

Introductory Remarks for the Evaluation Process

Geesthacht, 1-2 October 1996

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(Speaker of Forschungsschwerpunkt)

The Objectives of Environmental Research



Thus, environmental research is to some extent a

basis research field

dealing with fundamental physical-chemical-ecological questions, but at the same time an

applied research field

answering concrete questions from societal users.

Specifics of Environmental Research



- Openness.
- Large systems.
- Interrelationship in space and time.
- Public relevance.

The Objectives of Environmental Research



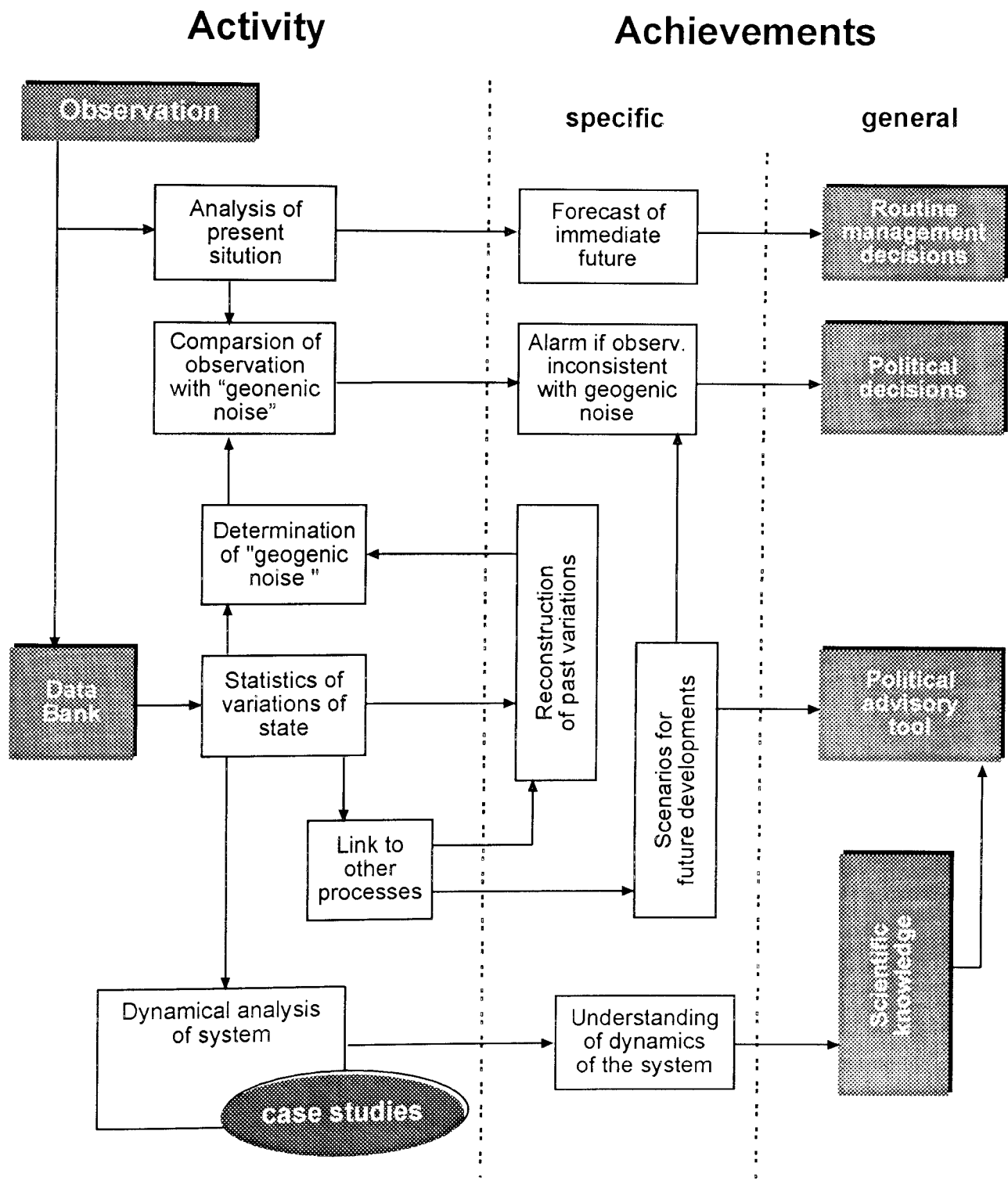
- **Understanding of the dynamical processes** controlling the state and its **anthropogenic and natural variations**.
- **Determination** the system's **sensitivity to external factors** and its **natural range of variation**.
- **Analysis** of the **current and past state** of the system.
- **Prediction** of its near future development.
- **Derivation of scenarios** of possible consequences of **anthropogenic modifications**

The Role of Observational Data



Observational data serve a multitude of purposes. They form...

- the basis of the analysis of the present state and possible alarms if anthropogenic effects are passing critical thresholds.
- the statistical evidence for the determination of “geogenic” noise, against which any anthropogenic signals have to be compared.
- the empirical basis for reconstructions of past states.
- the empirical evidence for verifying quasi-realistic models against.



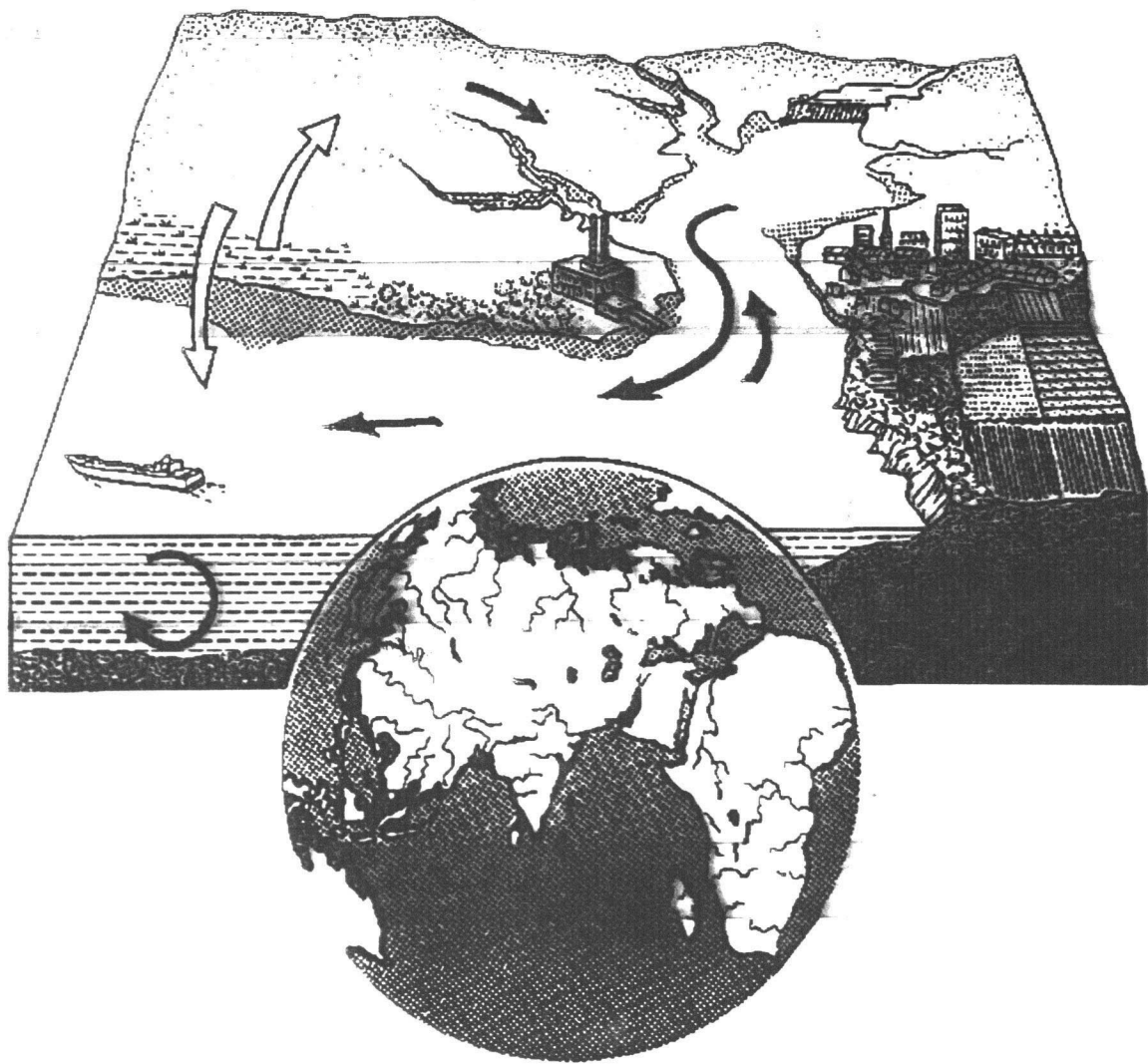
The Role of Monitoring

The Role of Numerical Models



There are two types of **models** in environmental research

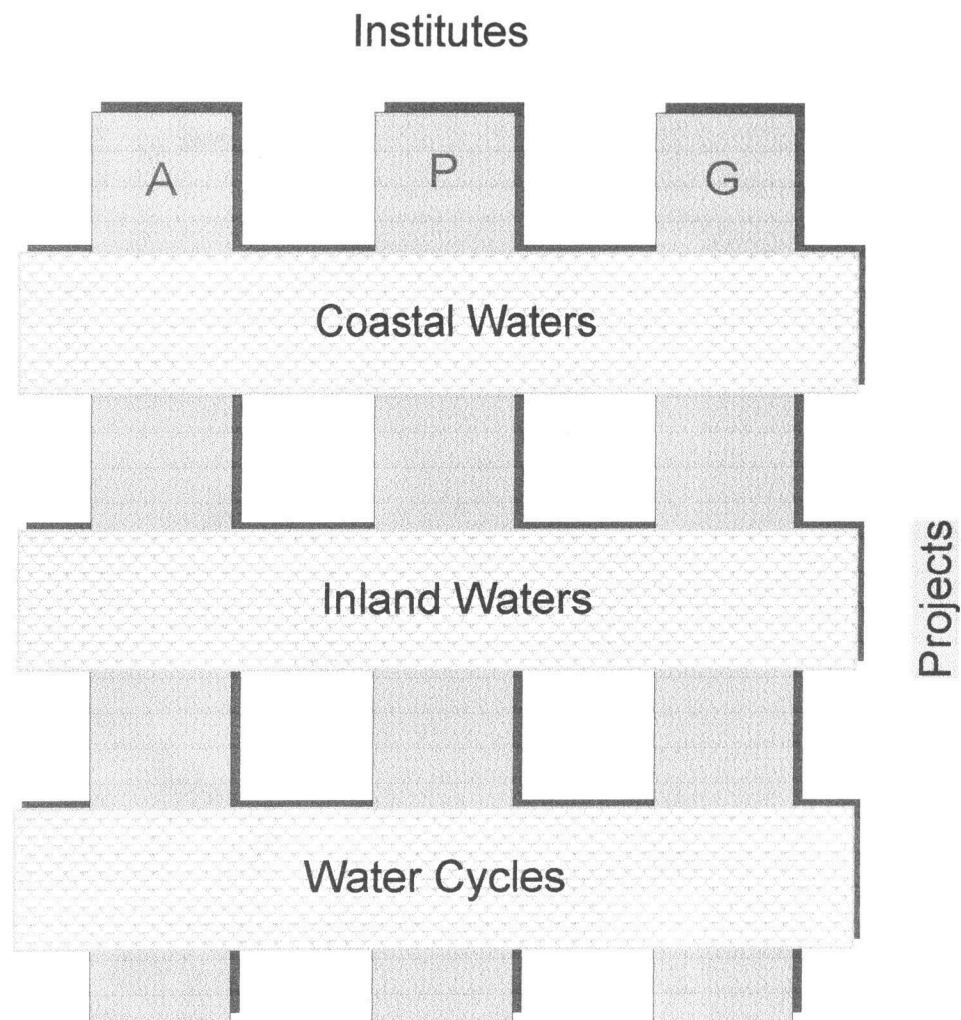
- **conceptual models** aimed at the understanding of the systems dynamics
- **quasi-realistic models** which approximate reality in detail and may be used for
 - interpolating observed data (“analysis”),
 - extrapolating observed data (“prediction, scenarios”)
 - executing experiments on the system’s sensivity to changes in external factors and dynamical components



Environmental Research at GKSS

- **Matrix organisation:** Interaction of institutes through time limited projects.
- **“Double Pull”:** Interaction with basic research institutions and clients at governmental agencies and commercial enterprises. Spawning of small companies.

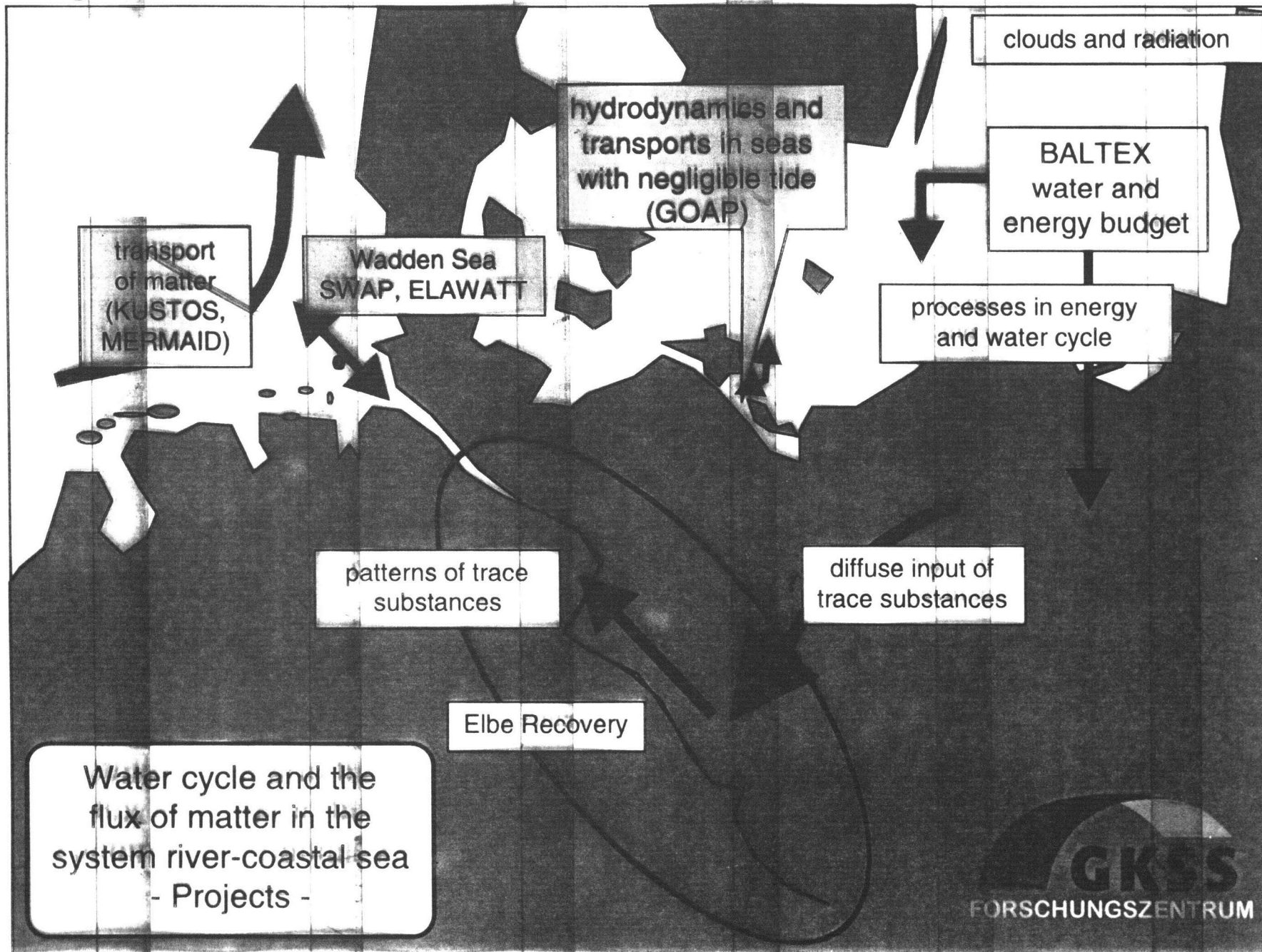
IX Interconnection of research fields



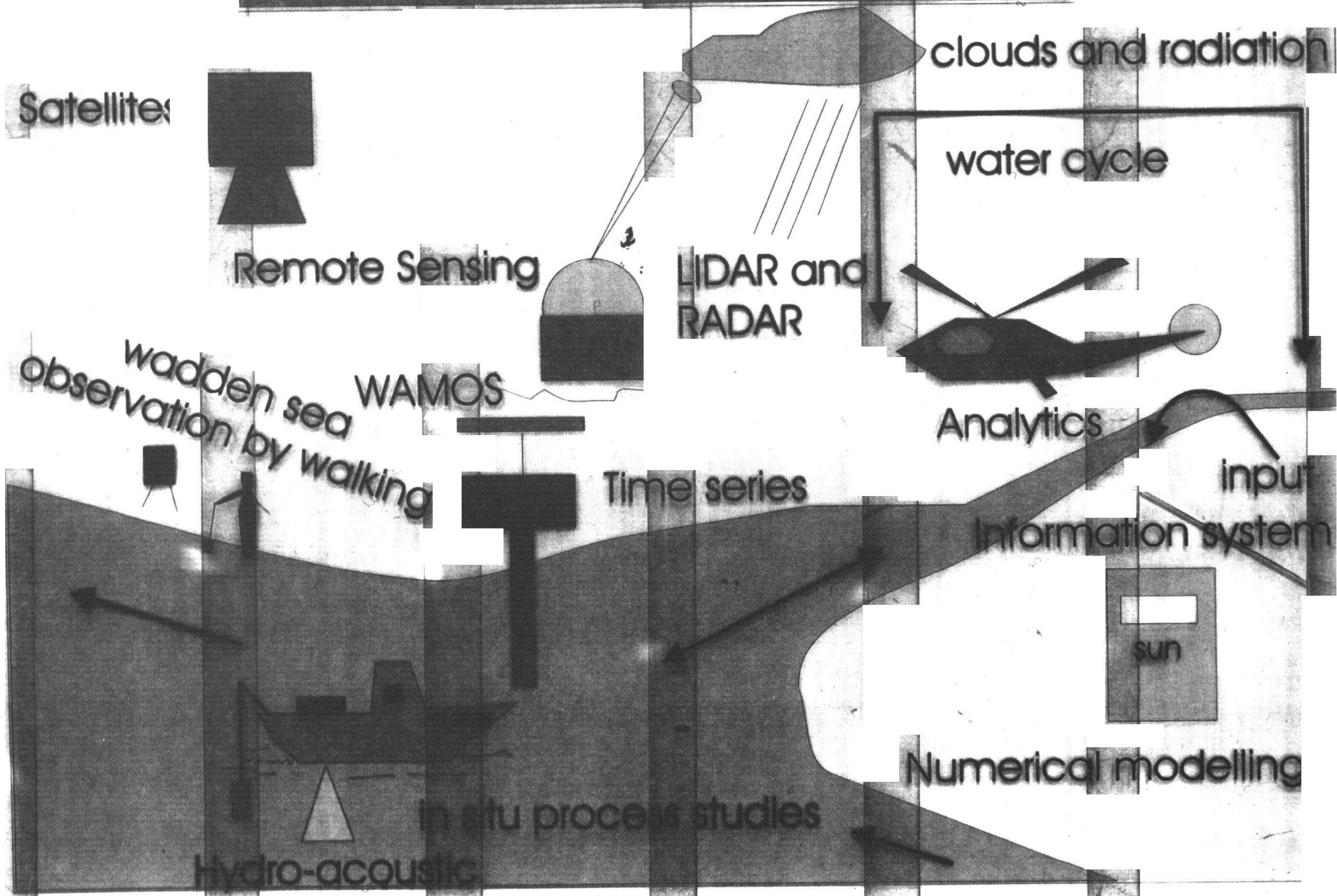
A: Institute of Physical and Chemical Analytics

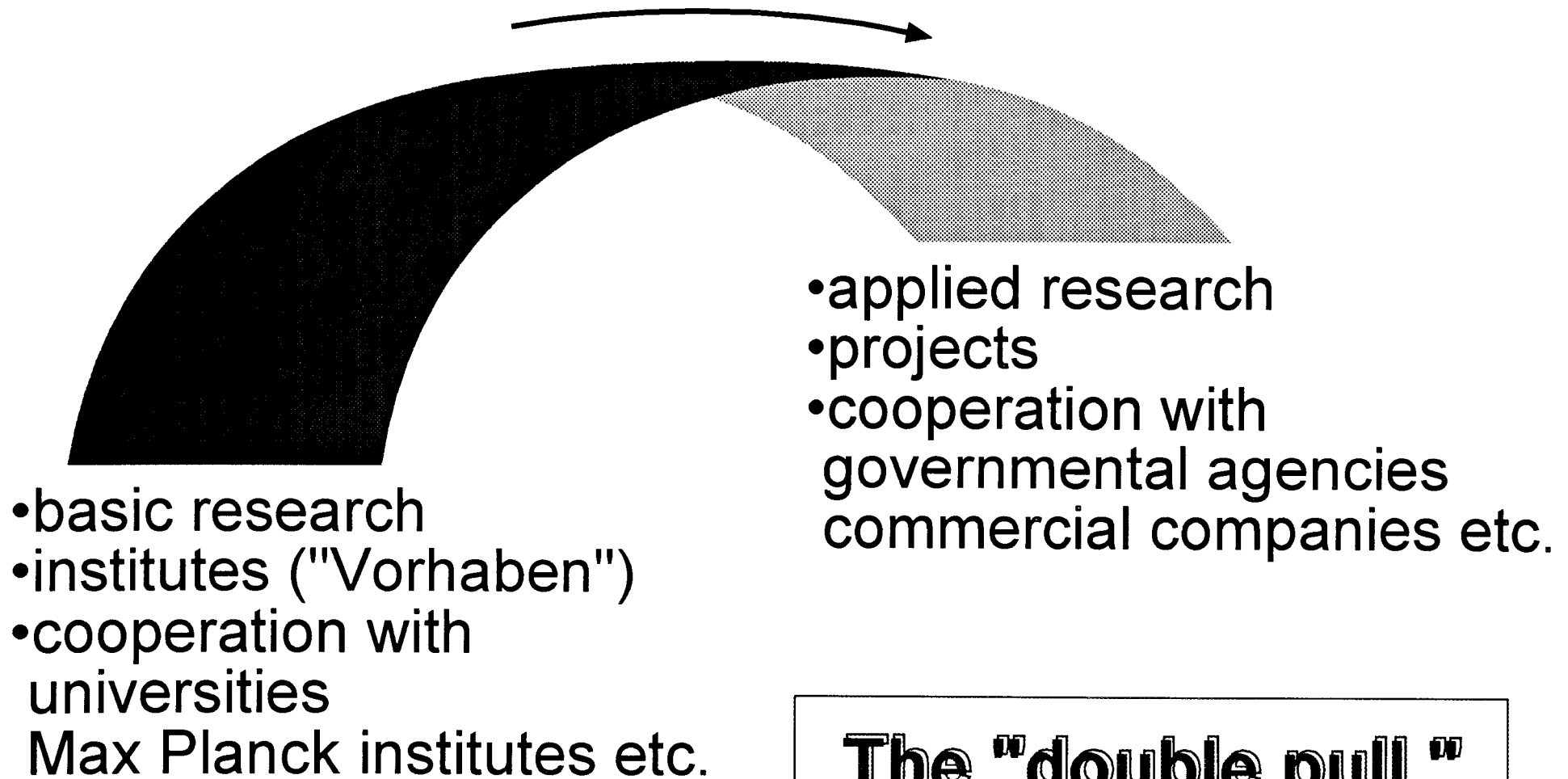
P: Institute for Atmospheric Physics

G: Institute of Hydrophysics



GISS Environmental Research Methods

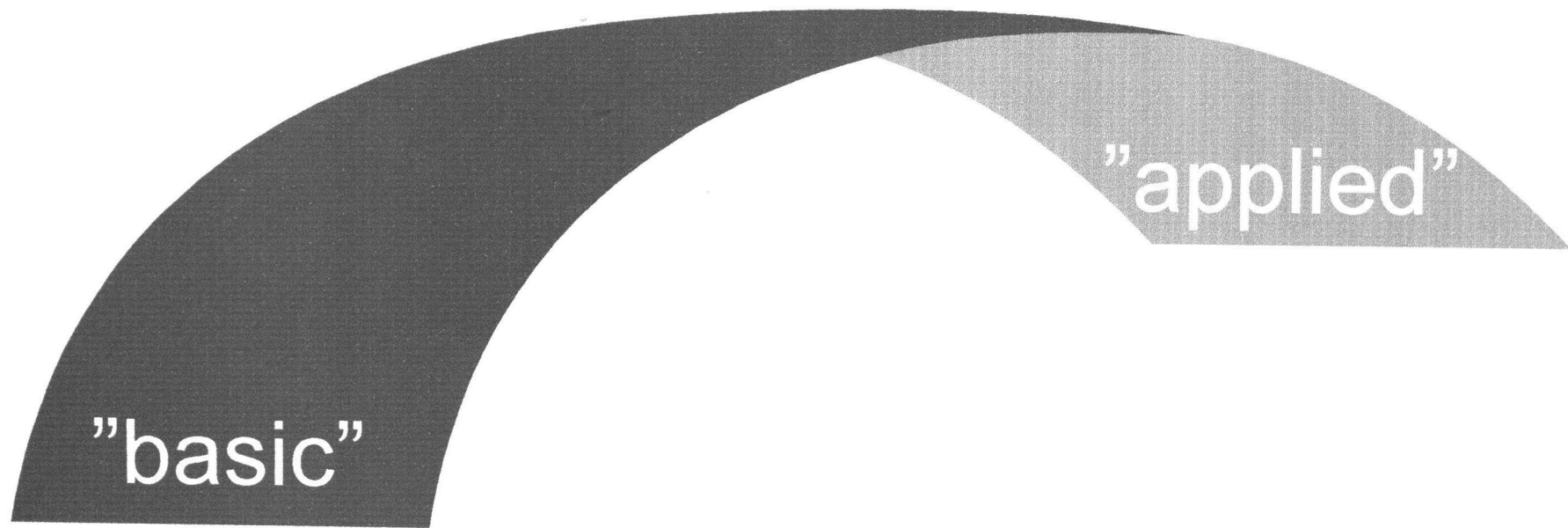




Plan of Presentation



- **Introductory remarks by Forschungsschwerpunktsprecher**
(now)
- **Presentation of exemplary work** characteristic for the type
of research pursued by GKSS. (this morning)
- **Presentation of Project Fields by posters.** (this afternoon)
- **Visit of Institutes.** (tomorrow morning)



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|--------------|--|
| Nolte-Holube | |
| Ebinghaus | |
| Ziemer | |

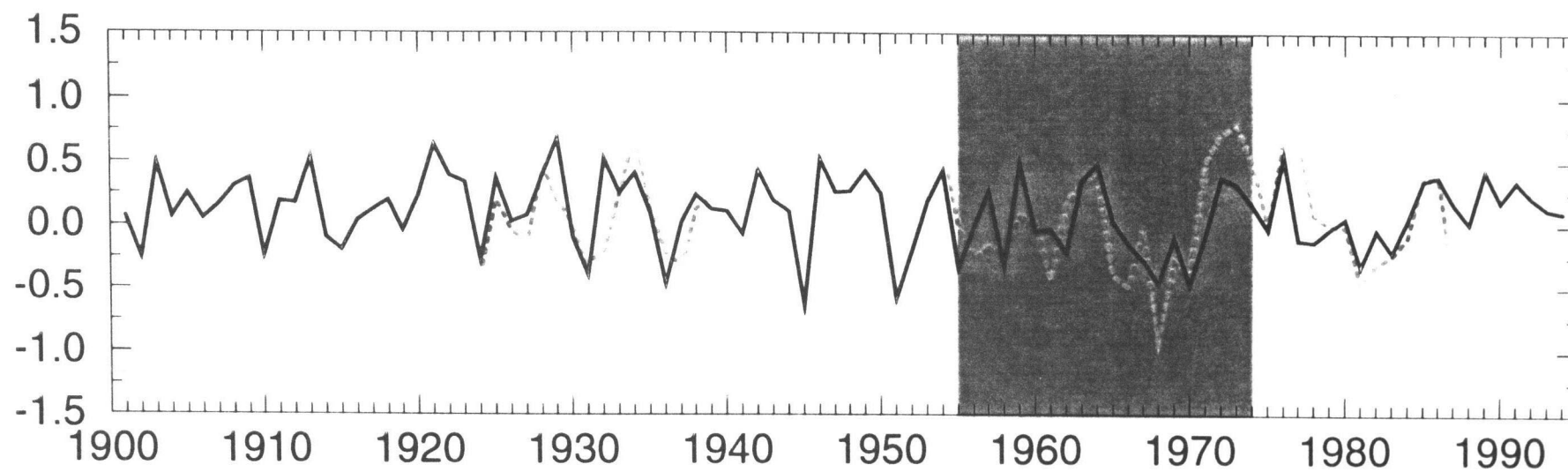
Achievements

- Technology and know-how for in-situ observations of the hydrographic, and biogeochemical state of rivers estuaries and coastal seas (nutrients, suspended matter, waves, currents, topography of river and sea bed, contaminants, multi-element and species analytics)
- Know-how for the calibration and interpretation of remotely sensed data (examples: MERIS, ScaRaB, newly acquired cloud radar, LIDAR, ERS)
- Development and test of new and cost- effective monitoring strategies of the contaminant and nutrient load of rivers (example: Elbe)
- Capabilities for modelling hydrodynamics and biogeochemical processes in rivers, estuaries and coastal seas (examples: Elbe, Odra estuary, Wadden Sea)
- Capabilities for modelling the elements of the water and energy cycle in a catchment (atmosphere-soil- sea; example: Baltic Sea)
- Techniques for combining observational evidence and quasi-realistic models (example: mercury cycle and contaminants in the Elbe, clouds)
- Implementation of GKSS mesoscale atmospheric circulation model GESIMA as community model at German Climate Computer Center and at other centers.

Future Perspectives- Science



- **EUROBASIN**
- **MAP techniques- Monitoring, Analysis and Prediction.**
- **Coastal morphodynamics.**
- **Reconstruction of regional decadal (and centennial) variations.**



Salinity [PSU] at LV Borkumriff

— Observation
— Estimation

Future Perspectives- Organisational



•HGF

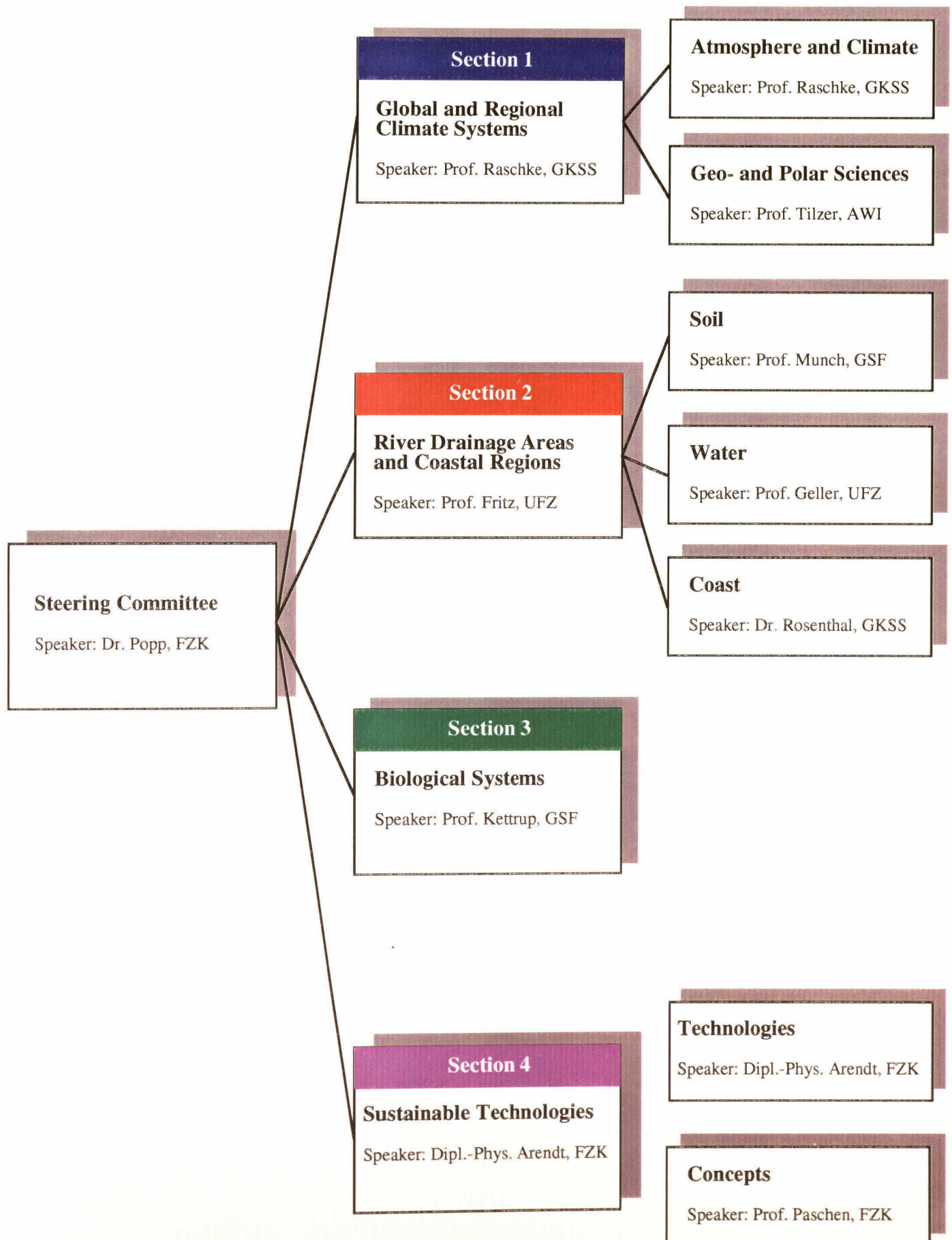
-the Helmholtz Research cooperation set up by all Grossforschungsanlagen in Germany.

•Schools

-dissemination of knowledge about environmental systems in "schools".

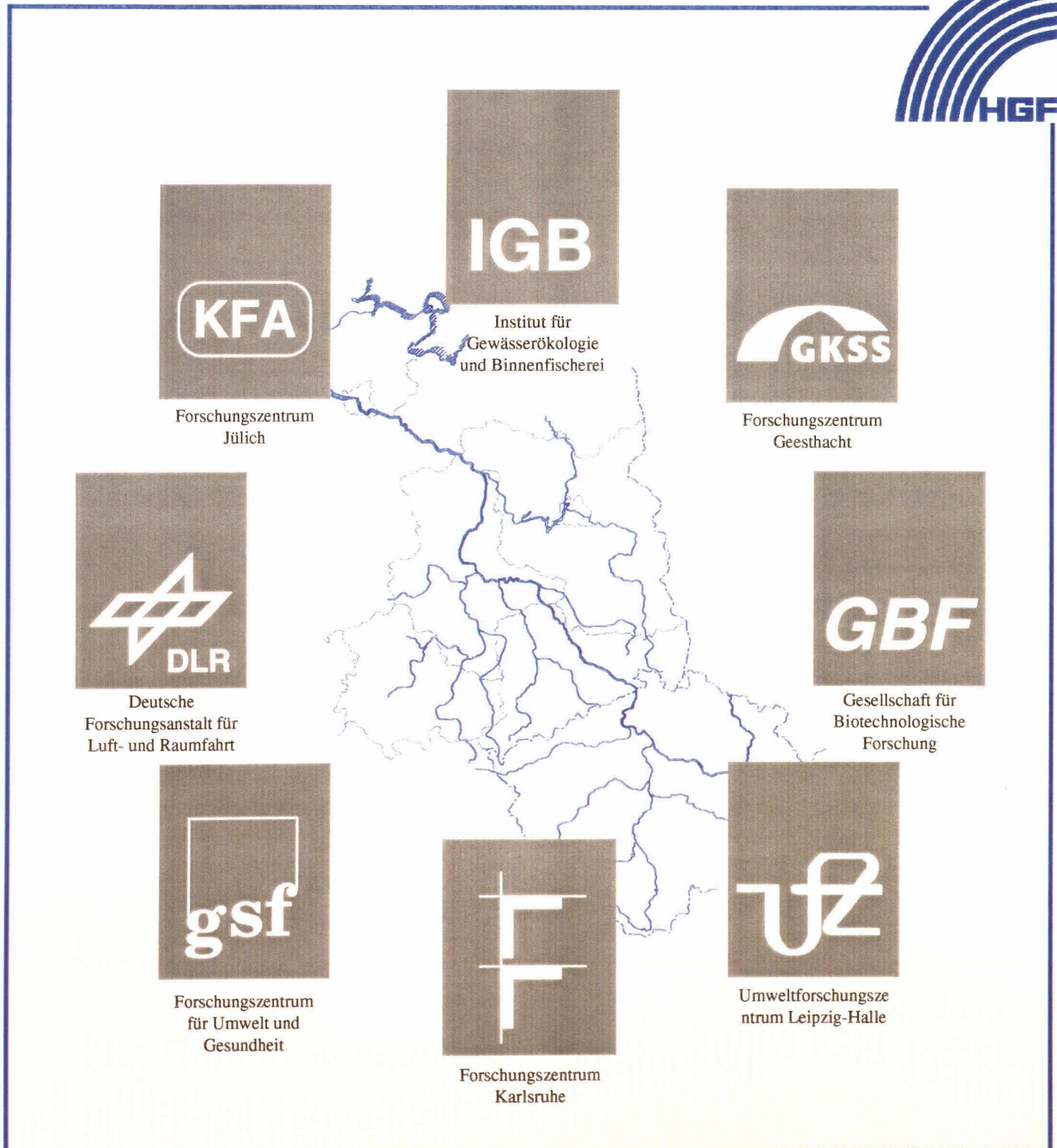
Two NATO schools organized by Raschke,
April 1997: "anthropogenic climate change".

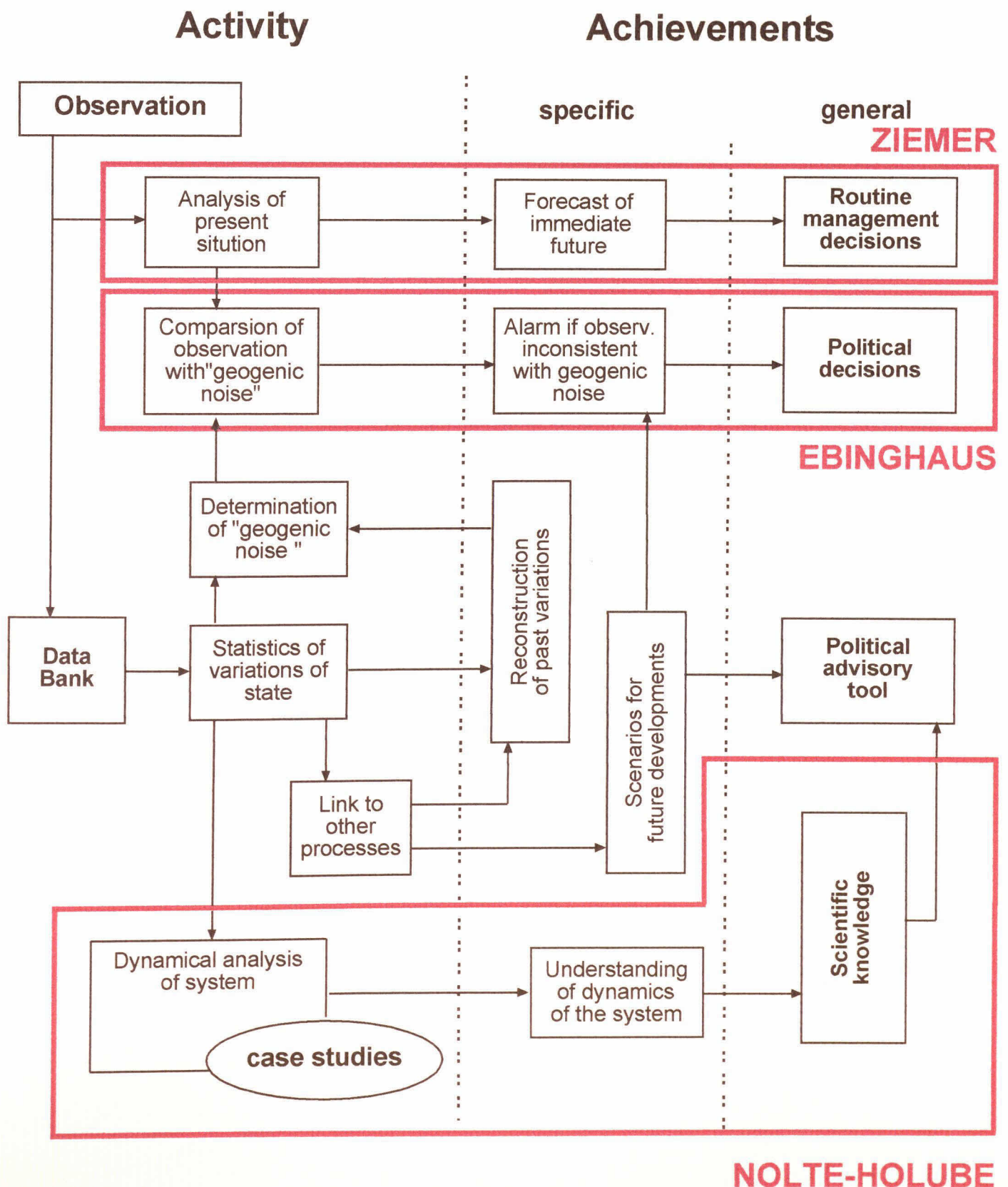
HGF Environmental Research



Herrmann von Helmholtz-Association of German Research Centers

Section 2: River Drainage Areas and Coastal Regions





The Role of Monitoring