Combined effects of chemical and environmental stressors: from local stressors towards climate change

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Organisms in terrestrial and aquatic ecosystems are increasingly exposed to combinations of chemical stressors and environmental stressors related to global change (e.g. eutrophication, salinization, UV, warming, droughts and floods). Stressor combinations challenge our ability to predict the impact of single chemical stressors under realistic field conditions. To improve ecological risk assessment we need to understand and be able to predict the occurrence of interactions between chemical and environmental stressors across levels of biological organization: from the (sub)-individual up to biological communities and ecosystem functions. This has been proven to be especially difficult when stressors affect different endpoints and effects are evaluated at higher levels of biological organization. Moreover, to relate effects across biological organization levels, we need to consider both direct effects as well as indirect and cascading effects that may shape biotic interactions and ecosystem functions. Significant advances have been made to increase our insights into the occurrence and combined effects of stressors. These include new mechanistic approaches to diagnose cause in complex stressor scenarios (including single-stressor diagnostic indices, traits-based approaches and functional genomics). Furthermore, considerable progress is being made in the area, of ecosystem observation through advances in earth observation technologies, ecogenomics, telemetry and the emergence of large-scale ecosystem assessment models, linked to high-capacity data streams from monitoring and assessment programs. This session welcomes presentations on multiple stressor studies preferentially addressing following questions on the effects of chemical stressors in a global change context: (i) To what extent do different stressors generate the same stress responses and what is the mechanistic base for the interactive effects of multiple stressors? (ii) Do stressors interact in the same way at different levels of biological organization? (iii) Are there geographical patterns in the effects of multiple stressor combinations? (iv) How can we link the performance of individual organisms under multiple stressor exposure with ecological functions at higher levels of biological organization (such as biotic interactions and ecosystem functions)? (v) How can we use mesocosm experiments and field monitoring in natural populations to increase our ability to extrapolate multi-stressor effects from the lab to the field? (vi) How can we use models to predict multi-stressor effects at different levels of biological organization? (vii) What combinations of chemical and environmental stressors will be most relevant in the future?