A FOUR-DIMENSIONAL AND CONNECTED OCEAN

GLOBAL CHANGE AFFECTS

- PHYSICAL OCEAN
- BIOGEOCHEMICAL OCEAN
- BIOLOGICAL OCEAN

OVER TIME

KEY RECOMMENDATIONS

FRAMEWORK FOR UNDERSTANDING INTERACTIONS

ATmosphere

PHYSICAL OCEAN

PLANKTON

NEKTOn

BENTHOS

LAND

BIOGEOCHEMICAL OCEAN

A MULTI-STRESSED AND RAPIDLY CHANGING OCEAN

HUMAN ACTIVITIES HAVE AN IMPACT ON THE OCEAN

- Pollution
- Overfishing
- Littering

OUR EARTH IS CHANGING AND THE IMPACT ON OUR OCEANS IS EVIDENT

Some major influencers:

- World Population
- International Trade
- Consumerism

KEY RECOMMENDATIONS

SCIENCE OF SURPRISES

Extreme events in the ocean are difficult to predict and prevent. Their impact on local ecosystems can be devastating.

Heat waves
Floods
Earthquakes
Tsunamis

Small changes can trigger big ones!
Temperature changes can lead to full ecosystem shifts!

Extremes events impact the marine ecosystem services
Examples
- Changing fishing seasons
- Reducing coastal protection

Lots of casualties!
We need to build strategies to take the impacts of extreme events into account!

Key recommendations
Observations in the right place
Enhanced modelling and forecasting
Improved early warning

SUSTAINABILITY SCIENCE FOR THE OCEAN

WORKING IN SILOS

SOCIAL SCIENCES  NATURAL SCIENCES  HUMANITIES

WHAT IS SUSTAINABILITY SCIENCE?

Centered on solving social challenges

Improving management of marine resources

KEY RECOMMENDATIONS

SUSTAINABILITY AT THE CORE OF MARINE RESEARCH AGENDA

NEW GENERATION OF SUSTAINABILITY SCIENTISTS

ESTABLISH MARINE SUSTAINABILITY FORUM

OCEAN TECHNOLOGIES

NOVEL TECHNOLOGIES

- NEW SENSORS
- ARTIFICIAL INTELLIGENCE
- DRONES

FUTURE TRENDS

REAL TIME DATA
All data to be openly available to everyone in real time.

- MOBILE
- COMPUTER

KEY RECOMMENDATIONS

OCEAN INTERNET OF THINGS

TOWARDS A DIGITAL OCEAN
In the future virtual reality software for diving into the sea would allow humans to explore the ocean.