Bio Prof. Reto Knutti, ETH Zurich

Education and professional experience

Reto Knutti got his PhD in Physics from the University of Bern in 2002. He worked as a PostDoc and visiting scientist at the National Center for Atmospheric Research (NCAR, Boulder CO) 2003-2007, and has been an affiliate scientist with NCAR since then. In 2007 he became assistant professor, in 2013 associate professor and in 2016 full professor for climate physics at ETH Zurich Switzerland.

Research

The activities in research and teaching of Prof. Reto Knutti over twenty-five years have focused on understanding changes in the global climate system caused by emissions of anthropogenic greenhouse gases like CO_2. Using a combination of process understanding, observations, dynamical and statistical methods, he has made seminal contributions to understanding recent climate change, to quantifying the human contribution to the observed trends, and improving projections into the future as well better quantifying their uncertainties. But his work has gone far beyond the physics and modeling of climate change: with contributions in economic journals, collaborations with statisticians, publications on the value of climate models for adaptation, mitigation and policy, and contributions to philosophy of science, he has bridged the gap to several other research fields. Reto Knutti has been named "highly cited scientist" ten times by Clarivate (Thomson ISI Web of Science) and has published over 200 peer-reviewed papers, book chapters and reports (many as first or senior author). Of these, 30 are published in the high-impact Nature journals, Science or PNAS.

The range of research topics covered by Reto Knutti and his group is wide, from causes of abrupt change during the last ice age, biogeochemical cycles, climate feedbacks and climate sensitivity, quantification of human-induced climate, observed and projected changes in extreme events, natural variability and the global warming pause, machine learning and data science, statistical methods to quantify uncertainty, allowed CO_2 emissions for a 2°C climate target, all the way to work with economists and philosophers. Some of the most highly recognized contributions are the quantifications of climate feedbacks and climate sensitivity. He has coordinated the assessment of this topic in two reports of the Intergovernmental Panel on Climate Change (IPCC), and has written two comprehensive reviews in Nature Geoscience. He has also demonstrated that the warming from CO_2 emissions (and much of the impacts as a consequence) is largely irreversible even if emissions are stopped. He has developed methods to quantify model robustness and uncertainties in global and regional projections of temperature and the water cycle, and has proposed climate model weighting schemes to deal with a long-standing problem on how to account for the fact that some models agree better with observed data than others, and some are largely duplicating others.

In the area of detection and attribution, Reto Knutti has quantified the contributions of various greenhouse gases to the observed warming using Bayesian methods and energy balance models. Together with Erich Fischer, he demonstrated the human contribution to very hot days and heavy precipitation events, and that record-shattering extremes will increase in the future. Both landmark studies have gotten scientific and media attention worldwide.

Reto Knutti has written on the scientific, societal and policy aspects of climate scenarios and the 2°C climate target, and has contributed to several high-impact papers that quantify the amount of CO_2 emissions that are compatible with those temperature targets. Together with his former PhD student Joeri Rogelj, he has been a key person to establish this concept of a "carbon budget" idea in the IPCC Fifth Assessment Report and in the climate negotiations of the United Nations.

He collaborated with statisticians on Bayesian hierarchical models to emulate patterns and to constrain the magnitude of climate change, with scientists at the Swiss Weather Service to develop weather generators for climate impact studies, with integrated assessment modelers on the science, policy and impact characteristics of climate scenarios and on how to design the next set of scenarios to be run with global climate models, on technological and policy aspects of strong mitigation targets, with leading international scientists of all disciplines to map out the challenges of future climate assessments, and with statisticians on the use of machine learning in detection and attribution.

Selected memberships, committees and services to the profession

Reto Knutti was selected as one of the youngest scientists to be a lead and coordinating lead author of the IPCC assessment reports 2007 and 2013, and he has made contributions to many chapters including the summary for policymakers. He has presented the results to the United Nations climate negotiations and contributed to the United Nations structured expert dialogue 2013-2015. Through research, public outreach and coordination work he has contributed substantially to the Swiss Climate Scenario Reports 2011 and 2018, to various Swiss Academies Reports and to the scientific activities underpinning future climate services in Switzerland. He has collaborated with consulting companies on the implications of global climate targets for CO_2 emissions in Switzerland, including the aspects of burden sharing across countries.

He served as Associate Vice President for sustainability of ETH Zurich 2015-2022, as president of ProClim, the Forum for Climate and Global Change of the Swiss Academies, 2017-2020, as member of "Expert Group Science Communication in the Digital Age", Swiss Academies, and is part of various steering groups of scientific projects.

Currently he is part of the steering committee of the Center for Climate System Modelling (2015-present, chair since 2021), member of the advisory board of the Competence Center for Sustainable Finance, University of Zurich, the steering board of the Europaforum, the jury of the Green Business Award, the board of Impact Gstaad, the jury and steering board of the K3 Kongress zur Klimakommunikation, and the lead principal investigator of the Joint Initiative SPEED2ZERO of the ETH domain.

As one of the most prominent voices, through talks, reports for the public and policymakers, and through countless media contributions in Switzerland and abroad he has been instrumental to inform society about the challenge of climate change and the steps required to address it.