



**A comparative approach to climate, environment and society in Eurasia, 300-1900
Towards understanding the impact of climate on complex societies**

Final Report of the first project period (September 2015 – July 2018)

The aims of the *Climate Change and History Research Initiative* (henceforward CCHRI) as set out in our original application were to bring together archaeologists, historians and palaeo-environmental scientists in an endeavor to transcend disciplinary boundaries and examine the climate history of the eastern Mediterranean basin within a global comparative context over the period ca. 300 – ca. 1900 CE. The focus was on issues that have the largest potential for cross-disciplinary cooperation within the broader field of climate-history related study. At the same time, the initiative aimed to provide concrete methodological and practical solutions to challenges that such collaboration involves. In this way, our hope was to contribute to a transformation of the way historians look at the past in general.

The research initiative involved three streams of activities, each of which contributed to the basic aims, and included specifically:

1. An annual entry-level workshop each September for pre-modernist junior scholars in history, archaeology and related disciplines, addressing issues of data collection, management, access, and interpretation covering key fields in the paleosciences (**Appendix 1**). The workshops were taught by internationally recognized experts in the relevant specialist fields who remained involved in our subsequent activities.
2. Multiple guest lectures each semester on a theme linking the study of climate and the environment to the history and archaeology of past societies (**Appendix 2**).
3. An annual colloquium held in May to bring together the key themes dealt with in the guest lectures and the workshop within the framework of the project as a whole (**Appendix 3**).

We would like to emphasize that a key element in our strategic planning was to bring scholars from history, archaeology and the palaeosciences together, to work on problems jointly and face-to-face on a regular basis. We have established a truly multidisciplinary network of scholars, a team unlike any other in the field of premodern environmental history. While there have been several publications in the field of environmental history involving large numbers of contributing scholars, our project is the only one of which we are aware that has generated (a) a common and ongoing program of research (as opposed to a one-off publication on a single theme, for example) and (b) regular face-to-face personal interaction and discussion focused on key research themes.

We have been told on several occasions, including by members of the National Academy of Sciences of the USA, that our project is unique in this respect.

While the CCHRI continues to develop its research, we believe the Initiative has more than fulfilled its original promise and has met all our initial aims:

- The project has been able to establish the project as a leader in pre-modern environmental history both in the US and internationally, with a high level of visibility on campus and beyond through a continued series of well-publicized events throughout the year during each of the three years. Members of the Initiative have also delivered a number of talks and lectures highlighting the results of our work at venues in the USA and internationally.
- The project website (<https://cchri.princeton.edu/>) has been very effective, while our newsletter is circulated to our mailing list and communicates our work with former event participants and other interested scholars on and off campus.
- The project has been successful in establishing a positive relationship with the Princeton Environmental Institute, other partners on campus, and the Institute for Advanced Study. Core members of the Initiative (Haldon, Di Cosmo, Mordechai, Newfield) have presented papers both in PEI and in the IAS, and Mordechai was awarded a fellowship at PECS (Princeton Energy and Climate Scholars).
- The project has also brought a number of internationally-recognized scholars to teach at Princeton, collaborate with the CCHRI and move on to achieve prestigious awards. Dr Timothy Newfield was offered a tenure-track position in medieval environmental history at Georgetown University as a direct result of his work on the project; Dr. Adam Izdebski, Krakow University, came to Princeton originally as a Council for the Humanities guest professor, and in part as a result of his participation in the project won a visiting fellowship at the IAS for 2017-2018 and has now been awarded a substantial 5-year grant from the Max-Planck-Gesellschaft to establish a Centre for Environmental History in Germany.
- The project has likewise involved a good number of Princeton history graduate students in our workshops and colloquia – apart from Lee Mordechai (dissertation defended in September 2017), who also served as Project co-manager – the following have also been closely involved: Merle Eisenberg, Mateusz Falkowski, Abigail Sargent, Lucas McMahon, Skyler Anderson. Many more attended our workshops, from Princeton as well as from Georgetown, Harvard, UPenn, NYU, Columbia and Yale.
- Dr. Lee Mordechai was awarded a fellowship at SESYNC, the National Socio-Environmental Synthesis Center; and has recently accepted a tenure-track position at Hebrew University, Jerusalem. His CCHRI work and experience in environmental history and environmental science played a major role in these successes.
- The CCHRI has also been a leader in interdisciplinary collaboration between scholars that has resulted in an ongoing series of publications in both historical as well as scientific journals, as well as informing elements in monographs (**Appendix 4**). Given the diverse

specializations required for such work today we believe this is an absolute necessity, yet – as noted above – our project is one of very few that function successfully in this way.

Core team: J. Haldon (Princeton, project leader), L. Mordechai (Notre Dame, co-leader), Tim Newfield (Georgetown, co-leader), Adam Izdebski (Krakow and IAS), Nicola di Cosmo (IAS), M. Cassis (Memorial U/Newfoundland), O. Doonan (CSU Northridge), W.J. Eastwood (U Bham/UK), H. Elton (Trent U, Ontario), D. Fleitmann (Reading/UK), I. Labuhn (Lund/Sweden), J. Luterbacher (Giessen/Germany), S. Manning (Cornell), J. Newhard (Coll of Charleston), N. Roberts (Plymouth/UK), A.M. Rosen (UTexas, Austin), E. Xoplaki (Giessen/Germany)

While we believe the Initiative has fulfilled all the goals and met all the expectations of our original proposal, we plan to exploit the momentum built up so far and to capitalize further on the project's achievements thus far. Several threads of research are ongoing and others are currently under development. For the future there are collaborations planned with colleagues at Georgetown, at the National Socio-Environmental Synthesis Center at Annapolis, Md. (SESYNC) and with the newly-formed Center for Environmental History in Berlin.

Appendix 1: CCHRI fall workshops 2015-2018

The fall 2015 workshop for pre-modernists (September 15-17) was devoted to an introduction to **Paleoclimates and Dendroclimatology** and was led by palaeoclimate modeler Jürg Luterbacher (Justus Liebig University, Germany) and dendroclimatologist Ulf Büntgen (Swiss Federal Research Institute WSL, Switzerland). Over 15 participants (graduate students, postdocs, assistant professors) from Princeton and other universities attended the three-day event.

The fall 2016 workshop (September 12-14), the second annual palaeoclimate workshop in the series, was focused on **palynology**, and was led by Professor Neil Roberts, Plymouth University, and Professor Warren Eastwood, Birmingham University. 25 junior scholars (graduate students to assistant professors) took part and over the course of three days tackled a number of issues from the principles of palynology, pollen dispersal and chronology development to the archaeological and palaeoclimate applications of pollen analysis. While the concentration was Mediterranean, the course leaders addressed the state of palynology in a number of world regions and introduced attendees to international pollen databases.

The fall 2017 workshop (7-9 September) was devoted to an introduction to the sciences of **glaciology** (ice cores) and **speleothemology** (stalagmites and stalactites) and how to use their data to reconstruct past climate on both local/regional and global scale. There were 19 participants from Princeton and a number of domestic and international universities and research centers internationally. A third day concentrated on **resilience theory** and its application to the study of past complex societies. Joe R. McConnell (Desert Research Institute), Dominik Fleitmann (University of Reading) and Marty Anderies (Arizona State University) led the workshop.

The fall workshops have been an unmitigated success, with excellent feedback. Through them we have been able to introduce junior scholars to a range of palaeo-science techniques and approaches, and encourage them to deploy these resources effectively in their own research. It is partly through the agency of these workshops that Princeton has become well-established as a focus for historical-environmental research. Our upcoming colloquium will feature a number of talks by scholars who have participated in our workshops and are now using their new skills in their research.

Appendix 2: CCHRI guest lectures 2015-2018

2017/8

- 10.25.17 'Climate and Bronze Age Collapse in the Mediterranean Region,' Guy Middleton (Newcastle University)
- 2.27.18 'Environmental Change and Societal Resilience in Roman Egypt,' Katherine Blouin (University of Toronto)

2016/7

- 11.10.16 'Toward a Global Climate History of the 1780s: Iceland and Egypt,' Alan Mikhail (Yale University)
- 11.30.16 'Mediterranean Tsunamis and the Port of Caesarea Maritima,' Hendrik Dey (Hunter College)
- 2.15.17 'Climate Change and Conflict: Perspectives from the Little Ice Age,' Dagomar Degroot (Georgetown University)
- 3.15.17 'Climate, Biodiversity, and Epidemics: The Ottoman Plague Experience,' Nükhet Varlık (Rutgers University)
- 4.26.17 'Climatic Variability and the Fisheries of Medieval and Early Modern Europe,' Richard Hoffman (York University)

2015/6

- 10.27.15 'Digitizing Patterns of Power in Macedonia (12th-14th C.): What do Nomads, Pasture, Camels and Hydrography Have in Common?,' Mihailo Popović (Vienna)
- 12.9.15 'Violence and Extreme Weather in Medieval Ireland,' Francis Ludlow (Yale)
- 2.17.16 'Climate and Rural Society in the Eastern Mediterranean, c.300-1000: using vegetation and landscape history to transform our understanding of the past,' Adam Izdebski (Krakow)
- 3.9.16 'Reconstructing Climate using Tree Rings and Speleothems,' Inga Labuhn (Lund)
- 4.6.16 'Climate, Crusades and Collapse? The Eastern Mediterranean ca. 1000-1200,' Johannes Preiser-Kapeller (Vienna)

Appendix 3: CCHRI May colloquia 2015-2018

The **first spring colloquium** took place in May 2016 and was focused on the theme *Resilience and climate change in history*. The speakers included Kevin Anchukaitis (UofArizona); Nicola di Cosmo (IAS); John Haldon (Princeton); Adam Izdebski (Krakow & Princeton); Inga Labuhn (Lund); Sofia Laparidou (UTexas); Lee Mordechai (Princeton); Don Nelson (UofGeorgia); Tim Newfield (Princeton); Arlene Rosen (UofTexas); Paolo Squatriti (UofMichigan). Some 35 people attended from campus and outside, including the speakers.

The **second spring colloquium** took place in May 2017 and focused on the theme: *Vulnerability and resilience: from catastrophe to complexity in the pre-modern Mediterranean and the pre-Columbian Americas*. Speakers included John Bintliff (Leiden), Vera Candiani (Princeton), Arlen Chase (University of Nevada), Warren Eastwood (University of Birmingham), Martín Medina Elizalde (Auburn University), Dominik Fleitmann (University of Reading), Benjamin Graham (University of Memphis), John Haldon (Princeton), Adam Izdebski (Krakow and IAS), Jürg Luterbacher (Giessen), Lee Mordechai (Princeton), Joseph Manning (Yale), Sturt Manning (Cornell), Jason Nesbitt (Tulane University), Tim Newfield (Georgetown University), Johannes Preiser-Kapeller (Austrian Academy of Sciences), Arlene Rosen (University of Texas), Billie Lee Turner (Arizona State University), Elena Xoplaki (Giessen). The program is attached as **Appendix 6**.

The **third spring colloquium** takes place this May, on the theme: *Society, environment and change in historical perspective. Recent collaborative and interdisciplinary research*. Speakers include: Peregrine Horden (Oxford), Johannes Preiser-Kapeller (Austrian Academy), Qing Pei (Hong Kong), Patrick Klinger (U Kansas), Kevin Bloomfield (Cornell), David Patterson (U Michigan), Lee Mordechai (Notre Dame), Patricia McAnany (UNC Chapel Hill), Marty Andeies (U Arizona), Guy Middleton (York), Ronnie Ellenblum (Jerusalem) and some 15 other speakers and participants, many of whom have been members of the group from the beginning.

Appendix 4: CCHRI research publications 2015-2018

(publications to which, one, several, or all core team members have contributed)

2018

1. J. Haldon, L. Mordechai, T. Newfield, A.F. Chase, A. Izdebski, P. Guzowski, I. Labuhn and C.N. Roberts, 'History meets palaeoscience. Consilience and collaboration in studying past societal responses to environmental change', *Proc. National Acad. of Sciences of the USA* 115 (13): 3210-3218 <https://doi.org/10.1073/pnas.1716912115>
2. J. F. Haldon and A.M. Rosen, 'Introduction: Problems of resilience, adaptation and transformation', *Human Ecology* 46/3 (2018) <https://doi.org/10.1007/s10745-018-9972-3>
3. I. Labuhn, M. Finné, I. Izdesbki, N. Roberts and J. Woodbridge, 'Climatic changes and their impacts in the Mediterranean during the first millennium A.D.', in A. Izdebski and M. Mulryan, eds., *Environment and society in the first millenium AD* (Late Antique Archaeology 13. Leiden 2018)
4. C. Oppenheimer, A. Orchard, M. Stoffel, T. Newfield, S. Guillet, C. Corona, M. Sigl, N. di Cosmo, U. Büntgen, 'The Eldgjá Eruption: Timing, Long-Range Impacts and Influence on the Christianization of Iceland,' *Climatic Change* (2018)
5. T. Newfield, 'Mysterious and Mortiferous Clouds: Towards an Historical Epidemiology of the Late Antique Little Ice Age,' in A. Izdebski and M. Mulryan, eds., *Environment and society during the long Late Antiquity* (Late Antique Archaeology 13. Leiden 2018)
6. T. Newfield, 'The Global Climatic Downturn of c.535-550: The State of the Art' in F. Mauelshagen, C. Phister, S. White eds., *The Palgrave Handbook on Climate History* (London, 2018)
7. A. Izdebski, S. Allcock, M. Cassis, S. Laparidou, L. Mordechai, J. Pickett and S. White, 'Environmental stress and resilience in complex historical societies. Insights from Eastern Mediterranean case studies,' *Human Ecology* 46/3 (2018)
8. M. Cassis, O. Doonan, H. Elton and J. Newhard, 'Evaluating archaeological evidence for demographics, abandonment, and recovery in Late Antique and Byzantine Anatolia,' *Human Ecology* 46/3 (2018)
9. L. Mordechai, 'Short-term cataclysmic events in premodern complex societies', *Human Ecology* 46.3 (2018) <https://doi.org/10.1007/s10745-018-9971-4>
10. L. Mordechai and J. Pickett, 'Earthquakes as the quintessential SCE: methodology and societal resilience', *Human Ecology* 46.3 (2018) <https://doi.org/10.1007/s10745-018-9985-y>

11. L. Mordechai, 'Antioch in the Sixth Century: Resilience of Vulnerability?', in A. Izdebski and M. Mulryan, eds., *Environment and society during the long Late Antiquity* (Late Antique Archaeology 13. Leiden 2018)
12. N. Roberts, M. Cassis, O. Doonan, W.J. Eastwood, H. Elton, J.F. Haldon, A. Izdebski, J. Newhard, 'Not the End of the World? Post-Classical Decline and Recovery in Rural Anatolia', *Human Ecology* 46.3 (2018) <https://doi.org/10.1007/s10745-018-9973-2>
13. M. Soroush and L. Mordechai, 'Adaptation to short-term cataclysmic events: flooding in premodern riverine societies', *Human Ecology* 46.3 (2018) <https://doi.org/10.1007/s10745-018-9986-x>
14. E. Xoplaki, J. Luterbacher, S. Wagner, E. Zorita, D. Fleitmann, J. Preiser-Kapeller, A.M. Sargent, S. White, A. Toreti, J. F. Haldon, L. Mordechai, D. Bozkurt, S. Akçer-Ön and A. Izdebski, 'Modelling Climate and Societal Resilience in the Eastern Mediterranean in the Last Millennium', *Human Ecology* 46.3 (2018) <https://doi.org/10.1007/s10745-018-9995-9>
15. J.F. Haldon, 'Some thoughts on climate change, local environment and grain production in Byzantine northern Anatolia', in A. Izdebski and M. Mulryan, eds., *Environment and society during the long Late Antiquity* (Late Antique Archaeology 13. Leiden 2018)

2017

16. T. Newfield, 'Malaria and Malaria-Like Disease in Europe, 450-950', *Early Medieval Europe* 25 (2017), 251-300
17. U. Büntgen, O. Eggertsson, L. Wacker, M. Sigl, F. Ljungqvist, N. di Cosmo, G. Plunkett, P. Krusic, T. Newfield, J. Esper, C. Lane, F. Reinig and C. Oppenheimer, 'Multi-Proxy Dating and Climate Forcing of Iceland's Pre-Settlement Katla Eruption in 822/3 CE' *Geology* 45 (2017), 783-786
18. T. Newfield, 'Livestock plagues in late antiquity, with a disassembling of the bovine panzootic of A.D. 376-386', *Journal of Roman Archaeology* 30 (2017), 490-508
19. T. Newfield and I. Labuhn, 'Realizing Consilience in Studies of Pre-Instrumental Climate and Pre-Laboratory Disease,' *Journal of Interdisciplinary History* 48/2 (2017), 211-240

20. T. Newfield, M. D. Teasdale, S. Fiddymment, J. Vnouček, V. Mattiangeli, C. Speller, A. Binois, M. Carver, C. Dand, C. C. Webb, D. G. Bradley and M.J. Collins, 'The York Gospels: a 1000-year biological palimpsest', *Royal Society open science* 4 (2017): 170988. <http://dx.doi.org/10.1098/rsos.170988>

2016

21. E. Xoplaki, D. Fleitmann, J. Luterbacher, S. Wagner, J. F. Haldon, E. Zorita, I. Telelis, A. Toreti and A. Izdebski, 'The Medieval Climate Anomaly and Byzantium: A review of the evidence on climatic fluctuations, economic performance and societal change', *Quaternary Science Reviews* 136 (March 2016), 229-252
22. J. Haldon, 'History: cooling and societal change', *Nature Geoscience* 9 (Feb 2016), 191–192
23. A. Izdebski, K. Holmgren, E. Weiberg, S. R. Stocker, U. Büntgen, A. Florenzano, A. Gogou, S.A.G. Leroy, J. Luterbacher, B. Martrat, A. Masi, A. M. Mercuri, P. Montagna, L. Sadori, A. Schneider, M.-A. Sicre, M. Triantaphyllou and E. Xoplaki, 'Realising consilience: How better communication between archaeologists, historians and natural scientists can transform the study of past climate change in the Mediterranean', *Quaternary Science Reviews* 136 (March 2016), 5-22
24. A. Izdebski, J. Pickett, N. Roberts and T. Waliszewski, 'The environmental, archaeological and historical evidence for regional climatic changes and their societal impacts in the Eastern Mediterranean in Late Antiquity', *Quaternary Science Reviews* 136 (March 2016), 189-208

2015

25. A. Izdebski, G. Koloch and T. Słoczyński, 'Exploring Byzantine and Ottoman economic history with the use of palynological data: a quantitative approach', *Jahrbuch der österreichischen Byzantinistik* 65 (2015), 67-110.
26. T. Newfield, 'Domesticates, Disease and Climate in Early Post-Classical Europe: The Cattle Plague of c.940 and its Environmental Context,' *Post-Classical Archaeologies* 5 (2015), pp. 95-126
27. T. Newfield, 'Human–Bovine Plagues in the Early Middle Ages', *Journal of Interdisciplinary History* 46/1 (2015), 1-38

Forthcoming papers

28. J. Haldon and W.J. Eastwood. ‘Euchaïta, landscape and climate in the Byzantine period’, in J. Preiser-Kapeller, A. Izdebski and M. Popović, eds., *A companion to the environmental history of Byzantium* (Brill: Leiden 2018),
29. L. Mordechai, ‘Archaeoseismology’, in J. Preiser-Kapeller, A. Izdebski and M. Popović, eds., *A companion to the environmental history of Byzantium* (Brill: Leiden 2018)

Papers in preparation

30. J. Haldon, A. Chase, M. Elizalde, A. Izdebski, P. Guzowski, F. Ludlow, J. Manning, L. Mordechai, J. Nesbitt and B.L. Turner, ‘A question of collapse? Environment, agency and resilience in pre-modern societies’, *Annales* 2018
31. T. Newfield, U. Büntgen, P. Benito i Monclús, ‘Climate Variability, Food Crisis and Vulnerability in high Medieval Catalonia’, *Medieval Studies*
32. T. Newfield, I. Labuhn, ‘Charlemagne’s Famines: Climate and Subsistence Crises in Carolinian Europe’, *Journal of Medieval History*
33. L. Mordechai and M. Eisenberg, ‘Rejecting catastrophe: the case of the Justinianic plague’, *Past and Present* (2018)
34. L. Mordechai, T. Newfield, J. Haldon, A. Izdebski, S. Hübner: review of K. Harper, *The fate of Rome: climate, disease, and the end of an empire* (Princeton 2017), for *American Historical Review*