ISSN 2294-4931

IAS

NwLtr 267

February 2017

www.sedimentologists.org

International Association of Sedimentologists

IAS Council

President: **Adrian Immenhauser**, Ruhr-Universität Bochum, Germany: Adrian.Immenhauser@ruhr-uni-bochum.de

Past-Pre sident: **Poppe de Boer**, Utrecht University, The Netherlands: P.L.deBoer@uu.nl

Vice-Presidents: **Pierre Francus**, Institut National de la Recherche Scientifique, Québec, QC, Canada:pfrancus@ete.inrs.ca
Giovanna Della Porta, University of Milano, Milano Italy: giovanna.dellaporta@unimi.it
Stephen Lokier, The Petroleum Institute, Abu Dhabi, United Arab Emirates: slokier@pi.ac.ae

General Secretary: **Vincenzo Pascucci**, University of Sassari, Italy: pascucci@uniss.it

Treasurer: **Marc De Batist**, Ghent University, Belgium: marc.debatist@UGent.be

Sedimentology Editors: **Nigel Mountney**, University of Leeds, Leeds, United Kingdom: n.mountney@see.leeds.ac.uk
Peir Pufahl, Acadia University, Wolfville, NS, Canada. peir.pufahl@acadiau.ca

Member: **Tracy Frank,** University of Nebraska Lincoln, NE, USA tfrank2@unl.edu

Special Publications Secretary: **Mark Bateman**, University of Sheffield, Sheffield, United Kingdom: m.d.bateman@sheffield.ac.uk

Council Members:

Bernadette Tessier, University of Caen, Caen, France:bernadette.tessier@unicaen.fr
Marcos Aurell, University of Zaragoza, Zaragoza, Spain: maurell@unizar.es
Paul Carling, University of Southampton, Southampton, United Kingdom: P.A.Carling@soton.ac.uk
Dilce Rossetti, INPE, Sao Paulo, Brazil: rossetti@dsr.inpe.br
Koichi Hoyanagi, University of Shinshu, Matsumoto, Japan: hoya101@shinshu-u.ac.jp
Gail Ashley, Rutgers University, Piscataway, NJ, United States of America: gmashley@rci.rutgers.edu
Chengshan Wang, University of Geociences, Beijing, China: chshwang@cugb.edu.cn

Link to **IAS National Correspondents:**
https://www.sedimentologists.org/society/correspondents

CONTENTS

EDITORIAL

Newsletter 267, the first of the 2017, collects reports of students granted with Post Graduaded Scheme on 2015 and 2016 (this last just in part).

Please note that a new research grant has been launched: the Early Career Scientists Research Grants.

On behalf of the work carried by Early Career Scientists Committee IAS, is on Facebook.

Student Grant applications guidelines close the Newsletter.

IAS has restyled the webpage (www.sedimentologists.org): please have a look at it, log in and fill the spaces under your profile, and renew your membership for 2017. Remember that being an IAS member gives you the following benefits:

- access to the online versions of Sedimentology and Basin Research, including all issues ever published;
- access to the printed versions of Sedimentology and Basin Research at very favourable rates;
- access to the IAS Member Directory;
- the Friendship Scheme which gives free membership to people in less-developed countries;
- the electronic Newsletter;
- a network of National Correspondents, which report on the activities in their countries;
- International Sedimentological Congress every four years at reduced fees;
- annual Regional Meeting and meetings sponsored by the IAS at reduced fees;
- special lecturer tours allowing sedimentology groups to invite a well-known teacher to give talks and short courses in their country;
- travel grants for PhD student members to attend IAS sponsored meetings;
- research grants for PhD student members (maximum 1.000 Euros);
- institutional grants for capacity building in 'Least Developed Countries' (LDC), (maximum

10.000 Euros)
- biannual Summer Schools focused on cutting edge topics for PhD student members.

I would like to remind all IAS members that:
- the IAS Newsletter 267 is published on-line and is available at: http://www.sedimentologists.org/publications/newsletter
- the next IAS Meeting will be held in Toulouse (France) from 10 to 12 October 2017. For details, please click: https://www.sedimentologists.org/ims2017

The Electronic Newsletter (ENIAS), started in November 2011, continues to bring monthly information to members. For information on ENIAS contact ias-office@ugent.be

Check the new Announcements and Calendar. Meetings and events shown in CAPITAL LETTERS and/or with * are fully or partially sponsored by IAS. For all of these meetings, IAS Student Member travel grants are available. Students can apply through the IAS web site. To receive the travel grant, potential candidates must present the abstract of the sedimentological research they will present at the conference. More info @ www.sedimentologists.org

Vincenzo Pascucci
(IAS General Secretary)

IAS POST GRADUATE GRANT SCHEME REPORT 2ND SESSION 2015

Puerto Rico Cave Monitoring - Improving the Interpretation of Tropical Speleothems as Climate Archives

ROLF VIETEN UNIVERSITY OF PUERTO RICO DEPARTMENT OF MARINE SCIENCE ROLF-MARTIN.VIETEN@UPR.EDU

Cave monitoring was conducted in Cueva Larga (Fig. 1), a vadose cave with some phreatic features located on the island of Puerto Rico in the northeastern Caribbean (Fig. 2). Speleothems from this site have recorded climate variability covering at least the last 35000 years. The monitoring results provide valuable insights into the climate signal transmission from the surface to the cave to elucidate the relation between surface climate and geochemical variations recorded in the speleothem archives.

Background

Speleothem's stable oxygen isotope composition (δ18O) has been shown to be an archive of rainfall's δ18O value (Fairchild and Baker, 2012). Rainfall's δ18O values depend on complex interactions in the hydrological cycle (Dansgaard, 1964; Rozanski *et al.*, 1993; Lachniet, 2009). In the tropics the "amount effect", first described by Dansgaard (1964), usually outweighs other stable isotope effects. The "amount effect" is a negative correlation between the monthly rainfall amount and its δ18O values. Deep vertical convection systems, including tropical storms and hurricanes, have more negative δ18O-values than most other tropical rain events (Dansgaard, 1964; Lawrence and Gedzelman, 1996). In tropical cyclonic systems Rayleigh distillation in the deep convection leads to an enrichment in light isotopes during the system's evolution (Lachniet, 2009), while small rain events are related to more positive δ18O-values due to less Rayleigh distillation and more extensive sub-cloud raindrop evaporation (Dansgaard, 1964; Lachniet, 2009).

Speleothem's trace element ratios of Sr/Ca and Mg/Ca also record hydrological variations (Fairchild and Baker, 2012). During drier conditions water seepage exhibit higher trace element ratios due to increased prior

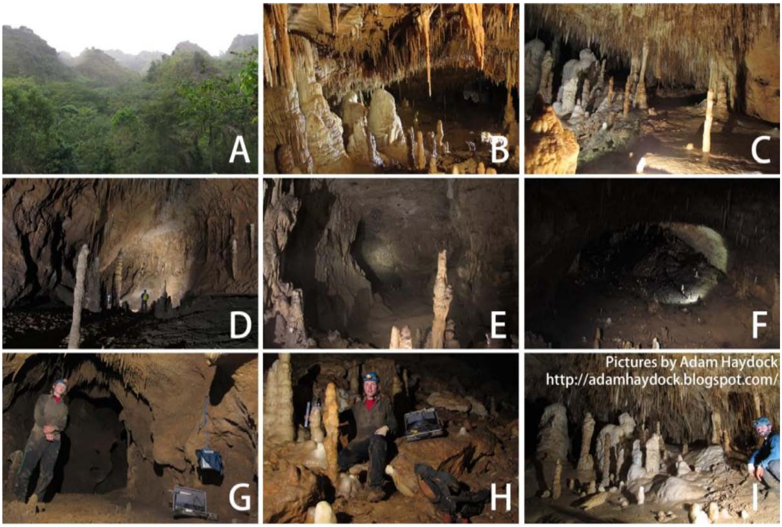


Figure 1.- Pictures from Cueva Larga: A-holokarst above the cave; B&C-speleothem formations; D&E- main cave passage; F-chamber at the end of the cave; G&H-cave monitoring sites: G shows cave atmosphere measurements via permanently installed data loggers and instantaneous measurements and H shows instantaneous water sampling; I-nature photographer Adam Haydock.

calcite precipitation (PCP) and selective leaching due to longer water residence times (Fairchild *et al*., 2000; Fairchild *et al*., 2006). PCP occurs upstream the drip site and preferentially incorporates Ca in the crystal's lattice increasing the trace element ratio downstream.

Site Description

Puerto Rico is the most eastern island of the Greater Antilles located in the northeastern Caribbean between the island of Hispaniola and the Virgin Islands (Fig. 2). From east to west, the northern karst region stretches along the north coast reaching heights of more than 400 m. Cueva Larga is positioned in the central northern karst region (N 18°19 W 66°48) at a height of 350 msl. The area is a developed holokarst characterized by sinkholes and mogotes (Fig.1-A). The main passage is nearly horizontal, strikes west-east, and forms a tube with ceiling heights of up to 30 m (Fig. 1-D+E). The cave ends in the Collapse Room, a chamber where a roof layer collapsed (Fig. 1-F). The horizontal extension of CL is about 1440 m (Miller, 2010) and numerous sites are decorated with speleothems (Fig. 1 B-C).

Methods

Cueva Larga was visited every month in 2013 and 2014 and about every second months in 2015 and 2016. Drip site SW-2, located in the main passage, and drip site C-2, located in the Collapse Room (Fig. 2), were chosen because they feed actively growing speleothems and their drip rate is fast enough to allow instantaneous drip water sampling during each cave visit. Measurements of partial pressure of CO2 (pCO2), temperature (T) and relative humidity (RH) were recorded

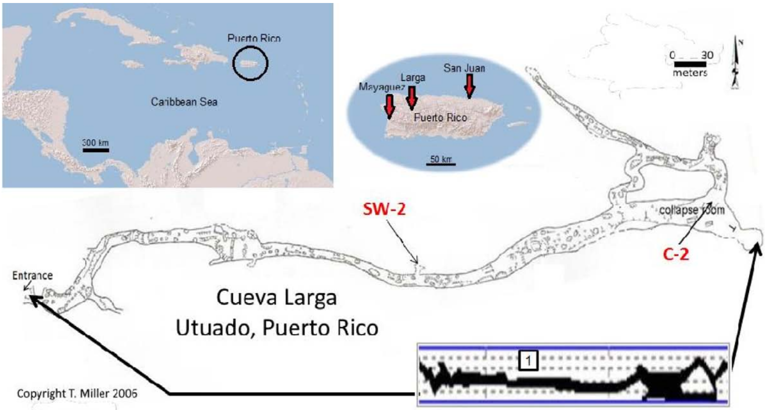


Figure 2.- Plan view of Cueva Larga (from Vieten, et al., (2016b) after Miller, 2010) with monitored drip sites SW-2 and C-2 (marked in red). Top left map shows an overview of the Caribbean and map in the center shows Puerto Rico with the locations of Cueva Larga, Mayaguez and San Juan (red arrows). Insert 1shows longitudinal section of the cave (Miller, 2010).

at each site during every visit (Fig. 1-G+H). Outside weather data was recorded at a weather station above Cueva Larga and is available from the Arecibo Observatory weather station, located about 10 km north of the cave site. Instantaneous cave drip water samples and (bi-)monthly rainwater samples were collected during each field trip. Water samples were analyzed for stable isotope ratios of oxygen and elemental concentrations.

Results

Results reveal the importance of cave site studies for correct interpretation of speleothem climate records. In Cueva Larga speleothems appear to grow preferentially during the winter when increased ventilation favors carbonate oversaturation. This could lead to a seasonal bias in the climate record but mixing in the soil and karst above Cueva Larga acts as a low-pass filter, indicating that changes in speleothems geochemical composition represent multiannual climate change rather than short term or seasonal variations.

Seasonal rainfall patterns above Cueva Larga show characteristic stable isotope values. The wet summer season is characterized by more negative δ18O values than the dry winter season (Fig. 3). Seasonal variations in the δ18O of rainfall are filtered out via mixing along the seepage path from the surface to the cave and the lack of seasonal variations in the drip water's trace element ratios (Fig. 3) also indicate well mixed seepage water. Further tritium analysis indicate that the seepage water takes several years to travel from the surface to the cave (Vieten, *et al.*, 2016b). Varying cave ventilation causes a seasonal cave atmospheric pCO2 cycle in the main cave passage from 600 ppm in winter to 1800 ppm in summer (Fig. 4). Calculations of virtual temperature and differences between cave and surface temperature indicate

that the seasonal surface temperature cycle is the main driver of the alternation from a well-ventilated winter mode to a near-stagnant

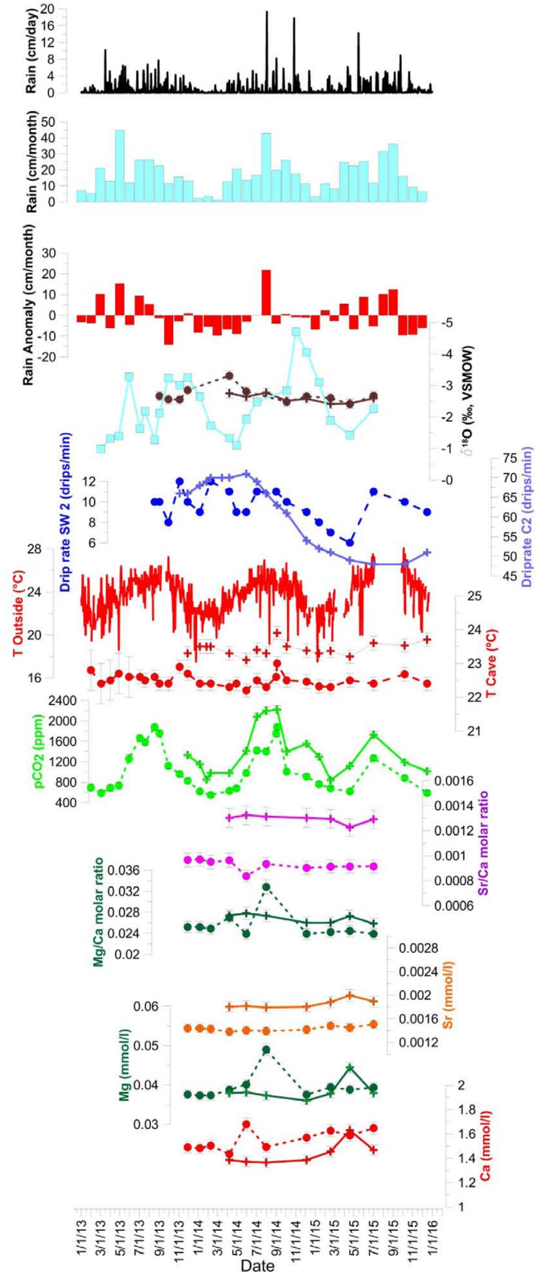


Figure 3.- Weather observation and cave monitoring results in Cueva Larga from 2013 to 2015 from Vieten, et al., (2016b). Data are shown for drip site SW-2 (circles on dashed line) and C-2 (crosses on solid line). The first three plots show the daily rainfall amount, the monthly rainfall amount and the rainfall anomaly of each month compared to the monthly climate normal from 1981 to 2010 from the Arecibo Observatory weather station (Fig. 2). The blue squares show δ18O results of rain water compared to the δ18O results of drip water (in brown). This is followed by the temperature outside and inside Cueva Larga (red), the cave atmospheric pCO2 at each site (green) and the Sr/Ca (pink) and Mg/Ca (dark green) values. The lowest plots show the concentrations of Sr (orange), Mg (green) and Ca (red) in the drip water

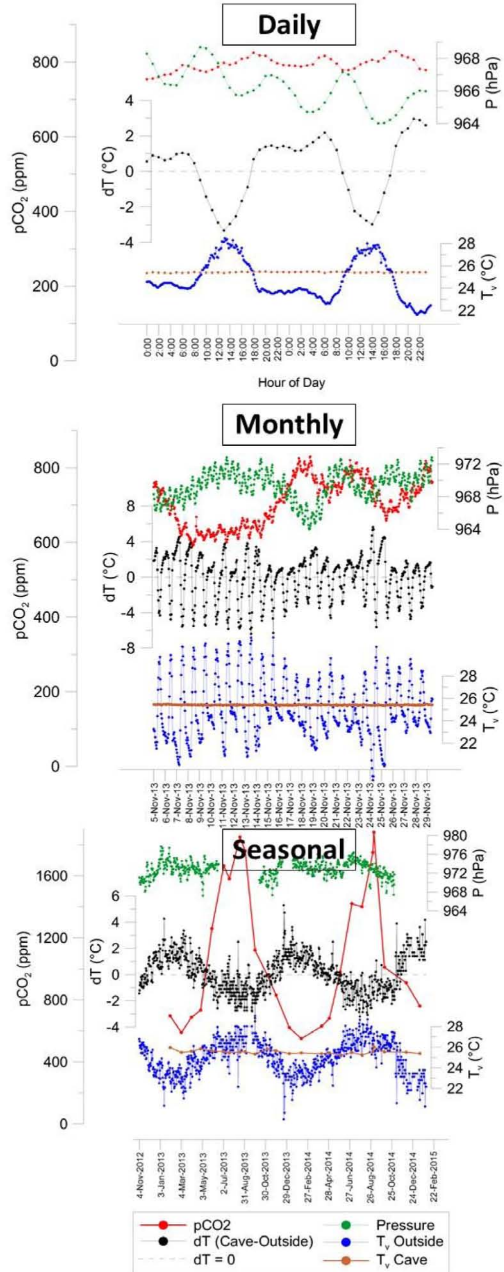


Figure 4.- Cave pCO2 measured at cave site E (red). Top shows the observations during two days (17 to 18 November 2013). Middle shows the high resolution pCO2 time series obtained from the data logger. Bottom shows the seasonal variations. It is compared to atmospheric pressure (green), dT (black; the dashed line marks dT=0) and Tv for the daily atmospheric observations at the weather station (blue) and the cave atmosphere (brown). A detailed discussion of observations is available in Vieten et al. (2016a).

summer mode where the cave morphology of Cueva Larga is an important boundary condition (Vieten, *et al.*, 2016a). On shorter time scales (diurnal to weekly), cave pCO2 is also influenced by atmospheric pressure where the variation in cave pCO2 is one order of magnitude lower than the seasonal pCO2 change (Fig. 4 and Vieten *et al.*, 2016a). The findings in Cueva Larga emphasize that cave systems with varying morphology have to be studied individually in order to correctly describe ventilation processes.

Published Results from Cueva Larga:

Vieten R., Winter A., Warken S., Schröder-Ritzrau A., Miller T. and Scholz D. (2016a) Seasonal temperature variations controlling cave ventilation processes in Cueva Larga, Puerto Rico. Int. J. Speleol. 45, 259–273. Available at: http://scholarcommons.usf.edu/ijs/vol45/iss3/7/.

Vieten R., Winterhalder S., Winter A., Scholz D., Miller T., Spötl C. and Schroeder- Ritzrau A. (2016b) Monitoring of Cueva Larga, Puerto Rico – a First Step to Decode Speleothem Climate Records. In Karst Groundwater Contamination and Public Health. Selected papers and abstracts of the symposium held January 27 through 30, 2016, San Juan, Puerto Rico (eds. W. White, E. Herman, M. Rutigliano, J. Herman, D. Vesper, and S. Engel). Karst Waters Institute Special Publication 19, Leesburg, Virginia. p. 74.

References:

Dansgaard W. (1964) Stable isotopes in precipitation. Tellus 16, 436–468. Available at: http://tellusa.net/index.php/tellusa/article/view/8993 [Accessed September 23, 2013].

Fairchild I. J. and Baker A. (2012) Speleothem Science: From Proces to Past

Environments. 1st ed., John Wiley & Sons, Chichester.

Fairchild I. J., Borsato A., Tooth A. F., Frisia S., Hawkesworth C. J., Huang Y., McDermott F. and Spiro B. (2000) Controls on trace element (Sr–Mg) compositions of carbonate cave waters: implications for speleothem climatic records. Chem. Geol. 166, 255–269. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0009254199002168 [Accessed February 14, 2014].

Fairchild I. J., Smith C. L., Baker A., Fuller L., Spötl C., Mattey D. and McDermott F. (2006) Modification and preservation of environmental signals in speleothems. Earth Planet. Sci. Lett. 75, 105–153. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0012825205001406 [Accessed September 23, 2013].

Lachniet M. S. (2009) Climatic and environmental controls on speleothem oxygen- isotope values. Quat. Sci. Rev. 28, 412–432. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0277379108003119 [Accessed October 17, 2013].

Lawrence J. R. and Gedzelman S. D. (1996) Low stable isotope ratios of tropical cyclone rains. Geophys. Res. Lett. 23, 527–530.

Miller T. E. (2010) Stream Pirates of the Caribbean: Tanamá and Camuy Rivers in the Northern Karst of Puerto Rico. Espeleorevista Puerto Rico, 8–13.

Rozanski K., Aragua's L. and Gonfiantini R. (1993) Isotopic patterns in modern global precipitation. In Climate Change in Continental Isotopic Records (eds. P. K. Swart, K. L. Lohmann, S. Savin, and K. L. McKenzie). American Geophysical Union, Washington, DC. pp. 1–37.

Vieten R., Winter A., Warken S., Schröder-Ritzrau A., Miller T. and Scholz D. (2016a) Seasonal temperature variations controlling cave ventilation processes in Cueva Larga, Puerto Rico. Int. J. Speleol. 45, 259–273. Available at: http://scholarcommons.usf.edu/ijs/vol45/iss3/7/.

Vieten R., Winterhalder S., Winter A., Scholz D., Miller T., Spötl C. and Schroeder- Ritzrau A. (2016b) Monitoring of Cueva Larga, Puerto Rico – a First Step to Decode Speleothem Climate Records. In Karst Groundwater Contamination and Public Health. Selected papers and abstracts of the symposium held January 27 through 30, 2016, San Juan, Puerto Rico (eds. W. White, E. Herman, M. Rutigliano, J. Herman, D. Vesper, and S. Engel). Karst Waters Institute Special Publication 19, Leesburg, Virginia. p. 74.

IAS POST GRADUATE GRANT SCHEME REPORT 1ST SESSION 2016

Dynamics and timings of glaciation in the Wicklow Mountains, Ireland

LAUREN KNIGHT DEPARTMENT OF GEOGRAPHY, UNIVERSITY OF PORTSMOUTH, LAUREN.KNIGHT@PORT.AC.UK

Background and rationale

Reconstructions of former ice cover in the Wicklow Mountains, Ireland, remain contested. In particular, there is poor consensus concerning the former Wicklow Ice Cap (Warren, 1993; Ballantyne et al., 2006) and the response of local ice to the Last Glacial-Interglacial Transition (LGIT; ~15-10 ka BP). Whilst it is acknowledged that the area hosted a local ice cap at the Last Glacial Maximum (LGM; ~27 ka BP) (Ó Cofaigh et al., 2012), there has been little consideration of ice cap disintegration and the transition to topographically constrained mountain-style glaciation, or of the dynamics of continued ice recession. A fragmentary approach to previous palaeoglaciological research has resulted in limited understanding of a complex record of glaciogenic landforms and sediments. This research therefore represents the first comprehensive investigation of evidence for LGIT glaciation in the Wicklow Mountains. The project aims to ascertain the extent, timings and dynamics of glaciation in the Wicklow Mountains during the LGIT by applying a threefold approach: 1) extensive geomorphological mapping using remotely sensed data and field mapping; 2) detailed sedimentological analysis to determine ice-marginal dynamics and moraine formation; and 3) relative dating to examine the timing of glacial events.

Preliminary findings

Funding from the IAS allowed the continuation of systematic assessment of the geomorphological and sedimentological evidence for former glaciation in the Wicklow Mountains during a four-week field campaign (August 2016). The fieldwork has highlighted that the glacial record preserved in the Wicklow Mountains is significantly more extensive than previously recognised. Although subtle, the landform record identified archives a complex pattern of ice mass growth, decay and readvance, with cross-cutting flow pathways documented

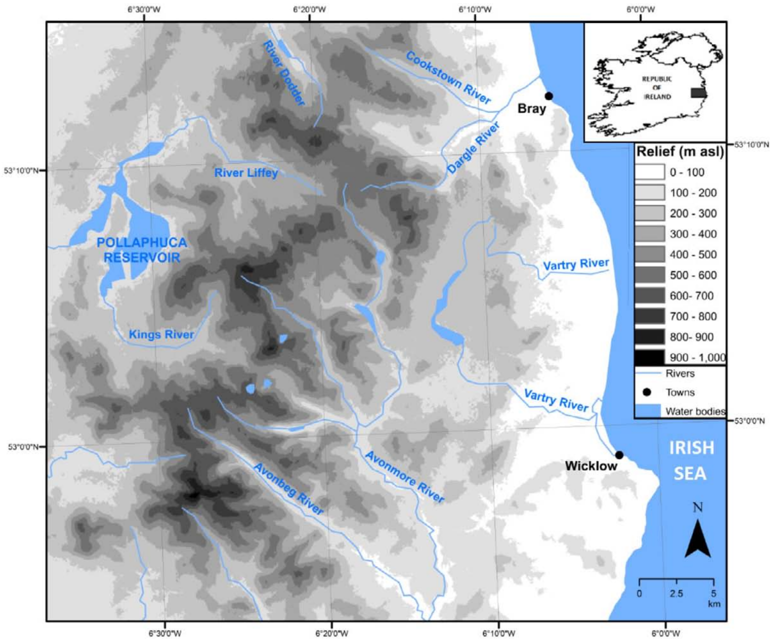


Figure 1. Location and relief of the Wicklow Mountains, Ireland (52°53'N-53°15'N; 06°11'W-06°36'W).

by moraines in selected areas. Several morphological signatures feature within the study area, highlighting varying landform characteristics (i.e. moraine size, shape and composition, meltwater channel incidence, drift extent). These are influenced, in part, by topographic controls (e.g. slope and aspect), geology, sediment availability and transport distances. The geomorphological evidence suggests that small icefield(s) and associated outlet valley glaciers existed during the LGIT, following disintegration of the main ice cap. Figure 2 highlights the variety of features mapped in the field which will form important parts of future analysis and interpretation.

In addition to the geomorphological mapping, suitable sediment exposures were identified and studied to make informed interpretations of the depositional environment and processes of landform formation. Sedimentary logs were produced to record facies architecture, with individual lithofacies identified on the basis of physical properties including grain size, sorting, compaction, sedimentary structures, nature of contacts and clast shape. Palaeocurrent and clast shape and roundness measurements were also recorded to establish the meltwater flow direction and debris transport pathways within the ice (cf. Benn and Lukas, 2006). One of the sections studied is briefly described below.

In the lower reaches of Glenreemore (0702196, 0700906 ITM), fluvial incision has exposed approximately four metres

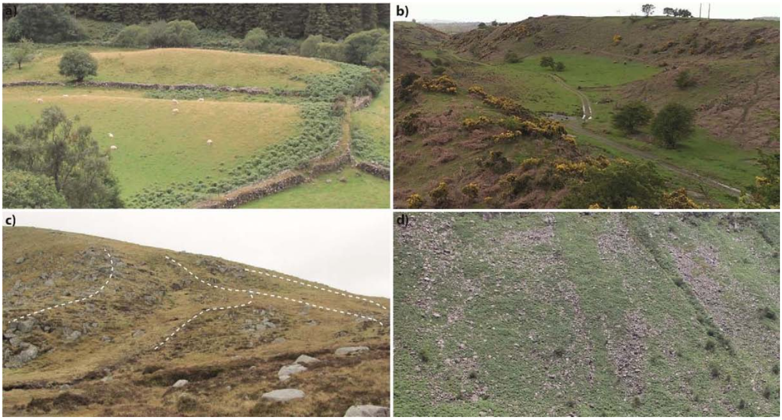


Figure 2. a) Isolated linear features on valley floor of Glenmacnass, which may indicate streamlining due to fast ice flow; b) meltwater channels at Hollywood Glen related to the drainage of Glacial Lake Blessington; c) recessional moraines at Lough Mullaghcleevaun. Note bifurcation of ridge crests indicating differential retreat along the ice margin; d) talus slopes in Glenmalur with thick drift cover highlighted by gullying.

of sediments in a large terrace (Figure 3). The section trends down valley at an orientation of 22˚ and is characterised by four units. The first, a consolidated clast-rich massive sandy diamict, forms the lowermost part of the section. The clean exposure has a maximum thickness of 1 m, with slumped material at the section base obscuring the lower part of the unit. Clasts range from gravels (5 mm) to boulders (70 cm), clast size variability exists throughout the unit and clasts range from sub-rounded to sub-angular.

The second unit, immediately above this, is a clast-poor sandy matrix-supported diamict. Clasts are predominately sub-angular cobbles and small boulders. Evidence of deformation is visible throughout this unit but there are notable zones of concentrated distortion, this is indicated by the presence of boudinage, sand stringers, pods and small-scale folds. The lithofacies also contains small incidences of gravel and clay. The boundaries between sand pods and gravel zones are sharp. At the same height as this diamict, an isolated unit of very fine sand is found at the upvalley end of the exposure. It contains occasional gravel-sized clasts up to 5 mm. The unit is easily pliable and features gently dipping bedding. A red band of iron oxidation initiates above this isolated sand unit and crosses the entire exposure, roughly following the loaded contact between diamicts two and three. The final unit, diamict three, tops the sequences, it is clast supported with a sandy matrix. Clasts range from coarse gravels to small boulders and are either angular or sub-angular. There is a sharp transition from the underlying heavily deformed diamict to the massive diamict, with no identifiable structures in the unit.

Significance

The landscape of the Wicklow Mountains is dominated by glacial landforms recording ice mass

Figure 3. Overview of the Glenreemore section described in the main text.

oscillation (both sustained retreat and minor readvance) that most likely occurred during the LGIT. It is evident from geomorphological mapping that clear spatial and temporal variability, in association with a fluctuating climate, is archived in the Wicklow Mountains. Knowledge of the transition to valley-style glaciation and the dynamics of continued ice recession, during the LGIT, is fundamental to advance our current understanding of local ice behaviour during periods of climate warming. Moreover, meaningful sediment exposures are not often abundant in former glaciated upland areas, and those studied present the opportunity to gain a more detailed understanding of the ice-marginal dynamics of the Wicklow Ice Cap during recession. The work, in progress, will help to build a coherent reconstruction of ice cap recessional dynamics during deglaciation, which in turn will provide an insight into contemporary small ice cap behaviour in a warming climate (e.g. in Iceland and Norway).

References

Ballantyne, C. K., McCarroll, D., & Stone, J. O. (2006). Vertical dimensions and age of the Wicklow Mountains ice dome, Eastern Ireland, and implications for the extent of the last Irish Ice Sheet. Quaternary Science Reviews, 25(17), 2048-2058.

Benn, D. I., & Lukas, S. (2006). Younger Dryas glacial landsystems in North West Scotland: an assessment of modern analogues and palaeoclimatic implications. Quaternary Science Reviews, 25(17), 2390-2408.

Ó Cofaigh, C., Telfer, M. W., Bailey, R. M., & Evans, D. J. (2012). Late Pleistocene chronostratigraphy and ice sheet limits, southern Ireland. Quaternary Science Reviews, 44, 160-179.

Warren, W. P. (1993). Wicklow in the Ice Age. Geological Survey of Ireland, Dublin.

Comparative investigation of Eustatic changes for the Middle Tournaisian glaciations Time in northern Iran and southern Belgium

MEHRDAD SARDAR ABADI.
PÉTROLOGIE SÉDIMENTAIRE, B20, UNIVERSITÉ DE LIÈGE, SART TILMAN, B-4000 LIÈGE (BELGIQUE)

1. Introduction and objectives

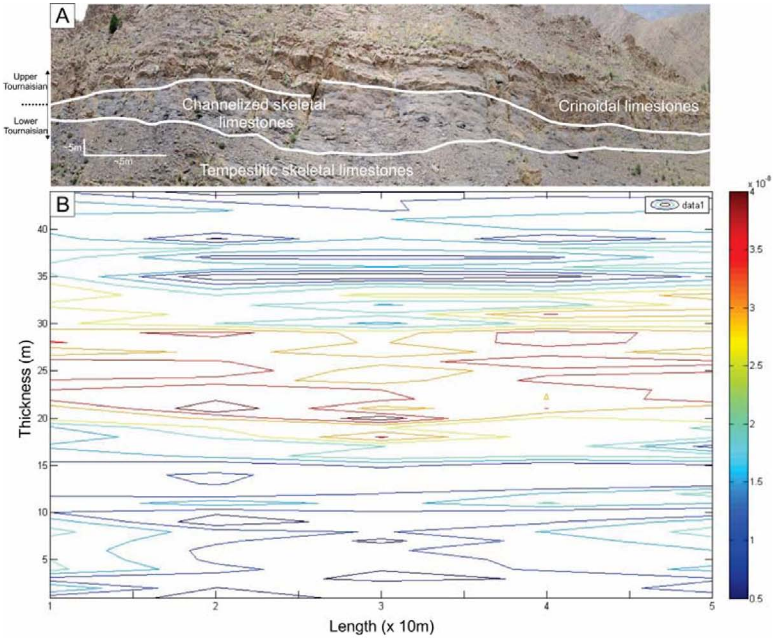
The Tournaisian period reflects a transition between the greenhouse conditions of the early Paleozoic and the Late Paleozoic icehouse earth (Saltzman, 2002). This transition between Greenhouse and Icehouse scaused multiscale environmental, biological and sedimentological fluctuations. The middle Tournaisian (Hastarian-Ivorian) boundary, for example, is characterized by a considerable sea level drop and development of widespread unconformities in North America, Eastern and Western Europe, the Urals and in Siberia. Moreover, climatic oscillations at this specific time interval are associated with a lower diversity and decreasing amount of foraminiferal assemblages in response to the cooling period (Kalvoda, 2002). No conclusive information on this interplay has yet been brought forward from the northern and north-eastern Gondwana margin. In this project, we aim to provide more insight to this phenomenon through the coeval stratigraphic intervals of Alborz basin which were located along the north-eastern margin of Gondwana.

2. Filed and laboratory

The main field work was performed in April 2016. During these periods, two sections along the Central and Eastern Alborz Sections are studied and sampled: The Shahmirzad Section (E 53δ19' 12''; N 35δ74' 19'') and the Mighan Section (E 54δ57' 10''; N 36δ38' 11''). About 400 samples were taken around the middle Tournaisian boundary and were shipped to the Oklahoma University for the purpose of inorganic geochemistry analyses, magnetic susceptibility and extracting the silicate mineral fractions (SMF) for advanced Paleoclimatic studies. In these 2 sections, about 120 samples were also collected in order to prepare thin–sections for the petrographic analyses. For the purpose of biostratigraphic correlation, selected samples from the Mighan Section will be also investigated for the presence and abundance of relevant calcareous foraminifera.

3. The obtained results

The foraminiferal biostratigraphic results on the Shahmirzad Section (my PhD project) are indicating that the middle Tournaisian boundary coincides with the upper boundary



1. (A) channelized skeletal limestones sandwiched between tempestitic skeletal limestones and crinoidal limestones within the Middle Tournaisian interval at the Shahmirzad Section. (B) Two dimentional magnetic susceptibility profile (ᵹn, m3/kg) along the Middle Tournaisian interval throughout the Shahmirzad Section.

of the Granuliferella latispiralis – Latiendothyranopsis assemblage biozone. The facies evolution across the middle Tournaisian boundary is markedly different than those preserved in the under- and overlying intervals. In the Shahmirzad Section (Central Alborz), this boundary shows occurrence of a stacked channel to lenticular bodies, with erosional surfaces at their base (Fig. 1A). This erosional surface could be followed into the Eastern Alborz (namely in the Mighan Section) where they show deposition of turbidity current. Occurrence of a major erosional surface within the Middle Tournaisan interval throughout the Central and Eastern Alborz Basin indicates a significant drop in relative sea level, which affected the ramp system in a large part of the Alborz Basin. This Level also correlates with a major exposure surface at the middle Tournaisian boundary in the Condroz area of Namur – Dinant basin (Belgium). This supports a scenario of global oceanic lowstand that caused widespread subaerial exposure, resulting in major erosion of the Middle Tournaisian interval.

The primary results in the magnetic susceptibility (ᵹn) section are indicating that the ᵹn increases strongly during the regression phase (Fig.1B) as response to the increasing exposure of terrestrial sources resulting in a higher erosion potential.

4. Perspectives

The eolian dust preserved in the marine realms has been considered as an agent of climate changes through its direct and indirect effects on the radiative forcing (Houghton, 2004). Late Paleozoic records show that atmospheric dust concentrations varied during glacial and interglacials at frequencies consistent with Milankovitch cyclicity (e.g. Sur et al., 2010). Therefore, we would like to examine the hypothesis that atmospheric dust flux varied at the Middle Tournaisian Intervals in response to the cooling stage caused by formation of some Ice caps in South Pole (Isaacson et al., 2008).

5. References

Houghton, J., 2004. Global warming: the complete briefing. Cambridge university press, 351.

Isaacson, et al., 2008. Late Devonian–earliest Mississippian glaciation in Gondwanaland and its biogeographic consequences. Palaeogeography, Palaeoclimatology, Palaeoecology 268 (3), 126–142.

Kalvoda, J., 2002. Late Devonian-Early Carboniferous foraminiferal fauna: zonations, evolutionary events, paleobiogeography and tectonic implications. Folia Facultatis scientiarium naturalium Universitatis Masarykianae Brunensis. Geologia 39, 213p. Brno.

Saltzman, M.R., 2002. Carbon and oxygen isotope stratigraphy of the Lower Mississippian (Kinderhookian–lower Osagean), western United States: Implications for seawater chemistry and glaciation. Geological Society of America Bulletin 114, 96–108.

Sur, et al., 2010. A record of glacial aridity and Milankovitch-scale fluctuations in atmospheric dust from the Pennsylvanian tropics. Journal of Sedimentary Research, 80(12), 1046-1067.

Characterization of the Late Pliensbachian-Lower Toarcian, in the Maghrebian Tethys by facies analysis, measurements of magnetic susceptibility (MS) and carbon isotope

FATIMA-ZAHRA AIT-ITTO
UNIVERSITY OF CADI AYYAD, MARRAKECH-MOROCCO, F.AITITTO@GMAIL.COM

Introduction

The Early Jurassic period was marked by an extreme environmental changes (Cohen et al., 2004; Hesselbo et al., 2007), characterized by major marine biological changes and turnovers at the global scale (Cecca and Macchioni, 2004; Wignall and Bond, 2008), associated to a pronounced negative carbon isotope shifts recorded in marine carbonates and organic matter, brachiopods, biomarkers and fossil wood (Hesselbo et al., 2000; 2007; Suan et al., 2008a). The increasing number of high resolution studies has led to smaller scale events being recognized during the Pliensbachian–Toarcian boundary (Bodin et al., 2010; Littler et al., 2010).

In the Middle Atlas of Morocco, the Pliensbachian-Toarcian boundary is marked by an abrupt change from alternating limestones to monotonous marly thick sections that accumulated in troughs under restricted dysoxic conditions. Previous investigations in the region have mainly focused on the platform drowning event observed in the Middle Atlas Basin at the Pliensbachian–Toarcian boundary (Fedan, 1989; Benshili, 1989, Lachkar et al., 2009; Dera et al., 2009a), whilst only a few studies have been undertaken in the Middle Atlas that characterize the palaeoenvironmental changes durant the lower Toarcian using benthic foraminiferal assemblages (Bejjaji et al., 2010). So far, i have invistaged the Issouka section in the Middle Atlas of Morocco as a subject of my research.

Research objectives

The aims of this research, is to present a new high-resolution investigation of carbon isotope resolution in the Middle Atlas, in order to contribute to an understanding the palaeoceanographic conditions during the Pliensbachian-Toarcian boundary in the deeper water zones of the Tethyan realm and show the extent of the carbon perturbation and to estimate precisely the durations of polymorphum zone and understand the links between the sedimentary record of orbital parameters and environmental changes.

Methods

The samples for this study were obtained from the Late Pliensbachian-Early Toarcian in the Issouka section, Middle Atlas, Morocco. The rock

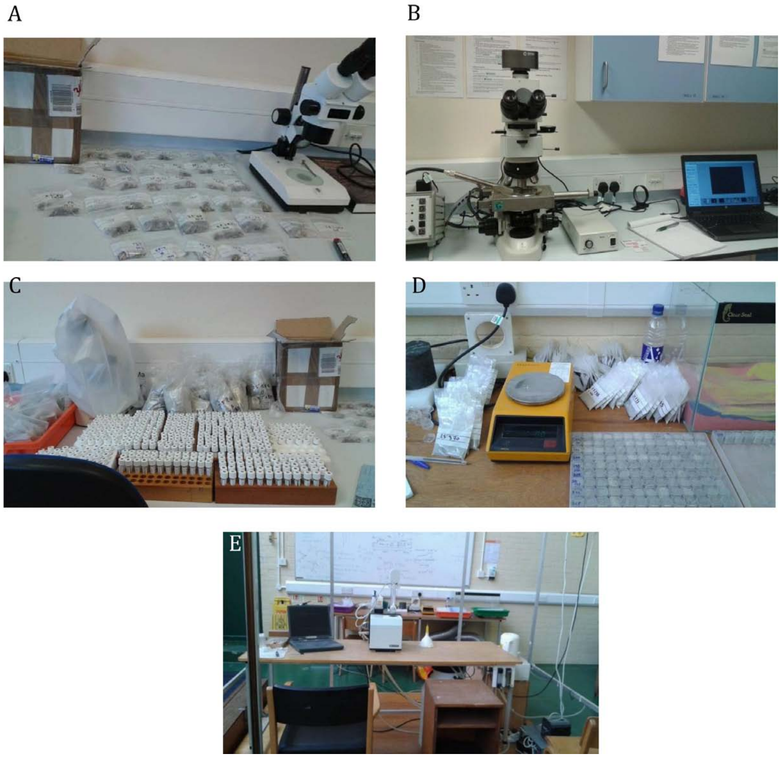


Figure 1.- The different preparations made in the laboratories at Plymouth University. A: preparation of belemnites for isotopic analysis. B: The MK5 CITL cathodoluminescence spectroscopy using for checking the preservation of belemnites. C: preparation of bulk carbonate for isotopic analysis. D. Preparation of sample for the magnetic susceptibility mesure. E: instrument of measure of magnetic susceptibility (kappabridge kly3).

samples for geochemical analysis were collected throughout the sections with interval of 10cm between 2 samples. Samples were recovered from as deep as possible, up to 15 cm below the surface, to minimize the effects of surface weathering. However, after being cleansed and crushed, the powdered samples were used for isotope analyses and susceptibility magnetic.

36 belemnites rostra were also analyzed. Polished thin sections were used to undertake initial screening using a MK5 CITL cathodoluminescence (CL) instrument. The preservation of the belemnite rostra was also assessed using trace element analysis (Ca, Sr, Mg, Fe and Mn concentrations). The belemnites were prepared for stable isotope and trace element analysis by first removing the areas of the rostrum typically most prone to diagenesis (the rostrum exterior, apical region, alveolus and observable cracks/fractures). The remaining calcite was then fragmented, washed in pure water and dried in a

clean environment. Fragments were subsequently picked under a binocular microscope to secure those judged to be best preserved, which were then analyzed for oxygen and carbon isotopes. The sub-samples taken for trace element (Ca, Mg, Ca, Fe and Mn) analysis were digested in HNO3 and analyzed by Inductively Coupled Plasma- Atomic Emission Spectrometer (ICP-AES) using a PerkinElmer 3100. Based upon analysis of duplicate samples reproducibility was better than ± 3% of the measured concentration of each element. Repeat analyses of standards JLS-1 and BCS CRM 393 was within 2% of the certified values for Sr, Mn, Ca and Mg and 10% for Fe. Followed, the 430 samples of bulk were analysed for their Magnetic susceptibility measurements performed with kappabridge kly3.

The same samples were analysed for carbon and oxygen stable isotopes. Using 200 to 300 micrograms of carbonate, stable isotope data were generated on a VG Optima mass spectrometer with a Gilson auto sampler at Plymouth University. Isotope ratios were calibrated using NBS standards and are given in δ notation relative to the Vienna Pee Dee

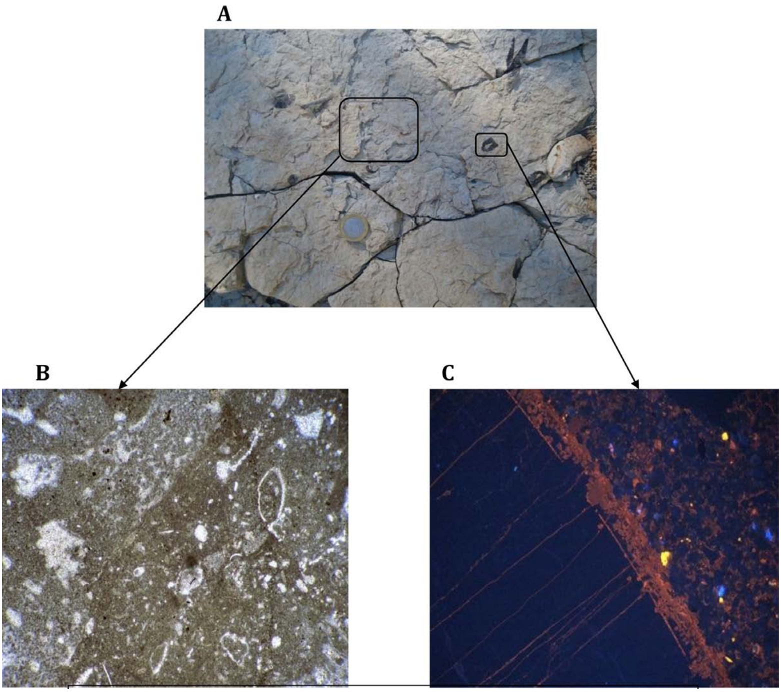


Figure 2.- example of the analysis performed in the Issouka section. A: Limestone of the Late Pliensbachian with fauna (sponges, ammonites, belemnites). B: Photomicrograph of limestone texture of the Pliensbachian showing abundance of microfauna. C: Photomicrograph of belemnites sampled in the present study with cathodoluminescence spectroscopy

Belemnite (VPDB). Reproducibility was generally better than 0.1‰ for samples and standard materials.

Preliminary results

As expected, a negative schift appear in the late Pliensbachian-Lower Toarcian boundary, the carbon isotope curve shows a number of negative shifts in the lower part of the section. The negative excursion is relatively sharp, starting at the Upper Pliensbachian-Lower Toarcian boundary (δ13C values around -0.1‰ to -2.8 ‰). A gradual decrease is thereafter observed in the Polymorphum zone, with maximum negative amplitude -2.8‰. The oxygen isotope data derived from the limestone and marls of the Pliensbachian and Toarcian show negative values that vary between -2.3 to -6.5‰.

Hence, with respect to the oxygen isotope data, a diagenetic overprint affecting the samples analysed is more likely. The oxygen isotope data are therefore not considered any further. The geochemical study of belemnites hence shows good preservation, consistent with CL images, which show that belemnites sampled in this study were largely non- lumiscent. Some areas were revealed to be Mn-rich and partial replacement by diagenetic calcite was observed particularly along the outermost growth bands and adjacent to the alveolar region. The oxygen isotope data derived from the Pliensbachian belemnites range from (-1.0 to 0.0 ‰). These data are considerably more positive that those data derived from the bulk rock analysis. All the results will be published in future research papers.

The report's objective

The present report aims, is to clarify the activities financed with the grant received by the recipient in the 1nd session of the IAS 2016 Grant Scheme. The money was used to pay expenses related to my internship in School of Geography, Earth & Environmental Sciences, at Plymouth University, for isotopic analysis and measure of magnetic susceptibility and calcimetry. A part of the money was used to pay the accommodation (256 €), transport from London to Plymouth (64 €), the flight ticket Morocco, London (507 €) and insurance (60 €).

Acknowledgements

I would like to thank IAS, for the financial support that I received in the first session of 2016. I want also to express my gratitude to Prof. Gregory Price for all his support and guidance before, during, and after the internship.

References

Bejjaji, Z., Chakiri, S., Reolid, M., Boutakiout, M., 2010. Foraminiferal biostratigraphy of the Toarcian deposits (Lower Jurassic) from the Middle Atlas (Morocco). Comparison with western Tethyan areas. Journal of African Earth Sciences 57, 154–162.

Benshili, K., 1989. Lias-Dogger du Moyen Atlas plissé (Maroc): sédimentologie, biostratigraphie et évolution paléogéographique. Documents des Laboratoires de Géologie Lyon 106, 1–285.

Bodin, S., Mattioli, E., Frölich, S., Marshall, J.D., Boutib, L., Lahsini, S., Redfern, J., 2010. Toarcian carbon isotope shifts and nutrient changes from the Northern margin of Gondwana (High Atlas, Morocco, Jurassic): palaeoenvironmental implications. Palaeogeography, Palaeoclimatology, Palaeoecology 297, 377– 390.

Cecca, F., Macchioni, F., 2004. The two Early Toarcian (Early Jurassic) extinction events in ammonoids. Lethaia 37, 35–56.

Cohen, A.S., Coe, A.L., Harding, S.M., Schwark, L., 2004. Osmium isotope evidence for the regulation of atmospheric CO2 by continental weathering. Geology 32, 157–160.

Dera, G., Pucéat, E., Pellenard, P., Neige, P., Delsate, D., Joachimski, M.M., Reisberg, L., Martinez, M., 2009a. Water mass exchange and variations in seawater temperature in the NW Tethys during the Early Jurassic: evidence from neodymium and oxygen isotopes of fish teeth and belemnites. Earth and Planetary Science Letters 286, 198–207.

Fedan, B., 1989. Evolution géodynamique d'un bassin intraplaque sur décrochements: le Moyen Atlas (Maroc) durant le Méso-Cénozoïque. Travaux de l'Institute Scientifique Rabat (Géologie Géographie Physique) 18, 1–144.

Hesselbo, S.P., Gröcke, D.R., Jenkyns, H.C., Bjerrun, C.J., Farrimond, P., Morgans Bell, H.S., Green, O.R., 2000. Massive dissociation of gas hydrate during a Jurassic oceanic anoxic event. Nature 406, 392–395.

Hesselbo, S.P., Jenkyns, H.C., Duarte, L.V., Oliveira, L.C.V., 2007. Carbon-isotope record of the Early Jurassic (Toarcian) Oceanic Anoxic Event from fossil wood and marine carbonate (Lusitanian Basin, Portugal). Earth and Planetary Science Letters 253, 455–470.

Lachkar, N., Guiraud, M., El Harfi, A., Dommergues, J.-L., Dera, G., Durlet, C., 2009. Early Jurassic normal faulting in a carbonate extensional basin: characterization of tectonically driven platform drowning (High Atlas rift, Morocco). Journal of Geological Society of London 166, 413–430.

Littler, K., Hesselbo, S.P., Jenkyns, H.C., 2010. A carbon-isotope perturbation at the Pliensbachian–Toarcian boundary: evidence from the Lias Group, NE England. Geological Magazine 147, 181–192

Suan, G., Mattioli, E., Pittet, B., Mailliot, S., Lécuyer, C., 2008a. Evidence for major environmental perturbation prior to and during the Toarcian (Early Jurassic) oceanic anoxic event from the Lusitanian Basin, Portugal. Paleoceanography 23, PA1202.

Wignall, P.B., Bond, D.P.G., 2008. The end-Triassic and Early Jurassic mass extinction records in the British Isles. Proceedings of the Geologists' Association 119, 73–84

Quantifying the composition of parrotfish derived sediments on coral reefs

ROBERT YARLETT, RY237@EXETER.AC.UK
AMORY BUILDING, UNIVERSITY OF EXETER, RENNES DRIVE, EXETER, EX4 4RJ, UK

Introduction

Coral reefs are focal points of marine carbonate production and accumulate as a function of both constructional and erosional processes (Perry & Hepburn 2008). Reef accumulation can be driven by biogenic carbonate production (primarily by corals) and cementation, while reef erosion can be a function of one, or a combination of physical (e.g. mechanical breakdown by waves and storms), chemical (e.g. dissolution) or biological processes (e.g. grazing, etching and boring by reef organisms) (Perry *et al.* 2012; Perry & Hepburn 2008; Glynn, 1997). In moderation, reef erosion is an important part of the reef building process, creating space for reef building organisms to settle, and producing sediment which can be reincorporated into the reef system (e.g. Glynn, 1997). In some settings, biological deconstruction, or “bioerosion” can be the primary erosional process, and a key source of carbonate sediment production (e.g. Morgan & Kench 2016).

In this context, parrotfish are widely recognised as quantitatively important bioeroders on coral reefs. Using their unique, beak-like feeding apparatus, parrotfish “scrape” or “excavate” chunks of reef framework whilst feeding (Bellwood & Choat 1990). This material is ingested, broken down in a modified gill arch known as the pharyngeal mill, processed in the gut and excreted as silt to sand grade sediment (Bellwood 1996; Hoey & Bellwood 2008; Morgan & Kench 2016). This sediment production is particularly important in locations where parrotfish are highly abundant, and rates of physical reef breakdown (e.g. storm frequencies) are low.

The ecological functional roles of parrotfish on coral reefs are well studied, as is their general role as agents of bioerosion and sediment generation (reviewed by Bonaldo *et al.* 2014). However, aside from two studies (Hoey & Bellwood 2008; Morgan & Kench 2016) details of the volumes, size fractions and compositions of sediment generated remain limited. These are key knowledge gaps given that parrotfish have been shown to account for up to 80% of biogenic sediment production on some Maldivian coral reefs (Perry *et al.* 2015). The sedimentary characteristics of the material produced can affect the fate of the sediment post-excretion. Some material may be reincorporated into proximal reef habitats and reef associated landforms (Perry *et al.* 2012; Perry *et al.* 2015), while fine grains may be transported by hydrodynamic processes and lost from the system (Bellwood 1996).

Of these knowledge gaps, the IAS funding was used to address questions regarding the composition of parrotfish faecal sediments. Specific research questions were 1) what is the composition of sediment generated by parrotfish and how does this vary between species? and 2) does within species composition vary between size classes of parrotfish? The study was conducted on reef systems in the Maldives, where parrotfish bioerosion is thought to be a particularly important component of reef deconstruction and sediment production (Perry *et al.* 2015). A brief overview of this work is presented here. This data compliments additional quantification of grain size parameters using Laser Diffraction techniques, and contributes a novel component to a wider project investigating the role of parrotfish in the production and cycling of carbonate over a reef scale.

Methodology

Parrotfish faecal sediment samples were collected during early 2015 and early 2016 field seasons at sites within both Lhaviyani and Gaafu Dhaalu atolls, Maldives, Indian Ocean. Individuals of previously identified (based on census data) target study species and size categories were selected on a first seen basis. The species studied were Chlorurus sordidus, C. strongylocephalus, Scarus rubroviolaceus, S. frenatus, S. niger and S. psittacus. These species are also representative of a range of parrotfish sizes and feeding modes (scrapers and excavators), and their distribution is widespread throughout the Indo-Pacific (Choat *et al.* 2012). The faecal pellet from the first defecation event observed (assuming it had not dispersed or was inaccessible) was collected using a large bulb pipette and falcon tube. The samples were treated with 5% sodium hypochlorite solution for ~30 mins and rinsed in distilled water to remove organics whilst minimising any dissolution of carbonate sediments.

A sub-sample of the dried sediments were mounted onto aluminium SEM stubs using a double sided adhesive, and coated with 20nm of Gold/ Palladium before being imaged using a Scanning Electron Microscope (SEM). An appropriate magnification was found for each sample, allowing clear identification of the majority of the grains, whist incorporating a reasonable amount of grains per image for convenience during image analysis. A series of images were taken systematically from left to right and from top to bottom of the stub, ensuring no overlap between images. Magnification was adjusted as appropriate to the grains in the field of view.

During image analysis, each grain was measured in the b-axis (max width), which is considered most comparable to sieving, and identified into one of the following categories; Coral, Coralline Algae, Halimeda, Mollusca, Foraminifera and where accurate ID was not possible, Unidentified. A minimum of 300 grains were measured and identified per stub. The primary rationale for this method was to gather composition data, which will be used to compliment grain size distribution data collected from the same samples using Laser Diffraction methodologies.

Results

On average, the sediment produced by parrotfish was comprised predominantly of coral (94.6% ± 1.2), with Halimeda and Coralline

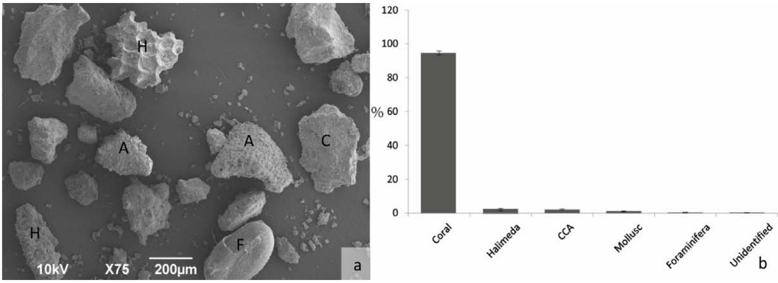


Figure 1.- a: An example SEM image of parrotfish faecal sediments with common grain types identified (C-Coral, H-Halimeda, A-Coralline Algae, F-Foraminifera). b: Average composition of parrotfish faecal sediments. Error bars display one standard error of the mean.

Algae making up ~2% each, and the remaining material comprised of foraminifera, bivalve fragments and unidentified grains. Fig 1. shows an example of some of these grain types and an average composition of the sediment generated by Maldivian parrotfish. The complete set of data, separating species, life phases and size classes of fish is to be published with grain size distribution data for the same categories in due course.

Discussion and relevance to wider project

When these data are published, this work will present the first integrated assessment of the size fractions and compositions of parrotfish derived sediments, showing how this varies between species and sizes of parrotfish. On average, the sediment produced by parrotfish is primarily comprised of coral (~95%), which is comparable to the compositional average found for Chlorurus spp. in North Malé atoll, Maldives (Morgan & Kench 2016). While some variation between species was observed, coral was consistently the primary constituent (range 78-100%).

As well as ingesting carbonate material through bioerosion, parrotfish also consume and rework loose sediment retained in the epilithic algal matrix on the dead coral and rubble substrates on which they predominantly feed (~99% of bites observed). The overall composition of the sediment they excrete therefore reflects their preferred feeding substrate, with some grains (i.e. mollusc shells and foraminifera) likely ingested as part of the loose sediment. Parrotfish were however observed to feed directly on Halimeda, live coral, coralline algae and on sand, although these combined make up only ~1% of bites.

The composition of parrotfish faecal sediments, combined with size fraction data, has relevance to the fate of the material post-excretion, and its likelihood of settling and being re-integrated into the reef and included in the sedimentary record, or being transported by hydrodynamic processes off slope (Bellwood 1996). In addition, census data and information on the movement of parrotfish between habitats and off slope can be used to make informed judgements about the contribution of the sediment to different reef habitats. On some reefs in the Maldives, parrotfish have been reported to account for ~80% of biogenic sediment production (Perry *et al.* 2015). Given that parrotfish population are generally in good condition, physical disturbance due to storms is infrequent, and the isolated location means terrigenous sediment inputs are low, it is likely that parrotfish contribute a significant proportion of sediment to reef habitats in the Maldives.

This work on the sedimentary characteristics of parrotfish derived sediment fits into a wider NERC funded PhD project on the overall contribution of parrotfish to carbonate production and cycling on coral reefs. This data will be used in models of bioerosion and sediment generation on reef systems to investigate the impacts of environmental disturbances on these processes.

Acknowledgements

The use of the Scanning Electron Microscope (SEM) (beam time and sample coatings) required for this work was supported by the IAS through the Postgraduate Grant Scheme. The wider project is funded by a NERC GW4+ DTP studentship. Many thanks go to Dr. Christian Hacker for his technical assistance, Dr. Mike Salter for general advice and guidance, and Prof. Chris Perry for supporting the grant application and guidance on grain ID.

References

Bellwood DR (1996) Production and reworking of sediment by parrotfishes (family Scaridae) on the Great Barrier Reef, Australia. Mar Biol 125:795-800

Bellwood DR, Choat H (1990) A functional analysis of grazing in parrotfishes (family: Scaridae): the ecological implications. Environ Biol Fishes 28:189-214

Bonaldo, R.M., Hoey, A.S., Bellwood, D.R. 2014. The Ecosystem Roles of Parrotfishes on Tropical Reefs. Oceanography and Marine Biology: An Annual Review, 52, 81-132.

Choat, J.H., Klanten, O.S., Herwerden, L.V., Robertson, D.R., Clements, K.D. 2012. Patterns and processes in the evolutionary history of the parrotfishes (Family Labridae). Biological Journal of the Linnean Society, 107, 529-557.

Glynn PW (1997) Bioerosion and coral reef growth: a dynamic balance. In: C. Birkeland (ed) Life and Death of Coral Reefs. Chapman & Hall, New York, 68–95

Hoey AS, Bellwood DR (2008) Cross-shelf variation in the role of parrotfish on the Great Barrier Reef. Coral Reefs 27:37-47

Morgan KM, Kench PS (2016) Parrotfish erosion underpins reef growth, sand talus development and island building in the Maldives. Sediment Geol 341:50-57

Perry CT, Edinger EN, Kench PS, Murphy GN, Smithers SG, Steneck RS, Mumby PJ (2012) Estimated rates of biologically driven coral reef framework production and erosion: a new census-based carbonate budget methodology and applications to the reefs of Bonaire. Coral Reefs 31:853-868

Perry CT, Hepburn LJ (2008) Syn-depositional alteration of coral reef framework through bioerosion, encrustation and cementation: Taphonomic signatures of reef accretion and reef depositional events. Earth-Sci Rev 86:106-144

Perry CT, Kench PS, O' Leary MJ, Morgan KM, Januchowski-Hartley F (2015) Linking reef ecology to island building: Parrotfish identified as major producers of island-building sediment in the Maldives. Geology doi:10.1130/G36623.1

Early Career Scientists Research Grants

Post-Doctoral Research Grants are intended as a seed to assist early-career post-doctoral researchers in either establishing a proof of concept, in order to support applications to national research funding bodies, or to fund areas of a project that were not included in the original project scope.

Up to 4 grants, each to a maximum of δ2,500, are awarded twice per year to Early Career IAS members – those that have secured their Ph.D. within the previous 7 years.

Applicants should apply for a Post-Doctoral Research Grant via the IAS website. The application requires submission of a research proposal with budget and CV (template provided on the submission webpage), and a letter of support from the researcher's supervisor, line manager or Head of School.

Eligibility:

- Applicants must be full members of the IAS.
- Applicants must have secured their Ph.D. within the previous 7 years.
- Applicants can only benefit from a Post-Doctoral grant on one occasion.

Proposals will be ranked on the following criteria:

- Scientific quality of research, novelty and timeliness, likely output.
- Feasibility.
- Cost effectiveness.
- The scientific and publication track record of the investigator.
- Demonstration that the proposed work cannot be conducted without a grant.
- Researchers that are not supported by substantial funding.
- Preference is given to applications for a single purpose (rather than top-ups of other grant applications).

Application requirements:

Applications must be made via the IAS web site.

- Research Proposal, maximum 3 pages A4, including:
  - →Rationale and scientific hypothesis to be addressed
  - →Specific objectives of the research
  - →Anticipated achievements and outputs
  - →Methodology and approach
  - →Research plan

→A list of pending and previous applications for funds to support this or related research.
- CV of the applicant, maximum 2 pages A4.
- Justification of the proposed expenditure, up to 1 page of A4. If other individuals are to be involved with the project, this document must include a clear explanation of their role and costs.

Examples of funding

- Direct costs of fieldwork.
- Laboratory analysis.
- Specialist equipment (not computers).

Funding exclusions

The IAS does not offer funding for the following costs:

- Investigator's salary costs.
- Travel to attend a scientific conference, workshop or exhibition.
- Core funding or overheads for institutions.
- Student tuition fees and summer research bursaries.

Deliverables

- The IAS should be acknowledged in all reports, presentations and publications produced as a result of the awarded grant.
- A report should be submitted to the IAS detailing the outcomes of the research.
- Where a publication is produced then this may be submitted in lieu of a report.

INSTITUTIONAL IAS GRANT SCHEME (IIGS)

IIGS Guidelines

Special IAS Grants or Institutional IAS Grants are meant for capacity building in third world countries. There exists a list of 'Least Developed Countries' (LDC) by the UN. This list categorizes countries according to income per capita and is yearly updated.

Grants are allocated to allow Geology Departments in LDC to acquire durable sedimentological equipment for teaching and research (like sieves, calcimeters, auger drilling tools, etc.) or tools that can be used by all geology students (like general geology/sedimentology textbooks, IAS Special Publications (SP), memory sticks with back issues of Sedimentology or SP, etc). Therefore, the grant application should clearly demonstrate to increase the recipient's capacity to teach sedimentology at the undergraduate level (Bachelor) in a durable way. It should also indicate in what way it would enable to support sedimentological research at the graduate level (Master).

Applicants should have a permanent position at their University and should be IAS Full Members. Applications should be submitted by email to the Office of the Treasurer (ias-office@ugent.be) and contain the following information (not exhaustive list):

- the mission statement of the University/Geology Department
- the approval of the University Authorities to accept the grant
- a list of permanent teaching and technical staff members of the Geology Department (with indication of their area of research)
- the structure of the geology undergraduate and graduate courses (Bachelor/Master programme with indication of courses and theoretical and practical lecture hours)
- the number of geology students
- the actual facilities for geology/sedimentology students
- a motivation of application
- a budget with justification
- the CV of the applicant, including a sedimentology research plan

The institutional grant scheme consists each year of 2 sessions of 1 grant of 10.000 Euro. Applications run in parallel with the PhD research grant scheme (same deadline for application and recipient notification). The IAS Grant Committee will seek recommendations from relevant National Correspondents and Council Members (eventually including visitation) before advising the IAS Bureau for final decision. Additional funds made available by the recipient's University are considered as a plus.

Items listed in the application will be bought through the Office of the IAS Treasurer and shipped to the successful applicant. By no means money will be transferred to the grant recipient.

POSTGRADUATE GRANT SCHEME (PGS)

PG Guidelines

IAS has established a grant scheme designed to help PhD students with their studies by offering financial support for fieldwork, data acquisition and analysis, visits to other institutes to use specialized facilities, or participation in field excursions directly related to the PhD research subject.

Up to 10 grants, each of about 1,000 Euro are awarded, twice a year. These grants are available for IAS Student Members only. Students enrolled in MSc programs are not eligible for funding and research grants are not given for travel to attend a scientific conference, nor for the acquisition of equipment.

Applicants should apply for a postgraduate grant via the IAS website. The application requires submitting a research proposal with budget and CV (template provided on the submission webpage) and a letter of support from the student's supervisor. After the deadline has passed, the IAS Bureau evaluates the submitted applications and makes a final selection. Applicants are personally informed by the Office of the Treasurer about their grant. The grants are transferred to the applicants' bank account upon submission of a short scientific and financial report.

Eligibility and selection criteria:

- Applicants must be enrolled as a PhD student;
- Applicants can only benefit from a postgraduate grant once during their PhD;
- In the evaluation process preference will be given to those applications that i) can convincingly demonstrate that the proposed work cannot be conducted without the grant, and ii) are not supported by substantial industry funding.

Application

The application should be concise and informative, and contains the following information (limit your application to 1250 words max.):

- Research proposal (including Introduction, Proposal, Motivation and Methods, Facilities) – max. 750 words
- Bibliography – max. 125 words
- Budget – max. 125 words
- Curriculum Vitae – max. 250 words

Your research proposal must be submitted via the Postgraduate Grant Scheme application form on the IAS website before the application deadline. The form contains additional assistance details for completing the request. Please read carefully all instructions before completing and submitting your application. Prepare your application in 'Word' and use 'Word count' before pasting your application in the appropriate fields.

A recommendation letter from the PhD supervisor supporting the applicant is mandatory, as well as a recommendation letter from the Head of Department/Laboratory of guest institution in case of laboratory visit. The letter needs to be uploaded by the candidate, when submitting his/her application, and not be sent separately to the Office of the Treasurer.

Please make sure to adequately answer all questions.

Deadlines and notifications

Application deadline 1st session: 31 March.

Application deadline 2nd session: 30 September.

Recipient notification 1st session: before 30 June.

Recipient notification 2nd session: before 31 December.

NOTE: Students who got a grant in a past session need to wait 2 sessions (1 year) before submitting a Postgraduate Grant Scheme grant application again.

Students whose application was rejected in one session can apply again after the notification deadline of the rejected grant application

Application Form

- Research Proposal (max. 750 words)
- Title: ....
- Introduction (max. 250 words): .....

Introduce briefly the subject of your PhD and provide relevant background information; summarise previous work by you or others (provide max. 5 relevant references, to be detailed in the 'Bibliography' field). Provide the context for your PhD study in terms of geography, geology, and/or scientific discipline.

- Proposal (max. 250 words): ...

Describe clearly your research proposal and indicate in what way your proposal will contribute to the successful achievement of your PhD. Your application should have a clearly written hypothesis or a well-explained research problem of geologic significance. It should explain why it is important. Simply collecting data without an objective is not considered wise use of resources.

- Methods (max. 125 words): ....

Outline the research strategy (methods) that you plan to use to solve the problem in the field and/or in the laboratory. Please include information on data collection, data analyses, and data interpretation. Justify why you need to undertake this research.

- Facilities (max. 125 words): ....

Briefly list research and study facilities available to you, such as field and laboratory equipment, computers, library.

- Bibliography (max. 125 words)

Provide a list of 5 key publications that are relevant to your proposed research, listed in your 'Introduction'. The list should show that you have done adequate background research on your project and are assured that your methodology is solid and the project has not been done already. Limit your bibliography to the essential references. Each publication should be preceded by a '*'-character (e.g. *Surlyk et al., Sedimentology 42, 323-354, 1995).

- Budget (max. 125 words)

Provide a brief summary of the total cost of the research. Clearly indicate the amount (in Euro) being requested. State specifically what the IAS grant funds will be used for. Please list only expenses to be covered by the IAS grant. The IAS will support field activities (to collect data and samples, etc.) and laboratory activities/analyses. Laboratory activities/analyses that consist of training by performing the activities/analyses yourself will be considered a plus for your application as they will contribute to your formation and to the capacity building of your home institution. In this case, the agreement of the Head of your Guest Department/Laboratory will be solicited by automated e-mail.

- Curriculum Vitae (max. 250 words)

Name, postal address, e-mail address, university education (degrees & dates), work experience, awards and scholarships (max. 5, considered to be representative), independent research projects, citations of your abstracts and publications (max. 5, considered to be representative).

- Advise of Supervisor and Head of Guest Department/Laboratory

The recommendation letter from the supervisor should provide an evaluation of the capability of the applicant to carry out the proposed research, the significance and necessity of the research, and reasonableness of the budget request. The recommendation letter must be uploaded by the applicant together with the rest of the application content. Applications without letter of support will be rejected. It will be considered as a plus for your application if your PhD supervisor is also a member of IAS.

If you apply for laboratory analyses/activities, please carefully check analysis prices and compare charges of various academic and private laboratories as prices per unit might differ considerably. Please first check whether analyses can be performed within your own University. If your University is not in a position to provide you with the adequate analysis tools, visiting another lab to conduct the analyses yourself strengthens your application considerably as it contributes to your formation and to capacity building of your home University. Please check with the Head of Department/Laboratory of your guest lab to assure its assistance during your visit. You should add a letter of support from him/her with your application.

Finally, before submitting your application, you will be asked to answer a few informative questions by ticking the appropriate boxes.

- is your supervisor a member of IAS
- was this application your own initiative
- did you discuss your application with your Supervisor
- did you already have contact in the past with the Head of the Guest Department/Laboratory (if appropriate)

CALENDAR

Flügel-Course 2017*

6th–17th March 2017
Erlangen, Germany

Axel Munnecke
axel.munnecke@fau.de
https://www.gzn.fau.de/en/palaeontology/events/fluegel-course/

XRF Core Scanning 2017*

20th–24th March 2017
Taipei, Taiwan

http://b00302249.wixsite.com/mxcs

EGU 2017 General Assembly*

23th–28th April 2017
Vienna, Austria

http://egu2017.eu/home.html

14th International Ichnofabric Workshop*

29th April - 7th May 2017
Taipei, Taiwan

Ludvig Löwemark ludvig@ntu.edu.tw
http://homepage.ntu.edu.tw/~ludvig/styled-12/index.html

The 2017th edition of the ItalianMeeting of Sedimentary Geology “GeoSed” - Italian Geological Society (SGI)*

16th - 20th June 2017
Perugia, Italy

Enrico Capezzuoli enrico.capezzuoli@unipg.it
Simoneta Cirilli simoneta.cirille
http://homepage.ntu.edu.tw/~ludvig/styled-12/index.html

11th International Conference on Fluvial Sedimentology*

17th-21th July 2017
Calgary, Canada

Stephen Hubbard
shubbard@ucalgary.ca
http://www.icfscalgary.com/

10th International Symposium on the Cretaceous*

21th-26th August 2017
Vienna, Austria

Michael Wagreich
michael.wagreich@univie.ac.at
https://10cretsymp.univie.ac.at/

Summer School on Speleothem Science 2017*

21th-26th August 2017
Burgos, Spain

https://summerschoolspeleothemscience.wordpress.com/

Deep-Water Circulation Conference 2017*

14th–16th September 2017
Wuhan, China

Xinong XIE and Tao JIANG
3dwc2017@cug.edu.cn
http://www.3dwc2017.org/

2nd International Conference of Continental Ichnology* ICCI 2017

2th–8th October 2017
Western Cape, South Africa

ICCI_2017@yahoo.com
https://sites.google.com/site/icci2017conference/home

33rd IAS MEETING OF SEDIMENTOLOGISTS*

10th–12th October 2017
Toulouse France

Delphine Rouby
ims2017@scienceconf.org
http://ims2017.sciencesconf.org/

*** THESE EVENTS HAVE FULL OR PARTIAL IAS SPONSORSHIP**

This Newsletter has been designed by
Proedex s.l. Francisco Silvela 27
28028 Madrid, Spain editorial@proedex.com

Contributions to be sent to:
Vincenzo Pascucci
IAS General Secretary
Department of Architecture,
Design and Planning,
University of Sassari,
sede di Via Piandanna 4,
07100 Sassari, Italy
Tel.: +39 079228685
pascucci@uniss.it

IAS

INTERNATIONAL ASSOCIATION OF SEDIMENTOLOGISTS

www.sedimentologists.org