

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