SOE 17: Socio-Economic Systems

Time: Wednesday 17:15–18:00 Location: GÖR 226

SOE 17.1 Wed 17:15 GÖR 226

Tipping Points and Cascading Pathways in Climate-Society Interaction — •Jürgen Scheffran and Jasmin Kominek — ZMAW, KlimaCampus, Universität Hamburg

Climate change affects the life of human beings and may have larger societal effects, by undermining the infrastructures of society or by inducing destabilizing human responses and social interaction patterns. An increase in global temperature above a threshold may lead to cascading pathways and tipping points, possibly triggering a cycle of environmental degradation, economic decline, social unrest and political instability. Whether individual agents and social networks are able to cope with the climate impacts will depend on their responses and abilities to adapt to or solve associated problems. To analyse these processes systematically, an integrated assessment framework of climate-society interactions uses concepts and methods of complex systems analysis. The complex causal chains can be constructed through a network of interconnections based on the sensitivities between key variables and actions. Analysis of the dynamic interaction model and its stability provides indications for developing approaches for early warning systems and risk reduction.

SOE 17.2 Wed 17:30 GÖR 226

Correlations between Human Development and CO2 emissions: projections and implications — •Diego Rybski, Luis Costa, and Jürgen P. Kropp — Potsdam Institute for Climate Impact Research (PIK), P.O. Box 60 12 03, 14412 Potsdam, Germany

Although developing countries are called to participate on the efforts of reducing CO2 emissions in order to avoid dangerous climate change, the implications of CO2 reduction targets in human development standards of developing countries remain a matter of debate. We find positive and time dependent correlation between the Human Development Index (HDI) and per capita CO2 emissions from fossil fuel combustion. Based on this empirical relation, extrapolated HDI, and three population scenarios extracted from the Millennium Ecosystem Assessment report, we estimate future cumulative CO2 emissions. If current demographic and development trends are maintained, we estimate that by 2050 around 85% of the world's population will live in countries with high HDI (above 0.8) as defined in the United Nations Human Development Report 2009. In particular, we estimate that at least 300Gt of cumulative CO2 emissions between 2000 and 2050 are necessary for the development of developing countries in the year 2000. This value represents 30% of a previously calculated CO2 budget yielding a 75% probability of limiting global warming to 2°C. Since human development has been proved to be time and country dependent, we plead for future climate negotiations to consider a differentiated CO2 emissions reduction scheme for developing countries based on the achievement of concrete development goals.

SOE 17.3 Wed 17:45 GÖR 226

Measuring Non-Quantitative Parameters - A Source for Enriching Socioeconomic Physics? — •Alexander an Haack, Paul Flachskampf, and Sabina Jeschke — Institute for Management Cybernetics e. V., Associate Institute of RWTH Aachen University, Germany

Over the past two decades, the discipline of socioeconomic physics has spread its reach from analyzing stock market behavior to collective opinion formation to road traffic. One constant within its use cases has been the availability of quantitative data. By applying statistical physics via modern age computation to vast amounts of socioeconomic data, this young discipline has managed to create insights, which were not feasible through the classical methods of econometrics. Yet, socioeconomic systems are by definition based on psychological and social phenomena, which commonly cannot be directly measured on interval or ratio scales. As management cybernetics scientists, with years of experience in interpreting corporate soft facts, we will share our knowledge about the quantitative approximation of non-quantitative socioeconomic parameters with the Phi-SOE community. In order to enrich the existing physical analysis of socioeconomic systems, we present our taxonomy for the evaluation of quantifying measurement methods as well as one of their successful examples (NOWS).