Current Earth System Models designed to study climate change (e.g., IPCC) contain fully coupled submodels for the atmosphere, ocean, land, and vegetation, but they do not include a fully coupled Human System Model (HSM). In reality, the Human System is not only strongly coupled but dominates the Earth biosphere and its changes. Fully coupling (or bi-directional coupling) is essential in order to have positive, negative, and delayed feedbacks. Because the Earth and Human System models are not coupled, we are missing essential positive and negative and delayed feedbacks between nature, population and technology. Overshoots are an example of the effect of such missing impacts. Dr. Kalnay will discuss basic facts about population and climate change, and a prototype of a coupled nature--human model that Safa Motecharre, Jorge Rivas and herself developed, including the impact of policies in both the model and reality.

Eugenia Kalnay is Distinguished Professor of the Department of Atmospheric and Oceanic Science at UMD. Prior to her coming to UMD, she was the Director of the Environmental Modeling Center (EMC, ex Development Division) of the National Centers for Environmental Prediction (NCEP, ex NMC), National Weather Service (NWS) from 1987 to 1997. During those ten years there were major improvements in the NWS models’ forecast skill. Many successful projects such as the 50-year NCEP/NCAR Reanalysis, Eta model and data assimilation changes associated with GCIP, seasonal and interannual dynamical predictions, ensemble forecasting, 3-D and 4-D variational data assimilation, advanced quality control, coastal ocean forecasting, were developed. EMC became a pioneer in both the fundamental science and the practical applications of numerical weather prediction. Her current research interests are in predictability and ensemble forecasting, numerical weather prediction, data assimilation and coupled ocean-atmosphere modeling.