aims to continue to do so in the future in preparation for the next International Polar Year (2032-33).

*References*

Abreu J, Phillips RA, Ceia FR, Ireland L, Paiva VH, Xavier JC (2020) Long-term changes in habitat and trophic level of Southern Ocean squid in relation to environmental conditions. Sci Rep 10:15215

Cavanagh RD, Murphy EJ, Bracegirdle TJ, Turner J, Knowland CA, Corney SP, Smith WO, Waluda CM, Johnston NM, Bellerby RGJ, Constable AJ, Costa DP, Hofmann EE, Jackson JA, Staniland IJ, Wolf-Gladrow D, Xavier JC (2017) A synergistic approach for evaluating climate model utput for ecological applications. Front Mar Sci 4:308

Constable AJ, Melbourne-Thomas J, Corney SP, Arrigo K, Barbraud C, Barnes D, Bindoff N, Boyd P, Brandt A, Costa DP, Davidson A, Ducklow H, Emmerson L, Fukuchi M, Gutt J, Hindell MA, Hofmann EE, Hosie G, Iida T, Jacob S, Johnston NM, Kawaguchi S, Koubbi P, Lea M-A, Makhado A, Massom R, Meiners K, Meredith M, Murphy E, Nicol S, Richerson K, Riddle MJ, Rintoul SR, Walker Smith Jr. W, Southwell C, Stark JS, Sumner M, Swadling K, Takahashi K, Trathan PN, Welsford D, Weimerskirch H, Westwood K, Wienecke B, Wolf-Gladrow D, Wright S, Xavier JC, Ziegler P (2014) Climate Change and Southern Ocean ecosystems I: How changes in physical habitats directly affect marine biota. Glob Change Biol 20:3004-3025

Gutt J, Bertler N, Bracegirdle TJ, Buschmann A, Hosie G, Isla E, Schloss I, Smith CR, Xavier JC (2015) The Southern Ocean ecosystem under multiple climate change stresses - an integrated circumpolar assessment. Global Change Biology 21:1434-1453

Gutt J, Isla E, Xavier JC, Adams BJ, Ahn I-Y, Cheng C-HC, Colesie C, Cummings VJ, di Prisco G, Griffiths H, Hawes I, Hogg I, McIntyre T, Meiners KM, Pearce DA, Peck L, Piepenburg D, Reisinger RR, Saba GK, Schloss IR, Signori CN, Smith CR, Vacchi M, Verde C, Wall DH (2021) Antarctic ecosystems in transition – life between stresses and opportunities. Biological Reviews 96:798-821

Hindell MA, Reisinger RR, Yan Ropert-Coudert Y, Hückstädt LA, Trathan PN, Bornemann H, Charrassin J-B, Chown SL, Costa DP, Danis B, Mary-Anne Lea M-A, Thompson D, Leigh G. Torres LG, Van de Putte AP, Alderman R, Andrews-Goff V, Arthur B, Ballard G, Bengtson J, Bester MN, Blix AS, Boehme L, Charles-André Bost C-A, Boveng P, Cleeland J, Constantine R, Corney S, Crawford RJM, Rosa LD, Nico de Bruyn PJ, Delord K, Descamps S, Double M, Emmerson L, Fedak M, Friedlaender A, Gales N, Goebel M, Goetz KT, Guinet C, Goldsworthy SD, Harcourt R, Hinke JT, Jerosch K, Kato A, Kerry KR, Kirkwood R, Kooyman GL, Kovacs KM, Lawton K, Lowther AD, Lydersen C, Lyver POB, Makhado AB, Márquez MEI, McDonald BI, McMahon CR, Muelbert M, Nachtsheim D, Nicholls KW, Nordøy ES, Olmastroni S, Phillips RA, Pistorius P, Plötz J, Pütz K, Ratcliffe N, Ryan PG, Santos M, Southwell C, Staniland I, Takahashi A, Tarroux A, Trivelpiece W, Wakefield E, Weimerskirch H, Wienecke B, Xavier JC, Wotherspoon S, Jonsen ID, Raymond B (2020) Tracking of marine predators to protect Southern Ocean ecosystems. Nature 580:87-92

Hughes KA, Constable A, Frenot Y, López-Martínez J, McIvor E, Njåstad B, Terauds A, Liggett D, Roldan G, Wilmotte A, Xavier JC (2018) Antarctic environmental protection: Strengthening the links between science and governance. Environ Sci Policy 83:86-95

Krüger L, Ramos J, Xavier J, Grémillet D, González-Solís J, Petry M, Phillips R, Wanless R, Paiva V (2018) Projected distributions of Southern Ocean albatrosses, petrels and fisheries as a consequence of climatic change. Ecography 41:195-208

Rintoul SR, Chown SL, DeConto RM, England MH, Fricker HA, Masson-Delmotte V, Naish TR, Siegert MJ, Xavier JC (2018) Choosing the future of Antarctica. Nature 558:233-241

Ropert-Coudert Y, Van de Putte AP, Reisinger RR, Bornemann H, Charrassin J-B, Costa DP, Danis B, Hückstädt LA, Jonsen ID, Lea M-A, Thompson D, Torres LG, Trathan PN, Wotherspoon S, Ainley DG, Alderman R, Andrews-Goff V, Arthur B, Ballard G, Bengtson J, Bester MN, Blix AS, Boehme L, Bost C-A, Boveng P, Cleeland J, Constantine R, Crawford RJM, Dalla Rosa L, Nico de Bruyn PJ, Delord K, Descamps S, Double M, Emmerson L, Fedak M, Friedlaender A, Gales N, Goebel M, Goetz KT, Guinet C, Goldsworthy SD, Harcourt R, Hinke JT, Jerosch K, Kato A, Kerry KR, Kirkwood R, Kooyman GL, Kovacs KM, Lawton K, Lowther AD, Lydersen C, Lyver POB, Makhado AB, Márquez MEI, McDonald BI, McMahon CR, Muelbert M, Nachtsheim D, Nicholls KW, Nordøy ES, Olmastroni S, Phillips RA, Pistorius P, Plötz J, Pütz K, Ratcliffe N, Ryan PG, Santos M, Southwell C, Staniland I, Takahashi A, Tarroux A, Trivelpiece W, Wakefield E, Weimerskirch H, Wienecke B, Xavier JC, Raymond B, Hindell MA (2020) The retrospective analysis of Antarctic tracking data project. Scientific Data 7:94

Xavier JC, Brandt A, Ropert-Coudert Y, Badhe R, Gutt J, Havermans C, Jones C, Costa ES, Lochte K, Schloss IR, Kennicutt II MC, Sutherland WJ (2016) Future challenges in Southern Ocean ecology research. Front Mar Sci 3:94

Xavier JC, Gray A, Hughes KA (2018) The rise of Portuguese Antarctic research: Implications for Portugal's status under the Antarctic Treaty. Polar Record 54:11-17

Xavier JC, Mateev D, Capper L, Wilmotte A, Walton DWH (2019) Education and Outreach by the Antarctic Treaty Parties, Observers and Experts under the framework of the Antarctic Treaty Consultative meetings. Polar Record 55:241-244