6ª Conferência Polar Portuguesa

30 - 31 outubro 2014 CIIMAR - Porto

PROPOLAR Programa Polar Português

PROGRAMA e LIVRO DE RESUMOS
PROGRAM AND ABSTRACT BOOK

Organização

ciimar · TÉCNICO LISBOA · IGOT Instituto de Geografia e Ordenamento do Território · ipma · MARE · CCMAR Centre of Marine Sciences

Apoios

FCT Fundação para a Ciência e a Tecnologia · U.PORTO Faculdade de Direito Universidade do Porto · Canadá · ciimar · U.PORTO

6ª Conferência Portuguesa de Ciências Polares

6th Portuguese Conference on Polar Sciences

"Do Ártico à Antártida: Desafios e Perspetivas da Ciência e Educação Polares em Portugal"

30-31 Outubro de 2013

Organização

Centro Interdisciplinar de Investigação Marinha e Ambiental (CIIMAR), Universidade do Porto.

Instituto de Geografia e Ordenamento do Território (IGOT), Universidade de Lisboa

Contatos

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PROPOLAR
Programa Polar Português

INDÍCE

Apresentação

O Aquecimento global é uma realidade do século em que vivemos e trouxe urgência na investigação das regiões polares. O Ártico e a Antártida estão na vanguarda das mudanças climáticas por serem as regiões mais sensíveis às variações climáticas à escala global. Deste modo, tornou-se cada vez mais evidente a relevância da investigação científica polar para deste modo aumentarem a compreensão dos processos atmosféricos, biológicos, criosféricos, geológicos e oceânicos que ocorrem nas regiões polares e que afetam todo o planeta. É essencial no entanto que os resultados da investigação cheguem a uma vasta audiência pública, na tentativa de fechar a lacuna entre a ciência e a sociedade.

Neste sentido a 6ª Conferência Polar vai iniciar-se a 30 Outubro com uma sessão aberta ao público em geral onde teremos a participação do explorador polar Dr. Antony Jinman que tem vindo a promover a educação polar através das suas magníficas expedições ao Ártico e Antártica.

Além de contarmos com a participação dos investigadores portugueses que fizeram parte de missões ao Ártico e Antártida, através da apresentação dos resultados mais recentes das suas atividades de investigação, iremos ainda contar com a presença de Jose Retamales Diretor do Instituto Antartico Chinelo (INACH), do Professor Holger Hintelmann, especialista na biogeoquímica de contaminantes no Ártico e de Gerlis Fungmann, Presidente da Associação Internacional de Jovens Cientistas Polares (APECS-Internacional)

Associado à 6ª Conferência Polar decorreu o 5º Workshop da Associação de Jovens Investigadores Polares em Portugal (APECS-Portugal), onde se debateram carreiras e experiências científicas polares com os convidados internacionais bem como com jovens cientistas polares representantes de outros países.

Sejam bem-vindos ao Porto onde temos o prazer de reunir, no CIIMAR, a comunidade portuguesa que se tem dedicado ao estudo multidisciplinar e à divulgação das regiões polares,

A comissão organizadora

Organização

- Centro Interdisciplinar de Investigação Marinha e Ambiental (CIIMAR), Universidade do Porto.
- Instituto de Geografia e Ordenamento do Território (IGOT), Universidade de Lisboa

Comissão Organizadora

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Sílvia Lourenço (IPMA)
José Seco (IMAR)
Patrícia Azinhaga (IMAR)

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Pedro Pina (IST)
Pedro Viterbo (IDL)
Vera Assis Fernandes (DFG-ICDP)

Contatos

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Mesa da Sessão de Abertura

Professor Doutor Pedro Teixeira, Sr. Vice-Reitor, em representação do Professor Doutor Sebastião Feyo de Azevedo

Doutor João Canário, Coordenador do Programa Polar Português

Professor Doutor João Coimbra, Presidente do Conselho Científico do Centro multidisciplinar das Ciências e Tecnologias do Mar (OCEANUS)

Doutor Filipe Castro em representação do Professor Doutor Vitor Vasconcelos, Diretor do Centro Interdisciplinar de Investigação Marinha e Ambiental

Doutora Teresa Ventura em representação do Doutor Jeffrey Marder, Sr. Embaixador do Canadá em Lisboa

Catarina Magalhães, Organizadora Local da 6ª Conferência Polar Portuguesa

Oradores Convidados

- Dr. Antony Jinman
  30 Out 17:20 – "A Journey to the Ends of the Earth"

- Dr Holger Hintelmann
  31 Out 9:00 – "Mercury in the Canadian Arctic"

- Dr. José Xavier
  31 Out 13:30 – "Southern Ocean Ecosystems: A Review of Potential Impacts of Environmental Change in the Future"

- Dr Gerlis Fungmann
  31 Out 16:15 – "The Association of Polar Early Career Scientists (APECS): shaping the future of polar research"

- Dr. Jose Retamales
  31 Out 17:00 – "The Chilean Antarctic Program: Overview and Opportunities for Collaboration"

Dr. Antony Jinman

Antony Jinman é um explorador polar, pioneiro em dar uso à tecnologia para partilhar as suas expedições através da "aprendizagem ao vivo". Em 2014 Antony esquiou 730 milhas de solo até ao Pólo Sul, em apenas 46 dias, enquanto interagiu com mais de 8000 alunos de escolas de todo o mundo, permitindo-lhe partilhar a sua experiência e debater online questões relacionadas com os ambientes polares com cientistas e educadores. Ao chegar ao Pólo Sul, fez história ao se tornar o 12º Britânico a atingir os dois Polos. Com 16 expedições ao Ártico e Antártida, Antony traz consigo uma rica experiência e conhecimento em educação, juntando cientistas e exploradores dentro das salas de aula através do seu método inovador de "aprendizagem ao vivo". O seu portal web liga alunos de todo o mundo a missões polares e projetos científicos e fornece casos de estudo em tempo real para fomentar a interação com as escolas.

Dr Holger Hintelmann

Holger Hintelmann é Professor de Química e Ciências Ambientais e atual diretor do departamento de Artes e Ciências da Universidade de Trent, Ontário, Canadá.
A sua investigação centra-se no estudo da especiação e destino de metais no ambiente, em especial o mercúrio. Está envolvido numa série de projetos nacionais e internacionais abrangendo ecossistemas que vão desde o Ártico à Amazónia, no sentido de explorar e desvendar o ciclo biogeoquímico do mercúrio. Utiliza, impressões digitais de isótopos de mercúrio para rastrear este contaminante desde as suas fontes de poluição até aos locais mais remotos, como as regiões polares. Com larga experiência em estudos de biogeoquímica do mercúrio no Ártico, Holger integra à 10 anos o Programa Contaminantes do Norte e ArcticNet (Rede de Centros de Excelência). É autor de mais de 100 artigos científicos e capítulos de livros, e participou em vários comités científicos e Conselhos Consultivos de diversas redes de investigação.

Dr. José Xavier

José Xavier é doutorado pela Universidade de Cambridge (Reino Unido), e atual investigador do Instituto do Mar da Universidade de Coimbra e da British Antarctic Survey (Cambridge). José estuda o comportamento de predadores de topo (pinguins, albatrozes e focas) no Oceano Antárctico em relação às alterações climáticas, fazendo investigação na Antártida desde 1997. A sua contribuição para a ciência, política e educação de Portugal sobre as regiões polares tem sido substancial. José é o chefe de delegação de Portugal nas reuniões do Tratado da Antártida e é membro de vários comités de programas científicos nacionais e internacionais (ex. ICED, CEPH, BAS-PSPE, AnT-ERA). Foi o mais jovem investigador a ganhar o prémio internacional Marta T. Muse pelo seu trabalho de excelência na ciência e politica na Antártida.

Dr. Gerlis Fungmann

Gerlis Fugmann assumiu o cargo de presidente da APECS-Internacional (Association of Polar Early Career Scientists) a 1 de Outubro de 2013. Terminou o seu doutoramento em Geografia na Universidade Justus Liebig Giessen, na Alemanha em 2011 e trabalhou posteriormente como investigadora de pós-doutoramento no International Centre for Northern Governance and Development (ICNGD) da Universidade de Saskatchewan, no Canadá. Integrou vários projetos no Ártico e Sub-Ártico, bem como no Norte da Escandinávia, abordando questões de desenvolvimento económico comparativo, empreendedorismo e turismo. O seu envolvimento na APECS-Internacional tem contribuído significativamente para a criação de inúmeros projetos e organização de grupos de trabalho juntamento com vários parceiros da APEPS-Internacional. Gerlis Fugmann tem grande interesse e apreço pelas regiões polares e investigação polar com inúmeras colaborações internacionais. Gerlis é uma forte defensora da participação dos jovens cientistas nos programas polares internacionais e reconhece a importância do trabalho em rede e desenvolvimento profissional.

Dr. Jose Retamales

Jose Retamales nasceu em Punta Arenas, Chile, licenciado em Engenharia Química pela Universidade Técnica do Estado, Santiago, Chile e doutorado pela Universidade de Bradford, Inglaterra, em ciências nucleares. Foi vice-reitor da Universidade de Magallanes onde duplicou em quatro anos o orçamento da universidade, o número de alunos, os docentes com pós-graduação e o número de projetos científicos. É autor de inúmeras publicações científicas e investigador principal de vários projetos de investigação que culminaram no registo de uma patente e na criação da sociedade "BRIDGES Ltda" para comercializar juntamente com a Universidade de Magallanes os resultados científicos dos projetos que participa. José Retamales é desde 2003 o diretor do instituto Antártico Chileno (INACHI) e foi durante 8 anos chefe adjunto da delegação do Chile para as reuniões consultivas do Tratado da Antártida. Desde 2010 é Presidente dos assuntos operacionais do Tratado da Antártida e atual vice-presidente do Conselho de Administradores dos Programas Antárticos Nacionais (COMNAP), associação internacional, que reúne os programas de investigação científica na área do Tratado da Antártida de um total de 29 países.

Programa e Comunicações Orais

30 Out 2014

15:00 - 17:00 Registo e entrega de documentação / Registration

16:00 -16:30 Sessão de Abertura / Opening Session

16:30 – 17:00 The Portuguese Polar Program, PROPOLAR.
João Canário

Sessões Temáticas / Theme Sessions

Educação & Comunicação / Education & Outreach

Chairs: José Xavier and Patrícia Azinhaga

17:00 - 17:20 – Polar Education & Outreach in Portugal: connecting science, education, outreach and policy making to the world.
José Xavier and **Patrícia Azinhaga**

17:20 - 18:20 – Plenary, **A Journey to the Ends of the Earth**.

Antony Jinman

19:30 Jantar da Conferência / Conference Dinner

31 Out 2014

8:30 - 11:00 Registo e entrega de documentação / Registration

Sessões Temáticas / Theme Sessions

Ciências da Terra e do Ambiente / Earth and Environmental Sciences

Chairs: Pedro Pina and Marc Oliva

9:00 - 9:30 – Plenary, **Mercury in the Canadian Arctic**.
Holger Hintelmann

9:30 - 9:45 - Oral 1 VERY HIGH RESOLUTION REMOTE SENSING OF BARTON PENINSULA (KING GEORGE ISLAND): NEW RESULTS FROM VISIBLE AND NEAR-INFRARED SURVEYS USING AN UNMANNED AERIAL VEHICLE. **Gonçalo Vieira**, Pedro Pina, Lourenço Bandeira, João Branco, Inês Girão, Soon Gyu Hong.

9:45 - 10:00 - Oral 2 USING UAVS FOR DETAILED AND EXTENSIVE SURFACE MAPPING IN BARTON PENINSULA. **Lourenço Bandeira**, Pedro Pina, Gonçalo Vieira.

10:00 - 10:15 - Oral 3 MAPPING FILDES PENSINSULA IN KING GEORGE ISLAND WITH AN OBJECT-BASED CLASSIFICATION OF VHR SATELLITE IMAGERY. **Pedro Pina**, Carla Mora, Gonçalo Vieira, Carlos Schaefer.

10:15 - 11:00 Intervalo / Coffe-break – POSTER SESSION

11:00 - 11:15 - Oral 4 CHEMICAL MEASUREMENTS IN POLAR REGIONS: CHALLENGES AND OPPORTUNITIES. **Hugo M**. Oliveira.

11:15 - 11:30 - Oral 5 THE HOLOCENE DEGLACIATION OF THE BYERS PENINSULA (LIVINGSTON, ANTARCTICA) INFERRED FROM LAKE SEDIMENT RECORDS. **Marc Oliva**, Dermot Antoniades, Santiago Giralt, Ignacio Granados, Manuel Toro, Sergi Pla-Rabes, Gonçalo Vieira.

11:30 - 11:45 - Oral 7 ASSESSING CONTAMINANT LEVELS AND DISTRIBUTION IN FILDES BAY. **Ana Padeiro**, Eduardo Amaro, Margarida C. Santos, Maria F. Araújo, Maria T. Cabrita, Susana S. Gomes, Marcelo Leppe, Kevin Hughes, Hans-Peter Ulrich, João Canário.

Ciências Sociais / Social Sciences

Chair: Catarina Magalhães

11:45 - 12:00 - Oral 1 THE GREAT POLAR GAME: MILITARIZATION OF THE ARCTIC AND PROSPECTS FOR THE ARCTIC COMMUNITIES. **Dennis Zuev**.

12:00 - 13:30 Almoço / Lunch – POSTER SESSION

Ciências Biológicas / Biological Sciences

Chairs: Pedro Duarte and Pedro Guerreiro

13:30 - 14:00 – Plenary, **Southern Ocean ecosystems: a review of potential impacts of environmental change in the future**.
José Xavier

14:00 - 14:15 - Oral 1 USING AUTONOMOUS UNDERWATER GLIDERS TO STUDY PHYTOPLANKTON DYNAMICS IN THE WEST ANTARCTIC PENINSULA. **Filipa Carvalho**, Hugh Ducklow, Oscar Schofield, Josh Kohut.

14:15 - 14:30 - Oral 2 HOW PREDICTABLE IS THE ARCTIC OCEAN? **Pedro Duarte**.

14:30 - 14:45 - Oral 3 FEATHERS AS A TOOL TO ASSESS MERCURY CONTAMINATION IN GENTOO PENGUINS: VARIATIONS AT THE INDIVIDUAL LEVEL. **Sara Pedro**, José C. Xavier, Sílvia Tavares, Norman Ratcliffe, Phil N. Trathan, Vitor H. Paiva, Eduarda Pereira, Yves Cherel, Miguel A. Pardal.

14:45 - 15:00 - Oral 4 WARM AND WATERY? THE STRESS ENDOCRINE AXIS of *NOTOTHENIA ROSSII* AND *N. CORIICEPS* IN RESPONSE TO ENVIRONMENTAL CHANGES. **Pedro Guerreiro**, Bruno Louro, Elsa Couto, Alexandra Alves, Alexssandro G, Becker, Sandra Silva, Adelino VM Canário

15:00 - 15:15 - Oral 5 PHYLOGENETIC DIVERSITY OF AMMONIA-OXIDIZING MICROORGANISMS IN THE EXTREME TRANSANTARCTIC MOUNTAINS. **Joana Senéca**, Hugo Ribeiro, Maria Monteiro, Charles Lee, S. Craig Cary, Catarina Magalhães.

15:15 - 16:00 Intervalo / Coffe-break – POSTER SESSION

Nova Geração de Jovens Cientistas / New Generation of Young Scientists *Chairs: José Seco, Sara Aparício and José Xavier.*

16:00 - 16:30 – Plenary, The Association of Polar Early Career Scientists (APECS): shaping the future of polar research

Gerlis Fugmann

16:30 - 16:45 - APECS PORTUGAL: YESTERDAY, TODAY AND TOMORROW. **José Seco**, **Sara Aparício**.

Colaborações internacionais num contexto interdisciplinar / International collaborations in an interdisciplinary context

Chairs: Gonçalo Vieira e João Canário

16:45 - 17:15 – Plenary, The Chilean Antarctic Program: Overview and Opportunities for Collaboration.

Jose Retamales

17:15 - 17:30 - PROPOLAR OUTCOMES, INTERNATIONAL COLLABORATION AND PERSPECTIVES FOR FUTURE CAMPAIGNS. **Gonçalo Vieira**.

17:30 - 18:00- Painel de Discussão / Discussion Panel

Chairs: José Xavier, Adelino Canário, Catarina Magalhães

Discussion Topic: "Future Challenges in Polar Research"

18:00 Protocolo FCT-INACH / FCT-INACH protocol

Ana Quartin, Coordenadora do Gabinete Polar FCT / FCT Polar Office Coordinator
José Retamales, Diretor do Instituto Antártico Chileno (INACH) / Director of Chilean Antarctic Institute (INACH)

Encerramento / Closing and Farewell

Catarina Magalhães

1 Nov 2014

10:00 – 12:00 Fórum de Investigadores em Ciências Polares

Lista de Posters

Ciências da Terra e do Ambiente

1. **Results of Electrical Resistivity Tomography Surveys in a CALM Site in Livingston Island (Maritime Antarctica) During Three Years.** Antonio Correia, Gonçalo Vieira

2. **3D Antartida - Mapping and monitoring the ice-free areas of the Antarctic Peninsula region: from crowdfunding to data acquisition.** Goncalo Vieira, Pedro Pina, João Canário, Lourenço Bandeira, Carla Mora, Mário Neves, Marc Oliva, Gonçalo Prates, Inês Fonseca, Julio Martin, Alexandre Nieuwendam, Alice Ferreira

3. **Towards a TTOP Model of Hurd Peninsula (South Shetland, Antarctica.** Alice Ferreira, Gonçalo Vieira, Miguel Ramos

4. **Contributions to the Classification of Polygonal Networks with Multivariate Data Analysis.** Maura Lousada, António Jorge Sousa, Pedro Pina, Gonçalo Vieira

5. **TerraSAR-X as a platform for high resolution summer snow melt mapping: new applications in Hurd Peninsula (Livingston Island, Antarctica).** Carla Mora, Gonçalo Vieira, Alice Ferreira, Ana David

6. **Present-day paraglacial processes in Elephant Point (Livingston Island, Antarctica).** Marc Oliva, Jesús Ruiz-Fernández

7. **Assessment of the spatial variability of surface deformation of Hurd rockglacier using D-INSAR (Livingston Island, Antarctica).** Gonçalo Vieira, João Catalão, Rita Reis, Gonçalo Prates, António Correia

8. **Evaluation of a possible urban Island effect in McMurdo Station, Antarctica.** João Branco

9. **Morphometric analysis of ice-wedge polygonal networks Adventdalen, Svalbard.** Miguel Cardoso, Maura Lousada, Gonçalo Vieira, Pedro Pina, Hanne H. Christiansen

10. **Assessment of photogrammetric techniques for rock-glacier creep monitoring (South Shetlands, Antarctica).** Gonçalo Prates, Cláudio Sousa, Gonçalo Vieira, João Catalão

11. **Dissolved trace elements in Fildes Peninsula, King George Island, Antarctica**. Eduardo Amaro, Ana Padeiro, Ana Maria Mota, Margarida Correia dos Santos, Marcelo Leppe, João Canário

12. **Toxicity potential of Antartica soils related with trace elements retention.** Joana Luísa Pereira, Patrícia Pereira, Ana Padeiro, Fernando Gonçalves, Marcelo Leppe, Eduardo Amaro, João Canário

13. **The use of multiple correspondence analysis to examine correlations between different ice-wedge polygon networks in Adventdalen, Svalbard, Norway.** Maura Lousada, António Jorge Sousa, Pedro Pina, Gonçalo Vieira

Ciências Biológicas

1. **Cyanobacteria from the McMurdo Dry valleys (Victoria Land, East Antarctica): their Biodiversity and chemodiversity.** Adriana Rego, Maria Sofia R. Costa, Vitor Ramos, Vitor Vasconcelos, Catarina Magalhães, Pedro Leão

2. **Distribution of short-finned squid *Illex argentinus* (Cephalopoda: Ommastrephidae) in the South Atlantic: little evidence from top predators that it extends to Antarctic waters.** José Seco, Gustavo Daneri, Filipe R. Ceia, Rui Pedro Vieira, Simeon L. Hill, José Xavier

3. **Feathers as a tool to assess mercury contamination in gentoo penguins: variations at the individual level.** Sara Pedro, José C. Xavier, Sílvia Tavares, Norman Ratcliffe, Phil N. Trathan, Vitor H. Paiva, Eduarda Pereira, Yves Cherel, Miguel A. Pardal

4. **Renal function in the antarctic *Notothenia rossii* exposed to diluted seawater and elevated temperature.** Pedro M Guerreiro, Beatriz Cruz, Bruno Louro, Alexandra Alves, Jonathan M Wilson and Adelino VM Canário

5. **Decadal variations on the demography and phenology of Black-tailed Godwits (*Limosa limosa limosa*) breeding in the Arctic region (Iceland).** Pedro M. Araújo, Tómas G. Gunnarsson, Lilja Jóhannesdóttir, Verónica Mendez, José A. Alves

6. **How nitrogen is recycling in Transantarctic Mountains where life exists under their limits: A culturing approach.** António Sousa, Maria Monteiro, Vitor Ramos,Pedro Leão, Charles Lee, Craig Cary, Catarina Magalhães

7. **Terrestrial microbial abundance and diversity across a transect focus in water availability in the Antarctic Dry Valleys.** Hugo Ribeiro, Joana Séneca, Maria Monteiro, L Charles, S C Cary, Catarina Magalhães.

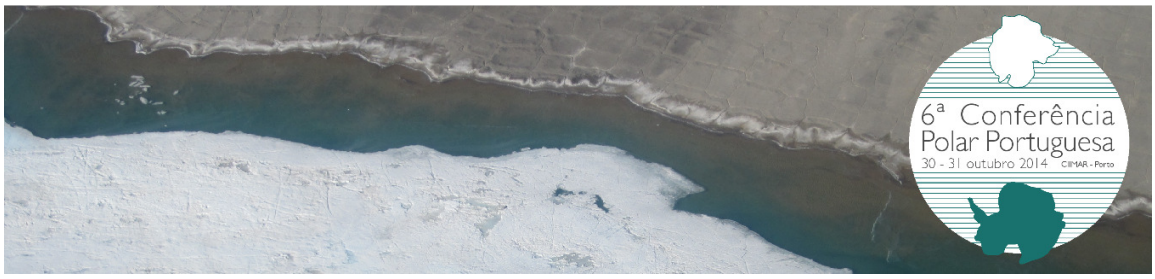
8. **Intra-annual variations of the diet of gentoo penguins (*Pygoscelis papua*) at South Georgia (Southern Ocean).** N. Velez, N. Ratcliffe, P. N. Trathan, G. Tarling, Y. Cherel, C. Broyer, F. C. Garcia, K. Erzini J. Seco and J. C. Xavier

PROPOLAR Ciência / Educação

1. **PORTUGAL EDUCATION AND OUTREACH: Final results from the polar projects "Profession: Polar Scientist" and "Education PROPOLAR".** José C. Xavier, P. Azinhaga, S. Lourenço, A. S. David, B. Cruz, J. Seco, S. Ferreira, G. Vieira, V. Pereira

2. **Supporting Polar research: the contribution of the Portuguese Polar Program (PROPOLAR).** Ana David, Gonçalo Vieira, José Xavier, Adelino Canário, João Canário

Palestras Plenárias



A Journey to the Ends of the Earth

Antony Jinman

Education Through Expedition (ETE), http://www.antonyjinman.com/

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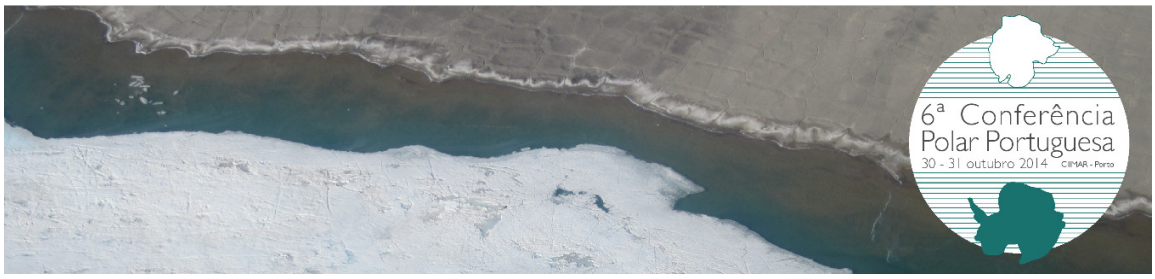

MERCURY IN THE CANADIAN ARCTIC

Holger Hintelmann

Department of Chemistry, Trent University, Ontario, Canada

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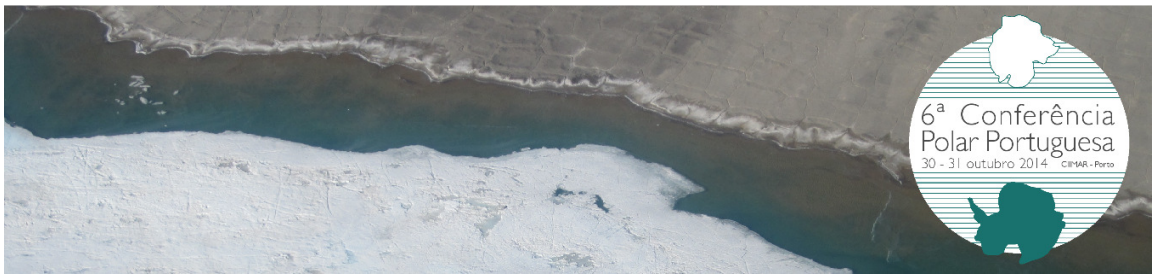
This presentation will give a brief overview of Canadian Polar Research initiatives, focusing on the ArcticNet Research Centers of Excellence network and the Northern Contaminant Program (NCP). Special emphasis is on the monitoring of mercury in the Canadian Arctic ecosystem. Two examples from the author's own research will highlight new assessment methods. The fractionation of stable mercury isotope is a new promising tool to better understand mercury processes in the environment and can potentially be applied to trace source of mercury. Fish (Arctic Char) in northern lakes show a distinct north-south gradient in Hg isotope ratios (mass dependent fractionation) and different regions are characterized by distinct Hg isotope fingerprints. The formation of monomethylmercury (MMHg) in the Arctic is still under debate. This paper will present new data from recent cruises on a Canadian research icebreaker demonstrating the occurrence of dimethylmercury (DMHg) in the lower arctic atmosphere and suggest a conceptual model, by which DMHg volatilizes from the arctic ocean, photo-degrades in the atmosphere to MMHg, which is then deposited back to the ocean, snow and ice.



CLIMATE CHANGE AND SOUTHERN OCEAN ECOSYSTEMS: A REVIEW OF POTENTIAL IMPACTS ON MARINE FAUNA FOLLOWING SCAR HORIZON SCAN GUIDELINES

José C. Xavier

Institute of Marine Research (IMAR-CMA), University of Coimbra, 3001-401 Coimbra, Portugal

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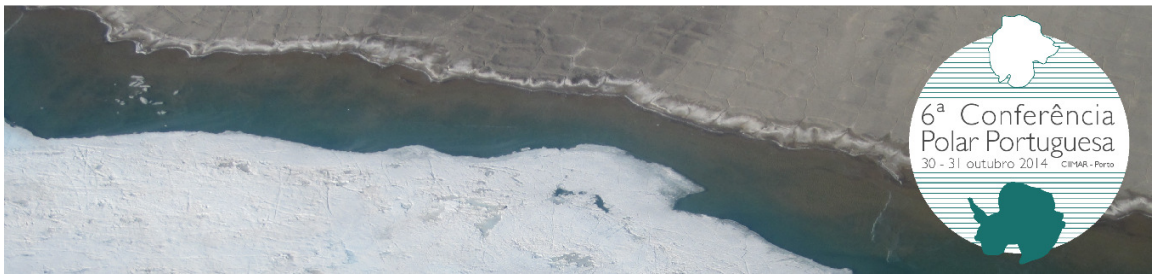
Southern Ocean has been changing for at least the last 30 years, including in response to increasing ocean temperatures and changes in the extent and seasonality of sea ice; the magnitude and direction of these changes differ between regions around Antarctica that could see populations of the same species changing differently in different regions. This presentation reviews, based on the research published (or in press) in the last year by our team in collaboration with international colleagues, of current and expected changes in Southern Ocean ecosystems in response to climate change. Particular attention will be paid to zooplankton, cephalopods, penguins and albatrosses. We will also provide modelling analyses on the potential habitat and distribution of poorly known Antarctic species. Finally, priorities for future Antarctic research work, following the Scientific Committee on Antarctic Research (SCAR) Horizon Scan results, along with its implications on conservation, policy making, education and outreach.



THE ASSOCIATION OF POLAR EARLY CAREER SCIENTISTS (APECS): SHAPING THE FUTURE OF POLAR RESEARCH.

Gerlis Fungmann

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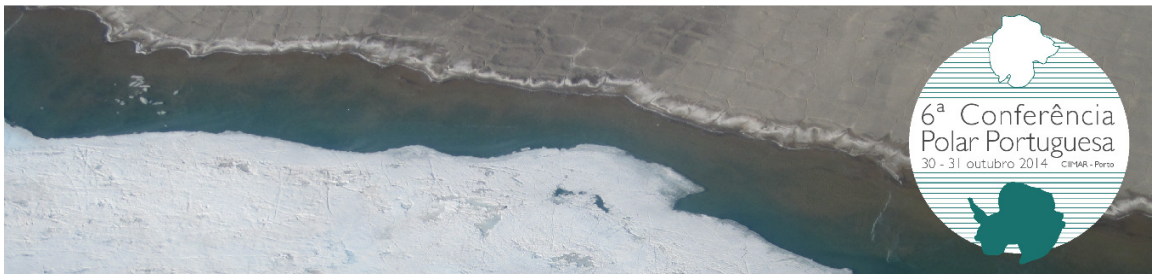

THE CHILEAN ANTARCTIC PROGRAM: OVERVIEW AND OPPORTUNITIES FOR COLLABORATION

Jose Retamales

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The Chilean Government made the decision to move the Chilean Antarctic Institute, Instituto Antártico Chileno (INACH) headquarters south, from Santiago to Punta Arenas, at the end of the year 2003. Being that Punta Arenas one of the major world gateways for National Antarctic Programs to Antarctica, the new location presented many opportunities to increase the international collaborations INACH had at the time. Developing new strategies to increase international co-operation is difficult and requires financial backing of governments to support international partnerships in science. For the INACH this has meant there has been a rapid growth in their science program supported by new funding coming mainly from their government funding agency the Comisión Nacional de Investigación Científica y Tecnologica de Chile (CONICYT). This paper explores the implementation of new strategies and results achieved to date. It also presents examples of sharing facilities and logistics are presented together with education and other initiatives and the Chilean Antarctic science program that has resulted from the strategy.

Apresentações Orais

VERY HIGH RESOLUTION REMOTE SENSING OF BARTON PENINSULA (KING GEORGE ISLAND): NEW RESULTS FROM VISIBLE AND NEAR-INFRARED SURVEYS USING AN UNMANNED AERIAL VEHICLE

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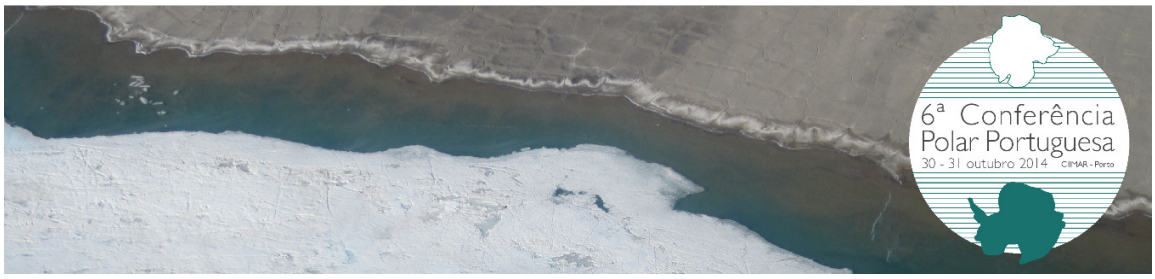
The West Antarctic Peninsula is one of the Earth's regions with fastest warming showing an increase of over +2.5 ºC in mean annual air temperatures since 1950. Changing permafrost will influence the terrestrial ecosystems by modifications in the active layer thickness, ground freezing regime, hydrology, geomorphodynamics and possibly, by changes in biogeochemical fluxes. Mapping and monitoring of the ice-free areas of the Antarctic Peninsula region has been until recently limited by the available aerial photo surveys, but also by the scarce high resolution satellite imagery (e.g. QuickBird, WorldView, etc.) that are seriously constrained by the high cloudiness of the region. The later provide excellent tools for vegetation and geomorphological mapping and therefore have been used for mapping purposes in some areas, but they have never been used for repeat monitoring of changes in land surface conditions. Recent developments in Unmanned Aerial Vehicles (UAV's), allow for a systematical use for mapping and monitoring in remote environments. In this talk, I will present the first results from the application of a Sensefly ebee UAV in mapping the vegetation and geomorphological processes, as well as for digital elevation model generation in a test site in Barton Peninsula. The UAV is a lightweight (ci. 700g) aircraft, with a 96 cm wingspan, portable and easy to trasnport. It allows for up to 40 min flight time, with application of RGB or NIR cameras. We have tested the ebee successfully with winds up to 10 m/s and obtained aerial photos with a ground resolution of 4 cm/pixel. The digital orthophotomaps, high resolution DEM's together with field observations have allowed for deriving geomorphological maps with unprecedented detail and accuracy, providing new insight into the controls on the spatial distribution of geomorphological processes such as patterned ground.

This work was sponsored by the Portuguese Science Foundation (FCT) through the project PERMANTAR 3 (Permafrost and Climate Change in the Antarctic Peninsula), reference PTDC/AAG-GLO3908/2012 and and through the Portuguese Polar Program (PROPOLAR).



USING UAVS FOR DETAILED AND EXTENSIVE SURFACE MAPPING IN BARTON PENINSULA

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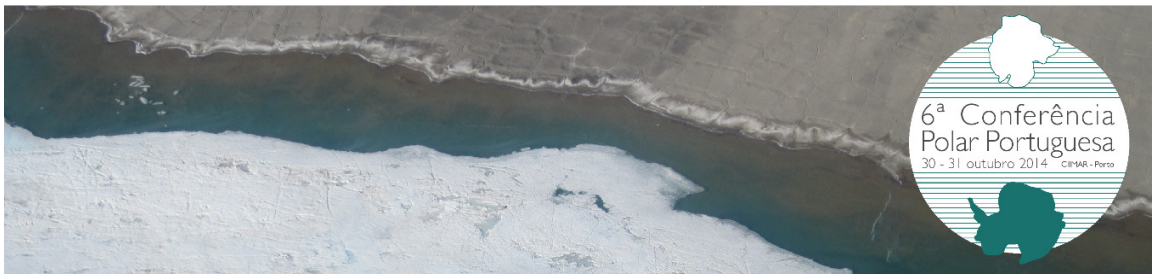
The detailed mapping of ice-free areas in the Antarctic Peninsula region on a regular temporal basis is important to evaluate the dynamics of the landscape in a region with one of the strongest warming rates on Earth in the last half century. This task can be advantageously performed with the aid of remotely sensed data, as systematic surveys can performed in a relatively swift manner. The acquisition of images with own platforms and sensors, that can be operated whenever the meteorological conditions allow, can thus overcome the difficulty of spaceborne systems to get clear and frequent images from these regions, where cloud covers are the common situation. Moreover, the possibility of having images with higher resolutions (spatial, spectral and temporal) than those provided by satellites is a relevant advance for mapping with the finest detail their periglacial and ecological features and thus giving a major contribution for monitoring the changes punctually observed in the field. Unmammed Aerial Vehicles (UAV) are therefore a solution to capture images. In this study we describe the activities we are developing in Barton Peninsula (King George Island, South Shetland) for acquiring ultra-high resolution images with two UAV systems: the first is a hexacopter that captures milimetric images and surveys particular sites of interest (several ha), the second is an airplane that acquires centimetric images and covers larger areas (several km2). We also present the kind and amount of data acquired by each system and the demanding processing chain that is needed to assemble the individual images acquired into a large one covering the entire site or region of interest (a mosaic) and the necessary subsequent geometric corrections using ancillary data obtained with field surveys with a differential GPS (ground-control points). The sites and regions presented show the diversity of the landscape and exhibit the predominant ice-free features of interest in Barton peninsula, namely lichens, mosses, snow, lakes, soils and rocks. The products obtained allow, for instance, to discriminate different types of vegetation or to compute the sizes of the elements that constitute stone circles and also to get a micro-topography of the regions of interest. The features perceived in these images allow mapping and monitor these regions with an unprecedented detail.



MAPPING FILDES PENSINSULA IN KING GEORGE ISLAND WITH AN OBJECT-BASED CLASSIFICATION OF VHR SATELLITE IMAGERY

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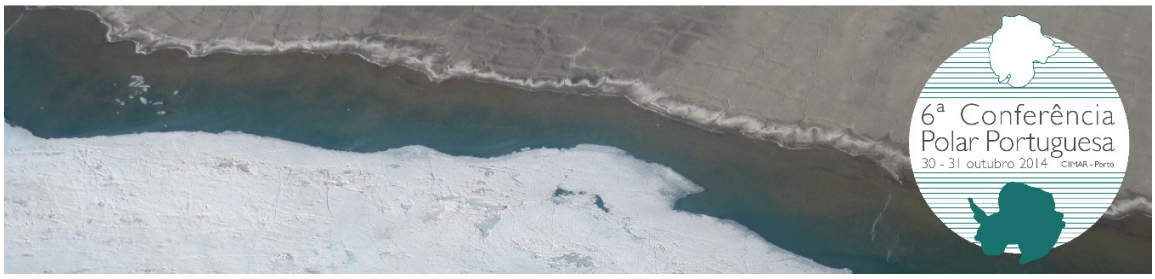
We present a methodological object-approach to improve the classification of very high resolution multispectral imagery of Fildes Peninsula (King George Island, 62ºS) provided by the QuickBird satellite. The validation is performed with ground-truth data collected in-situ in the summer of 2012. The approach starts by a segmentation procedure, which consists of the identification of regions with homogeneous spectral behaviours (the objects), followed by their assignment or labelling into one of the surface classes defined (lichen, moss, soil, rock, water, snow, ice). The object-based classifications are also compared to pixel-based ones and a breakdown analysis by classifier and surface type is also presented to better describe the robustness of the methodological approach presented and its advantage in being used in ice-free areas of Antarctica.

We conclude that the traditional image classification methods based on the elementary units of the digital image (the pixels) can be advantageously substituted by the elementary units of the image texture (the objects). This object-based classification enables extrapolating with more confidence the training/validation performed in regions where field work was performed to other regions relatively close and with similar landscape features, but where no ground-truth data was collected.



CHEMICAL MEASUREMENTS IN POLAR REGIONS: CHALLENGES AND OPPORTUNITIES

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The measurement of chemical parameters is a key task in almost all scientific fields. In remote areas, such as polar regions, analytical tasks have an extra difficulty level due to the logistical constraints and technical requirements of analytical instrumentation. These facts commonly lead to the impossibility of using state of the art analytical chemistry in polar expeditions, which limits the quantity and quality of the analytical output.

In the present communication, I will identify and overview the major issues that can be found in the analytical methodologies when used in extreme environments. I also intend to discuss the major challenges and opportunities that can arise from a systematic interaction between analytical chemists and polar scientists. These potential mutual benefits will be illustrated covering some examples related with the determination of trace metals in open ocean waters and also with the major outcomes of a recent collaborative workshop between chemical oceanographers and analytical chemists [1].

[1] Collaborative on Oceanographic Chemical Analysis working group, http://www.soest.hawaii.edu/oceanography/faculty/chrism/COCA/Home.html

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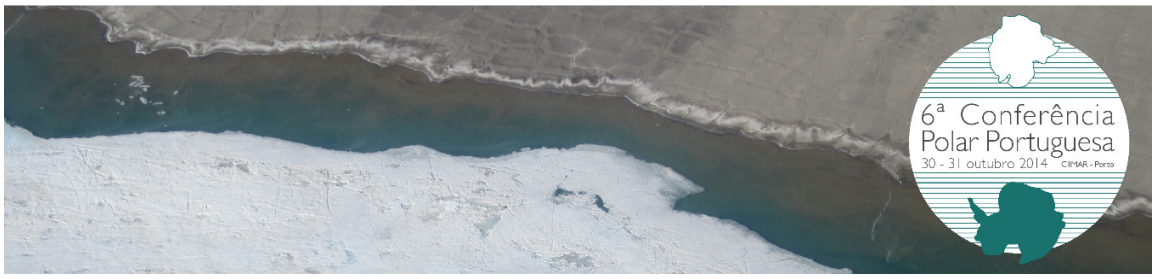

THE HOLOCENE DEGLACIATION OF THE BYERS PENINSULA (LIVINGSTON, ANTARCTICA)

INFERRED FROM LAKE SEDIMENT RECORDS

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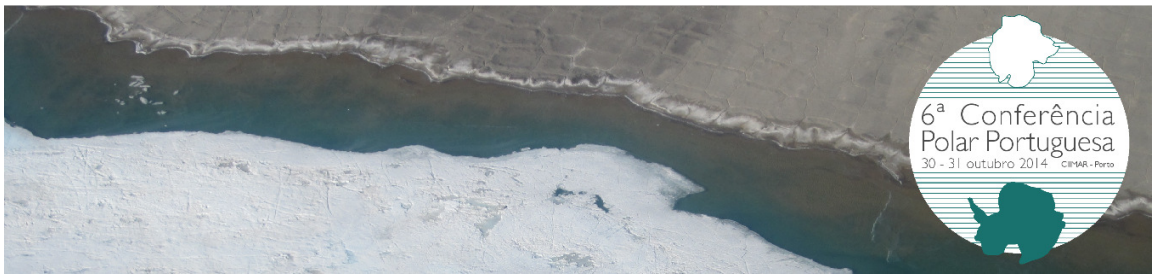
The Byers Peninsula, located in the westernmost part of Livingston island, constitutes the largest ice-free area in the South Shetland Islands with ~60 km^2. In the relatively flat plateau of Byers at a mean altitude of 80 m asl there are numerous lakes and other aquatic habitats. Some of these lakes have been studied within the HOLOANTAR project with the purpose of establishing the detailed deglacial evolution of this key area. We selected several lakes distributed along an E-W transect from the Rotch Glacier to the west coast of the Peninsula, following a hypothetical route of the deglaciation process.

In November 2012 we collected the sedimentary sequences from four lakes (Chester, Escondido, Cerro Negro and Domo). Besides, the Limnopolar lake record was retrieved in November 2008 (Toro et al., 2013; Martínez-Cortizas et al., 2014). In each lake we recovered the entire Holocene record, reaching basal till deposits, allowing inferences to be drawn about the date of formation. A complete chronological model for all the lakes is being generated based on different dating techniques (^{14}C, OSL, ^{210}Pb, tephrochronology).

According to the basal datings of these lakes, the deglaciation of the Byers Peninsula started at its western margin in the Early Holocene, followed by the deglaciation of the central plateau during the Mid-Holocene. The gradual thinning of ice favoured the early appearance of Cerro Negro lake, placed at a higher elevation (100 m asl) in the eastern fringe of Byers. Based on the OSL dating of the basal sediments, this lake formed around 7.5 ka BP, thus it functioned as a nunatak lake while most of the central plateau was still glaciated. The dates suggest a long-term glacier eastwards retreat of the Rotch Dome glacier during the Holocene, though some glacier spots probably remained longer next to the highest hills of the peninsula. The lake distributed next to the present-day glacier front (Domo) formed around 2.2 ka BP, suggesting that no major glacial advances occurred in the Byers Peninsula during the Late Holocene.

These data will be complemented with other mutiproxy analyses in order to improve our understanding of the deglaciation process and the postglacial environmental evolution of the Byers Peninsula.



ASSESSING THE CONTAMINANT LEVELS AND DISTRIBUTION IN FILDES BAY (KGI, ANTARCTIC)

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In the last decade there has been an increasing expansion, in intensity and diversity, of human impacts in Antarctica especially in its peninsula and the surrounding islands.

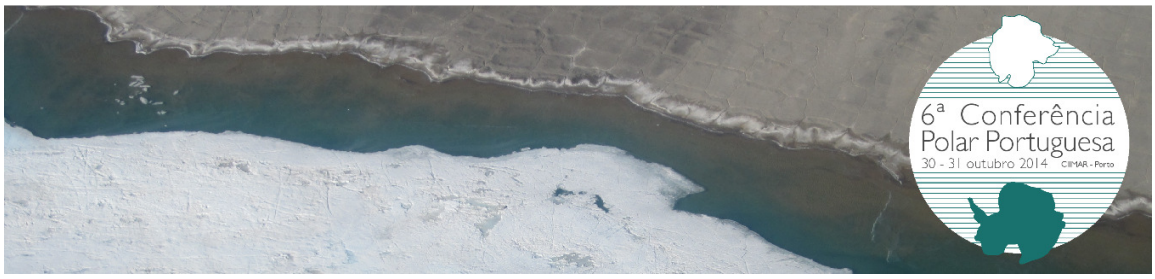
The Fildes Bay, located on Fildes Peninsula (62º 08´ S - 62º 14´S, 59º 02´ W - 58º 51´W), King George Island, is characterized by its high biodiversity, but also by the high density of scientific stations, becoming one of the most contaminated areas of Antarctica,

In order to assess the contamination and distribution of several trace elements (Cr, Ni, Zn, As, Cd, Cu, Pb and Hg) in Fildes Bay, 105 soil samples were collected using the sample grid technique. Additionally, 3 soil samples were collected in Glacier Collins area, chosen as a reference site. Total element concentrations and organic matter content (measured as loss on ignition, LOI) were determined in each soil and biological and chemical bioavailability or availability tests were conducted.

The results obtained in this study point to the existence of several contaminated hotspots mainly related to high levels of Cu, Zn, Pb, Cd, Cr and Ni. The absence of correlations between these trace elements and LOI suggests that these high concentrations resulted from anthropogenic sources. Additionally the significant correlations ($p<0.05$) between Cr/Ni and Pb/Cd indicate that these metals have the same origin

Bioavailability tests showed that, with the exception of As and Hg, all trace elements are bioavailable (max 25% for Zn and Pb) confirming the anthropogenic origin of this contaminants.

The results obtained with this work showed that Fildes Bay have several areas of great environmental concern. The comparison of the contaminant distribution pattern with previous works allows identifying the anthropogenic sources as well as proposing several remediation strategies.



USING AUTONOMOUS UNDERWATER GLIDERS TO STUDY PHYTOPLANKTON DYNAMICS IN THE WEST ANTARCTIC PENINSULA

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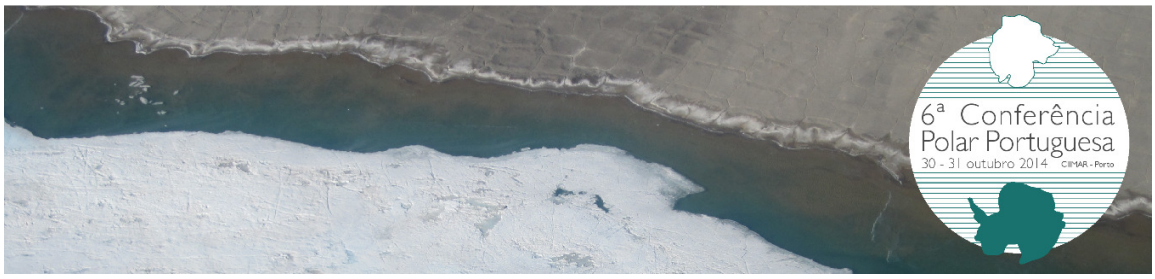
Palmer Deep Canyon in the West Antarctic Peninsula (WAP) is hypothesized to be a biological "hotspot". However, the physical mechanisms driving the phytoplankton bloom aren't well understood. This study aims to characterize the dynamics of the spring phytoplankton bloom over Palmer Deep Canyon using autonomous underwater gliders.

Here, a 7-year record comprised of 35 Slocum glider deployments is analyzed. Driven in a sawtooth vertical motion by variable buoyancy, slocum gliders are underwater autonomous vehicles that collect high resolution profiles of the water column. They surface regularly to transmit data to shore while downloading new instructions, providing a substantial cost savings to traditional ship sampling. Among other variables, gliders measure water temperature and salinity (CTD), Phytoplankton concentration (Fluorescence) and health (Fluorescence Induction and Relaxation - FIRe).

These data were gridded over the canyon to characterize spatial and temporal variability of the hydrography and phytoplankton bloom. Glider data revealed consistent upwelling of nutrient-enriched, warm Circumpolar Deep Water (CDW) along the slope of the canyon, a hydrographic feature linked with increased concentrations of phytoplankton. This feature, balanced with increased light availability due to the shoaling of the upper mixed layer resulted in bigger blooms. Similar results were found in other canyons in the WAP; increased phytoplankton concentrations coincided with an uplift of warm deep water.

This increased productivity is essential to the higher trophic levels in the Antarctic ecosystem and highlights the importance of understanding the dynamics of those phytoplankton blooms. High-resolution sampling provides better insight into the biological responses to physical forcing. Gliders allow us to study and map the dynamic (temporal and spatial) features of subsurface coastal waters and have proven to be robust platforms for oceanographic studies around the WAP.



HOW PREDICTABLE IS THE ARCTIC OCEAN?

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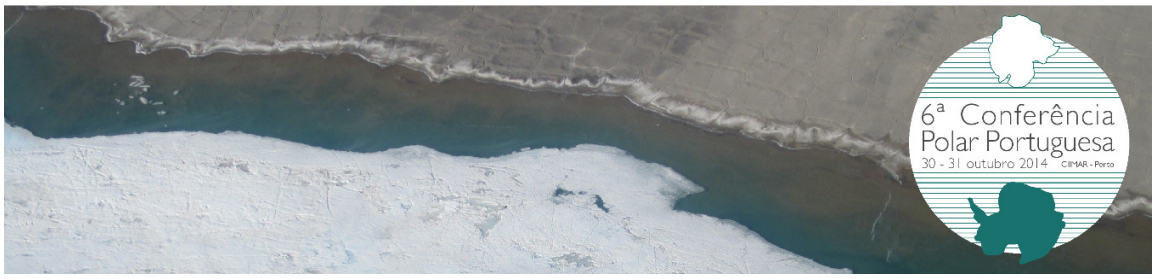
The Arctic Ocean (AO) is changing rapidly and some of the most visible aspects of these changes are the retreat of glaciers along some Arctic shores and the replacement of Multi Year Ice (MYI) with First Year Ice (FYI). This changing ice regime may have profound consequences on energy exchanges across the sea-ice-atmosphere interfaces, on sympagic (ice-associated) organisms and on species that depend on those to complete their life cycles. Empirical data suggest important reductions on the biodiversity of sympagic species along with the shift from MYI to FYI. Some authors argue about possible mismatches between the life cycles of Arctic copepods and ice algae, whereby the former seem to depend on ice algal blooms at the end of winter. These may have cascading effects along the trophic web. Also, carbon fluxes across the sea-ice interfaces and towards the sea bottom may change as a result of changes in sea-ice primary production and ice brine fluxes. The complex interactions between all mentioned aspects make it very difficult to predict their outcomes. The logical way to get insight into this complexity is the usage of mathematical models integrating the best available knowledge about relevant processes and variables. However, the lack of a consensus on the way similar processes are represented in different models and the apparent absence of validated AO ecosystem models suggest that we still have a limited capacity to realistic predict ecosystem changes in face of global trends on air temperature, ocean pH, land drainage and shifting ice regimes. The main goal of this paper is to present and discuss some available AO ecosystem modeling approaches and ongoing modeling projects with emphasis on the way sea-ice physical, chemical and biological aspects are integrated and spatially resolved. Arguments will be presented towards an “ideal” model combining and coupling different source models for physical oceanography, ice physics, sea and sea-ice biogeochemistry.



FEATHERS AS A TOOL TO ASSESS MERCURY CONTAMINATION IN GENTOO PENGUINS: VARIATIONS AT THE INDIVIDUAL LEVEL

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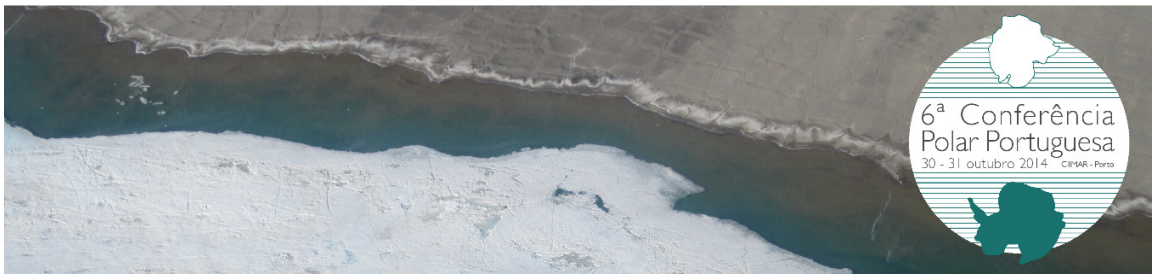
Feathers have been widely used to assess mercury concentrations in seabirds, since they reflect metal levels at the time of its formation and are easy to obtain with minimum harm to the birds. Moult is considered the major pathway for mercury excretion in seabirds. Penguins, which moult annually in a short period of time, are assumed to have a low individual-variability in feather mercury concentration, once it is assumed that all feathers are formed at a similar time. However, no studies ever validated this assumption. This is quite relevant to marine ecologists, in order to achieve accurate conclusions when interpreting the mercury contamination patterns from feathers of these birds. To test this assumption, we measured the mercury concentration in 5-7 body feathers of 52 gentoo penguins (*Pygoscelis papua*) breeding at Bird Island, South Georgia (54°S 38°W). Mercury levels ranged from 0.15 - 3.1 mg kg^{-1}: 0.41-3.1 mg kg^{-1} for males and 0.15-1.6 mg kg^{-1} for females. 25% of the penguins studied showed significant differences in the amount of mercury in their feathers (CV: 34.68 - 96.65 %). This variation may be caused by differences in moult patterns within the population leading to different interpretations if included in the overall population. The implications of this study are discussed, particularly from an Antarctic monitoring programs perspective, under the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR).



WARM AND WATERY? THE STRESS ENDOCRINE AXIS OF *NOTOTHENIA ROSSII* AND *N. CORIICEPS* IN RESPONSE TO ENVIRONMENTAL CHANGES

Pedro M Guerreiro, Bruno Louro, Elsa Couto, Alexandra Alves, Alexssandro G

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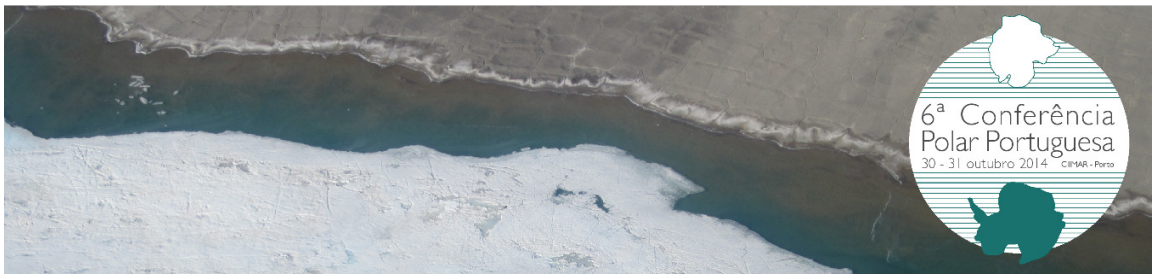
The stability of the Antarctic Ocean is threatened by recent and predicted effects of climate change, modifying an habitat where fish evolved for about 30 million years, developing a set of unique structural, physiological and behavioral features such as reduced bone density, loss of hemoglobin, aglomerular kidneys, low metabolic rates. Previous studies also described a sub-responsive stress axis in Antarctic fish. Our questions were then How will the stress endocrine axis of Antarctic fishes cope with such changes? What role the HPI plays on osmoregulation and metabolism and how much allostatic load can it take?

We exposed Notothenia coriiceps and N. rossii to changes in water temperature or/and salinity to evaluate the response of several physiological processes, including the stress axis. Fish were transferred to experimental tanks and acclimated from natural temperatures (0-2ºC) to 4-8ºC and from 32‰ to 20-10‰. The roles of the stress endocrine axis in changing conditions were tested using GR/MR blockers (mifepristone, spironolactone) and agonists (dexamethasone, cortisol), and inhibiting cortisol release (using metyrapone).

No significant mortality or changes in behaviour between were observed. Manipulation of the stress axis with drugs revealed responses similar to those of temprate species. Initial data shows cortisol and expression of metabolic-related genes were upregulated and may be modulated by manipulation of GR/MR. The changes in temperature induced the higher changes in plasma cortisol and glucose, while reduction in salinity had little effect in these parameters, suggesting that temperature may be the larger stress factor. However, both altered temperature or salinity reduced the fish response to handling stress when compared to animals in natural conditions. These results suggest that Antarctic fish have a functional HPI and are reactive to environmental change, but that their ability to accommodate rapid or adaptive responses may be compromised.



PHYLOGENETIC DIVERSITY OF AMMONIA-OXIDIZING MICROORGANISMS IN THE EXTREME TRANSANTARCTIC MOUNTAINS

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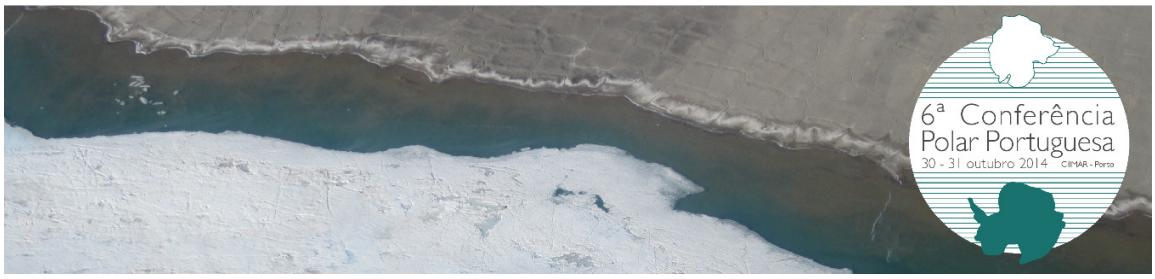
Ice free regions in Antarctica account for approximately 0.03% of the continental area and are patchily distributed. The existing environmental conditions have shaped soil ecosystems of low diversity and simple trophic structure in which soil microorganisms face severe conditions including low water and nutrient availability, cold temperatures, freeze-thaw cycles, long periods darkness in winter, and exposure to high levels of ultraviolet radiation in summer. In these areas, the diversity of microorganisms involved in key biogeochemical processes such as the nitrogen cycle is still largely unknown. In this study, we assessed the distribution and phylogenetic affinities of bacteria (AOB) and archaea (AOA) ammonia-oxidizers in a high range of Antarctic soil environments, based on DNA molecular approaches. In addition, we established relationships between the broad scale environmental gradients of the sampled locations and the relative diversity of ammonia oxidizing microbial communities. Miers Valley, Beacon Valley, Upper Wright Valley, Battleship Promontory, Victoria Valley, and the Darwin-Hatherton Glacier region, were the chosen sampling sites, from where DNA was extracted, cloned and sequenced. Results revealed generally low AOB and AOA *amoA* gene diversity, with only 6 and 5 identified OTU's (97% sequence identity). AOA OTU's were affiliated with the soil group 1.1b, along with cultivable representatives of the *Nitrososphaera* genus. AOB OTU's were mostly affiliated with the *Nitrospira* cluster. In addition, OTU prevalence per site also varied, being related with harsher or milder soil characteristics. This study confirms the ubiquity of AOA and AOB communities in these harsh conditions, as it has been confirmed in other environments, and strangles the importance of the nitrification process in driving microbial functionality in Antarctic ecosystems.

This study was funded by the Portuguese Science and Technology Foundation (FCT) through a researcher starting grant to C. Magalhães (PTDC/MAR/112723/2009 - FCOMP-01-0124-FEDER-015422), and through the Portuguese Polar Program (PROPOLAR).



THE GREAT POLAR GAME: MILITARIZATION OF THE ARCTIC AND PROSPECTS FOR THE ARCTIC COMMUNITIES

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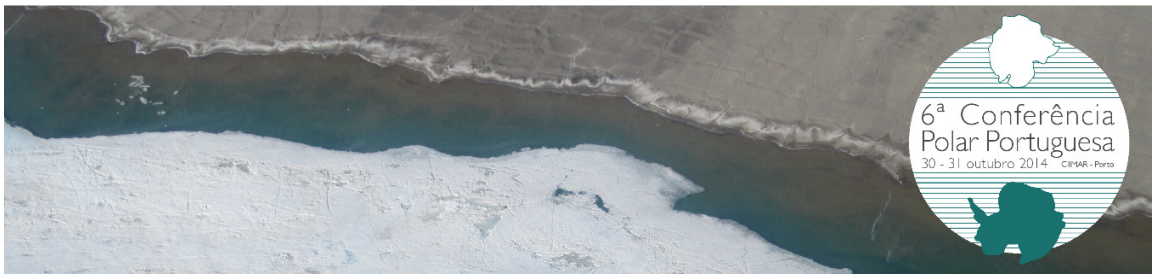
With the global climate changes military-backed oil-savvy claims-making in the Arctic has already become a reality. Some of the powerful rivalries have been established between Canada/USA vs. Russia, with non-Arctic nations such as China also asserting itself in the Arctic and inaugurating its icebreaker fleet and sending pandas to Denmark as a sign of intentions to develop closer collaboration in mining in Greenland. Hillary Clinton's Montreal address in 2014 summoned US and Canada to form a unified front against Russia, which as claimed by Clinton has been aggressively reopening its airbases in the Arctic. The developments in the Arctic where there is no claimed land mass, but ice may suggest and develop a very negative scenario for the claims-making in Antarctica, which has overlapping claims between the countries. The "bad" example of the Arctic "ice-seabed-grab" scenario may be followed by the land-grab in the Antarctica after the Peaceful Antarctic Treaty expires in 2041. Where there is a potentiality of the conflict between Chile, Argentina and UK. Chile and Argentina remain most vociferous about their overlapping claims. In both countries, it is illegal to display a map not showing the nation's claimed Antarctic territory. All three nations have negative experience in solving their border disputes and land-claims. Despite "scientific" purpose of Antarctica some countries like Argentina and Chile man their stations with the military, that manage the stations and provide most of the logistics (also for international research teams). Falkland/Malvinas conflict showed how precious the isolated particles of the landmass can be if they are to be used for resource-exploration or as stepping stones for this exploration.

Military training operations have been exercised by Canada in 2011 (Operation Nanook) and in 2013 Russia has reopened its airstrip on the island of Kotelny in Laptev Sea, which was closed thirty years ago. After the Soviet Union ceased to exist most of the transport infrastructure and bases including airstrips in the Russian Arctic degraded but with the renewed potential of the Northern Sea Route (NSR, *Sevmorput'*), the airbases as claimed by the Russian military are to serve the development of the infrastructure of the Sea Route, which provides a shorter transportation route from Europe to East Asia (and two of the largest world economies - Japan and China). Hence, China is actively searching for the ways of utilizing the Arctic both for logistics and powering its economy.

Although military presence is increasing, the indigenous Arctic communities in both Canada and Russia keep on facing a number of social problems that have long plagued them: depopulation, alcoholism, suicide and cultural decline, with the lack of subsistence which results in natural imbalances as for instance increase in Polar Bear hunting among Inuit in Canada and whaling among Chukchi.

The paper will review the prospects of the policy-making related to the Arctic region and the prospects for the Arctic communities directly being affected by these policies.

Apresentações em Painel



RESULTS OF ELECTRICAL RESISTIVITY TOMOGRAPHY SURVEYS IN A CALM SITE IN LIVINGSTON ISLAND (MARITIME ANTARCTICA) DURING THREE YEARS

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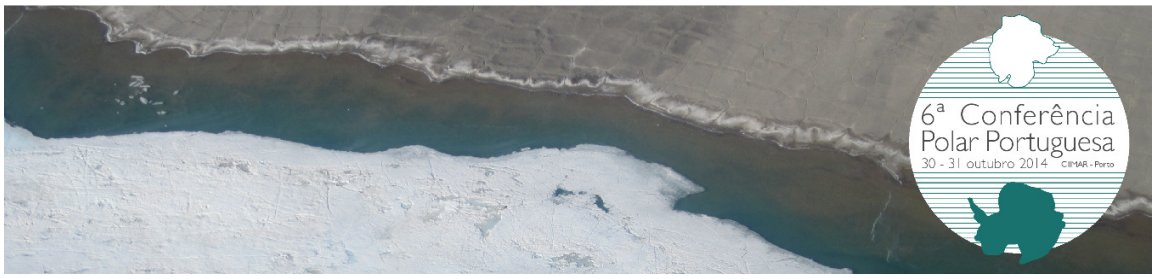
Under the framework of projects PERMANTAR and PERMANTAR-2 electrical resistivity tomography (ERT) profiles were done in a Circumpolar Active Layer Monitoring (CALM) site in the Hurd Peninsula of Livingston Island, near the Bulgarian Antarctic Station St. Kliment Ohridski, in 2009, 2012, and 2013 with the objective of studying the spatial and time distribution of permafrost in the area. Electrical resistivity tomographies were made along different directions in the CALM site. However, only two profiles are considered in this study. One of the profiles done in 2009 was never repeated because of the snow accumulated in the years 2012 and 2013. For each electrical resistivity tomography 40 electrodes were used in a Wenner configuration; adjacent electrodes were 2 m apart. The software RES2DINV was used for inverting the apparent electrical resistivity values into two-dimensional models of electrical resistivity of the ground. The models are a representation of the distribution of the electrical resistivity of the ground to depths of about 13 m along profiles 78 m long. In general, the models show high electrical resistivity values in some zones (values as high as 10^4 Ω.m were obtained). As a preliminary interpretation, in some zones traversed by the two profiles there are patches of frozen ground or sporadic permafrost. Most of those patches persist from year to year. At the surface of the ground, some of those areas also coincide with patches of snow that were not yet melted when the geoelectrical profiles were made; those snow patches are, therefore, acting as an insulating cover to the ground maintaining the temperature below the values it would reach if there were no snow; to a certain extent, this could explain the existence of some of the frozen ground patches.



3D ANTARTIDA - MAPPING AND MONITORING THE ICE-FREE AREAS OF THE ANTARCTIC PENINSULA REGION: FROM CROWDFUNDING TO DATA ACQUISITION

Goncalo Vieira[1], Pedro Pina[2], João Canário[3], Lourenço Bandeira[2], Carla Mora[1], Mário Neves[1], Marc Oliva[1], Gonçalo Prates[1,4], Inês Fonseca[1], Julio Martin[5], Alexandre Nieuwendam[1], Alice Ferreira[1]

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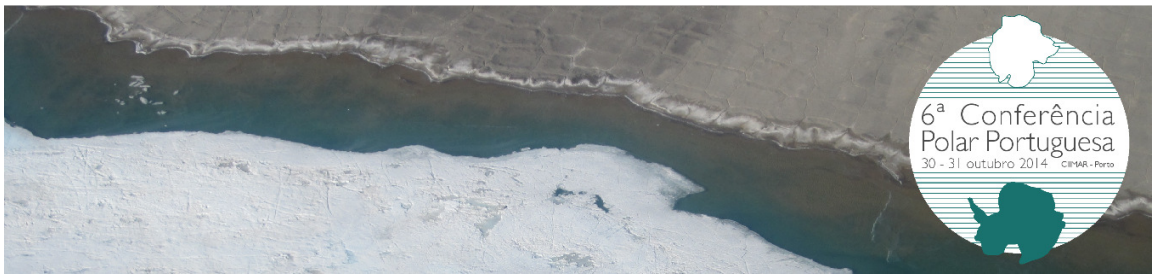
The Polar Research Group of the University of Lisbon has been studying the ice-free areas of the Antarctic Peninsula region for several years and conducting both field data collection with multiple techniques and also remote sensing imagery analysis. The recent technological developments of Unmanned Aerial Vehicles, allowing for fully automatical aerial surveying (photography and terrain modelling) and operation in moderate wind conditions allow for very significant advances in mapping and monitoring the fast changing ice-free areas of the Antarctic Peninsula.

3D Antartida is a crowdfunding project that aimed at the acquisition of an UAV in order to use it in the various research projects that our group is conducting in the Antarctic and the Arctic, as well as in the Portuguese mountains (Permantar-3, HiSurf-2, Contantarc-3, Holoantar). The aim was to obtain 20,000 euro for buying the UAV, while offering the funders a number of small prizes depending on the contribution, as well as a close link with the research group. The call for crowdfunding was initiated in December 2013 for a period of 40 days and we have been able to gather 21,800 euro supported by c. 300 people, including two main sponsors (Agencia Ciencia Viva and IGOT). The UAV was bought in early February and immediately integrated in the Antarctic campaign at Barton Peninsula (King George Island), with field testing and surveying taking place in late February and early March. The project also involves an educational component, including a blog with daily inputs from Antarctica, field trials in Portugal and visits to science centers.

The poster presents the overall organization of the project, the structure of the crowdfunding and also the preliminary results from the field surveys in Antarctica. It aims essentially at showing the SCAR community how such a crowdfunding initiative was implemented allowing for a boost in technology to be used in remote sensing field surveys by our group.



TOWARDS A TTOP MODEL OF HURD PENINSULA (SOUTH SHETLAND, ANTARCTICA)

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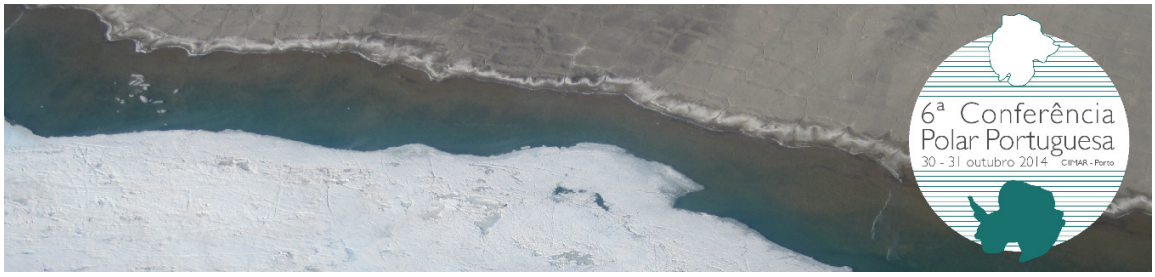
Western Antarctic Peninsula has been one of the world's regions where atmospheric warming occurred faster rate. Mean annual air temperatures increased ci 3.4º C since 1950 and permafrost degradation reported in the Palmer arquipelago (Bockheim et al. 2013). The study of energy fluxes between atmosphere and ground surface is complex in alpine and polar maritime areas, where topography is varied the influence of local factors are more relevant, particularly snow conditions in the ground. main objective of the ongoing research in Livingston island is to study the characteristics and thermal of the permafrost, the factors that control it´s variability, as well as it's spatial distribution. Temperature Top of Permafrost (TTOP) modelling, provides a functional framework of the climate-permafrost system, relating the influence of climate, terrain and lithological factors on thermal regime and distribution of permafrost (Henry and Smith, 2001). Surface conditions of this equation are provided by n-factors, which are ratio between soil and air freezing indexes (Carlson, 1952; Lunnardini, 1978), and are used to evaluate degree of atmosphere and soil coupling, concerning heat flux exchanges. N factors are frequently used representative value of the joint insulating effects of vegetation, organic matter in the soil surface and conditions in the ground (Lunardini, 1978, Karunaratne and Burn, 2004; Throop et al. 2012). Mmeasurements of air and ground surface temperatures, and snow thickness between 2009 and 2012, seven different geographical settings in Hurd Peninsula provided the initial framework for modelling n factors. Since snow conditions are the main controls of n factor variability, a thematic map concerning melt patterns derived from Landsat images was used to access spatial distribution of late lying snow cover. Thermal conductivity and its variation in depth was calculated for rock samples for seven study sites following Correia et al. (2012). Thermal-physical proprieties of bedrock are used. Ground truth is obtained from two locations in R. Sofia at 275 and 265 m altitude, where there are deep boreholes. Modelled TTOP values show a good approximation to permafrost temperatures measured, showing that where n factors are higher (late lying snow), usually below 40 m altitude permafrost was absent.



TERRASAR-X AS A PLATFORM FOR HIGH RESOLUTION SUMMER SNOW MELT MAPPING: NEW APPLICATIONS IN HURD PENINSULA (LIVINGSTON ISLAND, ANTARCTICA)

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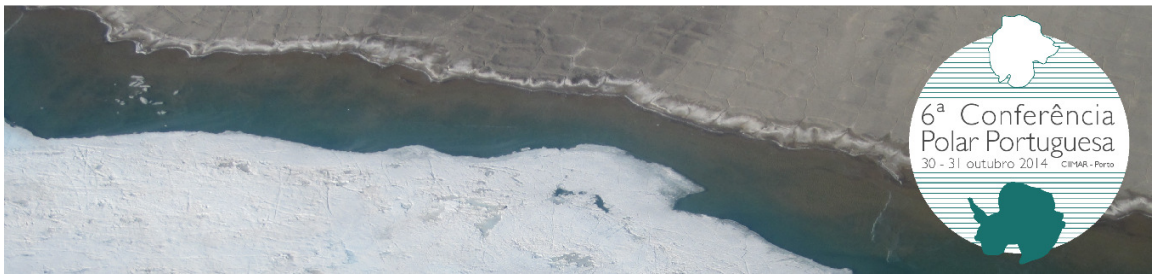
Snow plays an important role in controlling ground thermal regime and thus influencing permafrost distribution in the lower areas of the South Shetlands archipelago, where late lying snowpatches protect the soil from summer warming. The high cloudiness of the Maritime Antarctic environment limits good mapping results from the analysis of optical remote sensing imagery such as Landsat, QuickBird or GeoEye. Therefore, microwave sensors provide the best imagery, since they are not influenced by cloudiness and are sensitive to wet-snow, typical of the melting season.

Several TerraSAR-X scenes in modes Spotlight HH, Spotlight HH/VV and also in Stripmap mode have been acquired from January to March 2014. The first results of radar backscattering without terrain correction are shown here for spotlight modes HH and HH/VV. The former has a pixel resolution of c. 0.8m and the later of c. 2m. Results show that both modes allow for very accurate snow patch detection since snow temperatures are normally close to 0ºC in the summer. Spotlight HH shows much higher resolution and boundaries of snow patches are very sharpely defined. Dual polarization looses significant spatial detail but still the snow patches are very clear. Multitemporal analysis also shows that snow patch melting patterns can be accurately mapped.Terrain correction and comparison with snow pit data is being conducted and the results presented here are still preliminary, but a step forward has been achieved with the analysis of the dual polarization imagery.

This approach is currently being conducted in the framework of the project PERMANTAR-3 (Permafrost monitoring and modelling in Antarctic Peninsula – PTDC/AAG-GLO/3908/2012 of the FCT and PROPOLAR).



CONTRIBUTIONS TO THE CLASSIFICATION OF POLYGONAL NETWORKS WITH MULTIVARIATE DATA ANALYSIS

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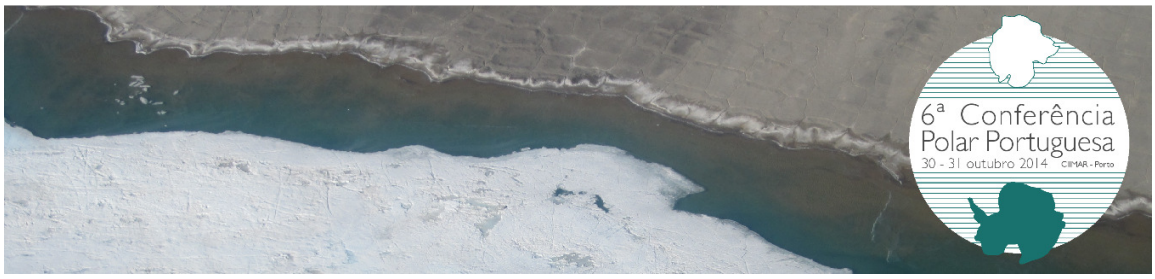
Polygonal patterns that commonly occur in periglacial regions of the Earth are seasonal processes of freezing and thawing that cause the soil to expand and contract, forming connected cracks of network patterns. The networks studied in this work are located Adventdalen valley, Svalbard archipelago, at 78° N. The contours of these ice-wedge networks were digitized from very-high spatial resolution remotely sensed images (0.2 m/pixel). More than 10,300 individual polygons in 120 networks were identified and organized into a GIS platform. The 17 largest of these networks (in a total of 6166 polygons) were analysed in detail, extracting several qualitative and quantitative parameters for each polygon. A set of multivariate data analysis techniques was applied to the whole dataset of parameters. In particular, a cluster analysis technique was used to search for clusters of the typologies of networks. The clusters of networks are noticeably different in what concerns the geometric/topologic features of the polygons, which we found to be related to their site of development: over flat terrain and loess sediment they exhibit small and orthogonal polygons whereas in slopes and consolidated formations they exhibit large, asymmetric and more hexagonal polygons. In addition, the locations of the networks belonging to the same cluster seem to be consistent in the different sites along the whole Adventdalen. The availability of a classification scheme is very helpful, not only for better understanding the underlying processes involved in the formation/evolution of these networks, but also for remotely classifying the networks where in-situ observations are not possible to be performed, namely on planet Mars, where these structures are ubiquitous.



PRESENT-DAY PARAGLACIAL PROCESSES IN ELEPHANT POINT (LIVINGSTON ISLAND, ANTARCTICA)

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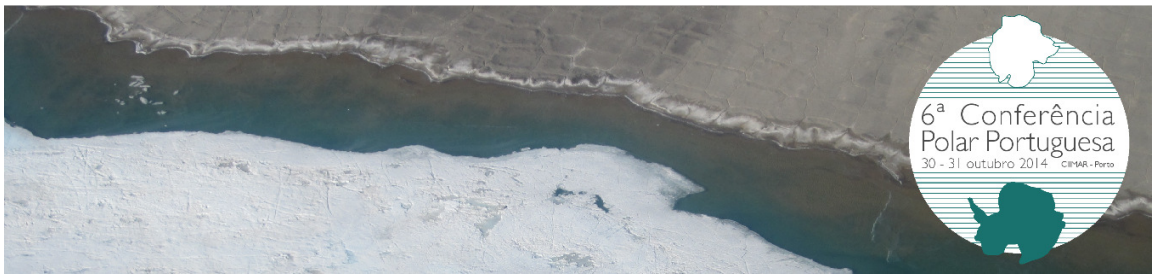
The Holocene retreat of Rotch dome glacier has exposed several ice-free areas in the western half of Livingston island, South Shetland Islands. In January 2014 a detailed geomorphological mapping was conducted *in situ* in one of these deglaciated peninsulas, Elephant Point. A wide range of glacial and periglacial processes and landforms are distributed in this small ice-free area of only 1.16 km^2. From the glacier front to the coast four main geomorphological environments were identified: (a) proglacial area, (b) moraine complex, (c) bedrock plateaus, and (d) marine terraces.

The glacier retreat between 1956 and 2010 has exposed 17.3% of the total ice-free surface in this peninsula. The recently deglaciated environments correspond to the northern slope of the moraine and the area extending between the moraine and the glacier front. In these two areas paraglacial processes are very intense, with a rapid loss of volume due to slow and rapid mass wasting processes.

Retrograde thaw-slumping is extremely effective degrading the moraine in its northern and western fringes, where mudflow processes transfer a large amount of sediments down-slope. Slumps are polycyclic, showing diverse degrees of development and variable geometries. A significant percentage of 9.6% of the slopes of the moraine is affected by this type of mass movement. In the most recent slumps ice-rich permafrost is exposed at the surface, which may indicate that the permafrost in these areas may have formed before the rapid deglaciation of these enclaves. Thus, this means that Rotch dome constitutes a cold-based glacier in this part of Livingston island.

The exposure of permafrost to solar radiation and summer air temperatures self-reinforces its accelerated thawing, triggering mudflows and inducing the retreat of the headwalls in the slumps. The large amount of mass-wasted material is being redistributed by glaciofluvial processes in the northern slope of the moraine as well as by coastal erosion in the westernmost fringe of the moraine. The flat proglacial environment as well as the plateau existing between the two ridges of the moraine are being also affected by thermokarst processes. In these areas the thawing of ground ice generates depressions, most of which are filled by water (kettle-lakes) coming from the snow melting and from the thawing of the active layer.



LIMITED GEOCHEMICAL VARIATION IN TEPHRAS FROM DECEPTION ISLAND, ANTARCTICA

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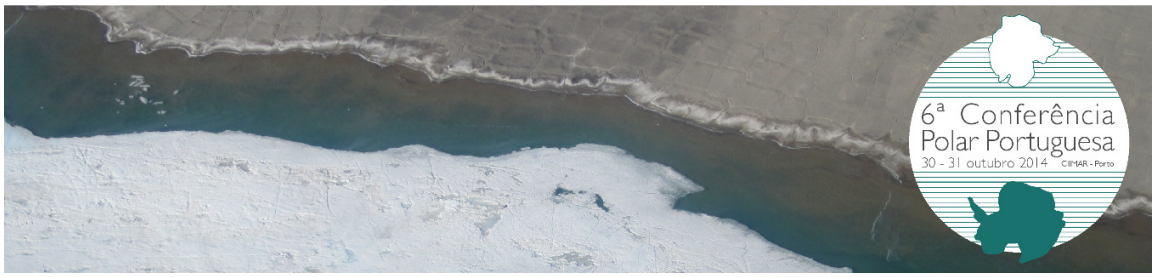
In this work we present, and interpret, geochemical data of volcanic rocks from Deception Island, Antarctica. Integrated in the CONTANTARC project, a set of 32 volcanic samples (tephra, having dimensions corresponding to lapilli), were collected in three regions of the island, all belonging to Post-caldera deposits formation. The Deception rocks form a compositional series that is almost limited to basaltic andesites, having a restricted SiO2 variation (between 52.5 and 55.5 wt%). These rocks have a subalkaline character, but not very pronounced. On the A(Na2O+K2O) – F(FeO*) – M(MgO) diagram, the trend produced by Deception tephras implies an initially moderate Fe-enrichment followed by a decrease in Fe content through magma differentiation, with data plotting close the limit between calc-alkaline and tholeiitic fields. Additionally, all lavas have a low-K nature.
The limited geochemical variation of the studied tephras, could be explained by their high volatile content, which are directly related to the notorious high amount of vesicles (up to ~ 50% volume) measured in these rocks. If this is a primary characteristic associated to magma composition, it is envisaged as a zonation in the magma chamber, where the volatile-rich magmas (already vesiculating) could preferentially occupy its top through density contrast to the remaining volatile-poor magmas and generate having limited compositional variation.
Despite the limited tephra compositional variation (e.g. Mg#= 53-41), their geochemical characteristics imply the occurrence of crystal fractionation; in fact, the regular decrease in CaO, Al2O3 and CaO/Al2O3, coupled with an increase of Fe2O3T with decreasing Mg#'s, supports the fractionation of olivine ± plagioclase ± clinopyroxene (all these mineral phases forming phenocrysts in Deception lavas). The sharp decrease in Fe and Ti concentrations (at ~Mg# =43), indicates titanomagnetite crystallization. The crystal fractionation trend for Deception tephras (also supported by the systematic increase in incompatible elements with differentiation) is well integrated in this more extensive magmatic process defined for lavas (basalts to trachydacites), suggesting that it is the dominant process relating volcanic rock compositions.



ASSESSMENT OF THE SPATIAL VARIABILITY OF SURFACE DEFORMATION OF HURD ROCKGLACIER USING D-INSAR (LIVINGSTON ISLAND, ANTARCTICA)

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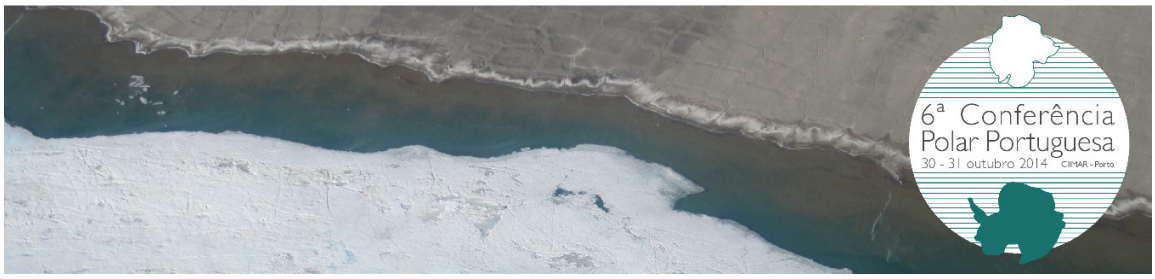
Nine rockglaciers and eleven protalus lobes have been identified in the South Shetlands by Serrano and López-Martínez (2000). However, little is known on their deformation rates nor about possible changes associated with a changing climate. Since the Western Antarctic Peninsula is one of the areas on Earth which has been warming at a faster rate, monitoring rockglacier deformation should provide insight into the influence of climate change on geomorphodynamics. Hurd rockglacier is located in the south of Hurd Peninsula, in a glacial cirque with a ridge varying from 227 to 301 m asl. The valley shows steep rockwalls with extensive scree slopes and a small retreating valley glacier with a prominent frontal moraine, from where the rockglacier develops. The rockglacier body is ci 630 m long and 290 m wide and the surface shows frequent pressure ridges and furrows, especially in the lower sector. The rockglacier front is 15-20 m high and shows a slope of 45º (Serrano and López-Martínez 2000).

In this poster we present the results of surface deformation monitoring using stakes and D-GPS measurements conducted annually since 2011, together with the analysis of permanent scatterers usin DInSAR from TerraSAR-X imagery. Deformation in the rockglacier body measured with D-GPS varies spatially between 8 and 15 cm/year, with highest rates in the northwest part of the rockglacier. Interpherometric data from the summer of 2014 show similar patterns, with a fastest moving area in the same sector of the rockglacier. It also shows that Hurd rockglacier is the area with fastest movement, which is compatible with the presenence of the rockglacier. The results also support the application of DInSAR as valid technique to assess terrain deformation in the unconsolidated ice-free areas of the South Shetlands.



EVALUATION OF A POSSIBLE URBAN HEAT ISLAND EFFECT IN MCMURDO STATION, ANTARCTICA

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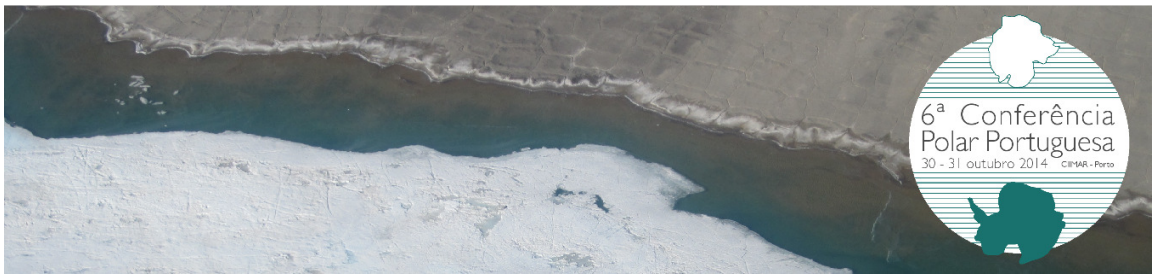
The US Scientific Station of McMurdo is located at Ross Island in East Antarctica. This station constitutes the largest human presence in the continent. The number of buildings surpasses more than one hundred and during the peak science season (Nov. to Jan.) the population amounts to 1,500 people. McMurdo´s climate (1981-2010) shows polar characteristics with an average monthly temperature of -16.7ºC (SCAR-READER, 2012). The station is located close to the coast with climate also reflecting the influence of topography on local wind regimes.

In Alaska, Urban Heath Islands (UHI) were identified by Magee (1999) and Hinkel (2003). This study follows Hinkel´s methodology for Barrow, Alaska and evaluates the possibility of the existence of an UHI due to human action in McMurdo. One year of daily temperatures from two sites, one within the "urban" (u) area opposed to other with more "rural" (r) characteristics, were compared (ΔTd), determining periods corresponding to ΔTd, u-r>0 ("urban" area warmer than the "rural" area). Correlations between these periods' temperatures and temperatures from the rural area were analysed.

Between March and November 2008 the daily average temperatures of the urban area were, in average, 1.1ºC higher than in the rural area (ΔTd, u-r) and, in three periods of approximately one month each, the average temperature was always higher in the urban area reaching a maximum of 6.1ºC. A clear relation between the wind and the magnitude of this ΔTd, u-r was not established, probably due to complexity of the area's topography. Nevertheless, considering the temperature differences (ΔTd, u-r) and the amount of thermal energy used to keep the base operational during winter and consequently liberated to the lower atmosphere of the built area, this study suggests a possible Urban Heath Island effect in the area of McMurdo Station.



MORPHOMETRIC ANALYSIS OF ICE-WEDGE POLYGONAL NETWORKS ADVENTDALEN, SVALBARD

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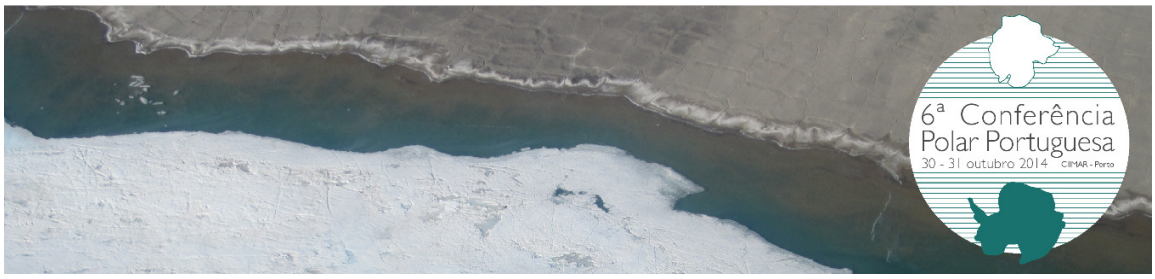
Permafrost gives rise to a number of unique and complex landforms. Ice-wedge polygons are the most widespread, most visible, and most characteristic landform of lowland permafrost terrain formed by repeated freeze-thaw cycles. The morphology of the ice-wedge polygons is controlled by various environmental factors which determine dimensions, shape, and orientation of polygons.

This study was performed on the polygonal networks of the Adventdalen valley in Svalbard. Morphometrical parameters of the polygonal network were calculated for more than 10,000 polygons identified in very-high spatial resolution remotely sensed images (four-bands RGB+NIR with 0.2 m/pixel of spatial resolution). Several polygon areas were field studied in 2010, 2011 and 2012. Multivariate statistics (factor analysis, hierarchical classification and discriminant analysis) were used to describe the polygon's morphometric parameters, and to determine their relationship to local environmental controlling factors. Based on the morphometric similarity (dimension, shape and topology) 6 major groups of polygons were identified. Their spatial distribution in Adventdalen highlights a general morphometric zoning from west to east. The groups located in the western part of the valley have a greater asymmetry in polygon size, while in eastern areas a more uniform distribution of the mean polygon area and greater overall polygon sizes were found.

The spatial zoning that was identified suggests a spatial control on polygon morphometry, probably controlled by geoecological variables, which may affect the growth and shape of polygons. The results from discriminant analysis show that geoecological factors (e.g. geology, geomorphology, slope, wetness index, distance to river/sea) contribute to successfully classifying more than 80% of the polygons within the 6 major morphometric groups.



ASSESSMENT OF PHOTOGRAMMETRIC TECHNIQUES FOR ROCK-GLACIER CREEP MONITORING (SOUTH SHETLANDS, ANTARCTICA)

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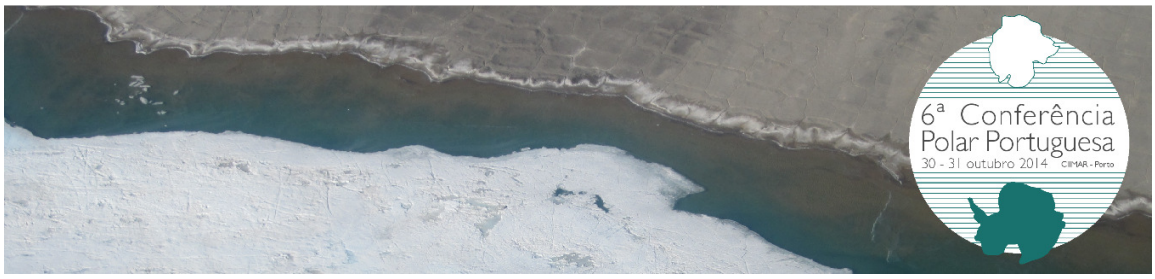
Aerial photography and satellite imagery are known data sources for wide-area mapping. Thus, suitable photogrammetric techniques can provide precise geomorphologic mapping and mass movement quantification. Creeping mountain permafrost, seen in rock-glaciers, is a climate-induced deformation and key landform geo-indicator of environmental change, with surface velocities of centimeters, decimeters and sometimes up to a few meters per year depending on material properties and thermal conditions. In Antarctica, these mass movement rates are still poorly studied, particularly in the Antarctic Peninsula region.

This study presents very-preliminary results of creeping mountain permafrost monitoring observed in Livingston (Hurd rock-glacier), through photogrammetric techniques applied to high resolution imagery. Comparing an orthophoto from 1957 with a quick-bird image from 2007, point to horizontal displacements between 10 cm/year, at the lower rock-glacier's fronts, and 30 cm/year, at the higher locations, close to the observed Real Time Kinematics Global Navigation Satellite Systems displacements measured for the last 4 years. This site provide ground-truth for the photogrammetric technique. A suitable technique, providing good results at the ground-truth site, can assess geomorphic dynamics at the regional scale and different climate settings to monitor environmental change with this geo-indicator.



DISSOLVED TRACE ELEMENTS IN FILDES PENINSULA, KING GEORGE ISLAND, ANTARCTICA

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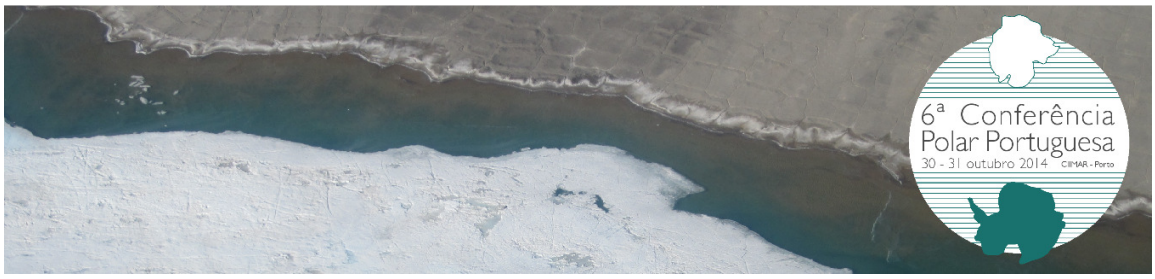
Fildes Peninsula is located in King George Island, South Shetland Islands, Antarctica. The proximity with South America and the retreat of the ice during the Austral summer turned this area in an important gateway to Antartica. For this reasons, a high density of scientific stations and logistic activities are located there.

In order to track inputs of trace elements (As, Cu, Cd, Zn, Pb and Hg) in the aquatic systems of the Peninsula, two field campaigns were made during the summer of 2013 and 2014. In 2013, 4 fresh and 12 saline water samples were collected in several areas of Fildes Peninsula: Fildes Bay, Great Wall Bay, Elephant Bay and Ardley Island. In the fresh water samples no perturbation resulting from anthropogenic activities was found. On the other hand, high values of Zn, Cu and Pb were found in saline water samples and seem to be the result of anthropogenic activities or structures.

A second field campaign in 2014 was focused only on Fildes Bay, where the bulk of scientific stations are located, with the aim to understand the extent of the anthropogenic pressure in this ecosystem. 6 samples were collected in different days (12 samples in total) from the seashore. Comparing with the 2013 sampling, higher values of dissolved trace elements (As, Cu, Cd, Zn, Pb) were found in Fildes Bay. The spatial and temporal distribution of the concentrations suggests a discharge directly from the stations or from the seepage in this area, which was not seen the year before.



TOXICITY POTENTIAL OF ANTARTICA SOILS RELATED WITH TRACE ELEMENTS RETENTION

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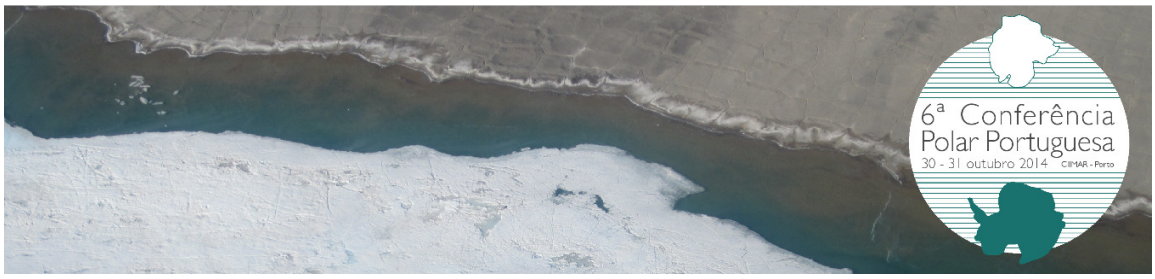
While Antarctica holds the reputation of an untouched area of the planet, there has been actually an increase in the human pressure over its ecosystems in the past half-century. This study addressed the putative soil pollution by metal loads in Fildes Bay (King George Island, Antarctica).This is still a largely overlooked area of Antarctica as to environmental risk assessment although it holds potential sources of contaminants deriving from human activity. Adding to natural sources, tourism and even the establishment of scientific stations seem to have contributed as sources of pollution by trace elements. Four soil samples were collected in different areas regarding the distance to potential contamination sources. Trace elements quantification was run on the soil samples (Cr, Ni, Cu, Zn, As, Pb and Cd by inductively coupled plasma mass spectrometry, and Hg by atomic absorption spectrometry) and elutriates prepared under a reduced temperature of 4 ºC were selected as the test matrix to address their ecotoxicity. The elutriate samples were tested using a standard ecotoxicological battery comprising organisms that represent different functional levels in aquatic ecosystems: (1) the luminescent bacteria *Vibrio fischeri*, (2) the microalgae *Raphidocelis subcapitata*, (3) the macrophyte *Lemna minor* and (4) the cladoceran zooplankter *Daphnia magna*. Their responses were expected to provide a general view on the hazardous potential of lixiviates in receiving water-bodies hence allowing an estimation of the environmentally hazardous potential of the focused trace elements. While the luminescence of *V. fischeri* and the survival of *D. magna* were largely unaffected by the elutriates, the growth of both producers was significantly impaired, namely: the estimated EC50 values as low as 37% elutriate of soil 3 for *R. subcapitata* and maximum *L. minor* yield inhibition as high as 35% elutriate of soil 2. Moreover, soil 3 showed the highest burden of Cr (95 µg Kg^{-1}) and Ni (35 µg Kg^{-1}), followed by soil 2, which is likely to relate to the toxic effects noticed. Still, the elemental concentrations were all below protective benchmarks in sediment and soil quality guidelines indicating a more than additive joint action of the contaminants present in the complex mixture that constitutes the tested matrix.



THE USE OF MULTIPLE CORRESPONDENCE ANALYSIS TO EXAMINE CORRELATIONS BETWEEN DIFFERENT ICE-WEDGE POLYGON NETWORKS IN ADVENTDALEN, SVALBARD, NORWAY.

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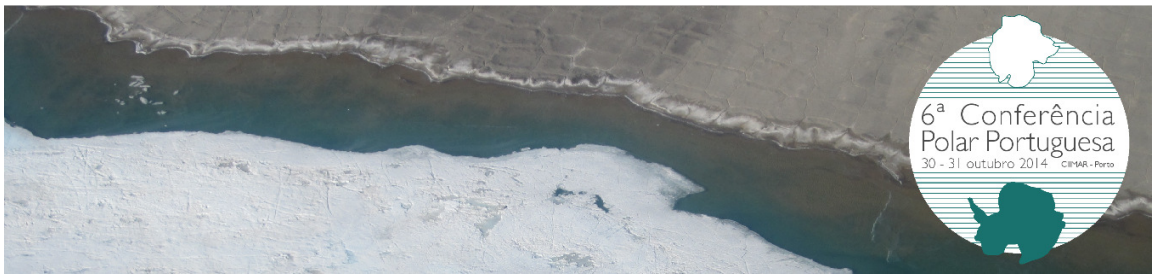
The Polygonal networks studied in this work result from ice-wedges located in the Adventdalen valley, Svalbard archipelago, at 78º N. The contours of these networks were digitized from the analysis of very-high spatial resolution remotely sensed images (fourbands RGB+NIR with 0.2 m/pixel of spatial resolution), acquired in 2009 by the Norwegian Polar Institute. More than 10,300 individual polygons in 120 networks were identified and incorporated into a GIS. The largest of these networks (a total of 17 networks and 6166 polygons) were analysed in detail. Qualitative and quantitative parameters were extracted, for each polygon of the 17 networks, into a database. These include geometric parameters, topological and topographic parameters (derived from a GDEM –Digital Elevation Model). The percentage of area of each geological and geomorphological unit within network was also computed. In order to obtain underlining similarities between the variables related to the physical or geomorphological processes that lead to a specific shape or size of polygon Exploratory Data Analysis (EDA), was used through Multiple Correspondence Analysis MCA) and applied to the whole dataset of parameters of this database, thus exploring the networks characteristics from a multidimensional point of view. Supplementary projections were also applied to isolated variables. The MCA technique had proven to be an adequate tool to quantitatively identify groups of polygonal networks with similar properties, by graphically placing into evidence groups more homogeneous and simultaneously distinct from other groups/ networks. Clusters of networks are noticeably different in what concerns the geometric/topologic features of the polygons, which we found to be related to their site of development: for instance, over flat terrain and loess sediment they exhibit small and orthogonal polygons whereas in slopes and consolidated formations they exhibit large, asymmetric and more hexagonal polygons.



CYANOBACTERIA FROM THE MCMURDO DRY VALLEYS (VICTORIA LAND, EAST ANTARCTICA): THEIR BIODIVERSITY AND CHEMODIVERSITY

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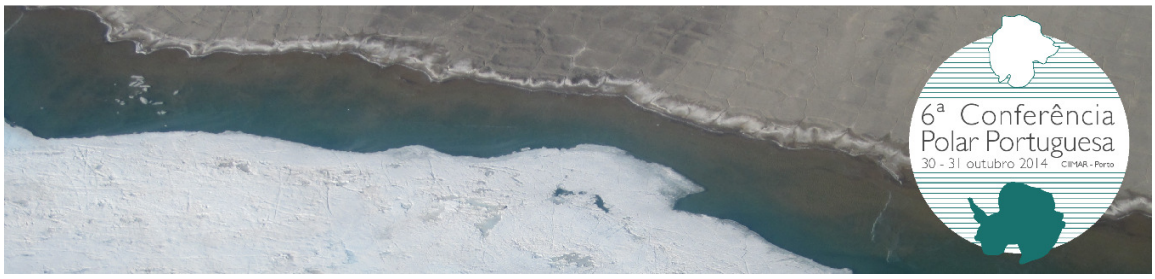
Cyanobacteria constitute one of the largest, most diverse and widely distributed group of prokaryotes. In fact, these photosynthetic microorganisms are present even in extreme environments such as those from cold Polar regions, where they play an important ecological role as primary producers and nitrogen fixers. Moreover, cyanobacteria are well recognized as a prolific source of complex bioactive secondary metabolites. However, little is known about the potential of Antarctica's cyanobacterial strains for the production of those bioactive molecules.

Here, we present a project that aims to study the diversity of cyanobacteria from the Dry Valleys - the largest ice free zone in continental Antarctica and one of the coldest and driest terrestrial environmental on Earth, with the objective of searching for new secondary metabolites produced by Antarctica's cyanobacteria isolates. So far, two endolithic strains have been successfully isolated, from a sandstone sample. Preliminary data derived from the morphological and molecular characterization (16S rRNA gene sequencing; detection of polyketide synthase genes (PKS) and nonribossomal peptide synthase genes (NRPS) by PCR) indicate that one of the strains exhibits high similarity with *Leptolyngbya antarctica* and possess genes involved in the PKS/NRPS biosynthetic machinery, and thus has the genetic potential to produce bioactive compounds of polyketide and/or non-ribosomal peptide nature. In order to isolate secondary metabolites produced by this strain (and from others that may eventually be isolated), future work will include large-scale cultivation followed by organic extraction of the biomass. Bioassays will then serve as a guide for isolation. An overview of the whole experimental approach is conveyed.



DISTRIBUTION OF SHORT-FINNED SQUID *ILLEX ARGENTINUS* (CEPHALOPODA: OMMASTREPHIDAE) IN THE SOUTH ATLANTIC: LITTLE EVIDENCE FROM TOP PREDATORS THAT IT EXTENDS TO ANTARCTIC WATERS

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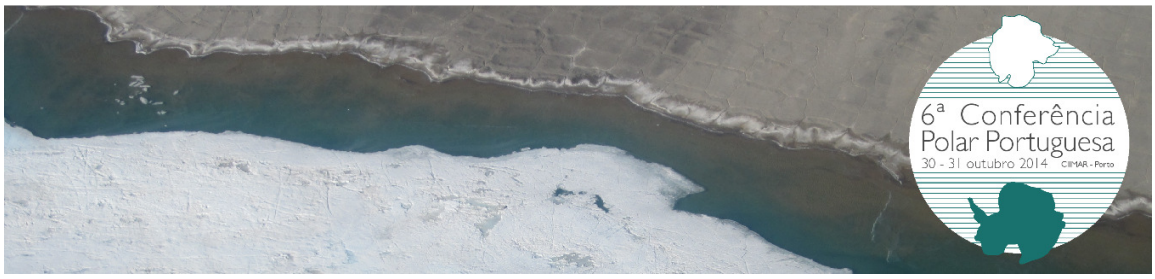
Global warming effects may change the distribution pattern of many species and some might extend into Antarctic waters. However, little evidence comes from pelagic marine species. The short-finned squid *Illex argentinus,* a species of commercial interest in the South Atlantic, has been reported in the diet of grey-headed *Thalassarche chrysostoma*, black-browed *T. melanophrys* and wandering *Diomedea exulans* albatrosses breeding in the Antarctic waters, suggesting that *I. argentinus* might occur in colder waters. To verify such hypothesis, we used stable isotope analyses from the cephalopod beaks collected in the diet of these three albatross species breeding in Bird Island, South Georgia (54°S 28°W). Our results show that *I. argentinus* identified in their diet has a Sub-Antarctic distribution (i.e. $\delta^{13}C$: -18.77 to -15.28 ‰). Thus, it is more likely that these albatross species foraged in Sub-Antarctic waters, at the Patagonian Shelf, where *I. argentinus* is commonly distributed (validated by the $\delta^{13}C$ of the Patagonian shelf distributed *Octopus tehuelchus*) rather than *I. argentinus* extending their distribution further south.



FEATHERS AS A TOOL TO ASSESS MERCURY CONTAMINATION IN GENTOO PENGUINS: VARIATIONS AT THE INDIVIDUAL LEVEL

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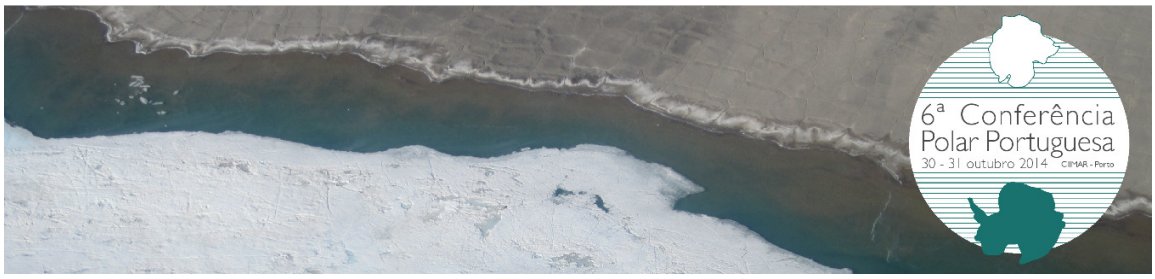
Feathers have been widely used to assess mercury concentrations in seabirds, since they reflect metal levels at the time of its formation and are easy to obtain with minimum harm to the birds. Moult is considered the major pathway for mercury excretion in seabirds. Penguins, which moult annually in a short period of time, are assumed to have a low individual-variability in feather mercury concentration, once it is assumed that all feathers are formed at a similar time. However, no studies ever validated this assumption. This is quite relevant to marine ecologists, in order to achieve accurate conclusions when interpreting the mercury contamination patterns from feathers of these birds. To test this assumption, we measured the mercury concentration in 5-7 body feathers of 52 gentoo penguins (*Pygoscelis papua*) breeding at Bird Island, South Georgia (54°S 38°W). Mercury levels ranged from 0.15 - 3.1 mg kg^{-1}: 0.41-3.1 mg kg^{-1} for males and 0.15-1.6 mg kg^{-1} for females. 25% of the penguins studied showed significant differences in the amount of mercury in their feathers (CV: 34.68 - 96.65 %). This variation may be caused by differences in moult patterns within the population leading to different interpretations if included in the overall population. The implications of this study are discussed, particularly from an Antarctic monitoring programs perspective, under the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR).



RENAL FUNCTION IN THE ANTARCTIC *NOTOTHENIA ROSSII* EXPOSED TO DILUTED SEAWATER AND ELEVATED TEMPERATURE

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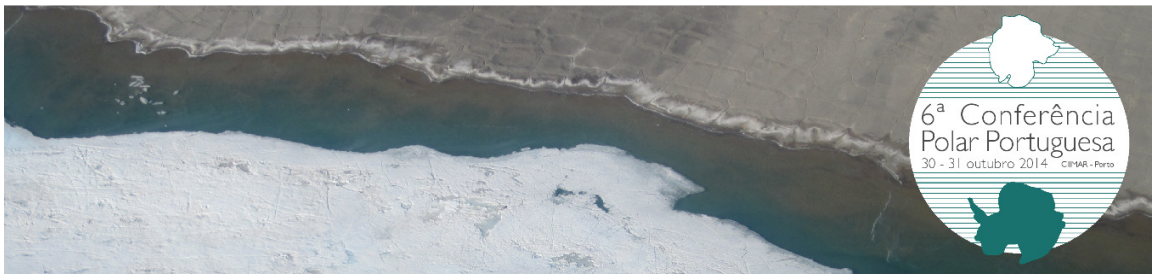
Antarctic fishes evolved in a stable environment for roughly 30 million years, currently displaying a number of peculiar structural features, including aglomerular kidneys, suggested as an adaptation to prevent the loss of water and anti-freeze proteins.

Recent climate changes and forecast models indicate the temperature increase in coastal areas of maritime Antarctica may lead to melting and freshening of shallow enclosed waters.

We exposed Notothenia rossii to rapid but gradual changes from 0-2ºC to 4-8ºC and from 32‰ to 20-10‰, over a period of up to 10 days. Plasma and urine electrolytes and renal and branchial Na+/K+-ATPase were determined, and tissues were collected for immunohistochemistry and gene expression.

Histological analysis confirmed the aglomerular nature of the kidney and showed high expression of Na+/K+-ATPase in basolateral membranes, with a regionally separation of CFTR and NKCC transporters. The rise in temperature induced a dependent decrease in plasma osmolality and an increase in Na+/K+-ATPase activity, while low salinity reduced both plasma and urine osmolality, with fish showing a marked increase in urine production. As for other fish species, divalent cations are the main electrolytes target in renal excretion, with magnesium making up for most of the osmotic pressure in urine. Results indicate these fish possess important mechanisms for water elimination despite their aglomerular kidneys and may cope partially with changes in local salinity.



DECADAL VARIATIONS ON THE DEMOGRAPHY AND PHENOLOGY OF BLACK-TAILED GODWITS (*LIMOSA LIMOSA LIMOSA*) BREEDING IN THE ARCTIC REGION (ICELAND).

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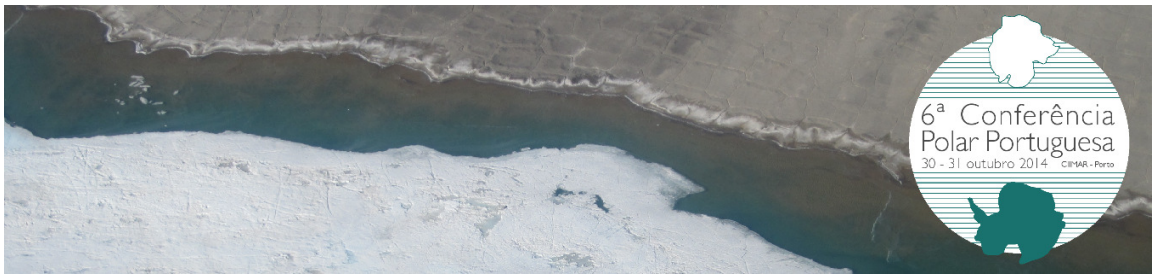
The Arctic is an extremely harsh region for most of the year. However, during the summer months it bursts with life. The capacity of migratory birds to fit breeding season and migratory journeys from southern latitudes to the short arctic summer has provided a long-standing riddle. Black-tailed Godwits (*Limosa limosa limosa*) breeds primarily in Iceland, with small numbers in the Faeroes, Lofoten and Shetland Islands. In Iceland they breed in lowland areas, primarily on coastal marshes and dwarf-birch bogs. Upon arrival in Iceland (April to May), Icelandic godwits congregate on a few sites in west, south and east Iceland. These sites have been regularly monitored every spring since 1999 in order to determine arrival dates of marked individuals during 3-4 weeks. During the arrivals the nesting territories still covered by snow and ice, and individuals concentrated in relatively milder coastal areas (in many cases influenced by geothermal activity) which can find food available. During this period we can establish and monitoring the size of breeding population. This work aims to investigate the phenology of this migratory species on the Artic.



How nitrogen is recycling in Transantarctic Mountains where life exists under their limits: A culturing approach.

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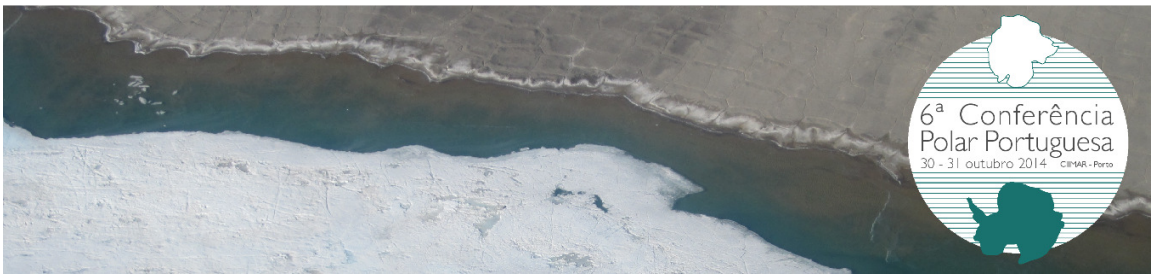
The Victoria Valley, placed within the McMurdo Dry Valleys of Antarctica, is a vast, ice-free region considered to be one of the most physically and chemically extreme terrestrial environment on Earth. In such harsh conditions, microorganisms dominate and are believed to drive all processes in the system keeping active the biogeochemical cycles within the ecosystem. From the point of view of the nitrogen (N) cycle, such ecosystems offer a unique natural environment with extreme gradients of N isotopic compositions. During the 2013 NZTABS campaign to Victoria Valley, endolithic and soil samples were collected and preserved to be used in a culturing approach in order to isolate the nitrogen-fixing and nitrifying microorganisms present in those samples. To this end, the research was structured in three steps: (1) the amplification of *nifH* and *amoA* genes which are related with the presence of nitrogen-fixing and nitrifying microorganisms respectively; (2) set up of enrichment cultures to isolate N_2-fixing and nitrifying organisms; and (3) to characterize the isolated organisms making use of molecular analysis such as next generation sequencing and bioinformatics methodologies. At this stage, enrichment media experiments were started in order to obtain ammonia oxidizing Archaea (AOA) and ammonia oxidizing Bacteria (AOB) isolates. The presence of the *amoA* bacterial gene was successfully amplified in the beginning of the enrichment assay, which indicates the presence of nitrifying organisms both in the samples and in our selected media. With respect to the study of N_2-fixing organisms (diazothrophs), the unexpected development of a population of a *Chlorella*-like alga in $BG11_0$ – a medium without a source of N and C - points to a probable consortium (symbiosis) between green microalgae and diazotrophic bacteria, a surprising finding to be further explored. Our research is looking for new discoveries that can have influence impact on the current Knowledge of AOA and AOB phylogenies and in the conventional ways of N_2-fixing and nitrification pathways from communities involved in N-cycle.

This study was funded by the Portuguese Science and Technology Foundation (FCT) through a researcher starting grant to C. Magalhães (PTDC/MAR/112723/2009 - FCOMP-01-0124-FEDER-015422), and through the Portuguese Polar Program (PROPOLAR).



TERRESTRIAL MICROBIAL ABUNDANCE AND DIVERSITY ACROSS A TRANSECT FOCUS IN WATER AVAILABILITY IN THE ANTARCTIC DRY VALLEYS

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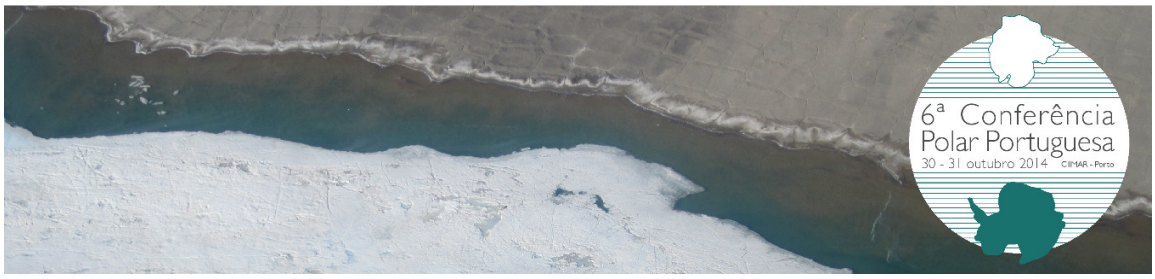
The Dry Valleys of Eastern Antarctica are vast, ice-free regions believed to be the coldest, driest desert on Earth. Little is known about the organisms that survive in these terrestrial ecosystems that are subject to more environmental stresses than any other desert on the planet. In order to answer these questions, we describe some results from the past expedition to Victoria Valley, Antarctica, under the NITROEXTREM project (Propolar), integrated in the ICTAR international program. The 2013 Antarctic field campaign covered a sampling area of approximately 300 km2 in Victoria Valley and surrounding areas. In this study, we will present the results obtained in samples collected within a water availability gradient transect. A total of six sites across a 32 m transect, beginning at the edge of a water pond (77º 20.241'S, 161º 38.593'E (WGS84)) in direction to dry sediments (77º 20.232'S, 161º 38.526'E (WGS84)) were analyzed for geochemical characteristics and microbial abundance, diversity and composition. Our results showed that even though the great abiotic spatial gradient, particularly in water activity, ranging across the transect from 1.06 (water pond edge) to 0.15 (dry sediments), no important differences were found on the microbial abundance (obtained by DAPI direct count method). Although a clear shifts was observed in bacterial activity and composition. The principal bacterial group represented in the sites nearest the water pond was Proteobacteria (> 35%), whereas Actinobacteria (> 30%) was the most prominent within dry sediments. Moreover, the three sampling sites nearest the water pond showed higher richness and diversity. The fact that both parameters are positively correlated with water activity revealed that water availability can be fundamental to the development and distribution of more complex microbial communities in the severe Antarctic soil ecosystems.

This study was funded by the Portuguese Science and Technology Foundation (FCT) through a researcher starting grant to C. Magalhães (PTDC/MAR/112723/2009 - FCOMP-01-0124-FEDER-015422), and through the Portuguese Polar Program (PROPOLAR).



INTRA-ANNUAL VARIATIONS OF THE DIET OF GENTOO PENGUINS (*PYGOSCELIS PAPUA*) AT SOUTH GEORGIA (SOUTHERN OCEAN)

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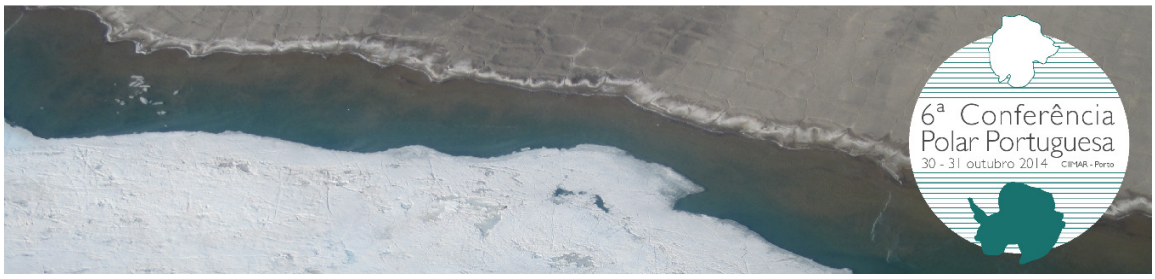
Gentoo penguins *Pygoscelis papua* are excellent bio-indicators of local prey availability (within 50 km) around their colony. As their foraging behaviour does not change considerably, and they come regularly to their breeding island, all through the year it is possible to assess in detail the availability and population dynamics of poorly known marine organisms (i.e penguins prey) during the Antarctic winter, when research cruises are extremely rare. In this study we assess the feeding ecology of gentoo penguins at Bird Island, South Georgia (54° S, 38° W) during the Antarctic Winter of 2009, using scats, to assess intra-annual variations in their diets, population dynamics of their most abundant prey and evaluated the implications of these results for the conservation of these penguins. The amphipod *Themisto gaudichaudii* was the main prey of gentoo penguins (present in 77.1% of the samples). Gentoo penguins diets were able to show the growth of *T. gaudichaudii* through the Antarctic Winter. As environmental conditions seemed unfavourable to gentoo penguins in 2009, with apparently lack of Antarctic krill *Euphausia superba* in close-by waters, these penguins struggled in finding sufficient amount of prey to maintain their body condition levels for reproduction. This was expressed in their attempt to breed in the following Summer 2-3 weeks later (British Antarctic Survey, unpublished data). In terms of conservation, if these unfavourable conditions continue to occur during the Antarctic Winter in this region, the population of gentoo penguins in South Georgia can be affected by decreasing their breeding performance.



PORTUGAL EDUCATION AND OUTREACH: Final results from the polar projects "Profession: Polar Scientist" and "Education PROPOLAR"

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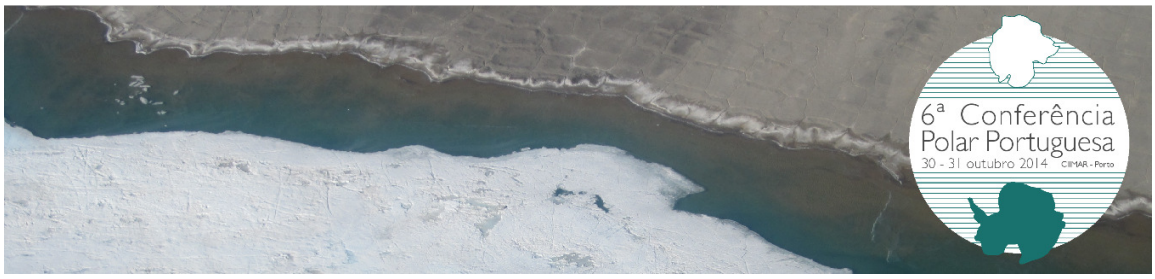
The educational projects "Profession: Polar Scientist" and "Education PROPOLAR", supported by Ciência Viva, and endorsed by the Portuguese Polar Program PROPOLAR, Association of Polar Early Career Scientists (APECS Portugal and APECS international) and by Polar Educators International (PEI) were concluded in August and September 2014. The first project aimed to reinforce the links between polar scientists with schools, under POLAR WEEKS organized by APECS and PEI, whereas the second project aimed to provide tools and materials to schools on polar science. The aim of this presentation by poster is to provide the final results of these educational projects while providing guidance and an example of how other countries can engage in Antarctic education and outreach initiatives at an international level in the future.



SUPPORTING POLAR RESEARCH: THE CONTRIBUTION OF THE PORTUGUESE POLAR PROGRAM (PROPOLAR)

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Polar research has global impacts and is truly interdisciplinary, international, involving cutting edge science. Science questions and the rough environmental conditions allow for new technological developments fostering collaboration between research units and industrial partners, while also promoting diplomatic and educational links. Portugal is a new country in Polar research, but during the last decade new groups formed in several institutions. The National Conference on Polar Sciences shows annual involvement of circa 15 institutions and international publications are growing at a steady pace.

The Portuguese Polar Program (PROPOLAR) is the national framework for Portugal-based researchers to access the Polar regions. It was initiated in 2011 following an increasing demand by the scientific community. The program is FCT-funded in an annual basis, is coordinated by IGOT-ULISBOA, CCMAR, IMAR-UC and IST-ULISBOA and is a multi- and interdisciplinary initiative coordinating logistics with programs from other nations. Since Portugal has no research stations nor vessel in the Polar regions, PROPOLAR provides field access to Portuguese researchers while contributing to international Antarctic logistics. In the past 3 years, this was done by freighting an annual flight (BAE-146) from P. Arenas (Chile) to King George Isl (Antarctic). Seats are offered to partner programmes, facilitating access by Portuguese scientists to partner logistics. Travel support to teams working in the Arctic or conducting laboratorial analysis on Antarctic samples is also provided.

Access to the Polar regions is based on annual call for applications open to the national science community. In the last three Antarctic seasons PROPOLAR supported field access to 45 researchers (29 from Portuguese institutions), from 19 institutions, integrated in 24 projects, equaling 2198 researcher.days. There is regular collaboration with 10 Polar programmes, which in the past 3 years used PROPOLAR to transport 227 passengers (scientists and technicians) to the Antarctic. PROPOLAR is closely supported by the FCT Polar Office, while is also framed by national participation in the ATS and EPB, with close contacts with COMNAP, FARO and, at the science level, with SCAR and IASC.

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