



Franco-German Fellowship Programme on Climate, Energy and Earth System Research

“Make Our Planet Great Again – German Research Initiative (MOPGA-GRI)”

Funded projects

Field of research “Climate Change“

Name	Dr. Jed Kaplan
Current residence	Switzerland
Nationality	American
German host institution	University of Augsburg (Prof. Dr. Peter Fiener)
Project title	Feedbacks between land cover, people, and climate in the seasonally arid tropics (MONSOON)
Description	The project investigates the interrelations between human activities, land cover, and climate change in the seasonally arid tropics in South Asia and West Africa. These regions in which poor land cover and large growth of population are combined, are best suited to understand climate-related processes of interaction. Also, modelling for such regions has so far been neglected. By compiling reliable data for future risk modelling, the project will be able to identify land use strategies with a particularly high risk for the subsistence of ecosystems.

Name	Dr. Matthias Tesche
Current residence	Great Britain
Nationality	German
German host institution	Leipzig University (Prof. Dr. Johannes Quaas)
Project title	Particles in Aerosol Cloud Interactions: Stratification, CCN/INP concentrations, and Cloud Lifecycle (PACIFIC)
Description	The project aims to investigate interactions between clouds and so-called aerosols, dust particles, which are known to influence processes of cloud-formation, rain, and ice-formation in clouds. However, it is yet largely unknown in how far these interactions also influence climate. Proposing a better use of satellite data to determine cloud properties produced by aerosol-cloud interaction, the project intends to provide an

	improved basis for climate change prediction. The innovative part is to use snapshots of the satellite data in the context of the cloud's life cycle.
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Name	Dr. Anna Possner
Current residence	USA
Nationality	German
German host institution	Goethe University Frankfurt (Dr. Bettina Heiss)
Project title	Organisation and Cloud-Radiative Properties of Low-Level Mixed-Phase Clouds
Description	The project focuses on a better understanding of the role of low-level clouds (forming in the lowest 1 to 3 km range of the atmosphere) for processes of climate change, targeting the mixed-phase type of clouds which contains both water and ice. The objectives are, to create a currently non-existing global database on locations, frequency, cloud field morphology and cloud-radiative effects, to use these data for an improved understanding and prediction of how such cloud formation will react to anthropogenic climate change, to determine the role of ice in cloud formation processes, and to determine cloud field resilience to meteorological drivers and aerosol perturbations, taking also into account the effects on precipitation.

Name	Dr. Clemens Scheer
Current residence	Australia
Nationality	German
German host institution	Karlsruhe Institute of Technology (KIT, Prof. Dr. Klaus Butterbach-Bahl)
Project title	Climate change, reactive nitrogen, denitrification and N²O: Identifying sustainable solutions for the globe
Description	The use of synthetic N fertilizers has grown over the last century, with severe environmental consequences. Denitrification will ultimately remove most of the anthropogenic reactive nitrogen (N _r), but it is very uncertain in which degrees this process will take place. Denitrification will also need to be seen in the light of the conflict between a growing world population which requires intensified crop production and an augmented use of fertilizers which in turn would lead to increased emissions of greenhouse gas (GHG) and nitrous oxide (N ₂ O) from managed soils. The project aims to initialize and strengthen global research networks on denitrification, establishment of a missing global database, and to reduce uncertainties of current model estimates.

Field of research “Energy Transition“

Name	Prof. Dr. Andreas Goldthau
Current residence	Great Britain
Nationality	German
German host institution	Potsdam Institute for Advanced Sustainability Studies (IASS) / Prof. Dr. Mark G. Lawrence
Project title	Investigating the systemic impacts of the global energy transition (ISIGET)
Description	The project is focused on determining and politically mitigating the systemic risks which arise from continued use of outdated energy technologies in a process which leads away from the use of fossil commodities. It addresses the fact that new technologies are predominantly being developed in OECD countries and China, whereas the global South may be disadvantaged due to lack of access to patented new technologies. Identifying the risks and suggesting policies for global energy governance to level such discrepancies are expected to provide valuable input for future climate-related policy decisions.

Name	Dr. Heechae Choi
Current residence	South Korea
Nationality	South Korean
German host institution	University of Cologne (Prof. Dr. Sanjay Mathur)
Project title	Amorphous-crystal junctioned semiconductor: a new class of photocatalytic material with high activity and cost-effectiveness
Description	The project addresses the problem of low photocatalytic activity in current materials for solar energy conversion. Current procedures to cope with the problem and to boost photocatalytic activity, require the use of expensive technological elements which largely prevents their commercialization. The project therefore aims to develop cost-effective charge-separating photocatalytic materials and their fabrication routes to provide a breakthrough for the commercial distribution of this new type of semiconductors. It focuses on the aspects band gap narrowing, charge separation, charge transport, and reaction parallelization.

Name	Dr. Michael Zürch
Current residence	USA
Nationality	German
German host institution	University of Jena (Prof. Dr. Christian Spielmann)

Project title	Quantifying ultrafast non-equilibrium dynamics in semiconductor quantum nanomaterials (QUESTforENERGY)
Description	The project addresses the challenge of developing new materials, since silicon-based transistors are no longer adequate due to their limited capacities, while homo-, hetero- and multijunction silicon solar cells are not as cost-efficient as would be needed for a fast and broad-scale energy transition. The research will therefore focus on novel semiconductor quantum nanomaterials of atomically thin, two-dimensional layers of transition metal dichalcogenides (TMDCs). In particular, the project will investigate the currently unknown properties of this new material under non-static conditions, especially when the systems are driven very rapidly out of thermal equilibrium. Understanding and controlling the optoelectronic properties in heterojunctions of TMDCs will pave the way for novel multijunction solar cells and highly efficient optoelectronic devices.

Name	Dr. Eric Hill
Current residence	USA
Nationality	American
German host institution	Hamburg University of Technology (Prof. Dr. Gerold A. Schneider)
Project title	Nanocomposites and Materials for Energy Solutions
Description	The project will conduct basic research to pave the way for the employment of new materials (nanocomposites) for the uses in energy storage and generators, focusing on photocatalysis and photovoltaics.

Name	Dr. Yutsung Tsai
Current residence	USA
Nationality	Taiwanese
German host institution	Helmholtz-Zentrum Berlin for Materials and Energy (Prof. Dr. Norbert Nickel)
Project title	Lateral multi-junctions of 2-D transition metal dichalcogenides as optoelectronic platform for transparent photovoltaics
Description	The project focuses on the development of solar cell devices for the use of two-dimensional TMD semiconductors. Major topics of interest include the understanding of quantum confinement in the lateral multijunction configuration, determining the temperature-dependent transport properties of photo-generated charge carriers, optimizing metamaterial coupling for light absorption in a single solar cell, and testing scalable transparent solar cell designs.

Field of research “Earth System Research“

Name	Dr. Gayane Asatryan
Current residence	Australia
Nationality	Armenian
German host institution	Museum für Naturkunde - Leibniz Institute for Evolution and Biodiversity Science (Dr. David Lazarus)
Project title	Polar Oceans, Plankton and Oceanic Carbon Sequestration in a warm high pCO² world
Description	Aiming to support the prediction of future climate developments, the project will investigate the role of ocean phytoplankton which acts as a carbon-absorbing agent and, by way of sequestration, exports it with sinking shells into deep sea sediments. While it is well-known that the transition from the geo-historical periods of the Eocene to the Oligocene about 30 million years ago brought significant climate changes and, in connection, also a change of the oceans' carbon export production, the important role of phytoplankton and the links to changing ocean circulation are still poorly understood. Investigating the nature of this geo-historical interaction will provide significant insight into the functions of the oceans as climate regulators.

Name	Dr. Christina Richards
Current residence	USA
Nationality	American
German host institution	University of Tübingen (Prof. Dr. Oliver Bossdorf)
Project title	Genomics and Epigenomics of Plant Invasion
Description	The project addresses the issue of maintaining biodiversity in the light of recent threats posed by plant invasion which leads to reduction or loss of native species. At the same time, a close study of invasive species will yield insights into patterns of resilience, adaptation, and expansion in reaction to climate-change. Research will include field and experimental ecological studies of genomics and epigenomics that will provide unprecedented deep knowledge of the mechanisms involved in species resilience and invasive abilities. The knowledge gained will be critical for recommendations to stakeholders in risk assessment and decision making for predicting, preventing, and managing biological invasion.

Name	Dr. Henry C. Wu
Current residence	USA
Nationality	American
German host institution	Leibniz Centre for Tropical Marine Research (Dr. Agnes Richard)
Project title	Ocean Acidification Crisis and global warming observations from tropical corals (OASIS)
Description	The project investigates ocean acidification as a result of enhanced anthropogenic CO ₂ absorption which threatens the ability of calcifying organism to build their calcium carbonate skeletons, thus depriving maritime populations of habitats and foodwebs and in consequence also severely impairing global fishing economy. Since current understanding of these changes is limited by the lack of reliable long-term seawater pH monitoring and the difficulty in reconstructing past changes in ocean chemistry, the project will reconstruct past seawater pH from boron isotope signatures in long-living tropical corals to observe global evolution of seawater pH and carbonate chemistry. The results are expected to provide a basis for future research and to advise policymakers seeking to mitigate the negative effects of rising atmospheric CO ₂ and the impact of corrosive seawater on fragile marine calcifiers.

Name	Prof. Dr. Helmuth Thomas
Current residence	Canada
Nationality	German
German host institution	Helmholtz-Zentrum Geesthacht Centre for Materials and Coastal Research (Prof. Dr. Kay-Christian Emeis)
Project title	The Ocean's Alkalinity: Connecting geological and metabolic processes and time-scales
Description	The project addresses the role of oceans as regulators of atmospheric carbon dioxide, thus making a crucial contribution to maintain climate on Earth in a habitable range. This regulatory function is biogeochemically performed by the ocean's alkalinity, its CO ₂ and pH buffer capacity. Research will investigate in which measure human activities and climate change affect the ocean's alkalinity, particularly the impact of nitrogen fertilizers which enter the oceans and the risk of deoxygenation of shallow oceans.