

Helmholtz-Zentrum Geesthacht

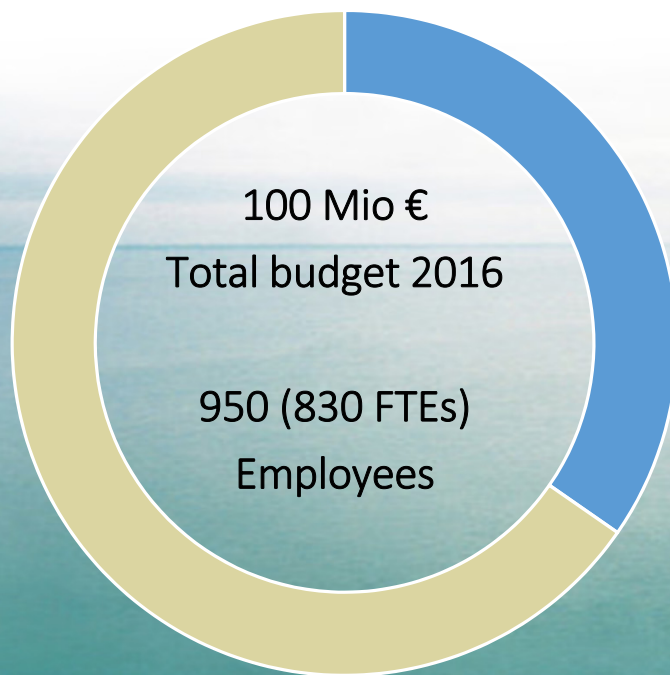
General Information on the Center



Helmholtz-Zentrum Geesthacht

Research directions

- Coastal research and climate services (1/3 of budget)
- Research on materials and materials systems (2/3 of budget)



Institutional budget:
78 Mio €
90% BMBF
10% federal states

Third party funding:
22 Mio €
funding agencies
industry

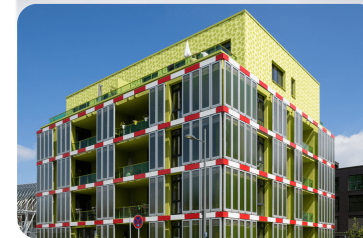
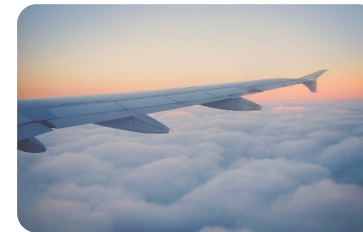


Materials and Materials Systems

HZG research foci:

Materials for...

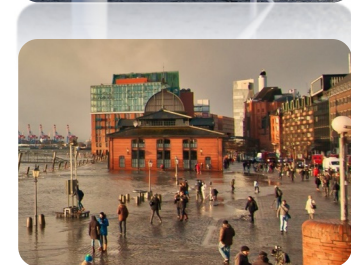
- lightweight structures
- energy saving and energy storage concepts
- pollutant-reducing separation and purification technologies
- health assisting systems and regenerative medicine



Coastal Research and Climate Services

HZG research foci:

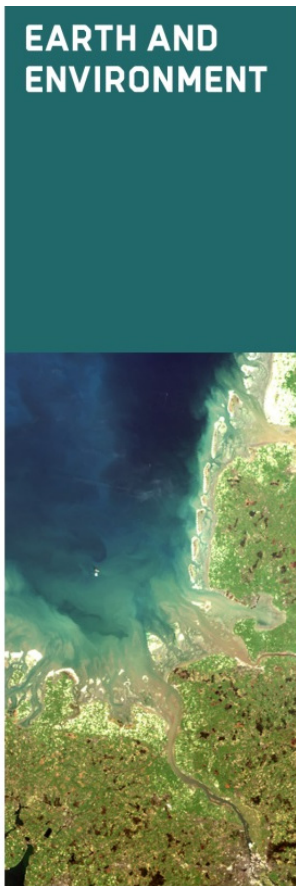
- coastal transition regions under natural and human pressure
- climate services for targeted adaptation



Helmholtz Association

Research Fields





We...



... address research questions related to coastal transition regions as part of the Earth System changes and develop climate service products

... build up large, national and international observatories and networks as well as simulation capacities for coastal transition regions

... translate fundamental scientific results into data products, climate service tools and adaptation guidelines

Thereby contributing to ...



... *“solving major and pressing problems of society, science and industry”*

... *“researching highly complex systems using large-scale devices and infrastructure, cooperating closely with national and international partners”*

... *“shaping our future by combining research and technology development with perspectives for innovative application and provisions in tomorrow's world”*

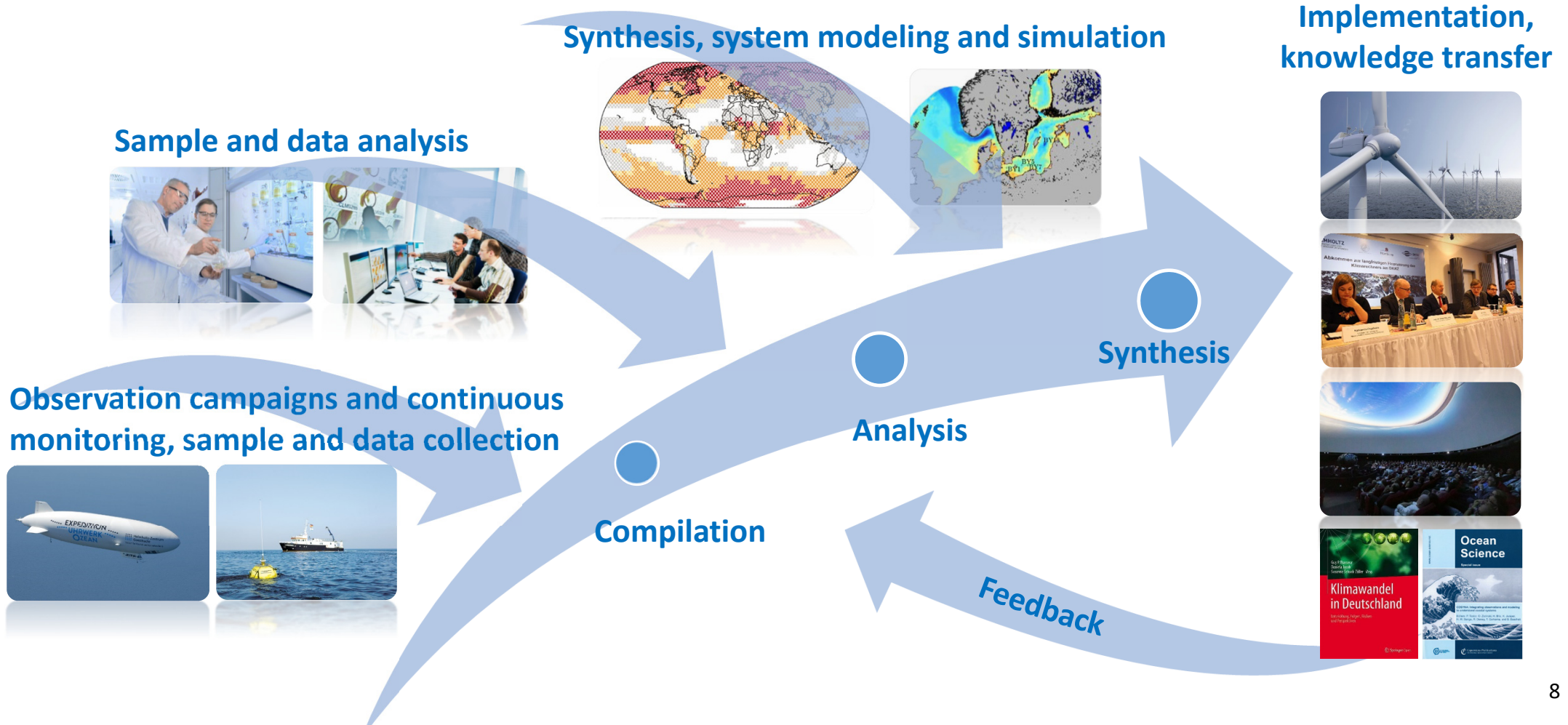
Guiding principles of our coastal research and climate services

Focusing expertise, infrastructure and financial resources on strategic scientific research on **select** coastal systems and **select** climate services

- **in-depth** and comprehensive research and prototype development
- fostering **multidisciplinary** and **transdisciplinary** research
- addressing the whole value chain implementing **observation** and **modeling** to **transfer** into society



Research along the value chain



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Multidisciplinary research on offshore wind farms

INVESTIGATING THE SOCIOCULTURAL PERSPECTIVE

CLIMATE CHANGE IMPACTS ON FINANCING

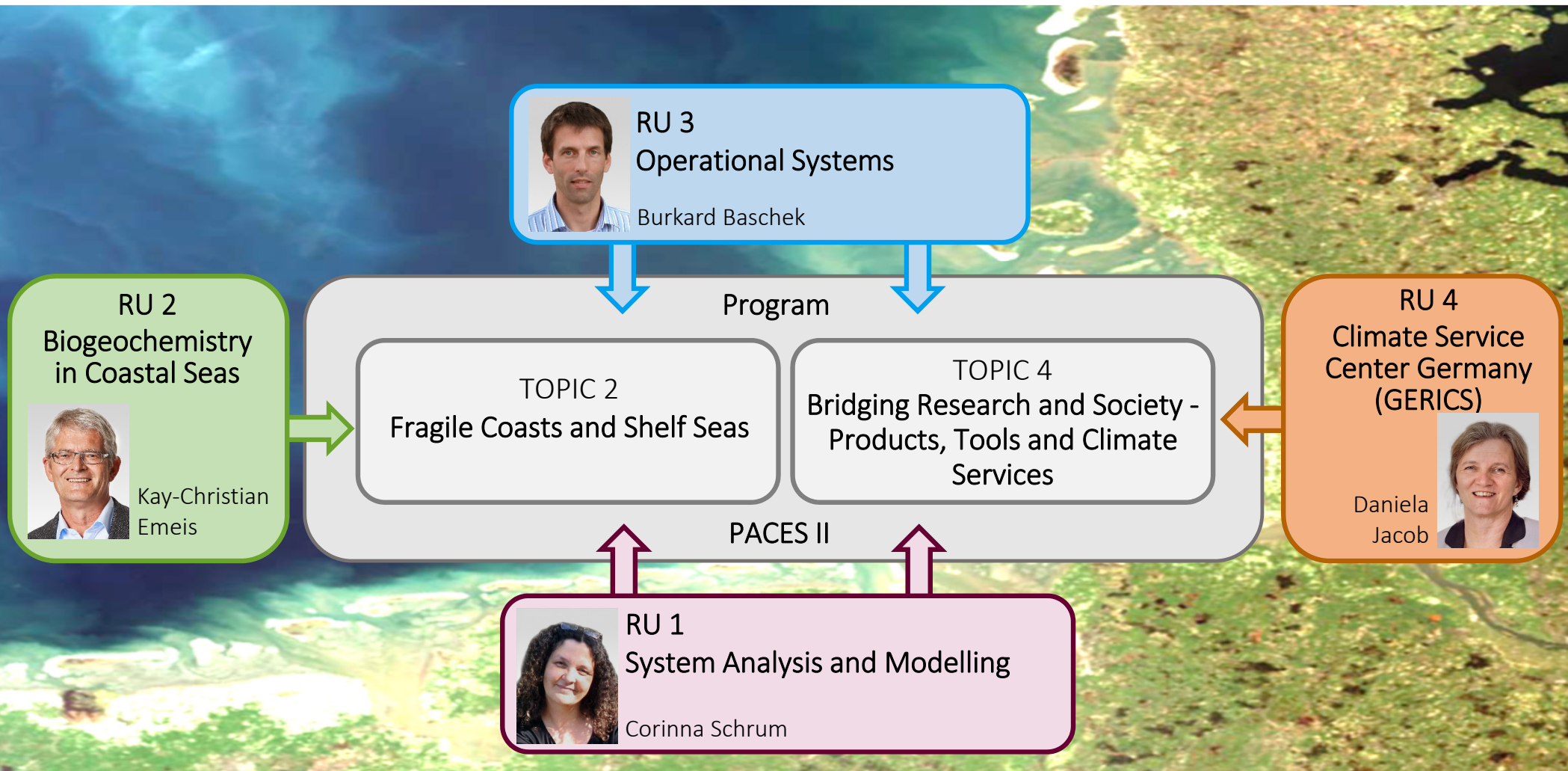
EFFECTS ON NORTH SEA STRATIFICATION

OPTIMIZATION OF DESIGN AND LOGISTICS

SIMULATING TURBULENCE EFFECTS

POLLUTION FROM CONSTRUCTION AND OPERATION

Research Units



Research Unit: Operational Systems



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Deciphering the physical dynamics of the coastal ocean

- developing an integrated coastal observing system
- understanding small-scale physical processes
- immersive science communication



Research Unit: Biogeochemistry in Coastal Seas



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Research Unit: Biogeochemistry in Coastal Seas



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Tracing natural and human chemical impacts in coastal transition zones

- persistent organic and inorganic pollutants in the land-sea-atmosphere transition
- sea floor state and variability
- atmospheric chemistry, emission and transport modeling



Research Unit: System Analysis and Modelling



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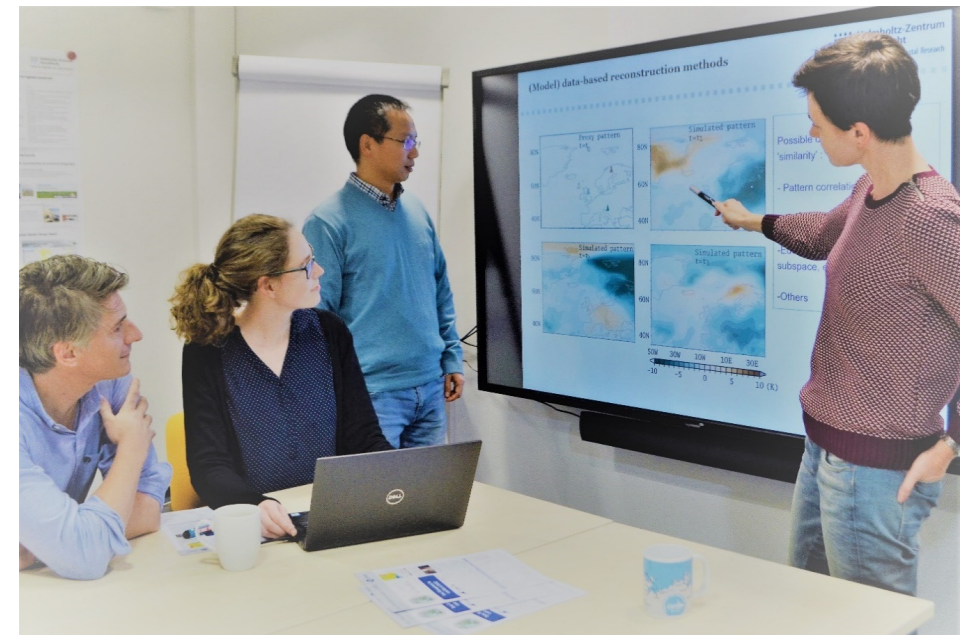


Research Unit: System Analysis and Modelling



Turning lessons learned from the past into robust predictions

- understanding of long-term changes and variability of coastal systems
- advancement of coastal modeling capacity, model development
- transfer of knowledge



Research Unit: Climate Service Center Germany (GERICS)



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Research Unit: Climate Service Center Germany (GERICS)



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Supporting adaptation to climate change with climate service tools and knowledge

- development of local climate information, prototype products and services
- integration of climate change in development strategies
- evaluation of climate services and development of climate service infrastructures



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Research infrastructures

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Research infrastructures

- seagoing and laboratory infrastructure for physical, optical and biogeochemical properties in air, water, and sediment
- use of airborne infrastructure for targeted multi-platform experiments
- state-of-the-art observatories combined with advanced analytical instrumentation and computing facilities
- shareholder of the German Climate Computing Center (DKRZ) in Hamburg

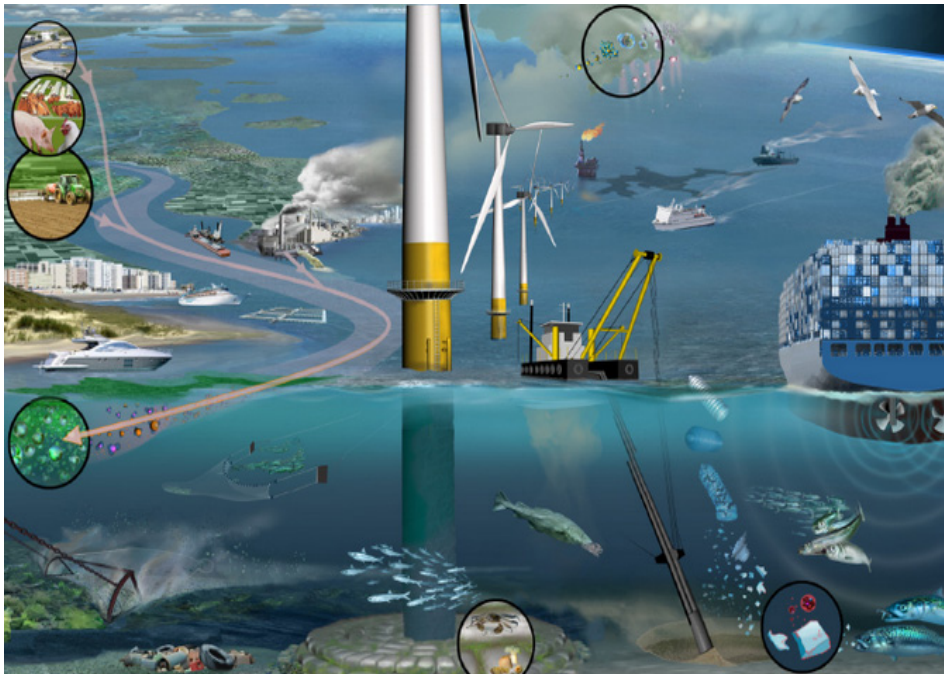


- *development and operation of an extensive and world-class coastal observatory*
- *generation of one of the most comprehensive inventories of sea floor state variables*
- *compilation of extensive high resolution long-term climate reconstructions*
- *taking an international forerunner position in climate services*
- *unique pioneering science communication*



Extending today's strengths to address tomorrow's challenges

Coastal transition zones – a global challenge with regional consequences

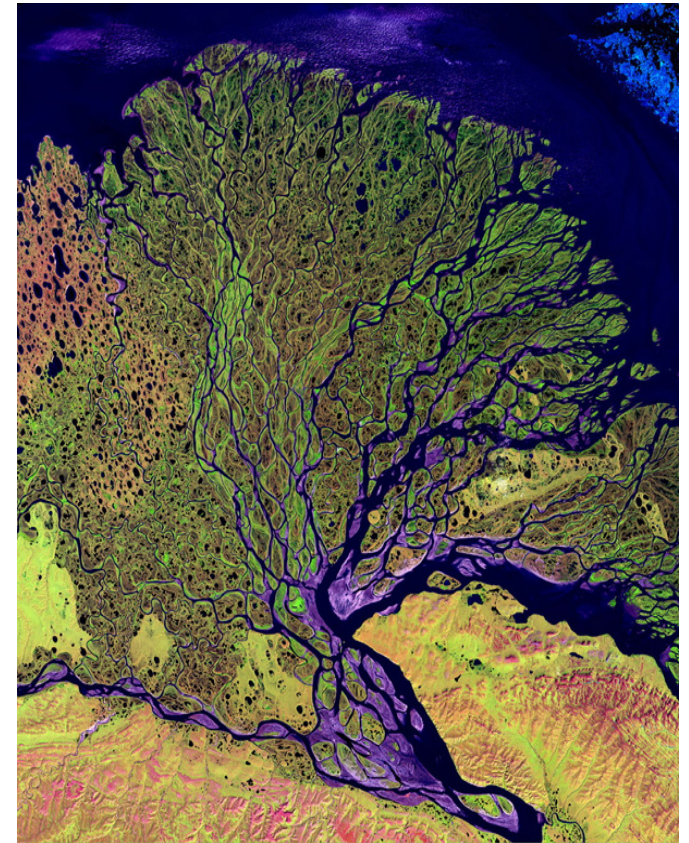


- increasing conflicts of interests, natural and human pressure
- growing demand for information and adaptational measures
- complex interactions of ocean, atmosphere, land and people as well as coupling of regional coastal processes with the global system
- increased requirements for data processing, metadata standardization, modeling and simulation

Extending today's strengths to address tomorrow's challenges

Future strategic research foci of the Center

- *focusing on select essential questions of coastal systems and climate service*
- *investigating coastal regions as open systems*
 - focus on coastal transition zones (as focal points of competitive interests)
 - enhance research on interaction of systems (e.g., terrestrial/marine) and respective simulations
 - enhance space and time resolution and robustness of climate service tools



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Investing in future key enablers

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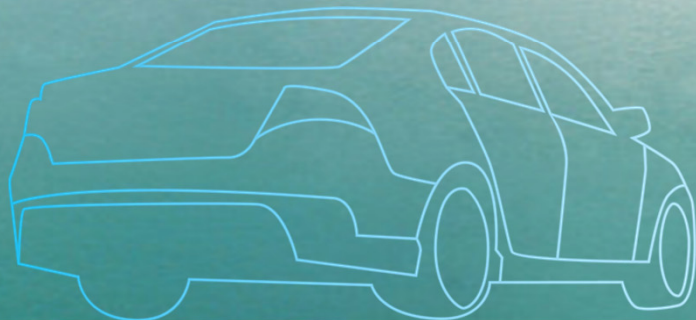


Investing in future key enablers

- space (new buildings)
- innovative sampling gear and tailored vessels (artificial swarms, new research vessel)
- IT-infrastructure (OCEAN II cluster, HLRE-4)
- observatory networks (DANUBIUS, MOSES, etc.)
- intense national and international cooperation in basic research and innovation (e.g., CliCCS, ...)
- innovative paths for science communication (e.g., media dome, VR-presentations)
- **most important !** minds (recruitment)







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