

FOUR DECADES OF THE WORKING GROUP ON MARINE AND COASTAL GEOGRAPHY – INTERDISCIPLINARY PERSPECTIVES AND PRACTICES

Introduction to the special issue

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1 AMK - the German Working Group on Marine and Coastal Geography

In 2024, the Working Group on Marine and Coastal Geography (*Arbeitskreis Geographie der Meere und Küsten*, AMK) looked back on 40 years of exchange and collaboration between coastal scientists and professionals. Since its foundation in 1983 as a working group of the German Society for Geography (*Deutsche Gesellschaft für Geographie*, DGfG) (PAFFEN & KORTUM 1984; ZIMMERMANN 1984), the AMK has developed into a central platform for research on coastal geographical research in German-speaking countries, fostering a dialogue across physical and human geography as well as many neighbouring disciplines. This special issue marks the anniversary by highlighting both contemporary research perspectives in marine and coastal geography based on global examples and the practices of coastal observation and protection along the German coasts.

The AMK was founded on 25 March 1983 at the 44th German Geographers' Conference (*Geographentag*) in Münster. Since then, annual meetings have provided a forum for interdisciplinary exchange, bringing together scholars from physical and human geography and related fields. Research presented within the AMK spans a broad thematic spectrum, including coastal and marine geomorphology, coastal hazards, societal and economic dimensions of coastal zones, governance and planning, as well as methodological approaches from remote sensing, geoinformatics and geoarchaeology. Intersections with geosciences, biosciences, political and social sciences, archaeology, urban and spatial planning, hydraulic engineering and fisheries research have been a defining feature from the beginning. The thematic scope of the AMK extended well beyond the German coastline and coastal regions worldwide have been examined and discussed at annual meetings (LINK et al. 2018).

The 40th annual conference of the AMK was held in Heidelberg, Germany, in 2024, and carried this spirit on. The sessions were divided into *Storms, tsunamis and sea-level rise*, *Coastal protection and risk management*, *Coastal societies, economies and sustainability* as well as *Coastal landscape*

evolution and geoarchaeology. Among these broader topics, coastal risk and resilience in a broader sense as well as coastal protection emphasizing nature-based solutions have been outstanding. In total, the conference comprised 24 oral presentations and 16 poster contributions.

2 Evolution of the AMK

From the beginning, the AMK has documented its activities through conference proceedings, inaugurated by KELLETAT (1983). For many years, an AMK volume was published on an annual basis, usually within the publication series of the hosting institutes. These volumes typically contained more than ten, often more than 15 contributions. In comparison with other working groups of the DGfG, the AMK has thus been among the most productive ones in terms of scientific output.

The early conference proceedings primarily served as a forum for internal documentation, the first steps of early-career researchers in academic publishing and the visibility of marine and coastal geography within the wider geographical community in Germany. Until 2010 most of the contributions were published in German (e.g. SCHWARZER et al. 2010), despite many of them covering international case studies (e.g. KELLETAT 1983, 1998).

While most proceedings reflected the broad thematic range of coastal geography, some volumes focused on specific regions or topics, such as the North Sea (TILLMANN 2015) or field-based geomorphological studies (KLUG 1985). With the gradual phase-out of institute-based publication series, the AMK shifted towards special issues in peer-reviewed international journals from 2018 onwards. The first of these special issues was published in the *Journal of Coastal Conservation* in 2018 (LINK et al. 2018), based on the 33rd and 34th annual meetings in Hamburg (2015) and Rostock-Warnemünde (2016), comprising a total of 15 articles. A further five articles were published under the Research Topic *Geography of Seas and Coasts: Integrating environmental and social processes* in 2019 in *Frontiers in Environmental Science*, drawing on contributions from the 35th and 36th meetings in Kiel (2017) and Braunschweig (2018).



The transition to peer-reviewed special issues entailed a complete shift to English-language publications, further quality assurance of the contributions and increased international visibility. This development reflects broader changes in scientific publishing practices and is not unique to the AMK.

After 2019, no further AMK-related publications were produced and the annual conferences were also suspended for several years due to the COVID-19 pandemic. With the 40th annual conference in Heidelberg, the present special issue, which represents the 34th published conference proceedings of the AMK, aims to continue and revive the tradition of publishing AMK conference output and to generate international visibility of our research. Contributions were invited from all conference participants as well as from scientists beyond the meeting who engage in marine and coastal geographical research.

3 The AMK today and the scope of this special issue

Today, the AMK continues to serve as a platform for exchange between physical and human geography, with a strong inter- and transdisciplinary perspective. This is also reflected by the contributions to this special issue, some of which bridge several fields and cannot be clearly assigned to a single subdisciplinary tradition. Over time, the thematic emphasis within the AMK has shifted from a strong focus on physical geography (e.g. KELLETAT 1983, 1998; KLUG 1985) towards increasingly integrated approaches that incorporate social, political and planning-related perspectives. At the same time, physical geography remains a vital component, particularly in light of global challenges such as climate change, sea-level rise and coastal hazards.

Selecting an appropriate journal for this special issue posed a challenge, given the broad thematic, methodological and disciplinary range of the AMK. With *ERDKUNDE*, a journal was selected that accommodates the full spectrum of geography, offers rigorous peer-review, and is indexed in major databases such as the Science Citation Index Expanded and Scopus, which in most cases is a requirement for publication-based doctoral dissertations. The major selling point, however, is the diamond open-access publishing model of *ERDKUNDE* – community-driven, not-for-profit, free to read and publish – which is the most inclusive way of dissemination of scientific knowledge and reduces systemic inequalities in open-access publishing across the sciences and humanities (e.g. ANDRINGA et al. 2024; LEFEBVRE et al. 2025).

In selecting contributions for this special issue, emphasis was placed on representing a broad spectrum of topics and methodological approaches rather than on a narrow thematic focus. This approach also aims to provide early-career researchers with an opportunity to publish results from ongoing doctoral and postdoctoral projects. The seven articles and two more technical short communication papers compiled in this special issue reflect the diversity of current research within German coastal geography and may be read as a snapshot of contemporary debates within the field.

One recurring topic in this volume addresses coastal hazards related to extreme coastal flooding. It is covered by three articles. In an integrated approach, LAWRENZ et al. (2025) illuminate the stakeholder perceptions of extreme sea-level events and their future projections on the East Frisian islands Norderney and Borkum in the German North Sea. The authors use a hybrid modelling approach to identify flood-prone areas in future projections until 2100 under a range of different Representative Concentration Pathways adapted from VOUSDOSKAS et al. (2018) and assess the perception of local stakeholders of these scenarios as well as possible mitigation measures. The interviews reveal a very broad spectrum of perceptions reaching from high urgency in implementing adaptation strategies, usually associated with stakeholders from the environmental sector, to very moderate concern and motivation, mostly with interviewees from the tourism industry.

ENGEL et al. (2025) investigate the movement of massive boulders along the coast of Guantánamo, Cuba, during Hurricane Matthew in 2016, which is close to the upper limit of size-elevation relationships of storm wave-transported boulders worldwide. The presence of even larger coastal boulders at three different sites indicates that more intense coastal flooding must have occurred within the past millennia than that generated by a Category 4 hurricane. The study suggests that Hurricane Matthew should be regarded as a minimum benchmark for reassessing coastal hazard management across the entire province.

Coastal hazards are also addressed in the article by QUIX et al. (2025), who explore the sediment dynamics on beaches of Eastern Visayas, Philippines, after Supertyphoon Haiyan in 2013. Using high-resolution satellite imagery combined with sedimentary analyses, the authors reveal a rapid recovery of eroded beach ridges along the coast within a few months after the typhoon. This rapid recovery also comes with intense post-depositional changes of storm deposits and a low preservation potential of indicative sedimentary criteria both emphasizing limitations in the functionality of coastal sedimentary and geomorphic archives in humid tropical regions.

Another group of articles covers coastal protection and risk management along the German coasts. FLOTH et al. (2025) elaborate on the challenges for coastal protection in Mecklenburg-Western Pomerania for the 21st century from a combined scientific and administrative perspective. The biggest of these challenges are the long-term projections of sea-level rise which require site-specific solutions ranging from reinforcement of protection structures to strategic retreat where permanently flooded areas are anticipated to increase in size. However, almost any situation and mitigation measure is associated with conflicting interests between residents, nature conservation and different industrial sectors such as tourism or agriculture. These conflicts require careful mediation and environmentally, economically and socially sustainable solutions.

LINDSTEDT & TRELL (2025) investigate the perceptions of resilience and coastal protection among stakeholders at the German Wadden Sea in light of major challenges associated with the design of conventional coastal-protection structures imposed by ongoing sea-level rise. Their findings show that whereas most stakeholders are strongly attached to conventional engineered coastal-protection designs, especially those with a more profound understanding of coastal processes and ecosystems are very open to adaptation using nature-based solutions.

The article by HEISEL-SURE et al. (2025) underscores the transdisciplinary character of the AMK by presenting real-world laboratories as an approach to reduce plastic input into the North Sea. This hybrid science-practice perspective demonstrates that global challenges such as plastic pollution can only be addressed through socio-ecological transformations that involve stakeholders from multiple sectors in a balanced and inclusive manner. At the same time, the authors show that real-world laboratories reach their limits when geographical or thematic scopes become too broad or complex, and emphasize the importance of clearly defined objectives and potential benefits at an early stage.

DEMMLER & KLEEMANN (2025) investigate ocean literacy – “the ability [...] to understand and explain the concepts and phenomena related to the oceans” (CAVAS et al. 2023: 1) – among visitors and residents of the Port-Cros National Park on the French Côte d’Azur. By using 405 individual face-to-face interviews, the authors find generally high levels of awareness and concern regarding marine pollution, but only moderate levels of active information seeking as well as knowledge about ecosystems and population trends in marine fauna. In light of these findings, the authors suggest a range of place-based marine education and solution-based communication strategies for both targeted groups.

The two short communications of this special issue cover innovative applications for data collection in the intertidal Wadden Sea. STOREY et al. (2025) present an automated measurement instrument that continuously logs key abiotic ecological parameters in support of monitoring populations of seagrass meadows. The authors introduce their low-cost, custom-made measurement station that collects data on pH, conductivity, salinity, turbidity, temperature, depth and alkalinity (further sensors can be deployed, too), and discuss potential uncertainties in the data series as well as application cases.

KOHLUS et al. (2025) test whether smartphone sensors stored in the pockets of mudflat hikers can reliably record gait changes induced by changes in the sedimentary composition of mudflats. Their aim is to make these data usable to map sediment composition without time-consuming sediment sampling and, in the ideal case, develop a tool to be integrated into a citizen science approach. While some patterns in the gyroscope data look promising and changes in sediment softness can be inferred from the data, the authors conclude that a range of uncertainties remain and the approach is at the current stage only usable under idealized conditions.

4 Future perspectives in marine and coastal geography in Germany

Looking ahead, marine and coastal geography is likely to further consolidate its role as an integrative field at the interface of environmental change and societal transformation. Global climate change, accelerating sea-level rise, increasing coastal hazards and growing pressures on coastal and marine resources – including space in the coastal realm – continue to create a demand for research approaches combining physical process understanding with social, political and planning perspectives. At the same time, advances in geospatial methods, long-term monitoring, modelling and participatory research are opening new avenues for addressing complex land-sea interactions across various scales.

In this context, the AMK is well positioned to further strengthen its role as a platform for interdisciplinary and transdisciplinary exchange. By bringing together physical and human geographers as well as scholars from neighbouring/overlapping disciplines, the AMK can contribute to bridge methodological and conceptual divides and to foster integrative research agendas. Supporting early-career researchers remains a key function of the working group, particularly by providing a supportive and encouraging environment for presentation, discussion and publication. Beyond academia, the

AMK can also enhance the societal relevance of marine and coastal geography by engaging with practitioners, policy debates and coastal stakeholders, who continuously participate in the annual conferences, thereby contributing geographical perspectives to pressing challenges in coastal and marine governance.

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