The following list is not exhaustive of the huge amount of significant production in the field of PAIS, but can give a quick view of the multidisciplinary work carried out in the programme's life span. Note that * indicate early-career lead authors.

1. *Cook, C. P., van de Flierdt, T., Williams, T., Hemming, S. R., Iwai, M., Kobayashi, M., Jimenez-Espejo, F. J., Escutia, C., González, J. J., Khim, B.-K., McKay, R. M., Passchier, S., Bohaty, S. M., Riesselman, C. R., Tauxe, L., Sugisaki, S., Galindo, A. L., Patterson, M. O., Sangiorgi, F., … Yamane, M. (**2013**). Dynamic behaviour of the East Antarctic ice sheet during Pliocene warmth. **Nature Geoscience**, *6*(9), 765–769. https://www.nature.com/articles/ngeo1889.
    - This paper presents a geochemical and petrographical provenance study combined with biostratigraphic analysis of sediments recovered from site U1361 (IODP Exp 318) in the continental slope of the George V Land margin. The result documents that the Eastern Antarctic Ice Sheet retreated several hundreds of kilometers inland from the Wilkes subglacial Basin, during the Pliocene climatic warm interval between 5.3 and 3.3 Ma. Such retreat could have contributed between 3 and 10 m of global sea level rise from the East Antarctic ice sheet.

2. Bijl, P. K., Bendle, J. A. P., Bohaty, S. M., Pross, J., Schouten, S., Tauxe, L., Stickley, C. E., McKay, R. M., Röhl, U., Olney, M., Sluijs, A., Escutia, C., Brinkhuis, H., Klaus, A., Fehr, A., Williams, T., Carr, S. A., Dunbar, R. B., Gonzàlez, J. J., … Yamane, M. (**2013**). Eocene cooling linked to early flow across the Tasmanian Gateway. ***Proceedings of the National Academy of Sciences***. https://doi.org/10.1073/pnas.1220872110.
    - This paper found direct evidence from marine microfossil and organic geochemical records from site U1356 (IODP Exp 318) of paleo sea surface temperature (2–4 °C) cooling caused by the throughflow of a westbound Antarctic Counter Current since ~49–50 Ma. This has been interpreted as evidence of a southern opening of the Tasmanian Gateway.

3. Passchier, S., Bohaty, S. M., Jiménez-Espejo, F., Pross, J., Röhl, U., Flierdt, T. van de, Escutia, C., & Brinkhuis, H. (**2013**). Early Eocene to middle Miocene cooling and aridification of East Antarctica. ***Geochemistry, Geophysics, Geosystems***, *14*(5), 1399–1410. https://doi.org/10.1002/ggge.20106.
    - This paper date the time of a major shift to arid conditions occurred as ice volume on the continent grew 34 million years ago, from continental weathering changes obtained by the geochemical character of sediments deposited off the coast of East Antarctica.

4. The RAISED Consortium, Bentley, M. J., Cofaigh, C. O., Anderson, J. B., Conway, H., Davies, B., Graham, A. G., ... & Mackintosh, A. (2014). A community-based geological reconstruction of

Antarctic Ice Sheet deglaciation since the Last Glacial Maximum. **Quaternary Science Reviews**, 100, 1-9. https://doi.org/10.1016/j.quascirev.2014.06.025.

- This was a real community achievement within PAIS, which brought together many different researchers working on land and in the ocean, who pulled together to publish the current state of knowledge on LGM-Holocene AIS changes (despite having individually published partly contradicting reconstructions in previous papers) in a format that is useful for modellers.

5. *Patterson, M. O., McKay, R., Naish, T., Escutia, C., Jimenez-Espejo, F. J., Raymo, M. E., Meyers, S. R., Tauxe, L., Brinkhuis, H., Klaus, A., Fehr, A., Bendle, J. A. P., Bijl, P. K., Bohaty, S. M., Carr, S. A., Dunbar, R. B., Flores, J. A., Gonzalez, J. J., Hayden, T. G., … Yamane, M. (**2014**). Orbital forcing of the East Antarctic ice sheet during the Pliocene and Early Pleistocene. ***Nature Geoscience***, *7*(11), 841–847. https://doi.org/10.1038/ngeo2273.
   - This paper demonstrates that maximum iceberg debris accumulation is associated with the enhanced calving of icebergs during ice-sheet margin retreat, in the warm Pliocene, between 4.3 and 3.5 million years ago. Spectral analyses show a dominant periodicity of about 40,000 years. Subsequently, the powers of the 100,000-year and 20,000-year signals strengthen, suggesting that as the Southern Ocean cooled between 3.5 and 2.5 million years ago, the development of a perennial sea-ice field limited the oceanic forcing of the ice sheet.

6. DeConto, R. M., & Pollard, D. (**2016)**. Contribution of Antarctica to past and future sea-level rise. ***Nature***, ***531***(7596), 591-597. https://doi.org/10.1038/nature17145.
   - This work uses past ice sheet retreat scenarios during the Last Interglacial and Pliocene to calibrate the physics in a numerical ice-sheet model, that considers the effects of 1) ice shelf loss by ocean melt and hydrofracturing caused by atmospheric warming, 2) marine ice sheet instability on reverse sloped bedrock, and 3) calving at thick marine-terminating ice margins (ice cliff instability). When applied to worse case future warming scenarios, the paleo-calibrated model predicts the complete collapse of WAIS and major ice retreat into deep East Antarctic basins, causing more than 10 m of sea level rise within the next five hundred years.

7. *Simkins L., Anderson J. B., Greenwood S. K., Gonnermann H.M., Prothro L.O., Halberstadt A.R., Stearns L.A., Pollard D., DeConto R.M. **2017**. Anatomy of a meltwater drainage system beneath the ancestral East Antarctic ice sheet. **Nature Geoscience**. https://doi.org/10.1038/ngeo3012.
   - This paper provides new clues into the contested deglaciation history of the Ross Sea at the end of the Last Glacial Maximum. It highlights the role of bathymetry in the details of the retreat. It also demonstrates the utility of a multidisciplinary approach (using sedimentology, geomorphology, oceanography, and modeling) to better understand rates of ice sheet retreat and the role of ocean circulation changes. This approach, fostered by PAIS, is crucially needed for robust paleo-modelling, which ultimately informs future ice sheet projections.

8. *Mezgec K., Stenni B., Crosta X., Masson-Delmotte V., Baroni C., Braida M., Ciardini V., Colizza E., Melis R., Salvatore M. C., Severi M., Scarchilli C., Traversi R., Udisti R. & Frezzotti M. **2017**. Holocene sea ice variability driven by wind and polynya efficiency in the Ross Sea. **Nature Communications** volume 8, Article number: 1334. https://doi.org/10.1038/s41467-017-01455-x
   - This work combines information from marine diatom records and sea salt sodium and water isotope ice core records, to document contrasting patterns in sea ice

variations between coastal and open sea areas in the Western Ross Sea over the current interglacial period. The results point to possible future impacts on sea ice, in light of recent and future changes in the Southern Ocean winds.

9. *Graham, A.G.C., Kuhn, G., Meisel, O., Hillenbrand, C.-D., Hodgson, D.A., Ehrmann, W., Wacker, L., Wintersteller, P., dos Santos Ferreira, C., Römer, M., White, D., Bohrmann, G. **2017**. Major advance of South Georgia glaciers during the Antarctic Cold Reversal following extensive sub-Antarctic glaciation. ***Nature Communications*** 8, https://doi.org/10.1038/ncomms14798.
    - This work provides data from the more distal part of Antarctica's influence on the Southern Ocean, during the last deglaciation. This provides an important and previously missing end-member within the PAIS concept of ice proximal-to-distal transects.

10. Gulick, S.P.S., Shevenell, A.E., Montelli, A., Fernandez, R., Smith, C., Warny, S., Bohaty, S.M., Sjunneskog, C., Leventer, A., Frederick, B., Blankenship, D.D. **2017**. Initiation and long-term instability of the East Antarctic Ice Sheet. ***Nature* 552**, 225-229. https://doi.org/10.1038/nature25026.
    - This work provides the first evidence of marine-terminating and grounded ice near the Sabrina Coast of East Antarctic, by the early to middle Eocene epoch. The geological and geophysical record shows that expanded polar EAIS existed in the Miocene and that the Aurora subglacial basin catchment was not particularly sensitive to Pliocene warmth.

11. Wise, M.G., Dowdeswell, J.A., Jakobsson, M. & Larter, R.D. **2017**. Evidence of marine ice-cliff instability in Pine Island Bay from iceberg-keel plough marks. **Nature 550**, 506–510. https://doi.org/10.1038/nature24458.
    - This paper presents the first observational evidence of an episode of rapid ice-sheet retreat resulting from ice-cliff collapse, increasing confidence in the rapid past and future retreat scenarios modelled by DeConto & Pollard (2016).

12. Hillenbrand CD, Smith JA, Hodell DA, Greaves M, Poole CR, Kender S, Williams M, Andersen TJ, Jernas PE, Elderfield H, Klages JP, Roberts SJ, Gohl K, Larter RD, Kuhn G (**2017**) West Antarctic Ice Sheet retreat driven by Holocene warm water incursions. **Nature 547**(7661), 43-48. https://doi.org/10.1038/nature22995.
    - This work, for the first time, demonstrates warm Circumpolar Deep Water inflow variability onto the Amundsen Sea Shelf and related deglaciation forcing during the Holocene epoch. These results could increase confidence in the predictive capability of current ice-sheet models and will encourage similar analysis on core samples from past warm times.

13. *Wilson, D., Bertram, R., Needham, E., van de Flierdt, T., Welsh, K., McKay, R., Mazumder, A., Riesselman, C., Jimenez-Espejo, F., Escutia, C. **2018**. Ice loss from the East Antarctic Ice Sheet during late Pleistocene interglacials. ***Nature 561*,** 383-386. https://doi.org/10.1038/s41586-018-0501-8.
    - This work provides evidence from marine sedimentological and geochemical records for ice margin retreat or thinning in the vicinity of the Wilkes Subglacial Basin of East Antarctica during warm late Pleistocene interglacial intervals. This has important implications for the sensitivity of the marine margins of the East Antarctic Ice Sheet as the climate continues to warm. It is yet another high-profile outcome from the

IODP Leg 318 drilling expedition off Wilkes Land coast, that was supported and co-ordinated by PAIS.

14. *Shakun, J.D., Corbett, L.B., Bierman, P.R., Underwood, K., Rizzo, D., Zimmerman, S.R., Caffee, M., Naish, T., Golledge, N., Hay, C., **2018**. Minimal East Antarctic Ice Sheet retreat onto land during the past 8 million. ***Nature 558****, 284-287.* https://doi.org/10.1038/s41586-018-0155-6.
    - This paper is based on the ANDRILL 1B and shows that land-based sectors of the EAIS that drain into the Ross Sea have been stable throughout the past eight million years. These findings indicate that atmospheric warming during the past eight million years was insufficient to cause widespread or long-lasting meltback of the EAIS margin onto land. The paper shows that variations in Antarctic ice volume in response to the range of global temperatures experienced over this period—up to 2–3 degrees Celsius above preindustrial temperatures, corresponding to future scenarios involving carbon dioxide concentrations of between 400 and 500 parts per million—were instead driven mostly by the retreat of marine ice margins, in agreement with the latest models.

15. Rintoul, S.R., Chown, S.L., DeConto, R., England, M., Fricker, H., Masson-Delmotte, V**.,** Naish, T., Siegert, M., Xavier, J. C. Choosing the future of Antarctica. **2018**. ***Nature 558****, 233-240.* https://doi.org/10.1038/s41586-018-0173-4.
    - The Tinker Muse Fellows presents two narratives on the future of Antarctica and the Southern Ocean, from the perspective of an observer looking back from 2070. In the first scenario, greenhouse gas emissions remained unchecked, the climate continued to warm, and the policy response was ineffective; this had large ramifications in Antarctica and the Southern Ocean, with worldwide impacts. In the second scenario, ambitious action was taken to limit greenhouse gas emissions and to establish policies that reduced anthropogenic pressure on the environment, slowing the rate of change in Antarctica. Choices made in the next decade will determine what trajectory is realized. Co-produced by all SCAR SRPs

16. *Kingslake, J., Scherer, R., Albrecht, T., Coenen, J., Powell, R., Reese, R., Stansell, N., Tulaczyk, S., Wearing, M & Whitehouse, P., **2018**. Extensive retreat and re-advance of the West Antarctic Ice Sheet during the Holocene. ***Nature 558***. https://doi.org/10.1038/s41586-018-0208-x.
    - This paper shows, that during the last 10,000 years the grounding line of the West Antarctic Ice Sheet (which marks the point at which it is no longer in contact with the ground and becomes a floating ice shelf) retreated several hundred kilometres inland of today's grounding line, before isostatic rebound caused it to re-advance to its present position. The research is based on drilling sediment cores at the grounding of the Whillans Ice Stream and integration with ice sheet and glacio-isostatic adjustment modelling, which shows a negative feedback due to bedrock rebound as ice retreats that might halt retreat and even stimulate readvance. This work was presented at the PAIS Conference in 2017, Trieste, Italy.

17. Brook, E., Buizert., C. **2018**. Antarctic and global climate history viewed from ice cores. ***Nature 558***. https://doi.org/10.1038/s41586-018-0172-5.
    - This paper was commissioned by Nature for an Insight volume to celebrate the SCAR 60th anniversary. It summarises the state of play of Antarctic ice core research, showing that a growing network of ice cores reveals the past 800,000 years of Antarctic climate and atmospheric composition show tight links among greenhouse

gases, aerosols and global climate on many timescales, demonstrate connections between Antarctica and distant locations, and reveal the extraordinary differences between the composition of our present atmosphere and its natural range of variability as revealed in the ice core record. Further coring in extremely challenging locations is now being planned, with the goal of finding older ice and resolving the mechanisms underlying the shift of glacial cycles from 40,000-year to 100,000-year cycles about a million years ago, one of the great mysteries of climate science.

18. Colleoni, F., De Santis, L., Siddoway, C., Bergamasco, A., Golledge, N., Lohmann, G., Passchier, S., Siegert, M, **2018**, Spatio-temporal variability of processes across Antarctic ice-bed–ocean interfaces. ***Nature Communications***, https://doi.org/10.1038/s41467-018-04583-0.
    - This review article was commissioned by Nature at the 2107 PAIS Conference, Trieste, Italy. It summarises advances in how understanding how the Antarctic ice sheet will respond to global warming relies on knowledge of how it has behaved in the past. It discusses challenges and opportunities for future research that will be the focus of the new SCAR INSTANT Programme. The use of numerical models, the only means to quantitatively predict the future, is hindered by limitations to topographic data both now and in the past, and in knowledge of how subsurface oceanic, glaciological and hydrological processes interact. Incorporating the variety and interplay of such processes, operating at multiple spatio-temporal scales, is critical to modeling the Antarctic's system evolution and requires direct observations in challenging locations. As these processes do not observe disciplinary boundaries neither should our future research.

19. Sangiorgi, F., Bijl, P., Passchier, S., Salzmann, U., Schouten, S., McKay, R., Cody, R., Pross, J., van de Flierdt , T., Bohaty, S., Levy, R., Williams, T., Escutia, C., Brinkhuis, H., **2018**, Southern Ocean warming and Wilkes Land ice sheet retreat during the mid-Miocene. ***Nature Communications***, https://doi.org/10.1038/s41467-017-02609-7.
    - This research documents paleoceanographic conditions and the (in)stability of the Wilkes Land subglacial basin (East Antarctica) during the mid-Miocene (~17–13.4 million years ago) by studying sediment cores from offshore Adélie Coast. Inland retreat of the ice sheet, temperate vegetation, and warm oligotrophic waters characterise the mid-Miocene Climatic Optimum (MCO; 17–14.8 Ma). After the MCO, expansion of a marine-based ice sheet occurs, but remains sensitive to melting upon episodic warm water incursions. The results suggest that the mid-Miocene latitudinal temperature gradient across the Southern Ocean never resembled that of the present day, and that a strong coupling of oceanic climate and Antarctic continental conditions existed and that the East Antarctic subglacial basins were highly sensitive to ocean warming. This was another outcome of the IODP Leg 318 Expedition co-ordinated by PAIS (PRAMSO).

20. Levy, R.H., Meyers, S.R., Naish, T.R., Golledge, N.R., McKay, R.M., Crampton, J.S., DeConto, R.M., De Santis, L., Florindo, F., Gasson, E.G.W., Harwood, D.M., Luyendyk, B.P., Powell, R.D., Clowes, C., Kulhanek, D.K. **2019**. Antarctic ice-sheet sensitivity to obliquity forcing enhanced through ocean connections ***Nature Geoscience***. https://doi.org/10.1038/s41561-018-0284-4.
    - This paper examines the strong emergence of a strong obliquity (axial tilt) control on Antarctic ice-sheet evolution during the Miocene by correlating the Antarctic margin geological records from 34 to 5 million years ago with a measure of obliquity sensitivity that compares the variance in deep sea sediment core oxygen-isotope

data at obliquity timescales with variance of the calculated obliquity forcing. The analysis reveals distinct phases of ice-sheet evolution and suggests the sensitivity to obliquity forcing increases when ice-sheet margins extend into marine environments. This reconstruction of the Antarctic ice-sheet history suggests that if sea-ice cover decreases in the coming decades, ocean-driven melting at the ice-sheet margin will be amplified. This paper is an outcome of the PAIS Conference in Trieste, Italy in 2017.

21. Golledge, N., Keller, E., Gomez, N., Naughten, K., Bernales, J., Truse, L. Edwards, T., **2019**. Global environmental consequences of twenty-first-century ice-sheet melt. ***Nature*** **566**, 65-71. https://doi.org/10.1038/s41586-019-0889-9.
    - This paper shows using simulations of the Greenland and Antarctic ice sheets constrained by satellite-based measurements of recent changes in ice mass, that increasing meltwater from Greenland will lead to substantial slowing of the Atlantic overturning circulation, and that meltwater from Antarctica will trap warm water below the sea surface, creating a positive feedback that increases Antarctic ice loss. In the simulations, future ice-sheet melt enhances global temperature variability and contributes up to 25 centimetres to sea level by 2100. However, uncertainties in the way in which future changes in ice dynamics are modelled remain, underlining the need for continued observations and comprehensive multi-model assessments. Co-produced by PAIS and ISMASS.

22. *Dziadek, R., Gohl, K., Kaul, N., and the Science Team of Expedition PS 104, **2019** Elevated geothermal surface heat flow in the Amundsen Sea Embayment, West Antarctica, ***Earth and Planetary Science Letters 506***, https://doi.org/10.1016/j.epsl.2018.11.003.
    - This study provides ground-truth for regional indirect geothermal heat flux (GHF) estimates in the Amundsen Sea Embayment, which is part of the West Antarctic Rift System, by presenting in situ temperature measurements in continental shelf sediments. The results are critical for correct parameterizations in ice sheet and solid Earth deformation modelling associated with ice sheet dynamics.

23. Escutia, C., DeConto, R., Dunbar, R., De Santis, L., Shevenell, A., Naish, T., **2019**, Keeping an Eye on Antarctic Ice Sheet Stability, ***Oceanography 32***, https://doi.org/10.5670/oceanog.2019.117.
    - This review paper was invited as part of a special issue on the achievements and future of the Integrated Ocean Discovery Program. It summarises 40 years of ocean drilling on the continental margin of Antarctica. Many of these drilling projects (IODP, ANDRILL, CRP, SHALLDRILL) were co-ordinated within the SCAR PAIS community and its predecessors (ACE, ANTOSTRAT), and have revolutionized our understanding of Antarctic ice sheet evolution and behaviour, especially during warmer-than-present climates of the past that have provided significant insights into future change and have been used to develop and improve numerical ice sheets models.

24. *Paxman, Guy J. G., Jamieson, S. S. R., Hochmuth, K., Gohl, K., Bentley, M. J., Leitchenkov, G., & Ferraccioli, F. (**2019**). Reconstructions of Antarctic topography since the Eocene–Oligocene boundary. ***Palaeogeography, Palaeoclimatology, Palaeoecology***, *535*, 109346. https://doi.org/10.1016/j.palaeo.2019.109346
    - This is a reconstruction of Antarctic topography for four key time slices in Antarctica's climate and glacial history: the Eocene–Oligocene boundary (ca. 34 Ma), the Oligocene–Miocene boundary (ca. 23 Ma), the mid-Miocene climate transition

(ca. 14 Ma), and the mid-Pliocene warm period (ca. 3.5 Ma). The modelled topography considers ice sheet loading, volcanism, thermal subsidence, horizontal plate motion, erosion, sedimentation and flexural isostatic adjustment, and validate our models where possible using onshore and offshore geological constraints.

25. *Klages, J.P., Salzmann, U., Bickert, T., Hillenbrand, C.-D., Gohl, K., Kuhn, G., Bohaty, S., Titschack, J., Müller, J., Frederichs, T., Bauersachs, T., Ehrmann, W., van de Flierdt, T., Simões Pereira, P., Larter, R.D., Lohmann, G., Niezgodzki, I., Uenzelmann-Neben, G., Zundel, M., Spiegel, C., Mark, C., Chew, D., Francis, J.E., Nehrke, G., Schwarz, F., Smith, J.A., Freudenthal, T., Esper, O., Pälike, H., Ronge, T., Dziadek, R., and Science Team of Expedition PS104 (**2020**). Temperate rainforests near the South Pole during peak Cretaceous warmth. **Nature, 580**, 81-86. https://doi.org/10.1038/s41586-020-2148-5.
    - From analysis of a sediment core collected from MeBo70 seabed drilling on the Amundsen Sea shelf, pristinely preserved forest soil from the Cretaceous, including a wealth of plant pollen and spores and a dense network of roots, is discovered. These plant remains confirm that, at about 90 Ma, the coast of West Antarctica was covered by a temperate, swampy rainforest where the annual mean temperature was about 12°C. A climate model simulation shows that the reconstructed temperate climate at this high latitude requires a combination of both atmospheric carbon dioxide concentrations of 1,120–1,680 parts per million by volume and a vegetated land surface without major Antarctic glaciation, highlighting the important cooling effect exerted by ice albedo under high levels of atmospheric carbon dioxide.

26. Etourneau J., Sgubin, G., Crosta, L., Swingedouw, D., Willmott, V., Barbara, L., Houssais, M.-N., Schouten, S., Sinninghe Damsté, J., Goose, H., Escutia, C., Crespin, J., Massé, G and Kim, J.-H. Ocean temperature impact on ice shelf extent in the eastern Antarctic Peninsula. **2020**. ***Nature Communications*** 10: 1-8. https://doi.org/10.1038/s41467-018-08195-6.
    - The paper provides direct measurement documenting that a +0.3–1.5°C increase in subsurface ocean temperature (50–400 m) in the north-eastern Antarctic Peninsula has driven to major collapse and recession of the regional ice shelf during both the instrumental period and the last 9000 years.

27. *Hochmuth, K., Paxman, G., Gohl, K., Jamieson, S., Leitchenkov, G., Bentley, M., Ferraccioli, F., Sauermilch, I., Whittaker, J., Uenzelmann-Neben, G., Davy, B., DeSantis, L. (**2020**). Combined palaeotopography and palaeobathymetry of the Antarctic continent and the Southern Ocean since 34 Ma. **PANGAEA**. https://doi.org/10.1594/PANGAEA.923109.
    - Palaeo-bathymetric models reconstructed based on all available geophysical and geological data to form complete grids of the Southern Ocean and the Antarctic margins. They will facilitate detailed investigation of past ice sheet and ocean circulation development from land to sea, which is essential for robust reconstructions of palaeoclimate and past ice sheet and ocean dynamics.

28. Post, A. L., O'Brien, P. E., Edwards, S., Carroll, A. G., Malakoff, K., & Armand, L. K. (2020). Upper slope processes and seafloor ecosystems on the Sabrina continental slope, East Antarctica. ***Marine Geology***, *422*, 106091. https://doi.org/10.1016/j.margeo.2019.106091
    - A detailed analysis to understand how the sea bed morphology influences the distribution of seafloor biota on the East Antarctic margin, highlighting the importance of considering bathymetry when addressing reconstructions of biostratigraphic changes and biodiversity.