Session # 7

Finding the Tipping Point - Deep Uncertainty for Resilience Engineering in Coupled & Complex Systems

Description: The accelerating frequency and severity of environmental, technological or socio-political threats in our hyper-connected world has the potential to create cascading effects that lead to unexpected collapse of coupled social-technical-environmental (STE) systems. Resilience engineering is dedicated to understanding the conditions under which a system collapses or fundamentally changes its behaviour (regime shifts). The complex adaptive nature of such systems as well as the dynamic interactions between STE elements and cross-scale feedbacks call for integrating models from different domains. Inevitably, this approach increases the uncertainty space. Yet, the robustness of coupled models' performance is rarely studied, let alone a comprehensive exploration of tipping points and circumstances, in which the resilience of STE systems erodes. Moreover, in time- and resource-constrained environments, such as during the response to crises, it becomes impossible to thoroughly explore the entire uncertainty space.

This session is dedicated to discussing to what extent deep uncertainty methods are applicable to for computationally-heavy STE systems in time-bound situations. We will explore the boundaries of existing deep uncertainty methods and requirements for new methods for searching through the uncertainty space and identifying regime shifts. To this end, we aim to bring together the resilience (engineering) and DMDU communities.

Format: Interactive Session

Accepting Abstracts: Yes

Conveners:

Tina Comes - TU Delft

Tatiana Filatova - University of Twente