

References

Aktuell

COGLEY 2017

J. Graham Cogley, *The future of Asia's glaciers*. [nature 549 \(2017\), 166–167](#).

Glaciers in the high mountains of Asia are a crucial water resource, but are at risk from global warming. Modelling suggests that the glaciers will shed mass in direct proportion to the warming to which they are exposed.

If there was no warming between 1851–1880 and 2071–2100, about 22 % of the present-day ice mass would be lost over this time span. In fact, in one of their own simulations (which was not part of the 110 simulations), in which there is no warming after the present day, the authors find a mass loss of 14 % by 2071–2100 — implying that about 8 % of the present ice mass was lost between 1851–1880 and today. Mass loss in the absence of warming reflects a slow adjustment to an earlier climate because it can take decades for glaciers to reach the size sustained by a given climate. More speculatively, the work indicates that a warming of about 11 °C would be required to remove all of the ice. Such a value is much higher than any of those in the 110 climate simulations, suggesting that HMA glaciers are not going to disappear altogether by 2100, let alone by 2035 (as has previously been suggested).

KRAAIJENBRINK 2017

P. D. A. Kraaijenbrink, M. F. P. Bierkens, A. F. Lutz & W. W. Immerzeel, *Impact of a global temperature rise of 1.5 degrees Celsius on Asia's glaciers*. [nature 549 \(2017\), 257–260](#).

[n549-0257-Supplement1.pdf](#), [n549-0257-Supplement2.zip](#)

Glaciers in the high mountains of Asia (HMA) make a substantial contribution to the water supply of millions of people^{1,2}, and they are retreating and losing mass as a result of anthropogenic climate change³ at similar rates to those seen elsewhere^{4,5}. In the Paris Agreement of 2015, 195 nations agreed on the aspiration to limit the level of global temperature rise to 1.5 degrees Celsius (°C) above preindustrial levels. However, it is not known what an increase of 1.5 °C would mean for the glaciers in HMA. Here we show that a global temperature rise of 1.5 °C will lead to a warming of 2.1 ± 0.1 °C in HMA, and that 64 ± 7 per cent of the present-day ice mass stored in the HMA glaciers will remain by the end of the century. The 1.5 °C goal is extremely ambitious and is projected by only a small number of climate models of the conservative IPCC's Representative Concentration Pathway (RCP)^{2.6} ensemble. Projections for RCP4.5, RCP6.0 and RCP8.5 reveal that much of the glacier ice is likely to disappear, with projected mass losses of 49 ± 7 per cent, 51 ± 6 per cent and 64 ± 5 per cent, respectively, by the end of the century; these projections have potentially serious consequences for regional water management and mountain communities.

MARTIN 2017

John H. Martin, Brennan D. Yahata, Jacob M. Hundley, Justin A. Mayer, Tobias A. Schaedler & Tresa M. Pollock, *3D printing of high-strength aluminium alloys*. [nature 549 \(2017\), 365–369](#).

Metal-based additive manufacturing, or three-dimensional (3D) printing, is a potentially disruptive technology across multiple industries, including the aerospace, biomedical and automotive industries. Building up metal components layer by layer increases design freedom and manufacturing flexibility, thereby enabling complex geometries, increased product customization and shorter time to market, while eliminating traditional economy-of-scale constraints. However, currently only a few alloys, the most relevant being AlSi10Mg, TiAl6V4, CoCr and Inconel 718, can be reliably printed^{1,2}; the vast majority of the more than 5,500 alloys in use today cannot be additively manufactured because the melting and solidification dynamics during the printing process lead to intolerable microstructures with large columnar grains and periodic cracks^{3–5}. Here we demonstrate that these issues can be resolved by introducing nanoparticles of nucleants that control solidification during additive manufacturing. We selected the nucleants on the basis of crystallographic information and assembled them onto 7075 and 6061 series aluminium alloy powders. After functionalization with the nucleants, we found that these high-strength aluminium alloys, which were previously incompatible with additive manufacturing, could be processed successfully using selective laser melting. Crack-free, equiaxed (that is, with grains roughly equal in length, width and height), fine-grained microstructures were achieved, resulting in material strengths comparable to that of wrought material. Our approach to metal-based additive manufacturing is applicable to a wide range of alloys and can be implemented using a range of additive machines. It thus provides a foundation for broad industrial applicability, including where electron-beam melting or directed-energy-deposition techniques are used instead of selective laser melting, and will enable additive manufacturing of other alloy systems, such as non-weldable nickel superalloys and intermetallics. Furthermore, this technology could be used in conventional processing such as in joining, casting and injection moulding, in which solidification cracking and hot tearing are also common issues.

Bibel

ALBERTZ 2016

Rainer Albertz, *Noncontinuous Literary Sources Taken Up in the Book of Exodus*. In: JAN C. GERTZ, BERNARD M. LEVINSON, DALIT ROM-SHILONI & KONRAD SCHMID (Hrsg.), *The Formation of the Pentateuch, Bridging the Academic Cultures of Europe, Israel, and North America*. Forschungen zum Alten Testament (Tübingen 2016), 609–617.

All these observations provide good reasons for concluding that Exod 34 not only shows the final scene of a narrative sequence but also constitutes the end of a literary composition, which was originally not continued. What looks like a continuation in the book of Numbers does not fit and seems to belong to later literary layers. Therefore, I speak of a specific Exodus composition (KEX) containing most of the non-Priestly passages of the book within the wide range from Exod 1:9 to 34:32. This composition was not completely preserved, either; its exposition was lost in the redactional work at the beginning of the book. Whether some concluding remarks are missing at the end is not certain. Thus, a large but noncontinuous literary unit seems to have existed in the book of Exodus even at a higher level of text formation, where many scholars tend to assume continuous literary documents or comprehensive redactional compositions.

This means that it cannot be taken for granted any longer that those sources of the Pentateuch that are situated in a higher compositional layer, whether they are

designated J, E, JE, P or otherwise, constitute literary units throughout the entire range of the pentateuchal or hexateuchal narrative. How far such sources actually extended has to be carefully investigated in each case, as has already been done in the case of the preexisting material at lower levels of text formation.

FINKELSTEIN 2005

Israel Finkelstein, *A Low Chronology Update, Archaeology, history and bible*. In: LEVY (Hrsg.), *The Bible and Radiocarbon Dating, Archaeology, Text and Science*. (2005), 31–42.

The aim of this chapter is to present an up-to-date overview of the Low Chronology system for the late Iron I and early Iron II strata in the Levant, a system I first proposed in two articles which were published about a decade ago (Finkelstein 1995, 1996a). These articles have generated a fierce debate (e.g. Ben-Tor 2000; Ben-Tor and Ben-Ami 1998; Mazar 1997), which was a major stimulant behind the introduction of large-scale radiocarbon projects into Iron Age archaeology. And though the gap between my system and the reasonable voice in the traditional camp is narrowing (the ‘extended conventional chronology’—Mazar in the Radiocarbon Dating conference, Oxford 2004; see also Mazar 2004: 31), the dispute is far from being resolved.

KLEIMAN 2017

Assaf Kleiman, Margaret E. Cohen, Elin Hall, Robert S. Homsher & Israel Finkelstein, *Cult Activity at Megiddo in the Iron Age, New Evidence and a Long-Term Perspective*. *Zeitschrift des Deutschen Palästina-Vereins* **133** (2017), 24–52.

In this article we present new data from our excavations at Megiddo, which shed light on the history of cult activity at the site in the Iron Age in particular, and on cult in the Northern Kingdom of Israel in general. The Megiddo data point to two major transformations. The first took place at the end of the late Iron Age I, in the 10th cent. B.C.E., with the destruction of the central temple of the 2nd mill. B.C.E. city. The second occurred in the beginning of the late Iron Age IIA, in the early 9th cent. B.C.E., with a shift from a long-term tradition of buildings fully devoted to cult (temples) to cult practiced in restricted areas within prominent administrative buildings in the city.

Keywords: Megiddo | cult | cult stands | figurines | Northern Kingdom | Iron Age IIA.

Klima

MCCONNELL 2017

Joseph R. McConnell et al., *Synchronous volcanic eruptions and abrupt climate change ≈ 17.7 ka plausibly linked by stratospheric ozone depletion*. *PNAS* **114** (2017), 10035–10040.

[pnas114-10035-Supplement.xlsx](#)

Joseph R. McConnell, Andrea Burke, Nelia W. Dunbar, Peter Kohler, Jennie L. Thomas, Monica M. Arienzo, Nathan J. Chellman, Olivia J. Maselli, Michael Sigl, Jess F. Adkins, Daniel Baggenstos, John F. Burkhart, Edward J. Brook, Christo Buizert, Jihong Cole-Dai, T. J. Fudge, Gregor Knorr, Hans-F. Graf, Mackenzie M. Grieman, Nels Iverson, Kenneth C. McGwire, Robert Mulvaney, Guillaume Paris, Rachael H. Rhodes, Eric S. Saltzman, Jeffrey P. Severinghaus, Jørgen Peder Steffensen, Kendrick C. Taylor & Gisela Winckler

Glacial-state greenhouse gas concentrations and Southern Hemisphere climate conditions persisted until ≈ 17.7 ka, when a nearly synchronous acceleration in deglaciation was recorded in paleoclimate proxies in large parts of the Southern Hemisphere, with many changes ascribed to a sudden poleward shift in the Southern Hemisphere westerlies and subsequent climate impacts. We used high-resolution chemical measurements in the West Antarctic Ice Sheet Divide, Byrd, and other ice cores to document a unique, ≈ 192 -y series of halogen-rich volcanic eruptions exactly at the start of accelerated deglaciation, with tephra identifying the nearby Mount Takahe volcano as the source. Extensive fallout from these massive eruptions has been found $>2,800$ km from Mount Takahe. Sulfur isotope anomalies and marked decreases in ice core bromine consistent with increased surface UV radiation indicate that the eruptions led to stratospheric ozone depletion. Rather than a highly improbable coincidence, circulation and climate changes extending from the Antarctic Peninsula to the subtropics—similar to those associated with modern stratospheric ozone depletion over Antarctica—plausibly link the Mount Takahe eruptions to the onset of accelerated Southern Hemisphere deglaciation ≈ 17.7 ka.

Keywords: climate | deglaciation | volcanism | ozone | aerosol

Significance: Cold and dry glacial-state climate conditions persisted in the Southern Hemisphere until approximately 17.7 ka, when paleoclimate records show a largely unexplained sharp, nearly synchronous acceleration in deglaciation. Detailed measurements in Antarctic ice cores document exactly at that time a unique, ≈ 192 -y series of massive halogen-rich volcanic eruptions geochemically attributed to Mount Takahe in West Antarctica. Rather than a coincidence, we postulate that halogen-catalyzed stratospheric ozone depletion over Antarctica triggered large-scale atmospheric circulation and hydroclimate changes similar to the modern Antarctic ozone hole, explaining the synchronicity and abruptness of accelerated Southern Hemisphere deglaciation.

PÉREZ-MEJÍAS 2017

Carlos Pérez-Mejías et al., *Abrupt climate changes during Termination III in Southern Europe*. *PNAS* **114** (2017), 10047–10052.

Carlos Pérez-Mejías, Ana Moreno, Carlos Sancho, Miguel Bartolomé, Heather Stoll, Isabel Cacho, Hai Cheng & R. Lawrence Edwards

The Late Quaternary glacial–interglacial transitions represent the highest amplitude climate changes over the last million years. Unraveling the sequence of events and feedbacks at Termination III (T-III), including potential abrupt climate reversals similar to those of the last Termination, has been particularly challenging due to the scarcity of well-dated records worldwide. Here, we present speleothem data from southern Europe covering the interval from 262.7 to 217.9 kyBP, including the transition from marine isotope stage (MIS) 8 to MIS 7e. High-resolution $d_{13}C$, $d_{18}O$, and Mg/Ca profiles reveal major millennial-scale changes in aridity manifested in changing water availability and vegetation productivity. uranium–thorium dates provide a solid chronology for two millennial-scale events (S8.1 and S8.2) which, compared with the last two terminations, has some common features with Heinrich 1 and Heinrich 2 in Termination I (T-I).

Keywords: terminations | stalagmite | stadial event | stable isotopes | Iberian Peninsula

Significance: We present an outstanding speleothem record that reconstructs the vegetation activity and hydrological availability during Termination III (T-III) in Southern Europe throughout $d_{13}C$, $d_{18}O$, and Mg/Ca variations. The results reveal for the North Atlantic region the sequence of abrupt stadial events during T-III, in close analogy to the Asian Monsoon changes reconstructed from Chinese speleothems. The two stadials identified in this record (S8.1 and S8.2)

have similarities with Heinrich 1 and Heinrich 2 events in Termination I in terms of changes in the phasing of benthic $\delta^{18}\text{O}$, rise of semidesert pollen taxa, and ice-rafted debris release.

Metallzeiten

KNIPPER 2017

Corina Knipper et al., *Female exogamy and gene pool diversification at the transition from the Final Neolithic to the Early Bronze Age in central Europe*. *PNAS* **114** (2017), 10083–10088.

[pnas114-10083-Supplement.xlsx](#)

Corina Knipper, Alissa Mittnik, Ken Massy, Catharina Kociumaka, Isil Kucukkalipci, Michael Maus, Fabian Wittenborn, Stephanie E. Metz, Anja Staskiewicz, Johannes Krause & Philipp W. Stockhammer

Human mobility has been vigorously debated as a key factor for the spread of bronze technology and profound changes in burial practices as well as material culture in central Europe at the transition from the Neolithic to the Bronze Age. However, the relevance of individual residential changes and their importance among specific age and sex groups are still poorly understood. Here, we present ancient DNA analysis, stable isotope data of oxygen, and radiogenic isotope ratios of strontium for 84 radiocarbon-dated skeletons from seven archaeological sites of the Late Neolithic Bell Beaker Complex and the Early Bronze Age from the Lech River valley in southern Bavaria, Germany. Complete mitochondrial genomes documented a diversification of maternal lineages over time. The isotope ratios disclosed the majority of the females to be nonlocal, while this is the case for only a few males and subadults. Most nonlocal females arrived in the study area as adults, but we do not detect their offspring among the sampled individuals. The striking patterns of patrilocality and female exogamy prevailed over at least 800 y between about 2500 and 1700 BC. The persisting residential rules and even a direct kinship relation across the transition from the Neolithic to the Bronze Age add to the archaeological evidence of continuing traditions from the Bell Beaker Complex to the Early Bronze Age. The results also attest to female mobility as a driving force for regional and supraregional communication and exchange at the dawn of the European metal ages.

Keywords: mtDNA | strontium | oxygen | kinship | human mobility

Significance: Paleogenetic and isotope data from human remains shed new light on residential rules revealing patrilocality and high female mobility in European prehistory. We show the crucial role of this institution and its impact on the transformation of population compositions over several hundred years. Evidence for an epochtransgressing maternal relationship between two individuals demonstrates long-debated population continuity from the central European Neolithic to the Bronze Age. We demonstrate that a simple notion of “migration” cannot explain the complex human mobility of third millennium BCE societies in Eurasia. On the contrary, it appears that part of what archaeologists understand as migration is the result of large-scale institutionalized and possibly sex- and age-related individual mobility.

KOPANIAS 2017

Konstantinos Kopanias, *Mercenaries or refugees? The evidence from the inscriptions of Merenptah on the ‘Sea Peoples’*. *Journal of Greek Archaeology* **2** (2017), 119–133.

During the fifth regnal year of Merenptah (either 1208 BC or 1219 BC), king Meresy of the Rebu/ Lebu attacked Egypt, together with his archers and many northern warriors. These northerners were not affiliated with any of the existing minor or major kingdoms of the eastern Mediterranean, since they are only identified by obscure ethnonyms. Five inscriptions of Merenptah refer to these particular events, but they offer scarce historical information; a sixth one, inscribed on a wall of the Amun temple in Karnak, is the most elaborate one. Although the Karnak inscription has often been cited, most scholars usually focus on the parts referring to the ‘Sea Peoples’, which are often examined in isolation and out of their context. The aim of this paper is to re-examine the available evidence.

As always in the official Egyptian texts, the outcome of the battle is described as an Egyptian triumph, attributed personally to the king. The fact that the Egyptians captured Meresy’s wives and his valuables indeed shows that Meresy suffered a humiliating defeat. Nevertheless, the Libyan king, and probably many of his followers, managed to escape back to Libya. So it was not a devastating defeat. In the long run, the Egyptians were not able to keep the Libyans away from the Nile Delta: the Papyrus Harris I states that some groups of the Rebu and Meshwesh remained in various parts of Egypt for a long time, driving out the Egyptians. It is possible that this process had started already during the later part of Merenptah’s reign, and surely the situation worsened during the following turbulent period. Ramesses III fought against the Libyans, but in the long run they managed to control parts of the Nile Delta: the kings of the 22nd Dynasty openly admitted that they were descendants of the Meshwesh, who initially came to live in the eastern part of the Delta as prisoners of war of the Egyptians.