

The Weather Gods

Insights into Climate Change in Africa

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Human Dimensions of Climate Change
Aberystwyth, September 2013

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Providing scientific advice and analytical support to Greenpeace offices worldwide

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- Established 1987 at Queen Mary College, University of London
- Since 1992, based at the University of Exeter
- Research staff affiliated to College of Life and Environmental Sciences through Honorary Fellowships
- Independence to conduct and defend research

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Greenpeace values

- 'Bearing witness' to environmental destruction;
- Exposing bad practice - highlighting good practice;
- Use of non-violent confrontation to challenge destructive practices;
- Seeking solutions and promoting open, informed debate about society's environmental choices;
- Having no permanent allies or adversaries;
- Ensuring independence from political and commercial interests.

Greenpeace: an organisation guided by science



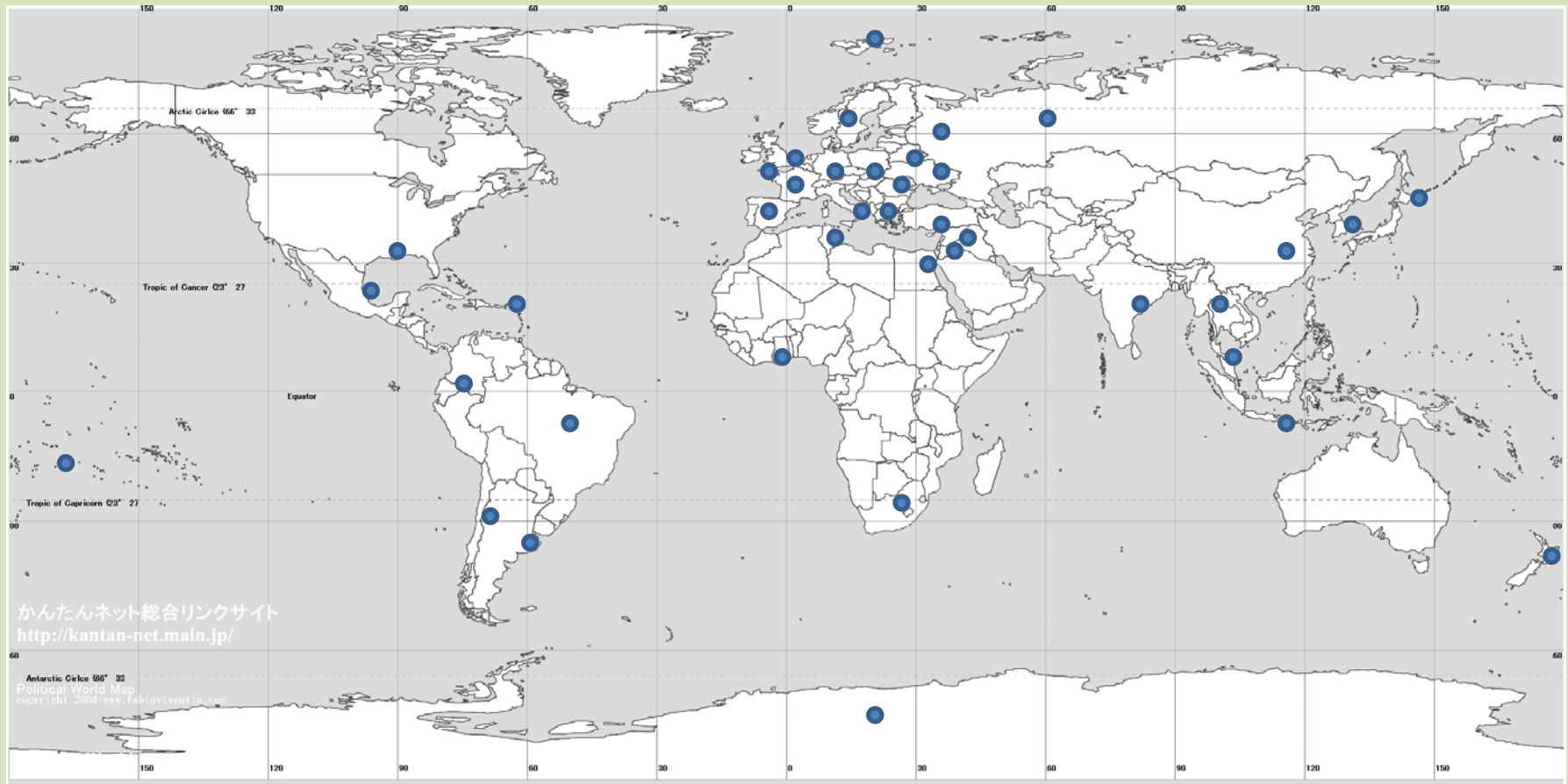
- Investigative research (including analytical research)
- Information and advice
- Critical review of output
- 'Radar' for emerging issues
- Media work (planned and reactive)
- Technical support for work with companies and governments and in international policy fora
- Guiding Greenpeace policy development

Greenpeace Research Laboratories: analytical capabilities



- GC-MS
- ICP-AES
- Field equipment
- Radiation safety advice
- Working relationships with many leading laboratories

Greenpeace Research Laboratories: a quarter of a century of research



Collaborative research: e.g. support for IFM-GEOMAR ocean acidification experiments, Svalbard 2010



The screenshot shows the GEOMAR website interface. At the top, there is a navigation bar with links for Home, Deutsch, Font size, Search, Projects, Publications, Staff, and Quick access. The GEOMAR logo and the text 'Helmholtz Centre for Ocean Research Kiel' are prominently displayed. Below this is a horizontal menu with categories: CENTRE, RESEARCH, STUDY, DISCOVER, and SERVICE. A sidebar on the left contains a 'Latest News' section with an archive from 2009 to 2012, and a 'GEOMAR FOR' section with links for MEDIA, PUPILS, APPLICANTS, and STAFF. It also mentions 'GEOMAR IS A MEMBER OF' the HELMHOLTZ ASSOCIATION and a 'FOLLOW US' section with RSS feeds for News, Jobs, and Weather, as well as social media links for Twitter and YouTube.

12.09.2013
CO₂-hungry microbes might short-circuit the marine foodweb

Results of the EPOCA experiment on ocean acidification in Svalbard

13 September 2013/Ny-Ålesund, Kiel. Do the smallest plankton organisms determine the future of the ocean? A five-week long field experiment of the European Project on Ocean Acidification (EPOCA) shows that pico- and nanophytoplankton benefit from higher carbon dioxide concentrations in the water, causing an imbalance in the food web. In addition, the carbon export to the deep ocean and the production of the climate-cooling gas dimethyl sulfide are diminished – two important functions for the global climate. A special issue of the European Geosciences Union's journal *Biogeosciences* compiles the results of the study which took place in Kongsfjorden, Svalbard, in 2010. It is the first of four long-term studies using the Kiel KOSMOS mesocosms under the direction of the GEOMAR Helmholtz Centre for Ocean Research Kiel.

The smallest of the small seem to be among the winners in the ocean of the future. In a five-week long experiment, an international team of scientists showed that particularly tiny plankton, so-called pico- and nanophytoplankton, grows more strongly under elevated carbon dioxide levels and produces more organic carbon. "If the tiny plankton booms, it consumes the nutrients that are normally also available to larger plankton species," explains Prof. Ulf Riebesell from GEOMAR, head of the KOSMOS mesocosm experiments. "We could clearly see that the boom at the base of the food web happened at the expense of diatoms which are part of the larger micro-phytoplankton. Our experiment was too short to determine whether zooplankton runs short in food as a consequence of this. This seems a reasonable assumption though."

In a system dominated by pico- and nanophytoplankton, less carbon is transported to the deep ocean. "This may cause the oceans to absorb less CO₂ in the future," concludes the GEOMAR biogeochemist. And one more climate-related function may be weakened: the production of dimethyl sulfide (DMS). This gas supports cloud formation over the oceans. Less DMS therefore means that more sunlight reaches the Earth's surface, contributing to the greenhouse effect "These important services of the ocean may thus be significantly affected by acidification."

Deployment of the mesocosms at Kongsfjord. Photo: Maika Nicolai, GEOMAR

With the "Spider" sea water enriched with carbon dioxide is added to the mesocosms. Photo: Maika Nicolai, GEOMAR

Mesocosm among icebergs at Kongsfjord. Photo: Ulf Riebesell, GEOMAR

<http://www.geomar.de/en/news/article/co2-hungrige-mikroben-koennten-das-marine-nahrungsnetz-kurzschliessen/>



GRL Mission Statement

The overall objectives of the Greenpeace Research Laboratories are:


1. to provide and oversee **best scientific practice**, quality control, and good quality communication of complex scientific and technical issues,
2. to act as a **radar** for future issues/risks,
3. to engage in the **debate** about the relationship between science and society,
4. in synergy with the Greenpeace's Political & Business Unit, to represent Greenpeace at relevant **policy and political fora** and...

GRL Mission Statement

5. to carry out these scientific functions **on issues that matter to Greenpeace**: climate and energy, oceans, forests, sustainable agriculture, GE, toxics and the application of the precautionary principle and the principles of sustainability, within the framework of the global programme.

Greenpeace Research Laboratories on the web:

www.greenpeace.to/greenpeace



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The Greenpeace Research Laboratories form the Science Unit of Greenpeace International. Based at the University of Exeter in the UK, the laboratories provide scientific advice and analytical support to Greenpeace offices worldwide, over a range of disciplines. The laboratories are equipped with hardware for the analysis of heavy metal and organic contaminants in a range of environmental samples. An extensive database of scientific literature has been built up since 1986 and serves as a core information resource.


The expertise of the group encompasses a number of disciplines, including toxicology, organic and inorganic analytical chemistry, biochemistry and terrestrial and marine ecology.

PLEASE NOTE: We have recently moved to new offices at the University of Exeter. For our new address and telephone numbers, click on CONTACT on the side bar menu.

Latest Publications

 [Levels and distribution of polybrominated diphenyl ethers in soil, sediment and dust samples collected from various electronic waste recycling sites within Guiyu town, southern China](#)

 [Organic chemical and heavy metal contaminants in wastewater discharged from three textile manufacturing and washing facilities in Mexico](#)

 [Organic chemical and heavy metal contaminants from communal wastewater treatment plants with links to textile manufacturing, and in river water impacted by wastewater from a textile dye manufacturing facility, in China](#)

SEARCH PUBLICATIONS

PUBLICATION AUTHOR

PUBLICATION YEAR

LINKS

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Greenpeace: a research presence in Africa



Kenya



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Facing the Weather Gods: the impacts of climate change in Africa

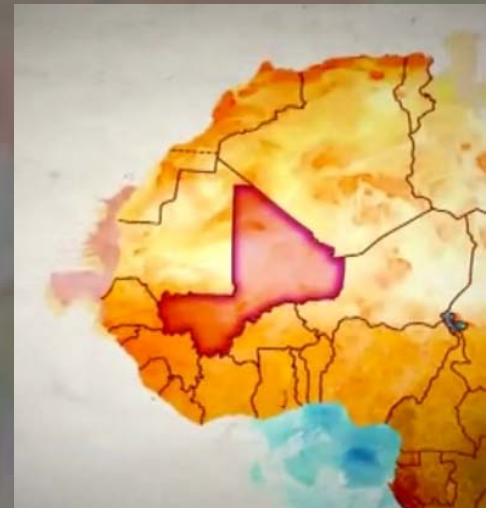
- A continent with many distinct climatic zones
 - Moist tropical equatorial
 - Seasonally arid tropical
 - Sub-tropical/Mediterranean
- Subject to many complex climatic interactions
 - Inter-Tropical Convergence Zone (ITCZ)
 - El Nino Southern Oscillation (ENSO)
 - West African Monsoon
- Limited observational data for most regions, including low resolution and poor ground-truthing

Projections of climate change impacts

- Temperature rise across continent expected to be higher than global average
- As a whole IPCC region, Africa projected to be warmer and drier
- Tropical cyclones may become more intense
- Expected greater variability and more extremes of weather and climate
- Access to surface water may be reduced over 25% of the continent

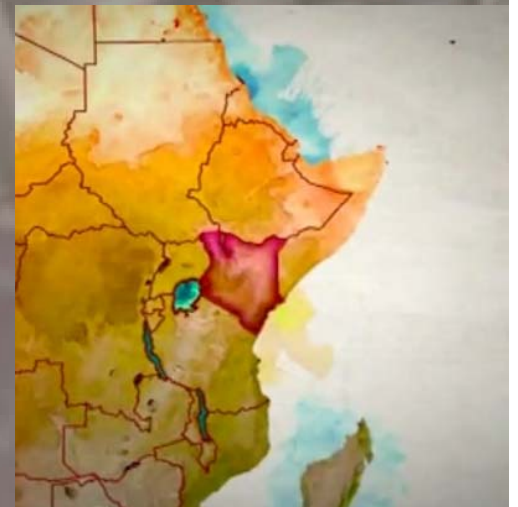
Mali

- Models suggest mean annual temperature increase of 1.2-3.6°C by 2060s, 5.9°C by end of century
- Significant increase in hot days & nights
- Country will become progressively drier, especially in North
- Rain in the South delivered in fewer, more intense events



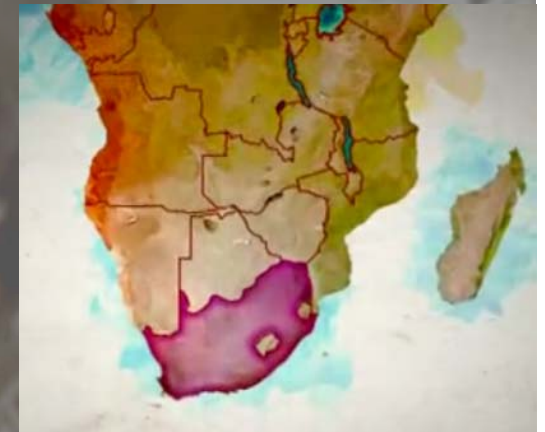
Kenya

- Projected increases of 1.0-2.8°C by 2060s, 1.3-4.5°C by 2090s
- Great uncertainty in rainfall projections, but possibly up to 48% increase in overall precipitation
- Delivered in fewer & shorter periods of intense rainfall



South Africa

- Mean annual temperatures projected to rise by 1.1-2.4°C by 2060s, 1.6-4.3°C by the end of the century
- Expected marked increase in number of hot days per year
- Small decrease in annual rainfall but with high degree of regional variability



Summary of climate change impacts

- Impacts expected to vary widely across Africa, but most pronounced in areas already experiencing climate and water stress
 - Heavy reliance on rain-fed agriculture
 - Many commercial & staple crops already close to limits of tolerance
- Climate change will have its impacts against backdrop of land-use change, deforestation, migration, urbanisation and social tension

Recommendations

1. Improve scope, structure & resolution of climate models & monitoring capabilities:
 - to record events & project trends reliably at local & regional scales and
 - to take particular account of increases in variability & frequency of extremes as signatures of impending abrupt change

Recommendations

2. Develop action plans which:
 - deal with expected temperature rises and tendencies for rainfall to become increasingly variable, unreliable and locally intense,
 - account properly for uncertainties and indeterminacies and
 - recognise that issues of human development & those relating to response of natural systems to climate change cannot be considered in isolation

Recommendations

3. Focus efforts where natural, social and agricultural systems are already under the most severe strain, building institutional support to develop solutions and assist adaptation. This must take special account of the particular needs of girls and women and ensuring that, as a result, communities become more, not less, empowered and able to meet their vital needs and those of future generations

Looking ahead: IPCC AR5, what can we expect?

- Confirmation of long term temperature increase of 0.5°C over the last 100 years
- Significant temperature increase over Equatorial and Southern Africa since 1980's
- Long rains have decreased over East Africa (Indian Ocean warmer SST)
- Decrease in rainfall across the Sahel in recent years

Looking ahead:

IPCC AR5, what can we expect? (cont.)

- Summer monsoon has declined over last 100 years in Horn of Africa
- More extremes (droughts/floods) likely over East Africa
- More warm extremes over Southern Africa
- Importance of achieving MDGs
- Outline of severe potential socio-economic consequences.

Facing the Weather Gods

Download the report...

<http://www.greenpeace.to/greenpeace/wp-content/uploads/2011/12/Facing-the-weather-gods-2.pdf>

Watch the video...

<http://www.greenpeace.org/africa/en/Multimedia/Video1/The-Weather-Gods/>



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