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### ***Assessment of regime shift dynamics in Southern Ocean ecosystems***

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The potential for fundamental changes in ecosystem structure and function – so-called ecological regime shifts – is of great concern for Southern Ocean ecosystems. Growing awareness of the importance of regime shifts has triggered growth in research and development of analytical tools and approaches for predicting regime shifts (and to a lesser extent for detecting regime shifts once they have occurred). However, so far there is no unifying approach for ecologists and ecosystem managers wanting to evaluate an ecosystem for evidence of past regime shifts or the risk of future regime shifts.

We reviewed both the theoretical and ecosystem case study literature to identify what ecosystem qualities increase risk of regime shifts, and current capabilities for predicting and detecting regime shifts. We particularly aimed to identify methods that are currently available, and to highlight improvements in methodology or data collection which are required to improve our capability in predicting or detecting regime shifts.

In this presentation, we provide a framework for assessing the likelihood of regime shifts in ecological systems. We focus on some of the particular challenges for Southern Ocean ecosystems, including that ecological data for this region tend to be patchily distributed in time and space. This presents a problem for assessment for regime shifts, because most methods for predicting and detecting regime shifts require highly resolved long time series data, usually from multiple concurrent variables. We identify methods which could currently be applied to Southern Ocean ecosystems and recommend improvements to methods needed to increase our capacity to conduct risk assessments of different Southern Ocean ecosystems, and to predict regime shifts in the Southern Ocean. It is hoped this talk will stimulate discussion and activity to improve capabilities before the 2022 Southern Ocean benchmarking activities.