

The Hidden Benefits of Maturity Modeling

Douglas W. Waples

¹Sirius Exploration Geochemistry, Inc.

ABSTRACT

Most 1-D (maturity) modeling studies are carried out with the explicit primary (and sometimes exclusive) objective of calculating hydrocarbon generation and expulsion. This focus on bottom-line output has caused many modelers to overlook a major additional value of such studies: the knowledge acquired while building internally consistent, realistic, and comprehensive geologic models. During the process of model building, one should carefully consider and integrate the depositional and erosional events that occurred during unconformities; rates and causes of sedimentation and tectonic and total subsidence; bathymetry and elevation through time; lateral and vertical variations in lithology; tectonic events that have created and modified the area being studied; isostasy and eustasy; and paleoheat flow.

The process of building such complex models requires that we fully integrate these disparate types of data, which are derived from specialized disciplines that often communicate poorly with each other. Techniques useful in building high-quality models are illustrated here using examples from around the world. When properly executed following this philosophy, maturity modeling becomes a unique, general, and extremely powerful and valuable tool for geologic investigation and integration. However, this integration is both technically and intellectually difficult, since it requires mastery of a wide range of skills. Working with software that facilitates and provides help in the process of building high-quality models is important.

Examples from around the world will show how this philosophy and specific techniques can be used to solve a wide range of model-building problems, and to extract maximum information and benefit from the model-building process. It is not even necessary to calculate hydrocarbon generation to benefit from this type of modeling; it is usually enough simply to do the rigorous thinking involved in building the models and reconstructing the geological history. This technology and philosophy are thus accessible, suitable, and even essential for all exploration geologists.

The deeper and often novel understanding we achieve in developing internally consistent, fully integrated geological models will often result in new exploration concepts, and thus can aid exploration programs in unanticipated ways. I believe it will become an essential tool for many explorationists in the very near future.