Geophysical Research Abstracts
Vol. 13, EGU2011-14217, 2011
EGU General Assembly 2011

The Modeling Challenges of Emerging Risks

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Developing a model for an emerging risk first requires deconstructing the processes driving the phenomenon to identify all the underlying controls that determine the outcome. Academic separation of disciplines needs to dissolve away as the phenomenon is taken apart into its underlying components, the all important interdependencies designed into a model structure and data explored to arrive at the distributions by which each component can be modeled probabilistically.

For example, for a deep-sea oil spill the probabilistic outcome (expressed as cost) will require modeling the fate of the escaping fluid in the water column, the ocean currents, surface winds and passing storms that transport the slick, the processes that reduce the oil including evaporation and bacterial decomposition, as well as deposition at the beach interface. Then there will be the operational factors related to the duration it will take to engineer a solution to block the flow. Finally the loss will be a function of the economic activity interrupted, pollution damage and how this is translated into loss through the liability culture of the country impacted.

All important in an emerging risk modeling problem will be calibration data against which the model can be tested – to show that it performs consistently in its individual component modules and (ideally) across the whole model. Emerging risks are often not new, but simply not recently experienced and historical precedents may exist: for example the 2010 Macondo blowout had a parallel multimillion barrel oil spill precedent in the Gulf of Mexico Ixtoc 1 borehole blowout in June 1979.