

SeaLevel Newsletter

Issue 7 | April 2020

www.spp-sealevel.de

Welcome to the SPP-1889 SeaLevel Newsletter!

We are pleased to engage with you with the spring edition of our quarterly Newsletter, summarizing some of the highlights from within the SPP SeaLevel program and its diverse activities and research work over the last several months.

To start with, we report of the two SPP SeaLevel Meetings, i.e. the Kick-Off of the 2nd phase and the 2nd Early Career Scientists Annual Gathering, which were held in Bonn earlier this year, bridging the 2 phases of the program, overviewing research from all projects, and welcoming all new scientists to the SeaLevel Community.

Moreover in this issue, read about: the new publications of i) the SLOSH project on the poleward shifting of all key ocean gyres globally over the last four decades, and ii) the OMCG project on the sensitivity of glacial isostatic adjustment estimates over Antarctica from satellite observations and model outputs; the exciting and innovative research achievements of the dynamic team of the ending EMERSA and new BlueUrban projects, their

INSIDE THIS ISSUE

Welcome to the 3rd SeaLevel Newsletter.....	1
Kicking-off the 2nd SPP SeaLevel phase Era!	1
2 nd Early career Scientists (ECS) Meeting.....	2
Recent SPP publications	4
SLOSH: Global warming is shifting the large-scale ocean circulation towards the Poles.....	5
OMCG: Sensitivity of GiA estimates over Antarctica from satellite observations & model outputs.....	6
Goodbye Emersa, Hello BlueUrban!	7
SEASCAPE-II paper: The added value of real options analysis for climate change adaptation.....	8
Future Events related to sea-level research.....	8
Miscellaneous Announcements.....	9

collaborations, including with the natural science SPP CoRSEA project among others, as well as their future aims and plans ahead. Last but not least, read about the 1st publication of the new SEASCAPE II project, discussing the added value of real options analysis for climate change adaptation.

We hope you enjoy reading this issue and we warmly encourage everyone to connect and interact with the SPP SeaLevel Community, whether belonging originally to the Program or not!

Thank you all for your interest to the SPP SeaLevel research & its activities!

Kicking-off the 2nd SPP SeaLevel phase Era!



Fig. 1: The SPP SeaLevel members who joined the 3rd Annual/2nd phase Kick-Off Meeting on 11-13.02.2020 in Bonn, Germany.

On 10-13 February 2020, the entire SPP SeaLevel community from both Phase 1 and 2 gathered in Bonn, Germany for the 3rd Annual/Kick-off Meeting, marking

officially the closure of the 1st phase and the beginning of the 2nd phase of the program. The community of natural and social scientists from the 1st phase met and interact with, exchanged and merged knowledge and expertise with those from the new projects and welcomed them to the SPP SeaLevel networking. The Annual Meeting followed the 2nd Early career Scientists (ECS) meeting/Winter School, specially dedicated to the young scientists of the SPP SeaLevel program to further support them with a range of keynote presentations to their scientific training and growth, their professional career development and networking.

This Annual Meeting offered the opportunity to overview and summarize the outcomes and achievements of every project and of the entire program, and to establish the new scientific aims and milestones for the remaining years of the SPP-1889 SeaLevel during its 2nd and last funding phase. The extensive 3-days agenda further included presentations on their planned research in the years ahead from the new projects, keynote overviews keynote of the 3 newly main scientific theme directions of the SPP 2 phase SeaLevel program: “Contributions to Global and Regional Sea Level Changes”, “Regional Biophysical and Societal Impacts in N. Europe and S.E. Asia/Indonesia”, and “Adaptation, Decision Analysis and Governance”, as well as discussions on sea level research funding perspectives and opportunities both nationally (DFG, BMBF) and internationally to inform and assist the entire SPP SeaLevel community to continue their innovative research work after the end of the SeaLevel program, hopefully still in line with its inter- and transdisciplinary character and approach.

Another essential aspect of the 2020 Annual Meeting, internationally well-known experts on sea level research, including Benoit Meyssignac (LEGOS, France), Ben Marzeion (University Bremen, Germany), Zita Sebesvari (United

Nations University, Germany) and Marjolijn Haasnoot (Deltares, The Netherlands) also contributed significantly with keynote presentations, connecting the innovative interdisciplinary research work within the SPP SeaLevel program with the wider scientific world, and the rest of the current, most state-of-the-art sea-level change and societal impacts research. Among the sea-level research topics covered in this keynote talks were the improvement of sea-level measurements and the linkage with the global water-energy cycle, several aspects related to the assessment and solution/adaptation pathways, setting thresholds for adaptation, challenges and uncertainties, implications for the coastal and low-lying islands communities, and more, while providing insights from several case studies as examples in each case.

In this Annual Gathering the SPP SeaLevel Coordination also brought forward another innovative Outreach expression in communicating the complexity of sea level research and the interdisciplinarity of the SPP program itself to different audiences, by connecting Science and Art together: graphic recorder, Ms. Birgit Jansen (Bikablo company) also joined the first 2 days of the meeting, and by following the scientific presentations and discussions of all projects as well as interviewing the scientists themselves, she was

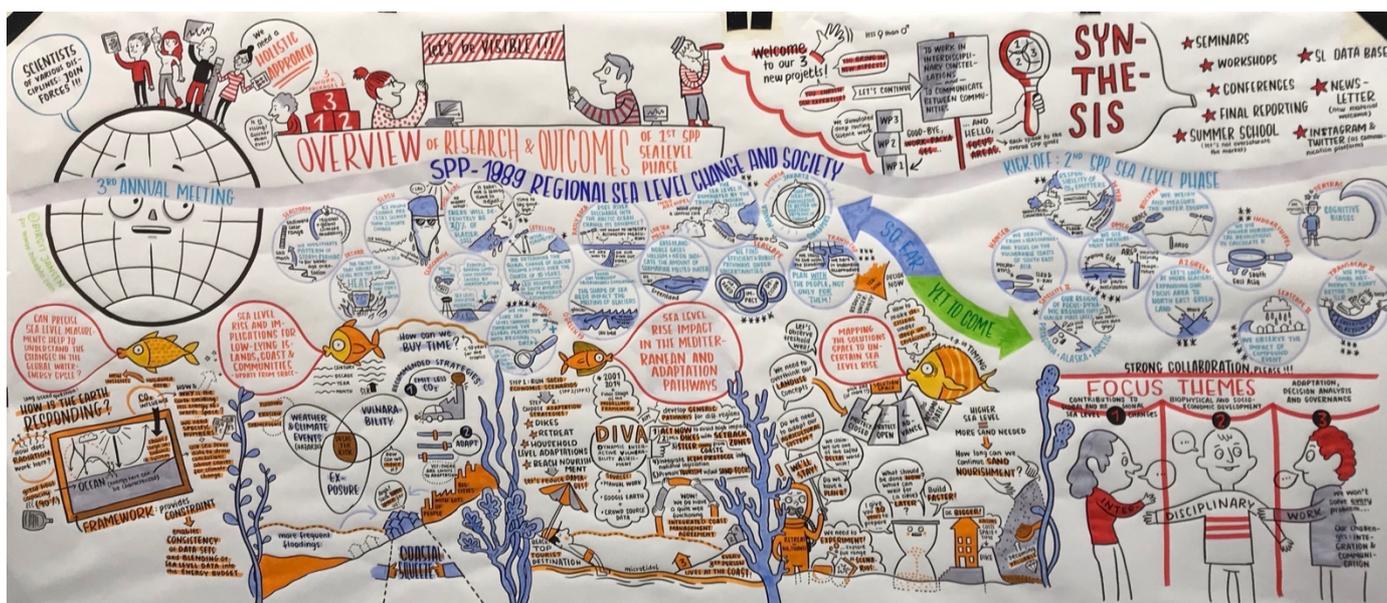


Fig. 2: The SPP SeaLevel graphic recording, produced during the 2020 Annual/Kick-Off Meeting in Bonn, Germany, illustrates the diverse natural and societal components into play that need to be accounted for and thus the interdisciplinary sea level research within the SPP program, but also overall when addressing the topic of sea level change and its impacts on and from society.

simultaneously illustrating graphically the science involved within the SPP SeaLevel on a 3-m poster. The graphic recording outcome (Fig. 2) summarizes both phases of the SPP SeaLevel program, its structure and interdisciplinary character but also provides an overview of the different components needed to be accounted for and combined to more comprehensively approach and address the sea level change issue, its range of societal impacts, adaptation/mitigation pathways and implementations, etc. As a next step, the SPP SeaLevel graphic illustration is now available to be exhibited to other future SPP events, workshops and other scientific/sea level meetings and conferences, booth exhibitions, as well as university affairs and open days, and other public and school events related to climate change and sea-level rise, to provide an alternative and more effective and enjoyable after all way to further communicate the SPP SeaLevel research to different audiences and ages, in addition to the wider scientific community. ([A copy of the entire SPP-1889 SeaLevel Graphic Recording 2020 can be downloaded here](#)).



2nd Early career Scientists (ECS) Meeting/ Winter School:

The Annual Meeting followed the 2nd ECS meeting on 10th February in Bonn, Germany supporting the entire young researchers community within the program to strengthen their background knowledge and understanding on sea-level, the benefits of the synergy of disciplines and expertise within the SPP SeaLevel program, but also to get informed on available funding opportunities and how to write successful proposals to assist, prepare and support them further to their scientific career and professional networking, and their following steps after the end of their PhD/postdoc research projects within the SPP SeaLevel program.

The ECS Meeting agenda included several keynote presentations from principal investigators of SPP projects from the 2nd phase of the program, specifically Ben Marzeion (Uni-Bremen), Roelof Rietbroek (IGG/Uni-Bonn) and Boris Braun (Uni-Cologne). Other scheduled invited presentations from Nassos Vafeidis (Uni-Kiel) and Anna-Katharina Hornidge (Leibniz ZMT, Bremen) were prevented from occurring unfortunately, as extreme stormy weather conditions over Germany the days before the ECS meeting caused train disruptions and cancellations all over the country. Nevertheless, a very productive and interesting 1-day meeting still took place and was supported by extra material and lectures from the rest of the SPP PIs who contributed to the ECS Winter Workshop, and the ECS community of the SPP SeaLevel warmly thanks them all for their help and assistance!

Hopefully, more such supporting events and opportunities will continue to take place throughout the year and not only on annual basis.

Fig. 3 and 4: Moments from the 2nd SPP SeaLevel ECS Meeting/2020 Winter School and the 3rd Annual/Kick-Off Meeting, which took place on 10th and 11th-13th February 2020, respectively, at the Gustav-Stresemann Institute (GSI) in Bonn, Germany.



Fig. 5 to 8: Impressions from the 2nd SPP SeaLevel ECS Meeting/2020 Winter School and the 3rd Annual/Kick-Off Meeting, which took place on 10th and 11th-13th February 2020, respectively, in Bonn, Germany.



Recent SPP SeaLevel Publications:

TRANSOCAP I: Bott, L.M., 2020. Living with sea level change and coastal flooding – Collective responses of households and communities in Indonesia. Dissertation Universität zu Köln.

OMCG I: Willen, M. O., Horwath, M., Schröder, L., Groh, A., Ligtenberg, S. R. M., Kuipers Munneke, P., and van den Broeke, M. R.: Sensitivity of inverse glacial isostatic adjustment estimates over Antarctica, *TC*, 14, 349–366.

SLOSH: Yang, H.G., Lohmann, U. Krebs-Kanzow, M. Ionita, X. Sri, D. Sidorenko, X. Gong, X. Chen, and E.J. Gowan (2020), Poleward Shift of the Major Ocean Gyres Detected in a Warming Climate, *G.R.L.*, 47(5).

Find the full list of the SPP SeaLevel published papers at www.spp-sealevel.de → “Resources” → “Publications”

SLOSH: Global warming is shifting the large-scale ocean circulation towards the Poles

Hu Yang, Gerrit Lohmann, Uta Krebs-Kanzow, Alfred-Wegener-Institut

Ocean circulation plays a vital role in regulating the weather, climate and supporting marine life. For example, the Gulf Stream transports warm water from lower latitude towards mid-latitudes, helping to maintain a mild and wet climate to the North America and Europe. The California Current, which locates at the eastern margin of the North Pacific Ocean, flows from higher latitude towards lower latitude, contributing to a relative dry and cool climate to the adjacent mainland. The upwelling associated with the California Current also brings nutrient-rich water from the ocean floor and maintains a prosperous ecosystem. Given the broad impacts of ocean circulation, it is important to understand whether and how it responds to global warming.

However, ocean observations are short and spare in space, partially due to the expensive cost. Prior to the satellite era (start around the 1980s), ocean observations (mostly temperature) are collocated primarily by the commercial ships and coastal stations, which are sparsely distributed both on spatial and temporal scales. Therefore, it is impossible to

have a global view of ocean conditions until the launch of satellites. Satellite altimetry has continuously monitored sea surface height (SSH) since late 1992. Satellite-based sea surface temperature (SST) records have been collected for almost four decades, starting from the early 1980s. These data are independently observed and provide an unprecedented opportunity to explore the dynamic changes of the large-scale ocean gyres.

Using a novel approach, we track the centre and boundary of the major ocean gyres, based on the satellite records of SSH and SST gradients. The results show that all the eight key ocean gyres are migrating towards the poles in the past four decades. Climate simulations under forcing of greenhouse gases well capture these changes, suggesting that the shift in large-scale ocean gyres is very likely to be a consequence of global warming, which so far has not been recognized by the public and the scientific community. The displacement of ocean gyres has broad impacts on ocean heat transport, regional sea level rise and coastal ocean circulation.

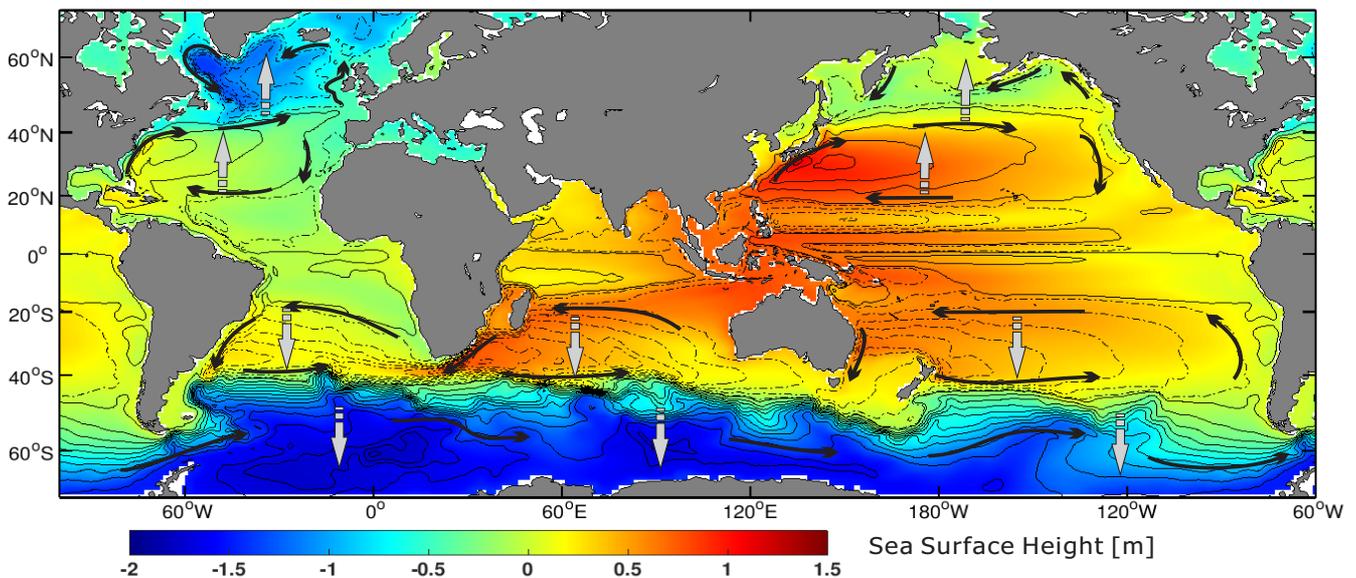


Fig. 9: Schematic diagram of the major wind-driven ocean circulation (black arrows) and their movement (grey arrows) under global warming.

OMCG: The sensitivity of glacial isostatic adjustment estimates over Antarctica from satellite observations and model outputs

Matthias Willen and Martin Horwath, TU Dresden

The present-day signal due to glacial isostatic adjustment (GIA) is of special interest for sea level research. GIA is a component of the sea level budget and it leads to gravity changes that need to be carefully considered when evaluating mass changes from time-variable gravity fields. We investigated the combination methodology approach from Gunter et al. (2014) which allows estimating GIA from satellite gravimetry and satellite altimetry observations over ice sheets. In this combination of satellite data, processes in the snow/firn layer are accounted for by the surface mass balance output from regional climate modelling and the elevation change product from firn densification modelling.

In our publication by Willen et al. (2020) we present findings of a sensitivity study where we tested a variety of processing choices and data products. (1) implementing external degree-1 and C_{20} products in GRACE gravity fields, (2) incorporating various satellite altimeter missions during GRACE observation period (Fig. 10), (3) empirically estimated uncertainties of model outputs, and (4) the correction for apparent

biases. Further, we pointed out limitations associated to data quality, data processing, and correction for apparent biases. We estimated the GIA signal from observations over almost the entire GRACE observation period and we developed the approach to combine time series of the satellite observations and model outputs. Our findings demonstrate the significant challenges quantifying the Antarctic ice mass change from combined satellite observations and model outputs.

References

- Gunter, B. C., Didova, O., Riva, R. E. M., Ligtenberg, S. R. M., Lenaerts, J. T. M., King, M. A., van den Broeke, M. R., and Urban, T.: Empirical estimation of present-day Antarctic glacial isostatic adjustment and ice mass change, *TC*, 8, 743–760, <https://doi.org/10.5194/tc-8-743-2014>, 2014.
- Willen, M. O., Horwath, M., Schröder, L., Groh, A., Ligtenberg, S. R. M., Kuipers Munneke, P., and van den Broeke, M. R.: Sensitivity of inverse glacial isostatic adjustment estimates over Antarctica, *TC*, 14, 349–366, <https://doi.org/10.5194/tc-14-349-2020>, 2020.

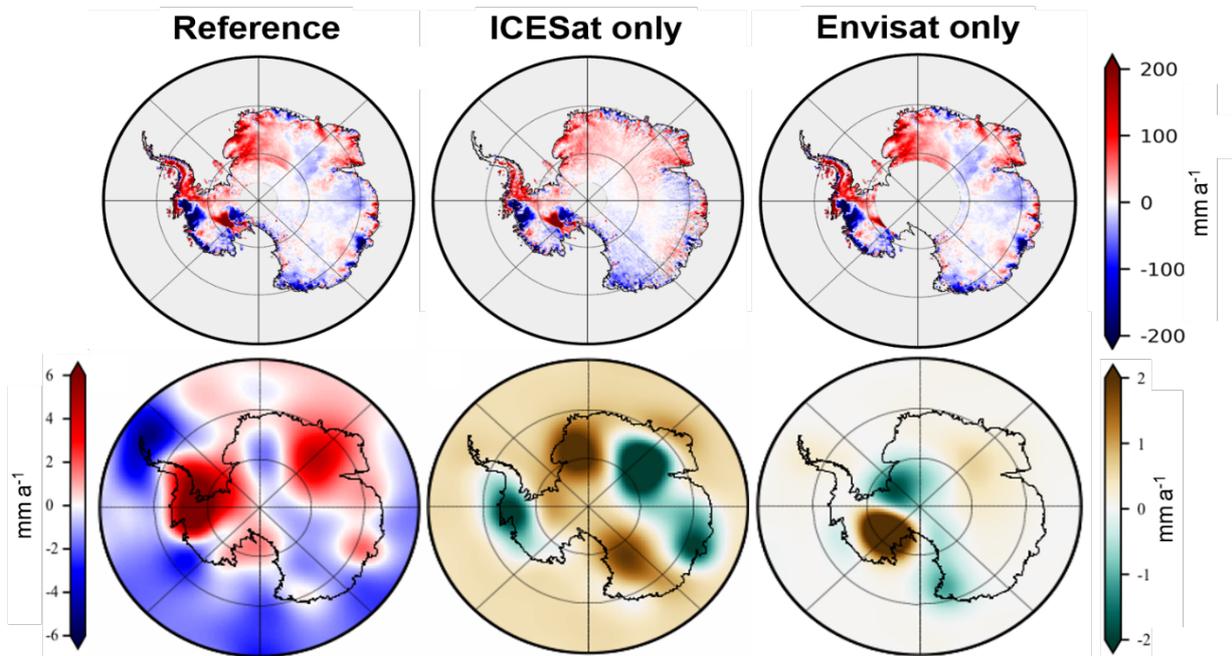


Fig. 10: As an example of our sensitivity study, we show GIA estimates (vertical land motion, second row) depending on different altimetry products (ice surface elevation change, first row). Differences compared to the reference solution are shown for the ICESat-only and the Envisat-only GIA estimate.

Goodbye Emersa, Hello BlueUrban!

Johannes Herbeck¹ and Rapti Siriwardane-de Zoysa², ¹Sustainability Research Center, Bremen University, ²Leibniz Centre for Tropical Marine Research (ZMT), Bremen

The past months of work at ZMT Bremen and the Sustainability Research Center Bremen have seen a wrap-up of activities for the Emersa project that will be fading out in summer, and the launch of activities for the second-phase project BlueUrban. In Emersa, two larger publications, partly also with partners of both the wider Emersa core team and of other SPP projects, have been finalized and submitted (see list of recent publications). The ‘epistemic mobilities’ paper by the Emersa core team reflects on how to



Fig. 11: Fieldwork in North Jakarta (Foto: Arif Gandpurnama).

conceptually grasp the travelling of knowledge embodied in standardised mitigation and adaptation practices and policies for living with sea-level change. The article on land subsidence, written together with Tilo Schöne and Julia Illigner (SPP-project CoRSEA) and partners of the wider Emersa consortium, explores the paradox of slow political action in addressing subsiding land, particularly along high-density urban coastlines with empirical insights from coastal geography, geodesy analysis, geology, and urban planning. At the same time, Rapti Siriwardane is currently back in Indonesia and Singapore to complete field work and gather data on most recent developments in both cities that will feed into the review process of the subsidence paper. She also participated in the “Water and the City” Workshop (6-7 Feb 2020), organized by the Asia Research Institute at the National University Singapore and presented a paper titled “Futuring ‘Blue Urbanism’: Between Promises and Paradoxes in Island Southeast Asia”. Simultaneously, work for the second-phase project BlueUrban has started, with a first draft of a conceptual paper being currently worked

on, and a first short field phase carried out in November. From Nov 26 to 29, Rapti Siriwardane and Johannes Herbeck went to Delft and Rotterdam, The Netherlands on fieldwork, visiting a working group at TU Delft, as well as leading interviews with representatives of Deltares and the floating island startup Blue21.

Recent publications:

Herbeck, J., & Flitner, M. (2019). Infrastructuring coastal futures : Key trajectories in Southeast Asian megacities . DIE ERDE Journal of the Geographical Society of Berlin, 150(3), 118-130.

Hornidge, A. K., Siriwardane de Zoysa, R., Herbeck, J. & Flitner, M. (submitted). Epistemic Mobilities: Following sea level change adaptation practices in Island Southeast Asia. Submitted to American Behavioural Scientist.

Siriwardane-de Zoysa, R. (2019). Beyond the wall: Dyking as an object of everyday governance in the Bay of Manila, Philippines. Marine Policy, 103661.

Siriwardane-de Zoysa, R., Schöne, T., Herbeck, J., Illigner, J., Haghghi, M., Simarmata, H., Porio, E., Rovere, A. & Hornidge, A. (submitted). The Wickedness of Governing Land Subsidence: Policy Perspectives from Urban Southeast Asia. Submitted to PLOS One.

Blueurban is planning to hold a mid-term workshop in Singapore in February 2022 (TBC). Further information will be announced closer the time of the meeting.

First SEASCape-II paper: The added value of real options analysis for climate change adaptation

Thomas van der Pol, Global Climate Forum

SEASCape-II is all about compound risks and flexible adaptation strategies at the Baltic Sea coast. For us, this means that things are getting much more complex than in phase I of the SEASCape project, where life was relatively easy with simpler statistics and adaptive decision-making in a footnote. Combining these additional dimensions for local case studies will be challenging. As we have to wait for each other's outputs,

some work in the individual work packages has to be performed first till we can get to the most exciting part of integrating hazard, impacts and flexible adaptation strategies. The economic valuation approaches for the latter are diverse and heavily debated. WIREs Climate Change has picked up on this debate, and presents a little opinion battle on the use of these so-called real options analysis (ROA) methods. It contrasts two opinion articles in the Early View section, one arguing against and one arguing in

favour of the use of ROA methods. Given the work to be done in Seascope II, I clearly did not mind to join the latter provided that one does not start from a model and fits the adaptation decision and context to it, rather than vice versa:

Wreford A, Dittrich R, van der Pol TD The added value of real options analysis for climate change adaptation. WIREs Climate Change e642, DOI: 10.1002/wcc.642 [<https://doi.org/10.1002/wcc.642>]

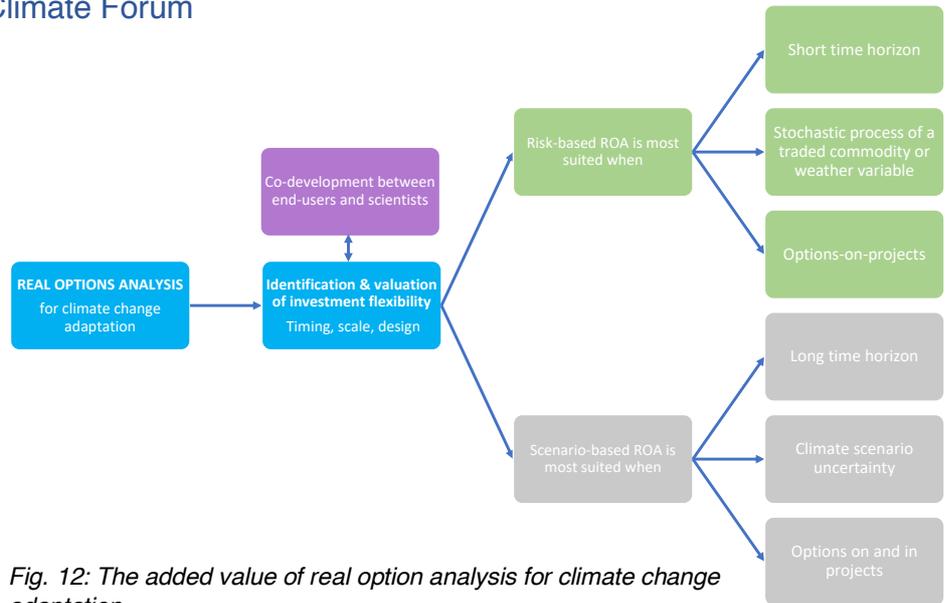


Fig. 12: The added value of real option analysis for climate change adaptation.

Coming Events related to Sea-Level:

Please note that, given the current conditions, several conferences are currently cancelled or postponed and have announced or not yet a new fixed date. Please check the meeting's dedicated webpage for most accurate updates. Below only events that are currently announced as due to occur, are listed.

Climate Change in the Asia-Pacific Region: from Environmental Aspects to Socio-Economic Impacts, 30 March- 3 April 2020, Quy Nhon, Vietnam

Rising Sea Politics: Governance, Communities, Commons: at EASA2020: New anthropological horizons in and beyond Europe, 21-24 July 2020, Lisbon, Portugal.

"International Conference for YOUNG Marine Researchers (ICYMARE)", 25-28 August 2020, Bremerhaven, Germany

Royal Geography Society-IBG Annual International Conference 2020, 1-4 September 2020, London, UK

2020 Joint 5th IGCP639 Sea level from minutes to millennia Annual Meeting & 6th International Tsunami Field Symposium, 1-7 November 2020, Puerto Varas, Chile

11th People and the Sea Conference, 28 June - 2 July 2021, Amsterdam, The Netherlands.

MISCELLANEOUS ANNOUNCEMENTS:

Find out about the data + information exchange possibilities within the SPP SeaLevel community!

At the SPP SeaLevel Redmine & Wiki platforms

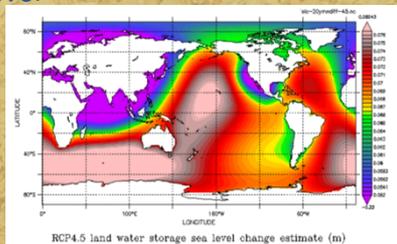
all members/projects can:

- ⇒ Access & benefit of their own private page/space;
- ⇒ Inquire & request data exchange within the SPP SeaLevel community;
- ⇒ Contribute & share their own datasets, fieldwork & other material & resources;
- ⇒ Access a developing repository of external links for sea level-related information, resources & databases;
- ⇒ And much more..!

Extract & visualize instantly IPCC AR5 global & coastal sea level projections, a simple tool for everyone!

Or get access & download the data directly from the [Integrated Climate Data Center \(ICDC\)](#).

Learn about regional differences in sea level rise!



www.spp-sealevel.de →
 “Resources” → “Extract & Visualize Sea Level Projections”

Congratulations to Prof. Anna-Katharina Hornidge (PI of EMERSA project) for her appointment as Director at the German Development Institute (GDI/DIE) & as Professor of Sociology at Uni-Bonn from 01.03.2020. She will also be a key shaper of the newly established Bonn Sustainability Alliance in the years to come.

We wish you all every success to your new assignments & future contributions in the field of Sociology!

SPP SeaLevel Mentoring Network for ECS!

Are you an early career scientist in the SPP community and looking for a mentor?

Or a senior researcher/professor who would like to volunteer as an ECS mentor?

Find information @ the SPP SeaLevel Redmine/Wiki area. For any questions, contact the SeaLevel Coordination Office!

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