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Sheet 2 of 3, Version 1.0

Petroleum Systems of the Alaskan North Slope - A Numerical Journey from Source to Trap

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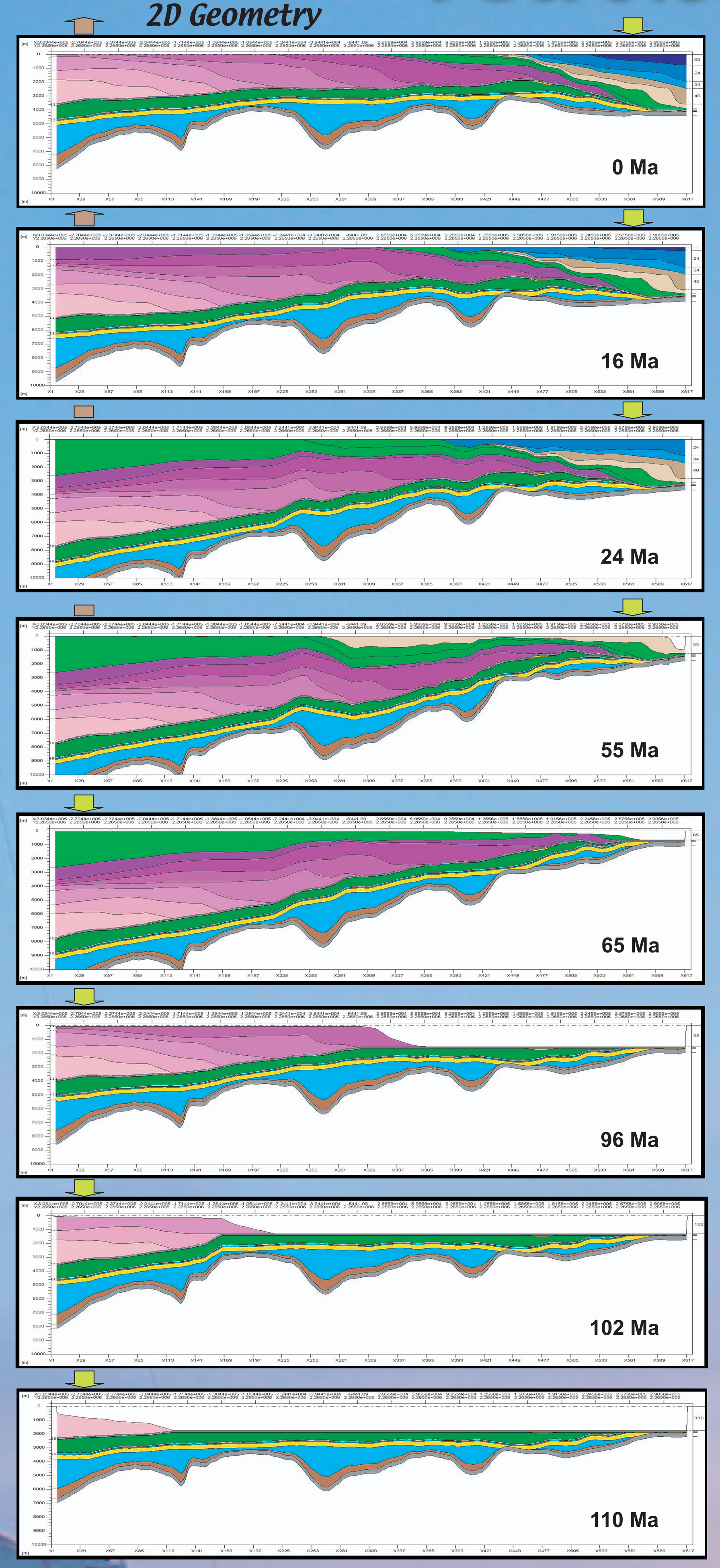
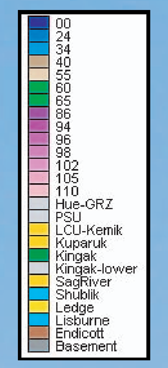
2D Geometry

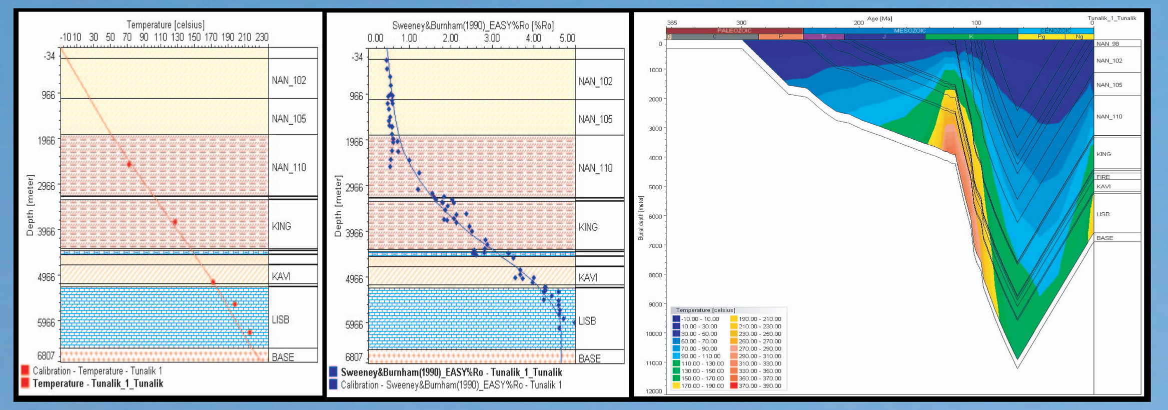


Changing geometry due to the diachronous deposition of the Brookian foresets (pink colors: Nanushuk/Torok; green colors: Colville/Canning; blue colors: Sagavanirktok/Canning). The prograding foresets shift the depocenter from West to East, allowing the source rocks to become mature at different times.



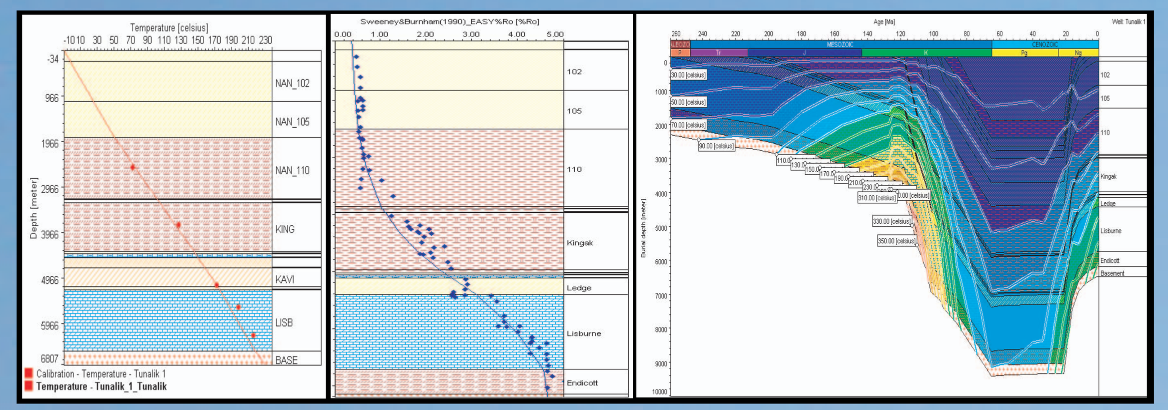
1D Calibration

Typical 1D model at Tunalik well. Temperature (left) and maturity (center) trends are calculated (lines) and checked against measured data (dots). The trends for key wells serve as a basis for the heat flow maps used in the 3D model (see Input boundaries: Heat Flow). The burial history (right) shows the Cretaceous heat spike and subsequent cooling. Depending on the position of a well, heat flow values maximize near 150 mW/m^2 with subsequent lower values near 25 mW/m^2 (see also Input boundaries: Heat Flow).

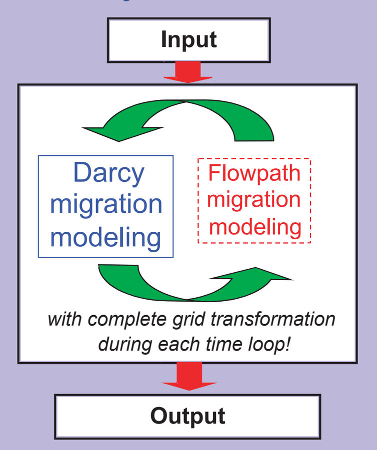


3D Calibration

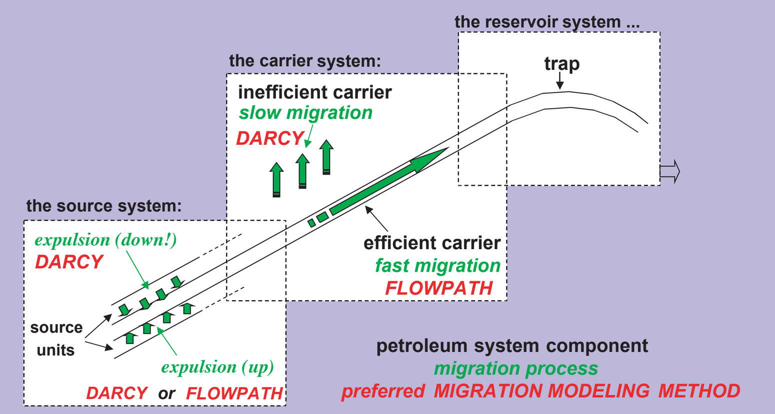
1D extraction of the 3D model along well Tunalik. Temperature (left) and maturity (center) trends (line) are calculated in the 3D simulation and are checked against measured data (dots). Compare to 1D calibration above.



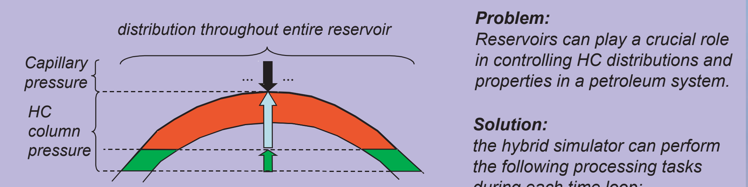
IES Hybrid Simulator



Hybrid Modeling: The Petroleum System



Hybrid Modeling: The Reservoir System



Problem:
Reservoirs can play a crucial role in controlling HC distributions and properties in a petroleum system.

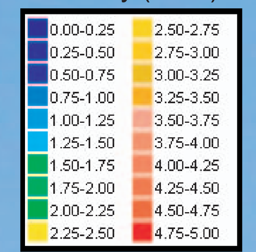
Solution:
the hybrid simulator can perform the following processing tasks during each time loop:

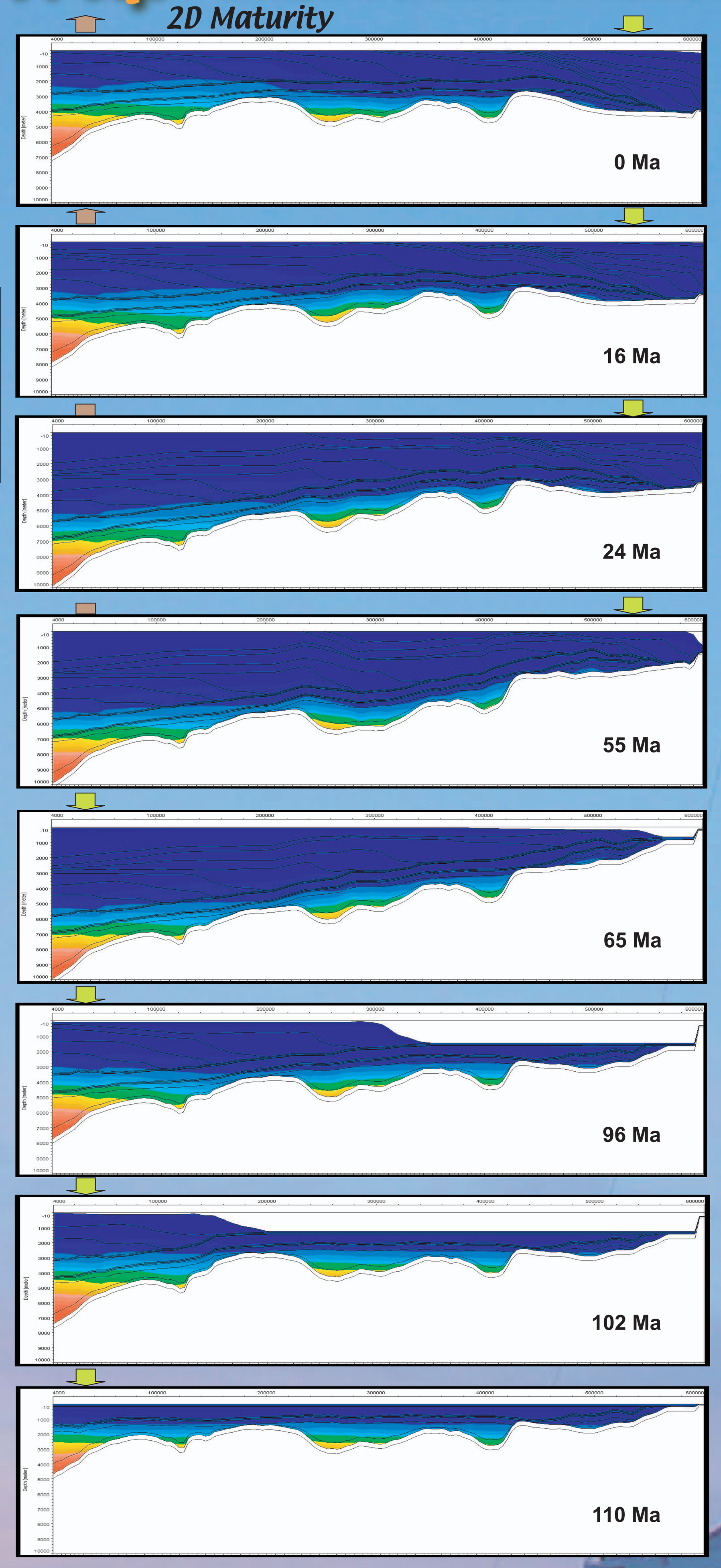
	Processing task	Modeling Method
1	Migration into reservoir	Flowpath and Darcy
2	Initial reservoir body calculation	Flowpath (reservoir geometry functions)
3	PVT control and correction	Darcy
4	Reservoir body calculation	Flowpath (reservoir geometry functions)
5	Seal efficiency control	Darcy and Flowpath (reservoir geometry functions)

2D Maturity

The prograding foresets shift the depocenter from West to East, allowing the source rocks to become mature at different times.

Maturity (%Ro)





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