

Climate and Global Change Research

A Survey of Swiss Programmes and Activities

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Abstract

Switzerland is active in all internationally relevant fields of research in *Climate and Global Change*, but focusing on terrestrial ecosystems, the cryosphere and paleo studies. The two programmes with nationwide coordination, the *National Research Programme 31*, "*Climate Change and Natural Disasters*" (*NRP-31*), and the *Priority Programme*, "*Environment*" (*PP-Environment*), include social and economic aspects of global environmental change, its effects and possible response strategies. While *NRP-31* und *PP-Environment* are linked on a predominantly regional level, individual projects, which are often closely associated with international *Core Projects*, allow Swiss researchers access to numerous internationally relevant fields of research in *Climate and Global Change*.

In spring 1993 *ProClim-* conducted a survey on current research projects to obtain an overview of the various current activities in the field of *Climate and Global Change Research*. The survey is a joint initiative with the Swiss National Committee of the International Geosphere Biosphere Programme (IGBP). The subsequent analysis of these research activities covered 255 projects in basic research carried out by a total of 190 project leaders.¹ The project database is being continuously updated. The information has already been used for an EC-survey and has been made available for other efforts related to Global Change research.

¹ Further information (addresses of project leaders, abstracts, research topics, etc.) is available from *ProClim-* on request. It is planned to make a selection of this information available on a public domain computer network.

Research Structures in Switzerland

Swiss research activities are influenced by the structure of the federalist state. Research aims and topics are generally defined by individual institutes and/or researchers. The Swiss Confederation has designated the *Swiss National Science Foundation, SNSF* to promote research. The *SNSF* subsidizes research activities but does not conduct any research, nor does it maintain any institutes of its own. Other academic institutions as well as private sources are also instrumental in promoting research.

Coordinated environmental research is currently carried out under the guidance of the *SNSF* within the framework of the two programme series: the *National Research Programmes* and the *Swiss Federal Priority Programmes*. These programmes have been initiated especially with the aim of finding solutions to major current environmental problems. They also aim at initiating research in new areas of knowledge and technology.

Climate and Global Change Research in Switzerland

In Switzerland, *Climate and Global Change Research* is conducted both within the framework of individual projects and as part of coordinated research programmes.

A substantial number of research groups on such projects collaborate with other national or international teams or programmes. Currently projects participating in European research programmes are considered by Swiss authorities as individual projects. They are usually funded by the Federal Office for Education and Science (BBW), but there is no Swiss involvement in the actual project management, because the chief project leader of EC programmes must be from an EC country.

Nationwide Coordinated Research Programmes

Of relevance for *Climate and Global Change Research* are the National Research Programme 31, "*Climate Change and Natural Disasters*" (NRP-31) as well as the Priority Programme, "*Environment*" (PP-Environment), which both focus on national and regional aspects.

- *NRP-31, "Climate Change and Natural Disasters"*

The main focus of NRP-31 is on climate and natural disaster as well as on the impacts of possible future climate change on the environment and society in Switzerland. NRP-31 is led by a team of experts chaired by Dr. Thomas Gutermann, Zürich; Mr. Ulrich Roth, Berne, is Programme Director. The projects of NRP-31 include experimental sites all over Switzerland, with priority on research in the two alpine regions of Surselva (Canton of

Grisons) and Les Ormonts (Canton of Vaud). The time frame for work on these projects is five years (1992 to 1996). Work is being conducted in the following modules: -

- Climate History
- Climate Dynamics
- Hydrology
- Weather, Precipitation
- Ice, Snow, Floods
- Instability of Slopes - Earthquakes
- Ecosystems
- Natural Disasters - Impacts on Vegetation
- Natural Disasters - Impacts on Society

- *PP-Environment*

The *PP-Environment (PP-E)* aims at providing well-founded scientific data and innovative solutions in the field of environment research, to promote awareness of ecological interrelations, to facilitate the implementation of environment legislation, and to help prevent environmental degradation. The approach of PP-E is interdisciplinary, linking environmental concerns in the natural and social sciences, engineering, humanities and economics. Centers of activity are being established at selected universities and other research institutions. This programme has a longer time frame and is currently in its initial stages (1993 to 1995). It is led by a team of experts; the programme director is Dr. Rudolf Häberli, Berne. Work in PP-E is being conducted in the following modules: -

- Environmental dynamics
- Biogeochemical processes and cycles
- Biodiversity
- Environmental awareness and activity
- Environmental economics
- Environmental technology
- Development and the environment

International Programmes

Swiss scientists participate in three large international programmes which were established to answer the need for information and research on climate and global change, the *IGBP (International Geosphere Biosphere Programme)*, the *WCRP (World Climate Research Programme)* and the *HDP (Human Dimension of Global Environmental Change)*. In Switzerland the *IGBP* is represented by a *National Committee*, chaired by

Hans R. Thierstein, ETH-Zürich. The link with the *WCRP* of the World Meteorological Organisation (WMO) is ensured by the Swiss Meteorological Office (SMO) in Zürich. Geneva will host the HDP research headquarters.

These programmes ensure the worldwide linking of projects and improved communications and therefore worldwide coordination of research as well as international access to rapidly expanding knowledge (see Table 1).

<i>Research Topics</i>	<i>Internat. "Core Project"</i>	<i>Internat. Programmes & Organisations</i>
Arctic Climate, Cryosphere	ACSyS	WCRP
Stratospheric Chemistry & Processes	SPARC	WCRP
Atmospheric Chemistry & Processes	IGAC	IGBP
Atmosphere - Ocean/Lake Coupling	TOGA	WCRP
Ocean Circulation	WOCE	WCRP
Ocean (Lake) Chemistry	JGOFS	IGBP
Land - Ocean (Lake) Interaction	LOICZ	IGBP
Physical Hydrology	GEWEX	WCRP
Biological Aspects of the Hydrological Cycle	BAHC	IGBP
Terrestrial Ecosystems	GCTE	IGBP
Greenhouse Gases (Sources & Sinks)		
Paleo Studies	PAGES	IGBP
Climate Variability and Predictability	CLIVAR	WCRP
Global Modeling	GAIM CMP	IGBP WCRP
Environment & Climate Monitoring	GCOS	WMO,IOC,UNEP, ICSU
Social & Economic Aspects of Global Change	HDGEC	ISSC
Impact of Global Change & Response Strategies		

Table 1:
Research topics and corresponding international "Core Projects" and their coordinating international Programmes in which Swiss scientists participate.

The *Swiss Academy of Sciences* established *ProClim-* to promote informal and dynamic networking among Swiss research projects on *Climate and Global Change*. *ProClim-* is to enhance scientific cooperation nationally and with institutions abroad by improving the

exchange of information and by sponsoring planning activities for national and international research projects.

Research Priorities in Switzerland

Some thematic focal points emerged from the *ProClim*- survey. To facilitate comparison of Swiss and international activities, the various fields of research were defined so as to coincide roughly with the research topics of the various international "Core Projects" (see Table 1).

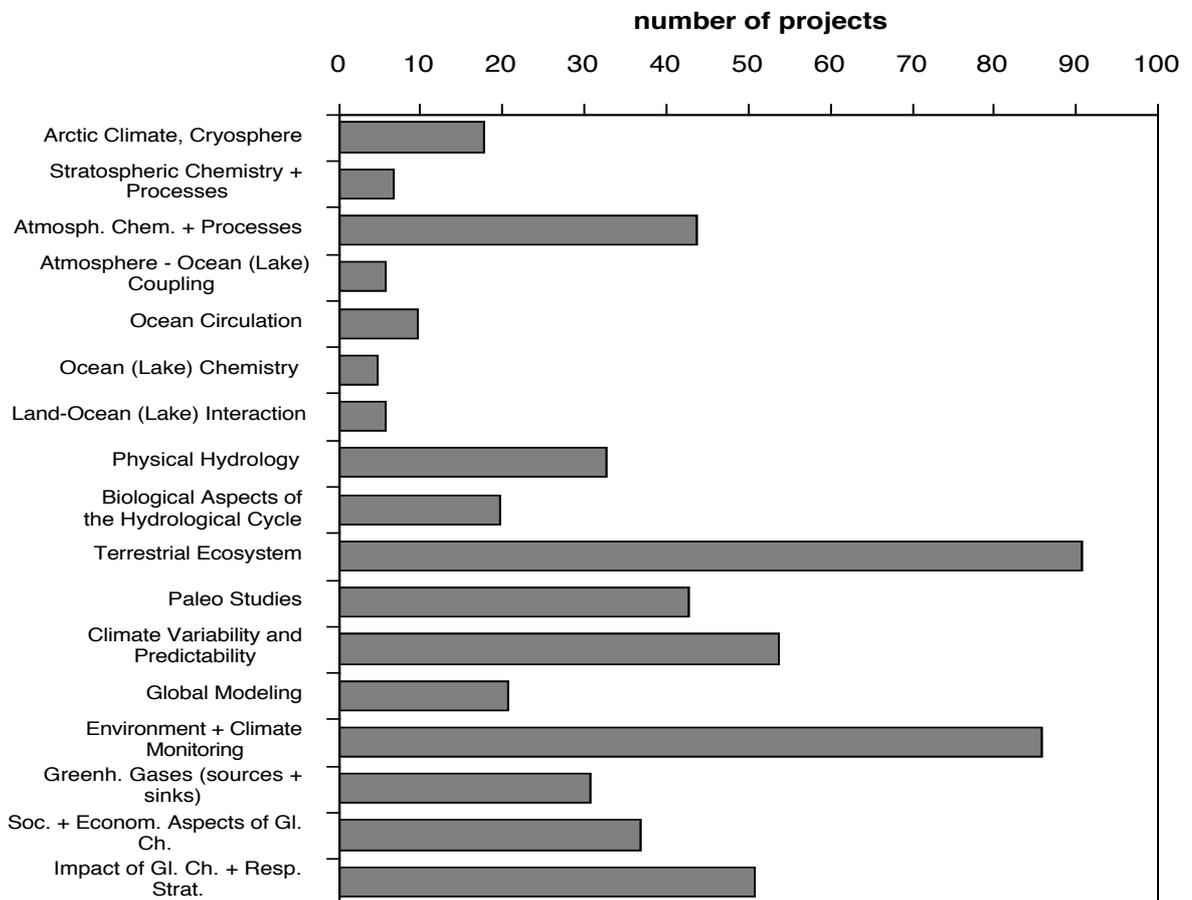


Diagramme 1:
Thematic distribution of research activities. Numbers of projects indicated (multiple mention is possible).

The *ProClim*- survey has shown that all internationally relevant topics of *Climate and Global Change Research* are being studied in Switzerland (cf. Diagramme 1). However, due to the geographical location of Switzerland some fields of research, such as terrestrial ecosystems, the cryosphere (glaciers and ice) and paleo studies, are emphasized and Switzerland has traditionally made most important contributions.

Comparatively few Swiss research projects are concerned with ocean processes (circulation, chemistry, land-ocean (lake)-interactions).

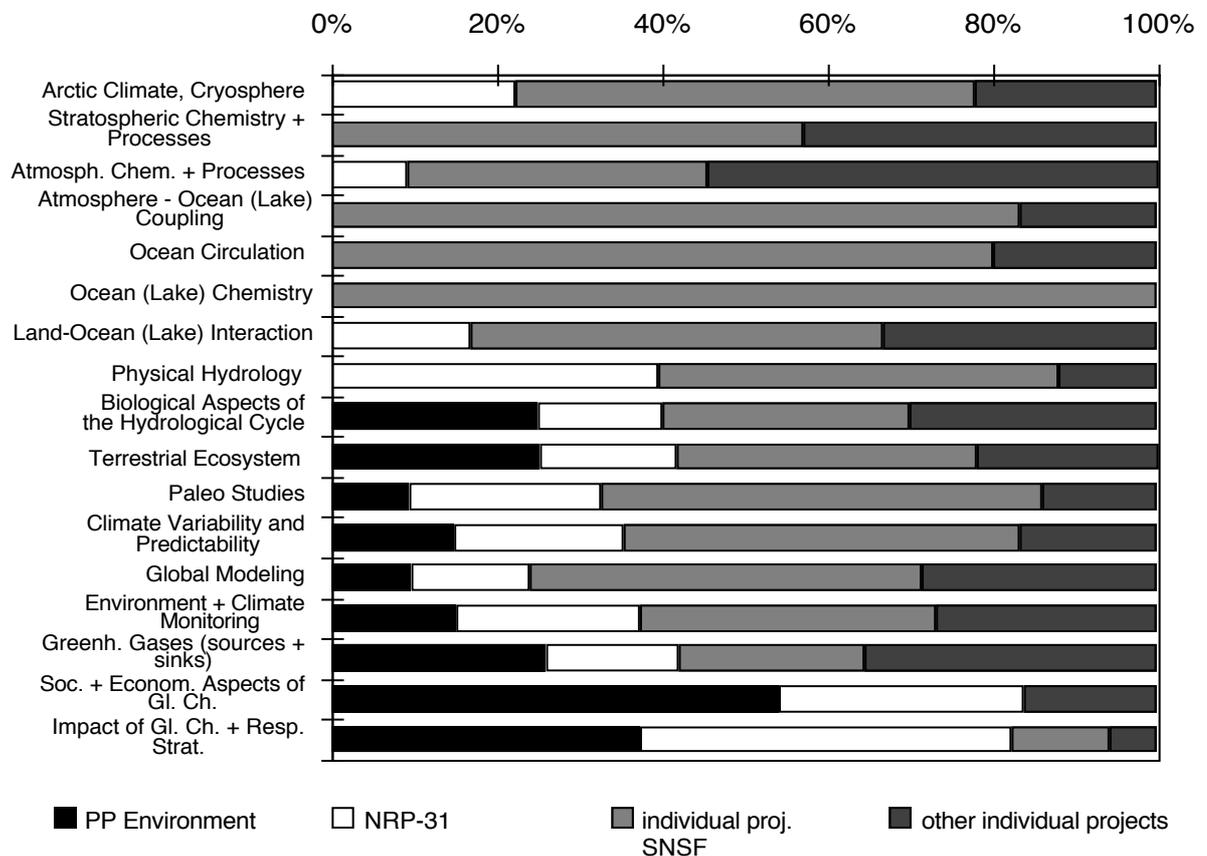


Diagramme 2: Distribution of projects in percent of the various sources of funding (multiple mention of individual projects possible).

The majority, approx. 60 percent of all projects in *Climate and Global Change Research* are in the category "individual projects" (diagramme 2). Issues concerning the stratosphere, the oceans as well as interaction between the atmosphere and oceans/lakes are studied in individual projects exclusively. These, then, guarantee Swiss presence in the whole spectrum of *Climate and Global Change Research*.

In compliance with their goals, *NRP-31* and *PP-Environment*, the two programmes with nationwide coordination, focus on national and regional issues favouring research topics directly related to Switzerland and the alpine region. Special emphasis has been given to launching of new interdisciplinary research topics such as "Social and Economic Aspects of Global Environmental Change", "Impacts of Global Environmental Change and Response Strategies" and "Biodiversity".

Regional and International Links

In accordance with the programme outlines of *NRP-31* and *PP-Environment*, the research goals and coordination of their individual projects are regional or national. A few of them are part of formally designated IGBP Core Projects, but most of them are of regional importance.

A relatively large part of the *individual projects* is neither internationally nor regionally attached to a "Core Project". On the other hand most of the formally designated Core Projects are individual projects. Whether or not projects or groups of projects become part of an international programme is usually up to the initiative of the individual researchers involved.

Funding

Since information is sometimes incomplete, only a rough estimate can be given of the total amount of funding, which is estimated at approx. 90 million Swiss francs for the 255 surveyed projects on *Climate and Global Change Research*. This amount covers the total research period of each project and therefore is a representative figure covering about 3-4 years.

The *Swiss National Science Foundation* covers approximately 60 percent of these expenditures: The NRP-31 is funded by 20 million Swiss francs for its fixed duration of five years (1992 to 1997) and the PPEEnvironment by about 40 million Swiss francs for the first phase from 1993 to 1995 (about half of which was allocated by the time this survey was made). The individual projects in basic research of the SNSF are funded by about 20 million Swiss francs.

The *remaining investment* in Climate and Global Change Research in Switzerland stem from a variety of sources (universities, federal research institutions, government offices, the private sector, etc.). The precise amount is not well known, since often not publically available. Based on the responses to the questionnaire it is estimated to be 40 percent of the total amount of funding. Among the government offices, the Federal Office for Education and Science (BBW) is funding the research projects within the framework of the EC programmes and other international activities.

Important addresses

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