No 04

GLANAM Newsletter

this issue:

Dear followers,

I am pleased to inform you that the Mid-term review meeting for the GLANAM Network went smoothly. The EU officers Ms. Giuliana Donini and Prof. Emeritus Robert Nesbitt praised both supervisors and fellows for the good general progress of the project and made constructive comments regarding the few details that the Network has yet to improve. One of these problems is outreach, the GLANAM group has been relatively quiet about its activity in the past year or so. Sure enough, the majority of the fellows were still getting to grips with their respective projects and all the hassles related to the first year of a PhD student. Personally I feel confident that from now on the latest accomplishments of the GLANAM fellows will reach many attentive eyes and ears, not the least because of the updated Newsletter. Also, do not forget to follow us on Twitter (@GLANAM1) or on our website.

I would like to welcome Lara F. Pérez to GLANAM on behalf of all the members. Lara is a Postdoctoral researcher with expertise in geophysics and sedimentology, and a new precious associate of the Network. Lara is based at GEUS, Copenhagen, started to work with us only a few months ago. On page 2 of the Newsletter she is giving a brief presentation of herself and her background.

This April issue is featuring Northern Ireland. Two of our PhD fellows, Kasper Weilbach and Kevin Schiele are focusing their attention on the deglaciation of the western margin of the British-Irish Ice Sheet (BIIS). From page 3 onwards you will be able to read about their experience on the island and some details about the state of the art knowledge of the demise of the last ice sheet in that region.
Enjoy

Riccardo Arosio

Communications

- The GLANAM 2015 annual meeting will be held at UNIS in Longyearbyen on Svalbard from the 12th to the 17th June
- The annual QRA Postgraduate Symposium committee is to be held 2-4th September 2015 at the Scott Polar Research Institute. For more info go to: http://qrapg.soc.srcf.net/

Meet the researchers: a new entry, Lara

Hello everyone,

Please, allow me to introduce myself. My name is Lara F. Pérez and I am from a small town in the northwest of Spain. I just finished my PhD last December and I am now ready to start a new phase as a Postdoc within the GLANAM team.

My PhD research was about the tectonic, climatic and palaeoceanographic implications of a particular area of Antarctica, the Scotia Sea between South America and the Antarctic Peninsula. There I was focussing on deep oceanic basin analysis, particularly the sedimentary processes and stratigraphic architecture.

Let's change poles now, as a member of GLANAM I am based at the Geophysical Department at GEUS and I am going to pay attention to the northeast margin of Greenland. Particularly, the aim of my research is to reveal the seismic architecture of the margin with emphasis on the role of ice stream processes on the continental margin evolution. This theme is new and really interesting, not only for the ice sheet history, but also for the sedimentary processes and hydrocarbon systems involved.

Copenhagen looks like a nice city. For now I found it really quiet but I think there are lots of interesting places to discover. I imagine that it is going to be easy adapting my lifestyle to the city. I may start buying a bike; it looks like everybody has one… or more! The people have always been kind to me, even if I don't speak a word of Danish. I am not worried about the language; it is true that it is hard sometimes, but two years are a long time and I will learn!

About my hobbies: I love diving and hiking, and also enjoy playing archery and swimming. I like going for long walks, spending time with friends and meeting new people. I also enjoy watching a good film, listening to music, but I especially like to read; I can spend hours reading a good novel!

I cannot explain how I became a scientist. There are some things in life that simply happen! I had never thought about being a marine geologist before, but during my degree I had the opportunity to start doing research. Time flew among expeditions, meetings and publications; and now I am a postdoc in a really interesting research project!

Within GLANAM I hope to grow up as a scientist and contribute to the knowledge of the North Atlantic margins with new and interesting findings. The collaboration with scientists working on related areas or topics is always welcome to exchange ideas and tackle new challengers.

Lara F. Pérez

Lara at Rothera Point (Adelaide Island, 67° 34' S 68 ° 08' W), Antarctica; 27 February 2015

Life in Northern Ireland, a brief guide for dummies

Northern Ireland belongs to the United Kingdom whereas the Republic of Ireland has been an independent country since 1922. If you decide to travel on the isle of Ireland you won't need to worry about border control and customs. Just a little sign at the side of the road and the text message on your mobile from your network provider will inform you about having crossed a political border. And one more thing, always have some change in Euros with you when travelling by car from the "North" to the "South" as Sterling is not accepted at the toll plaza.

There are plenty of places to visit in Northern Ireland (NI). Belfast and Derry/Londonderry are probably the most famous cities in the North that have an eventful historical background that stretches throughout the last centuries. There are lots of nice places worth a visit along the northern coastline close to Coleraine campus of the University of Ulster. It is also worth hiking part, or all of, the scenic route along the northern Irish coastline, which is part of the Wild Atlantic Way. If you decide to do so make sure you bring some time and your hiking boots of course. Starting at the coastal towns of Portstewart and Portrush you will pass the legendary medieval Dunlace Castle before approaching Bushmills where you can join a tour through the whisky distillery that holds the oldest licence. Afterwards you can enjoy a dram in the distillery's 1608 bar. The next stop following the road towards the east is the Giant's Causeway. The location was declared a World Heritage site by UNESCO in 1986. Basalt columns that resulted of volcanic activity in the early Paleogene (50 – 60 Ma ago) form the causeway that, according to the legend, was walked by the Irish Giant (Finn Mc Cool) and the Scottish Giant (Benandonner) to fight each other. Continuing on the road towards Ballycastle you should stop by Ballintoy harbour for a coffee, walk along White Park Bay beach during sunset and cross the thrilling 30m-high Carrick-A-Rede rope bridge. When you eventually get to Ballycastle you might get lost in all of the nice Irish pubs but there is also the opportunity of taking the tiny ferry to Rathlin Island where you can watch seals and puffins alongside with other seabirds from April onwards. If you are interested in Game of Thrones you may also want to visit the Dark Hedges which is an alley of old oak trees located between Ballycastle and Ballymoney. Another Game of Thrones site is Mussenden Temple in Castlerock which is located in close vicinity to Coleraine, just west of the river Bann. One of NIs best surfing spots for beginners and advanced surfers is Portrush. If you want to have a go with golf or simply want to improve your handicap there are also plenty of golf courses in the area between Portstewart and Bushmills. In May there is the *North West 200* which is NIs biggest and most thrilling road race with motorbikes. The race track forms a triangle between Coleraine University and the coastal towns of Portrush and Portstewart. Another big sports event in NI is the Giro d'Italia which is the second largest push bike race of the world. This bicycle race visits NI for 2 days and the track also follows along NIs stunning coast. As you can see, there is lots of to explore. So, start booking your flights.

Kevin Schiele

Map of Northern Ireland showing the main attractions along the northern coastline (*http://www.mapsofworld.com/northern-ireland/).*

View over Portrush Harbour towards west during a mild evening in autumn (photo: K.Schiele).

The Irish Ice Sheet, a review from the experts

Reconstruction of the Irish Ice Sheet (IIS) during and after the Last Glacial Maximum (LGM), a brief introduction of the main features.

The glacial history of Ireland has been studied for over 100 years, leading to a reasonable understanding of ice sheet behaviour onshore during the last glacial cycle. So far, only onshore glacial features (Fig. 1) such as drumlins and end moraines have been used for conceptual models for ice sheet extent, advance, and retreat (Fig. 2). Subglacial landforms (drumlins, striations, and eskers) are widespread features in Ireland (Fig. 1) and record offshore-directed ice flow onto the shelf during the last glaciation (Greenwood and Clark, 2009a). The late Midlandian (equivalent to the Devensian in Britain and the Weichselian in northern Europe and Scandinavia) glaciation of Ireland started prior to the LGM when ice from Scotland advanced towards the SW across Ireland and built together with ice from the upland dispersal centres the Irish Ice Sheet during the LGM (ca. 24 cal. ka BP). Evidence such as trimlines on mountains, flowlines, and cosmogenic nuclide and radiocarbon-dated features indicate that the British-Irish Ice Sheet (BIIS) overtopped all mountain ranges in Ireland and extended offshore. The maximum extent is marked by shelf-edge moraines and moraine complexes in the NW and W of Ireland (Fig. 3). In the Irish Sea Basin ice flows from Ireland and Britain were confluent. Expansion is thought to have occurred asynchronously and appears to have ceased at ca. 22 cal. ka BP in SE Ireland. Initial deglaciation after the LGM is further amplified by a global meltwater pulse at 19 cal. ka BP (P. Clark et al., 2004).

Fig. 1 Glacial map of Ireland redrawn from Synge, 1979 (after Greenwood and Clark, 2009a).

During the Cooley Point interstadial (≥20 - ≤18.2 cal. ka), the Irish Ice Sheet is thought to have lost approximately two thirds of its LGM mass (McCabe and Clark, 1998; McCabe et al., 2005). Nested moraines onshore and offshore (Fig. 3) indicate that the retreat was dynamic and interrupted by minor readvances. The most recent readvances occurred during the Clogher Head Stadial (18.2 - 17.1 cal. ka) and the Killard Point Stadial (17.1 - 16.0 cal. ka) in NE and Northern Ireland. The ultimate readvance of Scottish ice occurred across E County Antrim in northern Ireland just before the entire lowland-based Irish Ice Sheet was in the ablation zone at 15.5 cal. ka (J. Clark et al., 2009, 2012b). Only small glaciers formed in some mountain areas are thought to have persisted during the Nahanagan Stadial (12.9 - 11.7 cal. ka) prior to the onset of the Holocene (Colhun and Synge, 1980).

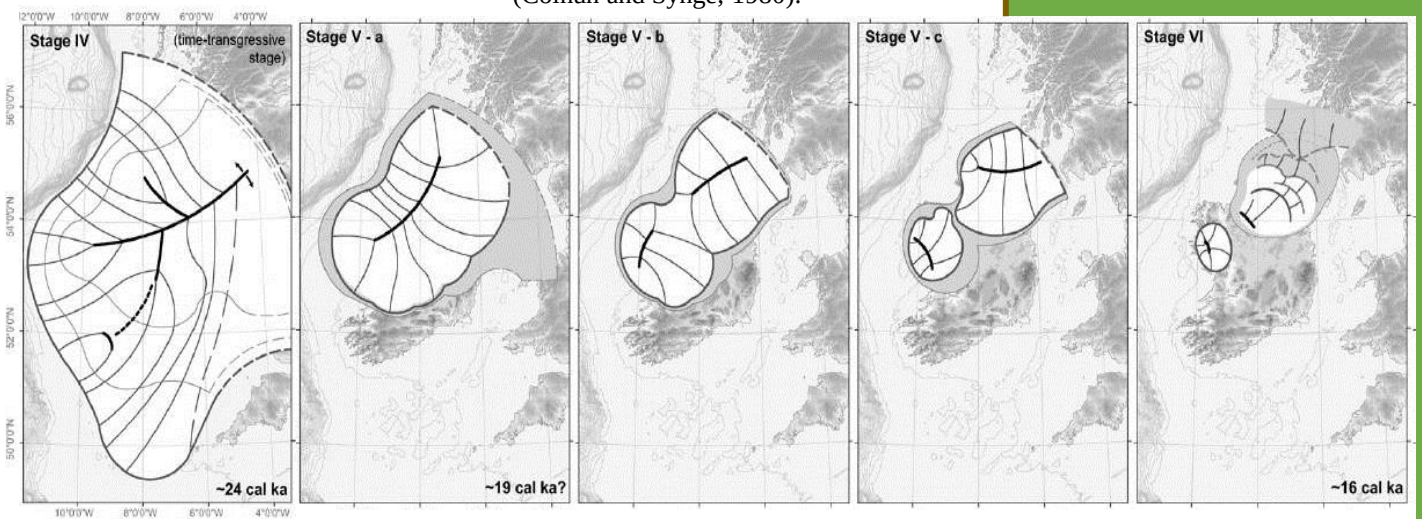

Fig. 2 (below) Conceptual model of glacial advance and retreat during and subsequent to the LGM in Ireland. This model is based on radiocarbon and cosmogenic nuclide dates from onshore features only. (Stage IV) LGM, (Stage V-a) Cooley Point interstadial (20 - 18.2 cal. Ka), (Stage V-b) Clogher Head Stadial (18.2 - 17.1 cal. Ka), (Stage V-c) Killard Point Stadial (17.1 - 16.0 cal. ka) the ice sheet retreated completely towards onshore in W Ireland, (Stage VI) Rough Island Interstadial (16.0 - 12.9 cal. ka) final stage of an unstable lowland ice sheet during abrupt warming. (after Greenwood and Clark, 2009b).

What are the main unknowns (if any) that are still to be investigated?

Shallow seismic profiles from the shelf west of Ireland have revealed a probable Quaternary succession of submerged end moraines (King *et al.*, 1998). Yet, none of these morainic ridges have been dated. Thus, it is unknown whether the outermost moraine ridges correspond to the maximum extent of last glacial deposits or if these features refer to earlier glaciations of the Midlandian period (Sejrup *et al.*, 2005). Another set of submerged glacial landforms has been identified from the Irish National Seabed Survey's marine geophysical data in Donegal Bay (Fig. 3) providing the first unequivocal evidence for a grounded ice sheet extending to the outermost shelf (Benetti *et al.*, 2010; Dunlop *et al.*, 2010; Ó Cofaigh *et al.*, 2012). This supports the idea of a slow retreating ice sheet on the continental shelf, leaving behind a set of well-developed, nested moraines in contrast to a more rapid retreating ice sheet onshore (C. Clark *et al.*, 2012a). However, the moraines on the western Irish continental shelf might also be related to ice-stream drainage into Donegal Bay during the LGM as hypothesised by Greenwood and Clark (2009b). As yet, there is neither direct dating control nor information on the depositional environments and lithofacies from associated marine sediment cores available on these submerged landforms that are essential for establishing the correct sequence of events on the shelf. However, unstudied marine geophysical and geological data are available from recent research cruises on the continental shelf in this area. This data now offers an unprecedented opportunity to GLANAM fellows Kasper and Kevin to resolve these key issues for this sector of the BIIS.

Kevin Schiele

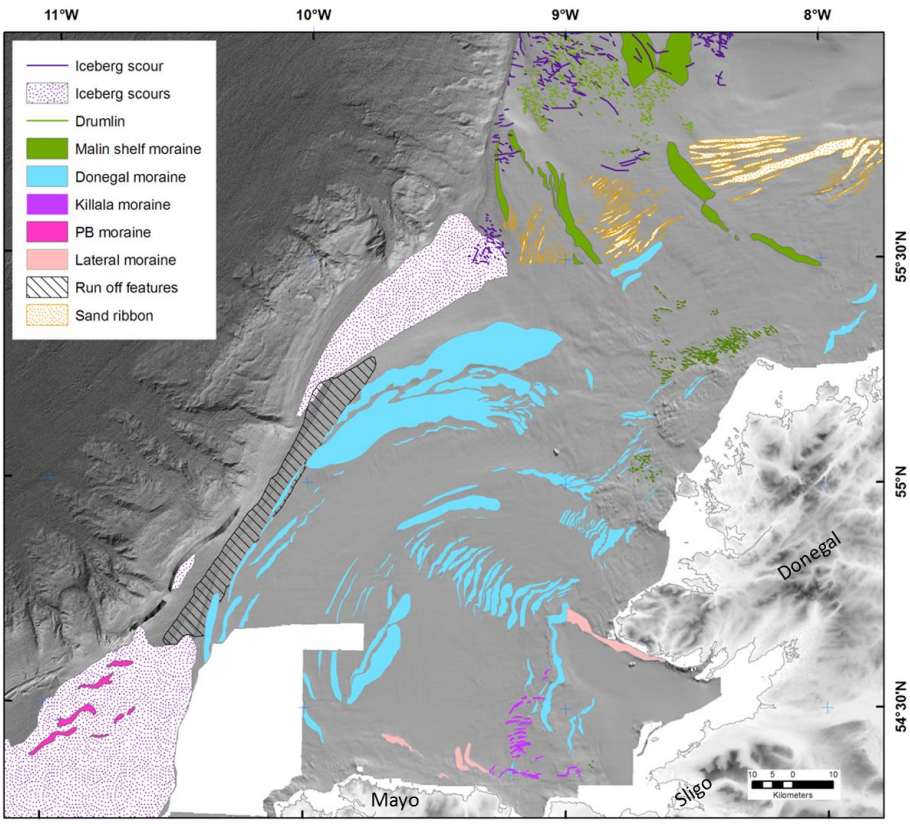

Fig. 3 Moraines and glacially derived morphological features on the western Irish shelf (after Benetti et al., 2010; Dunlop et al., 2010).

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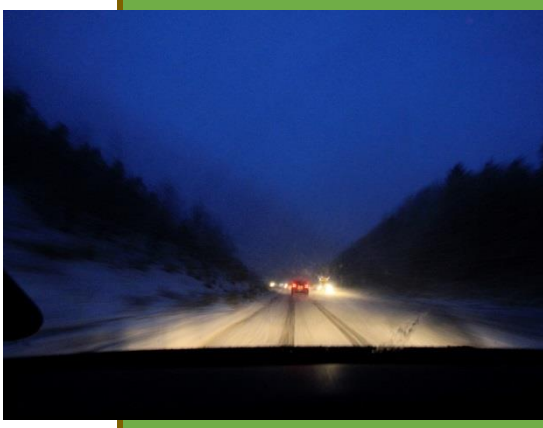
Adventures of a Dane in Ireland

For my project a secondment at Ulster University (UU) in Coleraine Northern Ireland was planned. The secondment time was set to be four months, but since I spent some weeks on the James Cook last summer with students and supervisors from UU, I have now planned to be here for two months only and then take the last bit of secondment time at a later stage. Although Northern Ireland is part of the UK, it is still very far from London, or from Durham for that matter. To get here one must embark on a lengthy journey with most of modern day's means of transportation. My secondment started an early morning in the beginning of March with a one hour delayed flight from Newcastle to Belfast, in beautiful northern English weather.

Landing in Belfast quickly changed that perspective though, since heavy clouds darkened the sky. In a taxi, and with Kevin's instructions at hand, I got to Belfast central station, and quickly learned about our distance from the heart of the empire. Paying by card in the taxi was no small achievement, and I was surprised that the old style dial-up modem, used by the taxi to communicate with the rest of the world, didn't start making the so familiar sound that would have brought me back to my early teenage years and the adventure it was to connect to the internet. When the binary communications between the connected world and the taxi finally had gone through, I was short of time. A short run to the ticket stand gave me ten minutes to reach the train -plenty of time- I was so naïve to think for a short moment. Again I was reminded of the distance to the civilised world when I learned that only one ticked stand accepted credit card. And even bigger was the confusion when I realised that most of the population in Belfast already had accepted this "new" way of payment, hence a very lengthy queue to that particular ticket stand awaited me. No surprise that the adrenaline level in my blood raised as departure time of the train crept closer. I finally got my ticket with one minute to spare and ran to the platform only to witness the doors closing and the train starting to roll down the tracks right in front of me. Great was my frustration at the prospect of an hour of waiting at the station. One very large cup of coffee and some snacks later I finally got the train, and could now look forward to two hours across the North Irish country side. The difference between the North English and the North Irish country side is very minimal, although there are less hills, and more sheep.

I reached Coleraine, now two hours later than first planned, and was greeted by Kevin impatiently waiting me so we could go on field work in proper time. After picking up the equipment we would need for fieldwork, we headed off to the west of Ireland. This brought us out on a four-hour journey across the mountains of County Donegal and through blizzards I would expect the people in Northern Norway would be more familiar with. When we finally reached our destination, a small village somewhere far out on the Irish country side called Ballina, time had passed eleven o'clock at night and I felt like the explorers of old times, sitting in a foreign place in a foreign country, only reachable by travelling across oceans and over mountains.

After a traditional Irish breakfast the next morning, with beans, bacon and black budding (no potatoes???), we headed out to the field. The plan was to collect rock samples from erratics in the western part of Ireland for cosmogenic nuclide analysis, which will allow us to constrain the age of glacial retreat in North County Mayo. For the sampling Kevin had brought a petrol saw with a diamond blade, capable of cutting through the samples in a matter of seconds. But since the first sampling site essentially was in the backyard of an elderly lady, we decided not to use the saw at this first site (personally I think she was afraid of Kevin ☺). Instead sampling was done the old-fashioned way: hammer and chisel.



Photos courtesy of Kevin S. and Kasper W.

During this work Ireland again showed how “beautiful” the weather here can be. The blizzards the night before had covered the ground in snow, but the morning sun quickly took care of that, leaving the ground nicely wet and muddy. The sun also meant that the hammering left one quite warm and sweaty after a short time, so the jacket quickly came off. This was, however, punished shortly afterwards, since the Irish weather changed from sun to hail in a matter of seconds and then to rain, storm and then back to sun again. If you don’t like the weather in Ireland, wait 15 minutes! Wet and cold, we finished the sampling at the first site and after a short lunch we quickly found the next sampling site in the foothills of the Ox Mountains. Darkness was creeping up on us, so we took out the petrol saw, no time for lengthy hammering on the erratics this time. After a short hike over a small, but very wet bog, we found a number of potential samples and, just before darkness fell, we got the last of the samples bagged. We decided to leave the mapping and measurements of each sample for the next day. Wet and happy with a good day’s worth of sampling, we headed back to Ballina, and after a nice dinner and some good whiskey a good night’s sleep came easy.

The plan for the next day was to rush out and take the measurements and mapping of the samples from the night before and, before embarking on the four-hour journey back to Coleraine, to stop at another sampling site to determine whether or not what Kevin had seen on satellite images would be worth sampling or not. Our car however, had other plans for us. Simply to start the engine that morning seemed to be too big a challenge for the little car and nothing happened when Kevin turned the key. After several trials with jumper cables we had to admit defeat and call the AA, who, also had to admit defeat after several trials, and tow the car to a nearby garage where it could be examined better. This put the fieldwork in somewhat of a jeopardy, but since we already had the samples from last night, we had to get the measurements from the sampling site, otherwise the work would have been for nought. Nothing else to do than take a taxi to the field site. The taxi driver was a bit puzzled as to why we wanted to go into the middle of nowhere, but quickly learned that geologists are weird people. After a very efficient mapping of the sample sites, we were picked up by the taxi again two hours later, and dropped off at the garage where the mechanics had got our car back to life. A bad connection to the alternator had meant that the battery had not been recharged, which left it dead. Luckily this did not happen while we were up in the Ox Mountains ☺ Happy about the prospect of getting home the same day and not on the back of a tow truck, we jumped in the car and drove towards Coleraine (as low tide was long gone at this time we weren’t able to make it to the potential sampling site we had spotted the day before on the satellite images). Halfway home though, the car again started to give us worries when the warning light for the battery came on, and in the middle of rush hour, in a roundabout on a main road into a large city, the car died. I had to go out and push it out of the way. Things were not so bad that they weren’t good for something though, and this time the AA knew who we were and after a short wait, a tow truck came and picked us up. At the back of the tow truck, we finally reached Coleraine late at night and after dumping the car at a garage we got a taxi to Portstewart and the field adventure was done. What should have been two short and fast field days was, due to delayed flights, missed trains, blizzards and broken-down cars, two very lengthy days. But Kevin got the samples and now we can hopefully say a bit more about the re-advancing ice in our study area.

Kevin getting ready to attack the erratic.

Kasper Weilbach

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