Helmholtz-Zentrum Geesthacht
Centre for Materials and Coastal Research

ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG



Marine, Coastal and Polar Systems:

Polar Regions **A**nd **C**oasts in the Changing **E**arth **S**ystem (PACES II) (2014–2019)

Thomas Jung, program spokesperson

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Motivation

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- Polar regions and coasts are key components of the changing the Earth System
- Both are strongly influenced by human activities
- Anthropogenic change matters
- Fascinating scientific arenas

Grand Challenges

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- Earth system dynamics and risks
- Availability of water and water management
- **Climate variability and climate change**
- **Ecosystem dynamics and biodiversity**
- Sustainable use of resources
- **Socio-economic dimension of global change**

Research Field *Earth and Environment* (2014–2018)

Structure

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Helmholtz Research Field: Earth and Environment

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Research Programmes	Geosystems – The changing Earth (GFZ & GEOMAR)	Marine, Coastal and Polar Systems – PACES II (AWI & HZG)	Oceans – From the Deep Sea to the Atmosphere (GEOMAR & GFZ)	Atmosphere and Climate (KIT, FZJ & GFZ)	Terrestrial Environment (UFZ, FZJ & HMGU)
Research Topics	**Topic 1** Changes and variability in Arctic and Antarctic (AWI)	**Topic 2** Fragile coasts and shelf seas (AWI & HZG)	**Topic 3** The Earth System from a polar perspective: Data, modelling and synthesis (AWI)	**Topic 4** Bridging research and society: Products, tools and climate services (AWI & HZG)	**Associated Research Infrastructure** RV Polarstern RV Heincke Neumayer Station III (AWI)
FTEs	114	36 & 51	83	12 & 40	14

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Topic 1

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The Polar Atmosphere and Cryosphere in a Changing Climate

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Topic 2

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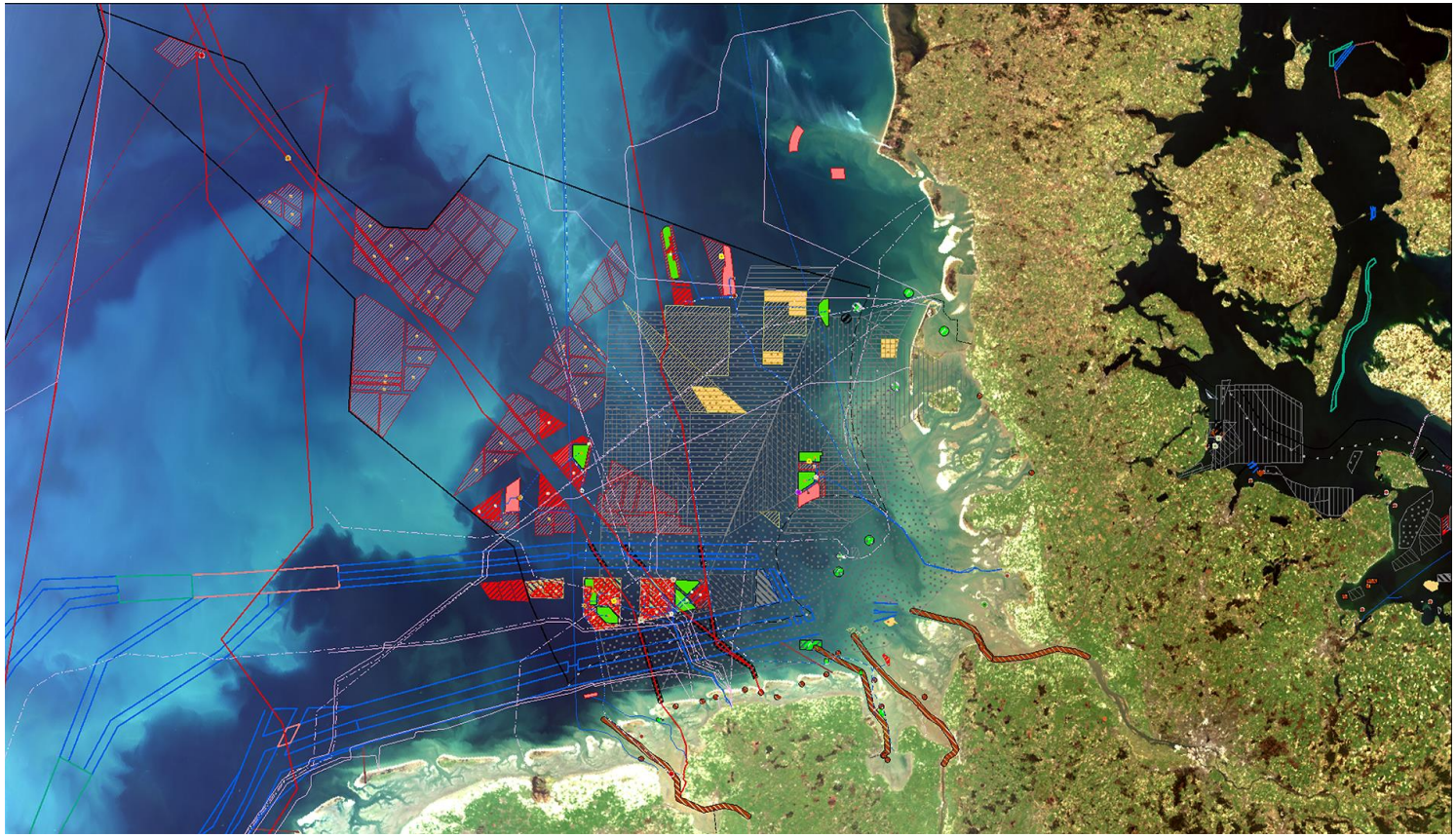
Fragile Coasts and Shelf Seas



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RU1, RU2 and RU3

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Topic 2: *Natural sciences domain*

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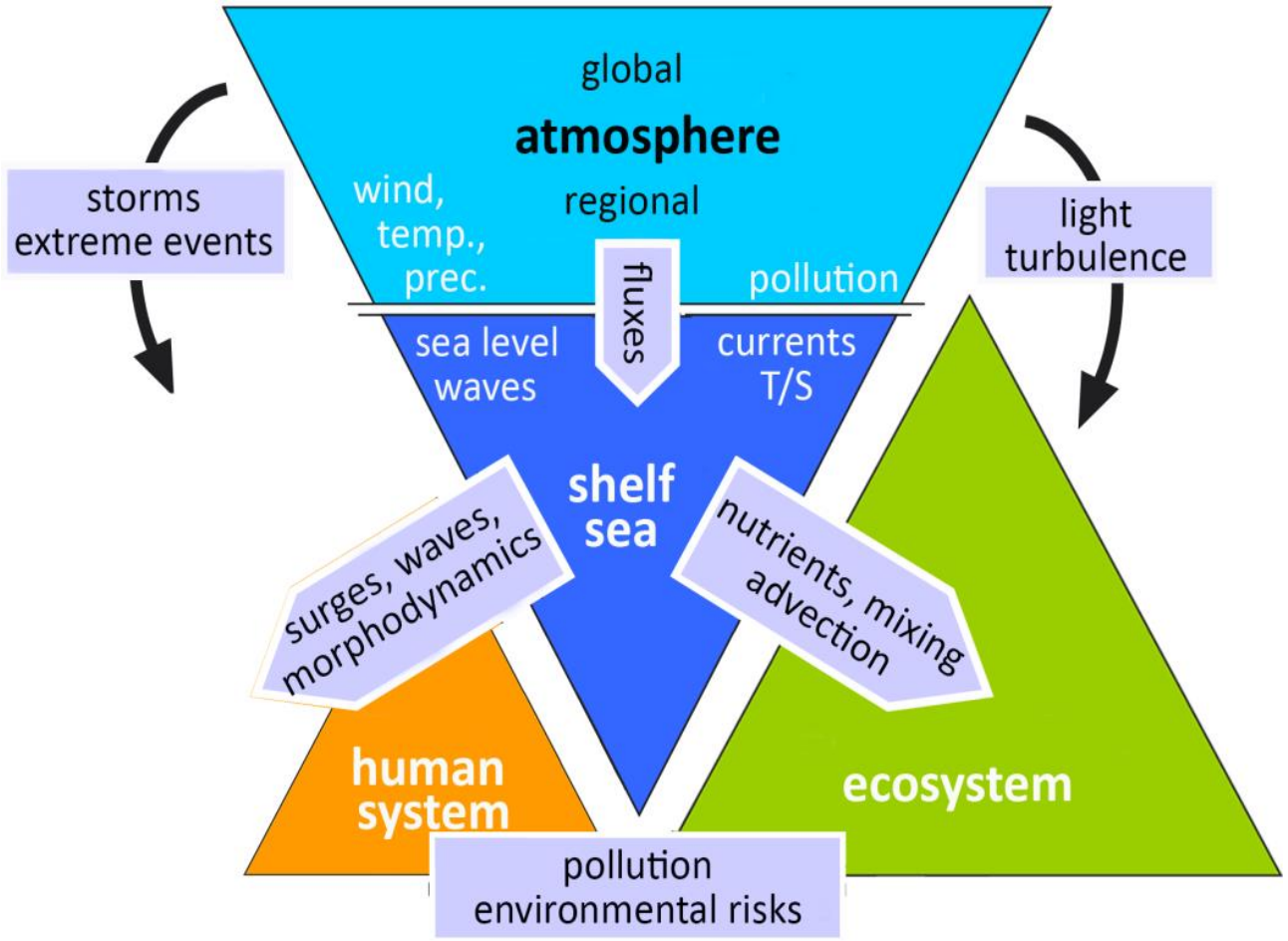
What are drivers of variability, both human and natural, in coastal and shelf sea systems?



Topic 2: Themes

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- Regional climate change in coastal systems, long-term ecological monitoring
- Species interactions, food webs, modeling of coastal ecosystems under natural and anthropogenic forcing
- Evolution and adaptation in cold-water ecosystems
- Status and role of sea floors in coastal systems
- Small-scale physical processes and their influence on ecosystems

Topic 3

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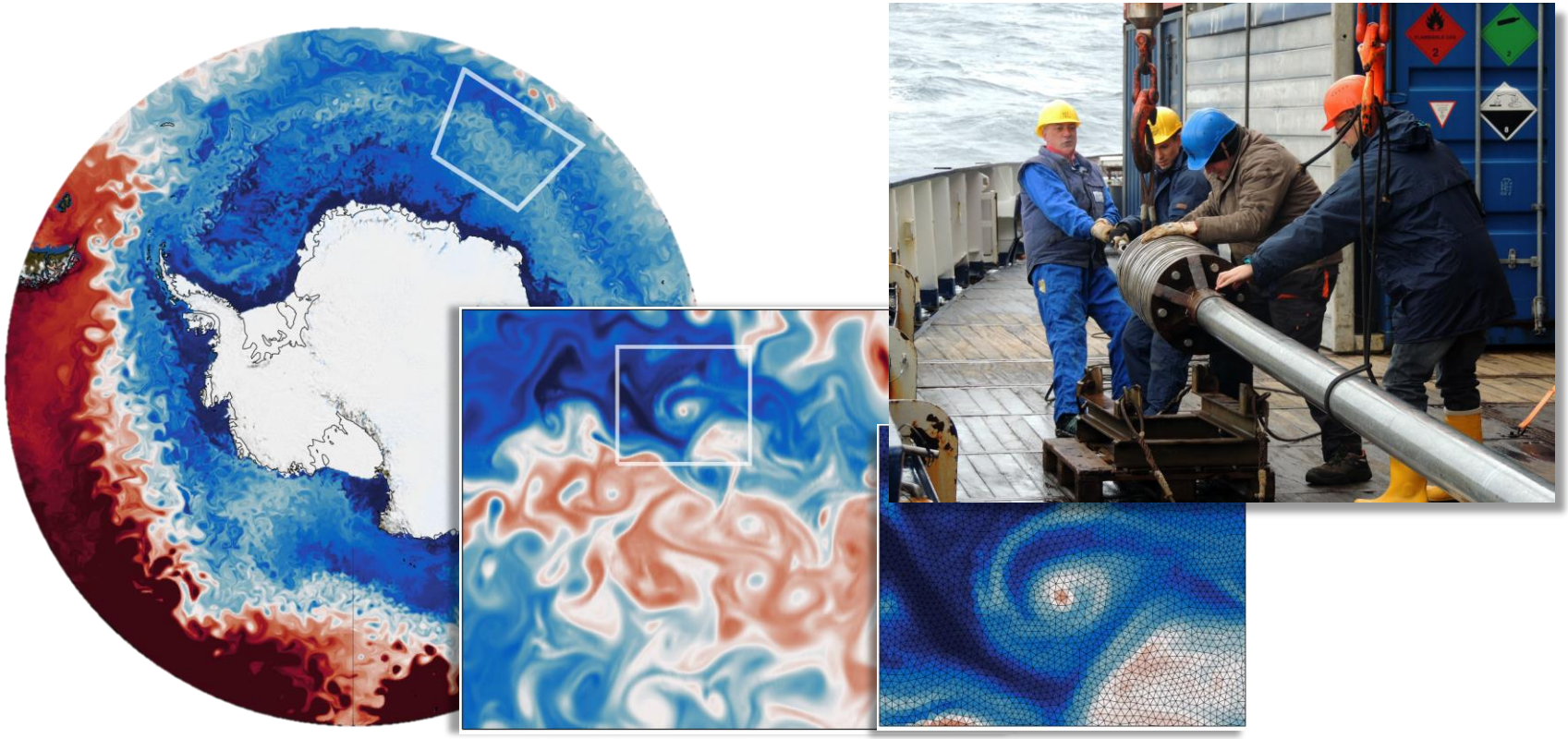
The Earth System from a Polar Perspective: Data, Modelling and Synthesis



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Topic 4

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Bridging Research and Society: Products, Tools and Climate Services

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RU4, RU1 and RU3

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Topic 4: *The interface to society*

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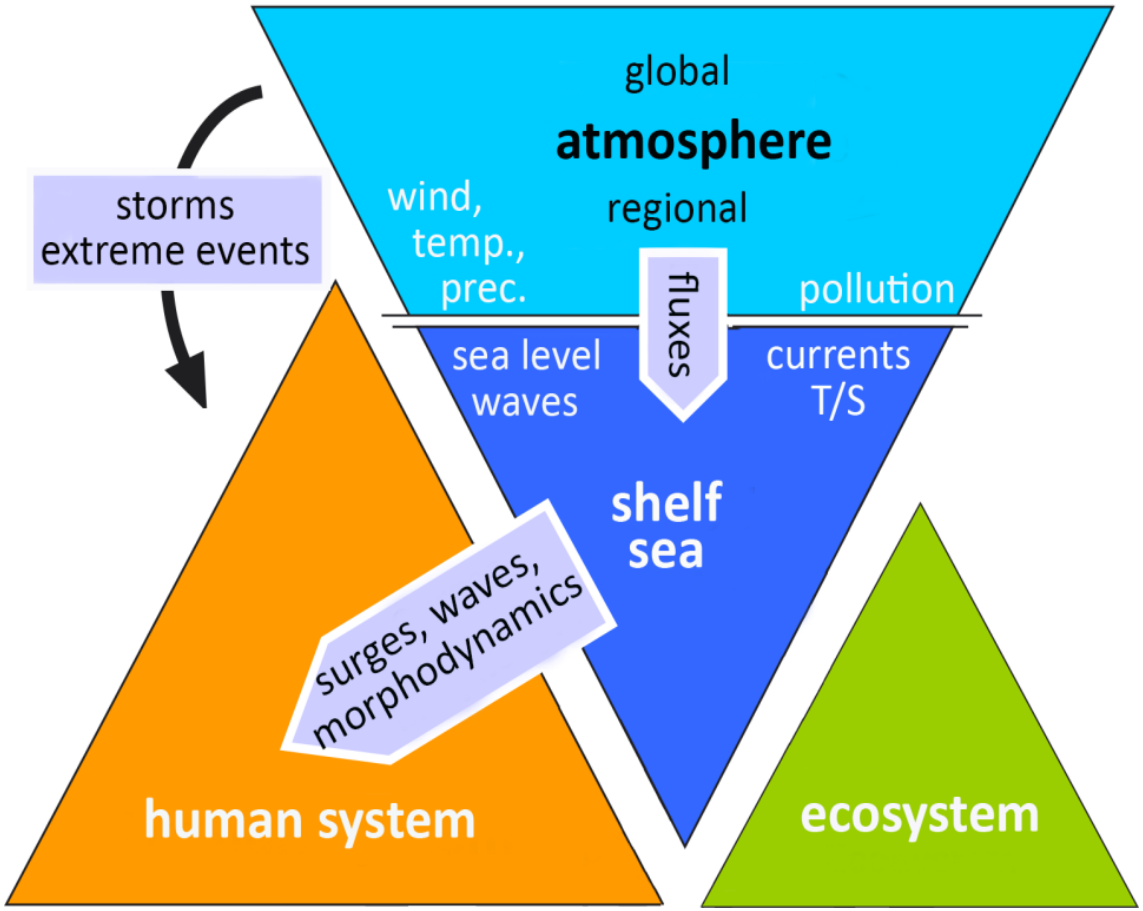
How can knowledge effectively be transferred from science to society by provision of products, tools and (climate) services?



Topic 4: Themes

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- Operational observing system and model data products, synoptic analyses, short-term forecasts.
- Technology for complex data information from models and observations in coastal research
- Knowledge for societal needs and dialogues between science, public, stakeholders, and multifaceted climate services

Large-scale infrastructure

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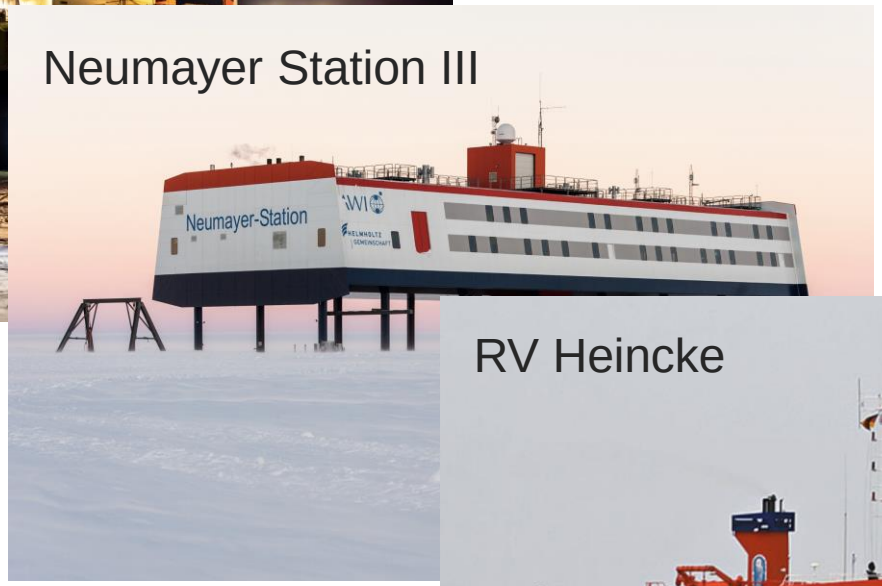
AWI

RV Polarstern

Neumayer Station III



RV Heincke

Successful collaboration

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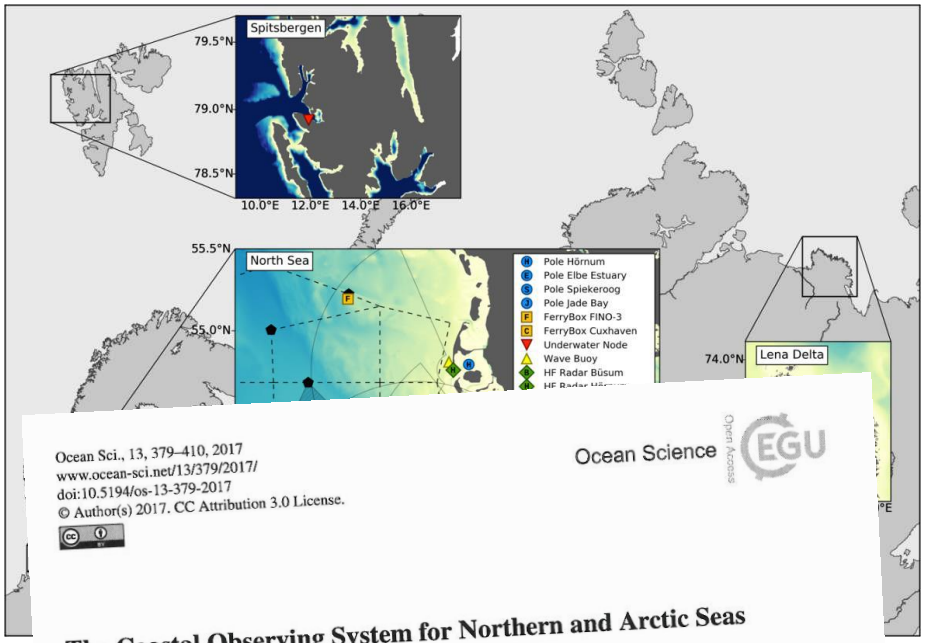
COSYNA

Coastal Observing System component:

- Expansion into the Arctic
- Installation of an underwater node in the German Bight
- Expansion into the Baltic Sea
- Real-time data availability
- Wide-spread use (science, industry etc.)



Ocean Sci., 13, 379–410, 2017
www.ocean-sci.net/13/379/2017/
doi:10.5194/os-13-379-2017

Ocean Science
Open Access
EGU

The Coastal Observing System for Northern and Arctic Seas (COSYNA)

Burkard Baschek[1], Friedhelm Schroeder[1], Holger Brix[1], Rolf Riethmüller[1], Thomas H. Badewien[2], Gisbert Breitbach[1], Bernd Brügge[3], Franciscus Colijn[1], Roland Doerffer[1], Christiane Eschenbach[1], Jana Friedrich[1], Philipp Fischer[4], Stefan Garthe[5], Jochen Horstmann[1], Hajo Krasemann[1], Katja Metfies[4], Lucas Merckelbach[1], Nino Ohle[6], Wilhelm Petersen[1], Daniel Pröfrock[1], Rüdiger Röttgers[1], Michael Schlüter[4], Jan Schulz[2], Johannes Schulz-Stellenfleth[1], Emil Stanev[1], Joanna Staneva[1], Christian Winter[7], Kai Wirtz[1], Jochen Wollschläger[1], Oliver Zielinski[2], and Friedwart Ziemer[1]

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Successful collaboration

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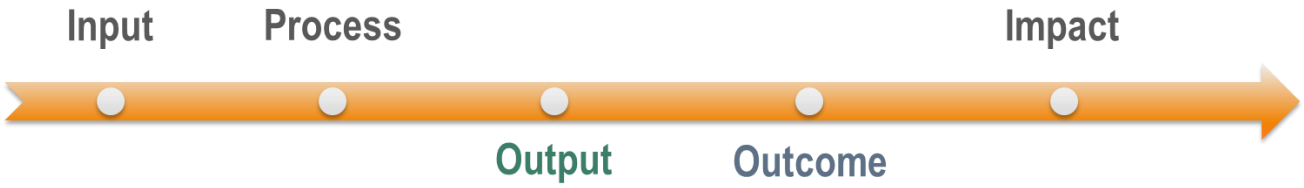
Challenge: Development of criteria and indicators for evaluation of success of knowledge transfer, dialogue processes with stakeholders, and climate service activities

What has been achieved:

- Agreement on terms and definitions (“common language”)
- Formulation of criteria and indicators for output and outcome (OECD) in parallel with the different product categories



Criteria for **Output**: availability – visibility – scientific quality – degree of innovation – scaling – practical relevance – strategic potential

Criteria for **Outcome**: use – user satisfaction – dissemination, attention – users‘ learning effect – valorisation

PACES II in numbers

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Budget for 2016:

- Research: 82 Mio€ (AWI) and 28 Mio€ (HZG)
- Large-scale research infrastructure: 45 Mio€ (AWI)

PACES II in numbers

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	2013		2014		2015		2016	
ISI or SCOPUS cited publications	**597** 495 102	**(PACES II)** (AWI) (HZG)	**585** 465 120	**(PACES II)** (AWI) (HZG)	**773** 609 164	**(PACES II)** (AWI) (HZG)	**824** 642 182	**(PACES II)** (AWI) (HZG)
Third pary funding (Million €)	**22,6** 18,9 3,7	**(PACES II)** (AWI) (HZG)	**25,8** 21,9 3,9	**(PACES II)** (AWI) (HZG)	**25,6** 21,2 4,4	**(PACES II)** (AWI) (HZG)	**22,6** 18,6 4	**(PACES II)** (AWI) (HZG)
Core-funded scientists without PhD-Students	**263** 207 56	**(PACES II)** (AWI) (HZG)	**313** 229 84	**(PACES II)** (AWI) (HZG)	**322** 234 88	**(PACES II)** (AWI) (HZG)	**348** 259 89	**(PACES II)** (AWI) (HZG)

Coordination & agenda setting

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IPCC
INTERGOVERNMENTAL PANEL ON climate change

IMPACT 2

MOSAiC
International Arctic Drift Expedition

YOPP
YEAR OF POLAR PREDICTION

The EU Arctic Cluster at a glance

- APPLICATE
- ARICE
- BLUE ACTION
- EU-PolarNet
- ICE-ARC
- INTAROS
- INTERACT
- NUNATARYUK

And their associated partner:
The European Polar Board

KÜNO
Küstenforschung Nordsee-Ostsee

Coastal Research in North Sea and Baltic Sea

Future directions

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Draft ´*Topics*´:

- The role of the atmosphere, ocean and cryosphere in climate
- Coastal transition zones under natural and human pressures
- Marine and polar life: Sustaining biodiversity, biotic interactions and biogeochemical functions

Future directions

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AWI

Flagship activities:

Copernicus
The European Earth Observation Programme

DANUBIUS-RI
International Centre for Advanced Studies on River-Sea Systems

ERA-PLANET

MOSES
Modular Observation Solutions for Earth Systems

BEYOND EPICA
OLDEST ICE

MOSAiC
International Arctic Drift Expedition

ESM
Advanced Earth System Modelling Capacity

IPCC
INTERGOVERNMENTAL PANEL ON climate change

ExtremeEarth
What is the next grand Science & Technology challenge?

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Additional slides

Topic 2: Highlight

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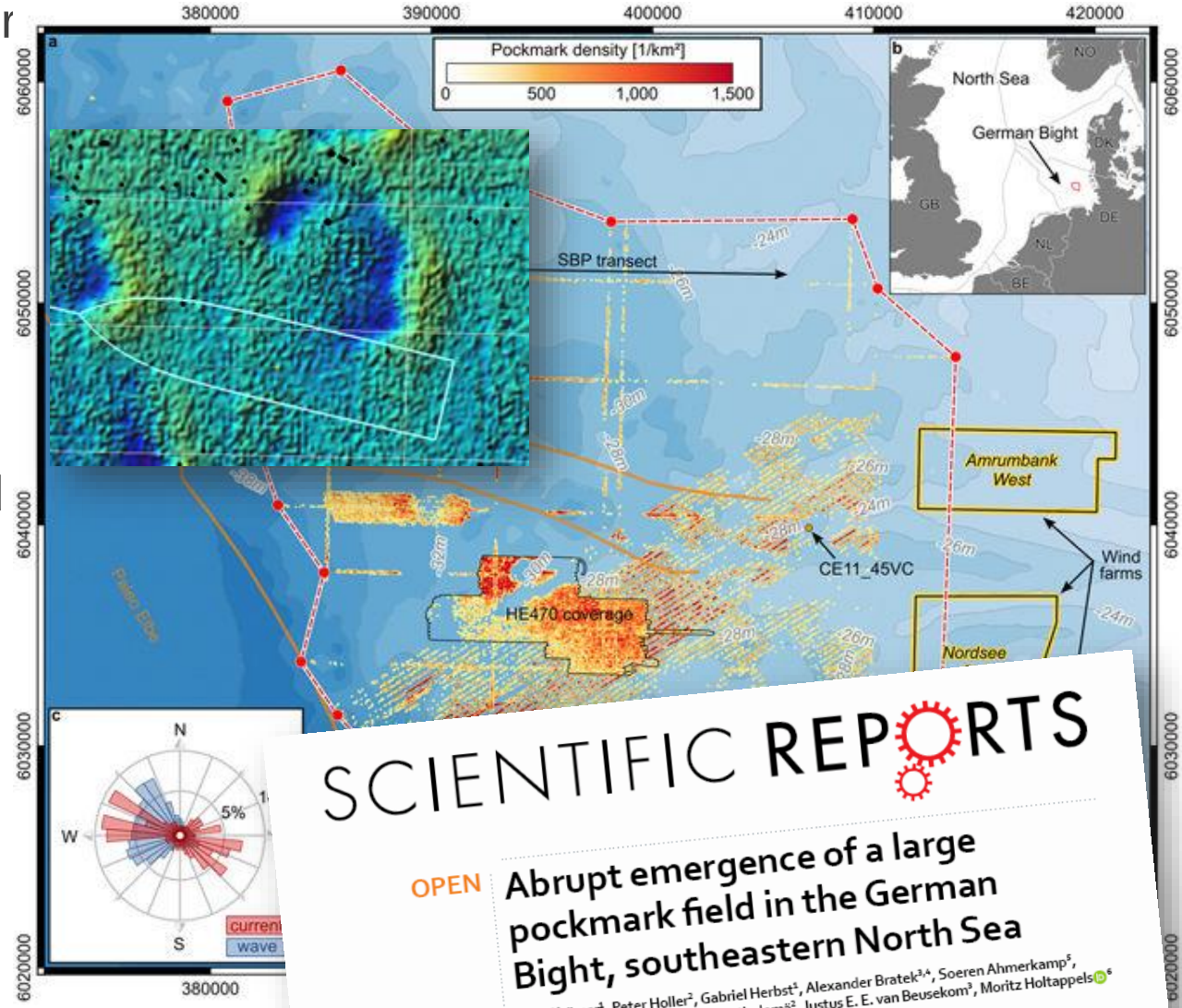
Up to 1200 pockmarks per km² over area 915 km², diameters 10 - 20 m

triggered by waves in storm season 2015/16

released 5,000 tons of biogenic methane, moved 6.9 million m³ sediment,



SCIENTIFIC REPORTS

OPEN

Abrupt emergence of a large pockmark field in the German Bight, southeastern North Sea

Knut Krämer[1], Peter Holler[2], Gabriel Herbst[1], Alexander Bratek[3,4], Soeren Ahmerkamp[5], Andreas Neumann[3], Alexander Bartholomä[2], Justus E. E. van Beusekom[3], Moritz Holtappels[6] & Christian Winter[1]

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Published online: 11 July 2017

A series of multibeam bathymetry surveys revealed the emergence of a large pockmark field in the southeastern North Sea. Covering an area of around 915 km², up to 1,200 pockmarks per square

marum

AWI

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MPI Bremen

SENCKENBERG
world of biodiversity