Severe Atmospheric Aerosol Events
Pathways, impacts and policies on large aerosol injections into the atmosphere

August 11-12, 2011 at the KlimaCampus, University of Hamburg
A conference organized by the Carl Friedrich von Weizsäcker Centre for Science and Peace Research (ZNF) in cooperation with the Max-Planck-Institute for Meteorology, the Research Group Climate Change and Security (CLISEC) of KlimaCampus Hamburg, and the King Abdullah University of Science and Technology, Saudi Arabia (KAUST) supported by the Cluster of Excellence Integrated Climate System Analysis and Prediction ( CliSAP)

Objectives of the conference
Huge historic volcano eruptions had significant impact on the climate, in particular by decreasing the average surface temperatures in the following months or even years. For a nuclear war involving hundreds of nuclear weapons previous studies have predicted a "nuclear winter". Other severe aerosol events like extended forest fires may also have tremendous impact on the environment.
This workshop will address climatic and environmental changes as a result of various kinds of huge injections of aerosols into the atmosphere and the possible consequences for the world population.
Environmental changes impact living conditions and in particular agricultural productivity. This could cause famines and other risks for human security. The required actions for climate mitigation and adaptation will be discussed and the question will be raised how the resulting challenges for regional and global governance may be tackled.

Structure
The conference will be structured in four topical sessions and a poster session.

I. Life-cycle of large aerosol injections
This panel covers aerosol generation, injections into the atmosphere and aerosol removal processes. The different aerosol sources (volcano eruptions, nuclear explosions, forest fires, climate engineering) require specific investigations.

II. Environmental consequences
The climatological impact of large and enduring atmospheric aerosol content has two levels. First, direct climate impacts (changes in temperature, precipitation, etc.) are studied, second indirect environmental impacts that are of relevance to human living (conditions for agriculture, ultraviolet intensity etc.) are investigated. These two levels are closely interconnected.

III. Socio-economic consequences
The third panel covers among others the medical implications, spread of famine, pressure on migration, possible causes for provoking or enhancing conflicts and the loss of economic assets.

IV. Policy implications
What are the implications of the above considered possible socio-economic consequences of severe aerosol injection events? What are possible mitigation and adaptation strategies? What are the differences between natural catastrophic and anthropogenic events?
**Thursday, August 11**

9:00 – 9:30 Opening
Martin Claussen (KlimaCampus, CliSAP), Martin Kalinowski (ZNF), Georgiy Stenchikov (KAUST)

9:30 – 12:00 Panel I: Life-cycle of large aerosol injections

**Chair: Claudia Timmreck and 2 rapporteurs of the School of Integrated Climate System Sciences (SICSS) and International Max Planck Research School (IMPRS)**

09:30 – 10:00 Simulating volcanic and biomass burning plumes with a very high resolving numerical model
*Hans-F. Graf*, University of Cambridge

10:00 – 10:30 Simulating dispersion and self-lofting of large smoke plumes with a fine-resolution regional model
*Georgiy Stenchikov*, King Abdullah University

10:30 – 10:45 Risk of radioactive exposure after nuclear power plant accident
*Daniel Kunkel*, MPI for Chemistry

10:45 – 11:00 Aerosol radiative heating as a self-lifting mechanism for aerosol plume rise: evidence from the 2009 Black Saturday Fires
*Jos de Laat*, Royal Netherlands Meteorological Institute

11:00 – 11:15 Prediction of large aerosol injections from biomass burning and volcanic eruptions with weather research forecast model with online chemistry
*Martin Stuefer*, University of Alaska Fairbanks

11:15 – 11:30 How does the impact of tropical volcanic eruptions depend on eruption season?
*Matthew Toohey*, Leibniz Institute for Marine Sciences

11:30 – 11:45 Geoengineered sulfate aerosol – microphysical evolution depending on emission parameters
*Ulrike Niemeier*, MPI for Meteorology

11:45 – 12:00 Impact of aerosols settling from stratosphere on cirrus clouds
*Ulrike Lohmann*, ETH Zurich

12:00 – 13:30 Lunch

13:30 – 15:30 Panel II: Environmental consequences

**Chair: Silvia Kloster and 2 rapporteurs of SICSS and IMPRS**

13:30 – 14:00 Catastrophic ozone loss following a regional nuclear war
*Michael Mills*, University of Colorado

14:00 – 14:30 Volcanic activity with a global impact
*Stephen Self*, The Open University

14:30 – 15:00 Climate impact of the young Toba tuff eruption
*Claudia Timmreck*, MPI for Meteorology
15:00 – 15:30 Assessing the implications and risks of engineering solar radiation to limit climate change – a multi-model approach
_Hauke Schmidt_, MPI for Meteorology

15:30 – 17:00 Postersession and coffee

17:30 – 19:00 Public Talk: Overview and History
  17:30 – 19:00 Severe atmospheric aerosol events: Aerosols along the spiral of geologic time
  _Owen Brian Toon_, University of Colorado

19:30 Dinner

**Friday, August 12**

9:00 – 10:00 Panel II: Environmental consequences Part 2

**Chair: Georgiy Stenchikov and 2 rapporteurs of SICSS and IMPRS**

09:00 – 09:30 Climatic consequences of nuclear conflict
  _Alan Robock_, Rutgers University

09:30 – 09:45 2010 – the year of severe atmospheric aerosol events: Volcano, heat wave and fires
  _Alexander Ginzburg_, A.M. Obukhov Institute

09:45 – 10:00 Southern hemisphere climate response to the extremely large volcanic eruption of Los Chocoyos
  _Doreen Metzner_, Leibniz Institute for Marine Sciences

10:00 – 10:30 Coffee break

10:30 – 12:00 Panel III: Socio-economic consequences

**Chair: Martin Kalinowski and 2 rapporteurs of SICSS and IMPRS**

10:30 – 11:00 Consequences of the younger Toba tuff eruption for human adaptation and evolution
  _Stanley H. Ambrose_, University of Illinois

11:00 – 11:30 Wildland fires and human security
  _Johann Georg Goldammer_, MPI Chemistry / Global Fire Monitoring Center, Freiburg

11:30 – 11:45 What if a Laki-style eruption were to happen tomorrow?
  _Anja Schmidt_, University of Leeds

11:45 – 12:00 Impacts of nuclear war on agriculture in China
  _Lili Xia_, Rutgers University

12:00 – 13:30 Lunch

13:30 – 15:00 Panel IV: Policy implications

**Chair: Jürgen Scheffran and 2 rapporteurs of SICSS and IMPRS**

13:30 – 14:00 Aerosol Particles and Politics
  _Hartmut Grassl_, MPI Hamburg
14:00 – 14:30 Reframing the Global Debate on Nuclear Weaponry: Recognizing scientific truths about nuclear war
Steven Starr, University of Missouri

14:30 – 15:00 The way to deep cuts
Valery Yarynich

15:00 – 15:30 Coffee break

15:30 – 17:30 Closing review and outlook on integrated activities

Chair: Steven Starr

15:30 – 16:00 Reviews of the panels by the rapporteurs

16:00 – 16:30 Security implications and conflict potentials of severe atmospheric aerosol injections: A comparative assessment of sources, pathways and policies
Jürgen Scheffran, KlimaCampus, University of Hamburg

16:30 – 17:30 Discussion