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INTEGRATING DIVERSE KNOWLEDGE SYSTEMS FOR FIRE MANAGEMENT AND BIODIVERSITY CONSERVATION

4-7th September 2018, Royal Holloway, University of London

Over the last few years, the occurrence of highly devastating, catastrophic fires (e.g. Portugal in 2017 and California in late 2018) is increasingly getting the media's attention and raising debates about best mitigating strategies for severe wildfires, especially at the wildlife-urban interface (Moritz *et al.*, 2014). Understanding the role of fire in a warmer world (e.g. Fischer *et al.*, 2018) is therefore of paramount importance to tackle future challenges about fire impacts on ecosystems and societies.

Regional and global syntheses of biomass burning over millennia through the Global Charcoal Database (GCD; paleofire.org) emphasized the complex interactions between fire, climate and people on decadal to millennial time scales (e.g. Daniau *et al.*, 2012, Marlon *et al.*, 2012, Vanni re *et al.*, 2016a, Power *et al.*, 2018), and the need for an improved understanding of past fire dynamics in key geographic regions (e.g. Colombaroli *et al.*, 2014). With the growing need in the Quaternary Science community to make palaeodata interpretation more accessible to applied disciplines (Colombaroli *et al.*, 2017, Vanni re *et al.*, 2016b), the Global Paleofire Working Group (GPWG2) is promoting new cross-cutting approaches that includes both the stakeholder's needs and the decision making process.

Between 4-7 September 2018, ca. 30 international participants gathered at Royal Holloway, University of London, to discuss integrative approaches to inform current Fire Policy and Biodiversity conservation. The workshop, titled: "*Diverse knowledge systems for fire policy and biodiversity conservation: integrating palaeoecology, traditional knowledge and stakeholders*", was coordinated by **D. Colombaroli**, **B. Vanni re**, **A. Milner**, **J Mistry**, with the support of the GPWG2 and ECR/PAGES ECN leaders, **C. Adolf** and **D. Hawthorne**. Participants included modern ecologists and palaeoecologists, physical and cultural geographers, park managers and researchers working at the science-policy interface. Such diverse background and expertise from both the northern and southern hemispheres was conceived for promoting the knowledge transfer from palaeofire research to more applied science (Colombaroli *et al.*, 2017, Blarquez *et al.*, 2018).

The meeting included keynote speakers and breakout/plenary sessions (details via this [hyperlink here](#)) to prioritize and discuss topical challenges for fire policy and ecosystem management. To achieve this goal, and to promote a more direct involvement of policy makers and stakeholders in the discussion, key priority challenges were selected in collaboration with the Department for Environment, Food and Rural Affairs (DEFRA) prior to

the workshop. During the four days of the workshop, participants discussed and provided evidence-based expertise on: the impact of changing climate and land use on fire regimes, the rates of ecosystem recovery after fires, the optimum fire regimes required to achieve management objectives, and the effects of certain land-management practices including prescribed burning.

Day 1 of the workshop focused on the current “fire issue” in the context of the long-term fire variability observed during the Quaternary, and accounting for the role of traditional land-use practices in present ecological systems (e.g. Mistry and Berardi, 2016). Breakout-groups identified specific case studies on post-fire vegetation recovery, sustainable land use practices successfully implemented by local communities, and conditions that maximize biodiversity across ecosystems (e.g. Colombaroli *et al.*, 2013, Fig 1).

Day 2 provided complementary examples on fire risk and ecological impacts, with a visit to Chobham Common, the largest National Nature Reserve in South East England (lead by George Rockell, Surrey Wildlife Trust see hyperlink here). Based on the feedback from the first two days of group discussions, **days 3 and 4** focused on using our collective knowledge to identify appropriate restoration goals for fire management and ecosystem conservation. Groups also identified key knowledge gaps and the critical role of traditional knowledge for sustainable landscape management. The discussion highlighted the need of balancing specific targets in areas that offers conservation challenges on both natural and cultural values (Whitlock *et al.*, 2018), and the identification of alternative management objectives that best meet landscape management goals, for instance by including local community knowledge into decision-making processes. In the final sessions of the workshop, participants began drafting a Policy Brief that included specific recommendations, highlighted key knowledge gaps and put forth ideas for integrating science and management in the future (to be released in late 2019). Additionally, several Early Career Researchers (lead by Carole Adolf and Donna Hawthorne) gathered to develop a systematic review (<https://www.roses-reporting.com>) to evaluate the effects of changing climate and land-use practices on local-to-global scale fire regimes.

This workshop offered a novel and alternative approach to foster collaboration among ecosystem practitioners, academic scholars and policy makers with themes that included “palaeoecology informed conservation” (i.e. long-term perspectives), “local community-owned conservation” (i.e. traditional practices and modern management perspectives), and the importance of “stakeholder-driven research”. This integrated framework provided capacity building and network development for researchers working at the interface between Palaeoecology, Ecosystem management, Biodiversity conservation and Fire ecology. The Palaeofire community will continue to provide user-friendly web-tools for data access (Paleofire.org, Vanniere *et al.*, 2016b) for all stakeholders (scientists, ecosystem managers, traditional and modern fire practitioners and policy-makers). Complementary

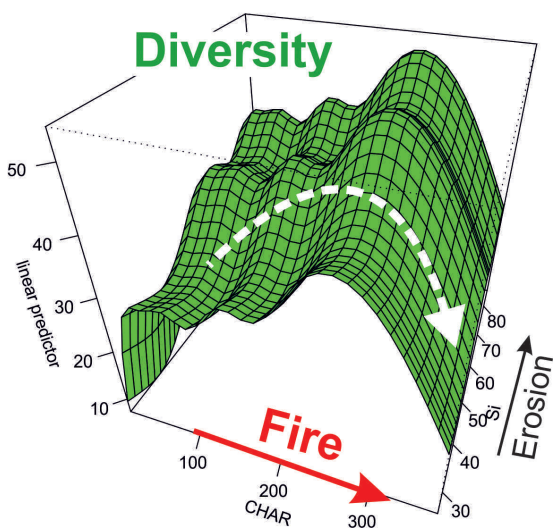


Figure 1. Top: a recent fire in Chobham common affected vegetation structure and composition, with consequences on soil nutrient cycling and erosion. Bottom: optimal conditions for biodiversity following fire, together with the long-term effects on soil erosion, as reconstructed from lake sediment records (modified by Colombaroli *et al.*, 2013).

initiatives led by the GPWG2 include the development of community tools for data analyses (Blarquez *et al.*, 2014), database standardization, and integration of other data-sharing platforms via web-services (e.g. NEOTOMA). Finally, the inclusion of other fire-related proxy (e.g fire-scarred tree rings data, biomass burning metrics from ice cores, soil charcoal, etc.) will help the community to design and develop new projects across the Quaternary Sciences.

Acknowledgements

More information about interdisciplinary work in the field of Conservation Palaeobiology and engagement with external stakeholders is further available on our website and Twitter accounts (@paleofireWG, @diverse_k). We would like to thank the GPWG community for promoting and inspiring this initiative, and Past Global Changes (PAGES), the QRA, and UMR-CNRS Chrono-environnement at Université Bourgogne Franche-Comté for funding.

References

- Blarquez, O., Vanni re, B., Marlon, J. R., Daniau, A. -L., Power, M. J., Brewer, S. and Bartlein, P. J. (2014). Paleofire: an R package to analyse sedimentary charcoal records from the Global Charcoal Database to reconstruct past biomass burning. *Computers and Geosciences*, 72, 255–261.
- Blarquez, O., Grondin, P. and the GPWG2 (2018). Paleofire knowledge for current and future ecosystem management. *Past Global Changes Magazine*, 26(1), 40 <https://doi.org/10.22498/pages.26.1>
- Colombaroli, D., Beckmann, M., van der Knaap, W.O., Curdy, P. and Tinner, W. (2013). Changes in biodiversity and vegetation composition in the central Swiss Alps during the transition from pristine forest to first farming. *Diversity and distributions*, 19(2), 157-170.
- Colombaroli, D., Ssemmanda, I., Gelorini, V. and Verschuren, D. (2014). Contrasting long-term records of biomass burning in wet and dry savannas of equatorial East Africa. *Global Change Biology*, 20(9), 2903-2914.
- Colombaroli, D., Whitlock, C., Tinner, W. and Conedera, M. (2017). Paleo records as a guide for ecosystem management and biodiversity conservation. *Past Global Changes Magazine*, 25(2), 78-79.
- Daniau, A.L., Bartlein, P.J., Harrison, S.P., Prentice, I.C., Brewer, S., Friedlingstein, P., Harrison-Prentice, T.I., Inoue, J., Izumi, K., Marlon, J.R., Mooney, S., Power, M.J., Stevenson, J., Tinner, W., Andric, M., Atanassova, J., Behling, H., Black, M., Blarquez, O., Brown, K.J., Carcaillet, C., Colhoun, E.A., Colombaroli, D., Davis, B.A.S., D'Costa, D., Dodson, J., Dupont, L., Eshetu, Z., Gavin, D.G., Genries, A., Haberle, S., Hallett, D.J., Hope, G., Horn, S.P., Kassa, T.G., Katamura, F., Kennedy,

L.M., Kershaw, P., Krivonogov, S., Long, C., Magri, D., Marinova, E., McKenzie, G.M., Moreno, P.I., Moss, P., Neumann, F.H., Norstrom, E., Paitre, C., Rius, D., Roberts, N., Robinson, G.S., Sasaki, N., Scott, L., Takahara, H., Terwilliger, V., Thevenon, F., Turner, R., Valsecchi, V.G., Vannièrè, B., Walsh, M., Williams, N. and Zhang Y. (2012). Predictability of biomass burning in response to climate changes, *Global Biogeochemical Cycles*, 26(4), GB4007

Fischer, H., Meissner, K. J., Mix, A. C., Abram, N. J., Austermann, J., Brovkin, V., Capron, E., Colombaroli, D., Daniiau, A. L., Dyez, K. A., Felis, T., Finkelstein, S. A., Jaccard, S. L., McClymont, E. L., Rovere, A., Sutter, J., Wolff, E. W., Affolter, S., Bakker, P., Ballesteros-Cánovas, J. A. and 39 others (2018). Palaeoclimate constraints on the impact of 2 °C anthropogenic warming and beyond. *Nature Geoscience*, 11, 474-485.

Marlon, J.R., Bartlein, P.J., Gavin, D.G., Long, C.J., Anderson, S.R., Briles, C.E., Brown, K.J., Colombaroli, D., Hallett, D.J., Power, M.J., Scharf, E.A. and Walsh, M.K. (2012). Long-term perspective on wildfires in the western USA. *Proceedings of the National Academy of Science of USA*, 109(9), 535-543.

Mistry, J. and Berardi, A. (2006). Bridging Indigenous and scientific knowledge: Local ecological knowledge must be placed at the center of environmental governance. *Science*, 352(6291), 1274-1275

Moritz, M. A., Batllori, E., Bradstock, R. A., Gill, A. Malcolm., Handmer, J., Hessburg, P. F., Leonard, J., McCaffrey, S., Odion, D. C., Schoennagel, T. and Syphard, A. D. (2014). Learning to coexist with wildfire. *Nature*, 515 (7525), 58-66.

Power, M.J., Coddling, B.F., Taylor, A.H., Swetnam, T.W., Magargal, K.E., Bird, D.W. and O'Connell J.F. (2018). Human fire legacies on ecological landscapes. *Frontiers in Earth Science*, 6, 151. DOI <https://doi.org/10.3389/feart.2018.00151>

Vannièrè B., Blarquez O., Rius D., Doyen E., Brücher T., Colombaroli D., Connor S., Feurdean A., Hickler T., Lemmen C., Leys B., Massa C., and Olofsson, J. (2016a). 7000-year human legacy of elevation-dependent European fire regimes. *Quaternary Science Reviews*, 132, 206–212.

Vannièrè B., Marlon, J.R. and the GPWG2 Scientific Steering Committee (2016b). Global Paleofire Working Group phase 2 (GPWG2). *Pages Magazine*, 24, 31.

Whitlock, C., Colombaroli, D., Conedera, M. and Tinner, W. (2018). Land-use history as a guide for forest conservation and management. *Conservation Biology*, 32-1.

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QUATERNARY RESEARCH ASSOCIATION

The Quaternary Research Association is an organisation comprising archaeologists, botanists, civil engineers, geographers, geologists, soil scientists, zoologists and others interested in research into the problems of the Quaternary. The majority of members reside in Great Britain, but membership also extends to most European countries, North America, Africa, Asia and Australasia. Membership (currently c. 1,200) is open to all interested in the objectives of the Association. The annual subscription is £20 with reduced rates (£10) for students and unwaged members and an Institutional rate of £35.

The main meetings of the Association are the Field Meetings, usually lasting 3–4 days, in April, May and/or September, a 2-3 day Discussion Meeting at the beginning of January. Short Study Courses on techniques used in Quaternary work are also occasionally held. The publications of the Association are the *Quaternary Newsletter* issued in February, June and October; the *Journal of Quaternary Science* published in association with Wiley; and the QRA Field Guide and Technical Guide Series.

The Association is run by an Executive Committee elected at an Annual General Meeting held during the Annual Discussion Meeting in January. Current officers of the Association are:

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All questions regarding membership are dealt with by the **Secretary**, the Association's publications are sold by the **Publications Secretary** and all subscription matters are dealt with by the **Treasurer**.

The QRA home page on the world wide web can be found at: <http://www.qra.org.uk>

1 **SPOTLIGHT ON A SITE**

1 Abermawr, Pembrokeshire

3 **OBITUARY**

3 Athur Massey ApSimon *Clive Gamble*

2 **ARTICLE**

2 Late Pleistocene coastal geology of the S'illot region, Alcudia, Mallorca: A classic location for Quaternary fieldwork teaching Steve Boreham, Julie Boreham

13 **LEWIS PENNY AWARD**

13 *Acceptance of the Lewis Penny Medal Clare Boston*

21 **QUATERNARY RESEARCH FUND**

21 Caldey ('Kald ey' in Old Norse) was literally a 'cold island', but was it under Devensian ice? *John Hiemstra*

32 The fundamental knowledge gap in coastal terrestrial palaeoclimate records for Greenland. *Gina Mosely*

34 Pollen analysis of a peat profile from Shaft F46, Nosterfield Quarry, North Yorkshire. *James Innes*

37 **NEW RESEARCH WORKERS AWARD**

37 Bedrock mega-grooves in Assynt, Scotland - from landform to landscape. Mihaela Newton

40 Exploring the dietary ecology of extant mixed-feeding antelopes to investigate paleo-vegetation in eastern Africa (3.5-1.6 Ma) Lucile Crété

44 Searching the geological signature of subduction zone earthquakes in the Pacific Coast of Mexico. J. Emmanuel Bustamante-Fernandez

48 **¹⁴CHRONO AWARD**

48 Creating palaeoenvironmental chronologies in semi-arid islands: A case from Cape Verde. Alvaro Castilla-Beltrán, Sandra Nogué

51 **OUTREACH AWARD**

51 The secrets of Ireland's Peatlands: Bog bodies, volcanoes and climate change. Helen Roe

53 **REPORTS**

53 Glaciers, moraines and climate: challenges of identifying, dating and extracting palaeoclimatic data from former glacier fluctuations. Inchnadamph, Scotland, 13th to 16th August 2018.

57 23rd QRA Postgraduate Symposium, University of Glasgow, 22nd- 24th August, 2018.

62 Global paleofire working group meeting on fire management and biodiversity conservation. 4-7th September 2018. .

68 9th International Symposium on Testate Amoebae (ISTA9): Recent advances and future research priorities. 11-12th September, 2018.

71 QRA Annual Discussion Meeting: Environmental Change: pace, magnitude and impact. University of Chester 3rd-5th January 2019