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2010 Ocean Sciences Meeting

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Coastal margin collaboratories: from reactive to anticipatory science (*Invited*)

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The decline of Columbia River salmon (US Pacific Northwest) and the onset of Minamata disease (Japan) are classical consequences of threats to ecosystem and human health that go undetected until major damage has already occurred. Climate change and human stresses combine to create emerging threats to coastal margins, some of which are potentially devastating. Preemptive mitigation of these threats requires shifting from fundamentally explanatory (reactive) to proactively predictive (anticipatory) science. Will “coastal margin collaboratories” – sustained networked integrations of sensors, platforms, models, data, analyses and social processes – enable such a shift? Collaboratories offer unprecedented opportunities to (a) accumulate long time-series of observations; (b) create skilled simulations that cut across past, present and future; and (c) share information and foster synergies without institutional, disciplinary and geographic barriers. SATURN (http://www.stccmop.org) is a test bed collaboratory for the Columbia River coastal margin. Three years into SATURN, have we shifted Columbia River science from reactive to anticipatory? Has SATURN forecasting become the powerful tool that will prevent the next emerging threat from reaching full potential? While the answers are “not yet”, the path is clear and promising. With SATURN, we have created an interdisciplinary environment where observations and simulations are deeply intertwined, where multi-directional mentorships accelerate learning and cross-disciplinary training, and where scientific issues are tackled with open access to information and tools. Within this environment, much of our attention is still on characterizing and understanding the condition and variability of the contemporary Columbia River. To do this, we mount interdisciplinary, hypotheses-driven field campaigns guided and supported by SATURN’s observations, predictions and information-sharing capabilities. We have already conducted an unprecedented assessment of prokaryotic and eukaryotic microbial diversity, abundance, and activity along the river-to-shelf gradient. We are rapidly striving to associate microbial activity with external forcing and physical and biogeochemical variability of “events and gradient regions” (E-GRs). E-GRs are strong indicators of contemporary variability, and potential “sentinels” for future change. As we extend our studies with the benefit of broader and more integrated expertise, longer time series, and more interdisciplinary observations and simulations, we are increasing our ability to identify and predict appropriate sentinels. These sentinels will help us anticipate future changes as a function of climate and human stresses. Specific examples will illustrate the vision, status and challenges ahead.

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