



ARCTIC MUSSELS

Photo-enhanced Toxicity of Dispersed and Burned Crude Oil to Arctic Mussels

The U.S. Coast Guard (USCG) relies on the General NOAA Operational Modeling Environment (GNOME) oil spill model and the National Oceanic and Atmospheric Administration (NOAA) for expert guidance when responding to an oil spill. At the start of this project, NOAA's existing GNOME oil spill model was not Arctic-capable (e.g., it did not account for sea ice). At the time, GNOME also did not account for oil plumes, and as a result, could not readily address sub-surface well blowouts and sub-surface pipeline ruptures.

The AOSM research team has engaged with NOAA's leading oil spill modelers to provide their expertise to assist in incorporating sea ice datasets into GNOME. As a result, ADAC oil spill research has provided a GNOME-compatible model that will forecast the movement of surface and under-ice releases of oil and gas. This model takes into account the under-ice roughness that affects oil spread within the first 24-48 hours of an oil spill. Recent ADAC research has created an Arctic oil spill calculator to serve as an in-house platform for the development and testing of Arctic-capable oil spill algorithms. These algorithms were recently incorporated into GNOME.

Significant progress has been made updating GNOME with the AOSM tools. The project team has incorporated the Texas A&M Oil Spill Calculator (TAMOC) for oil fate processes and subsurface transport. This model handles the equations of state (i.e., density, viscosity, surface tension, etc.) and fate processes (notably, dissolution) for the oil and its subsurface transport from a pipeline leak, oil well blowout, or a vessel grounding. The project team has also improved and tested the methods to translate oil properties between the TAMOC and GNOME paradigms. With the complete integration of TAMOC within GNOME, the project team will focus on developing training materials for user interaction.

The project team has created a user interface within GNOME and automate the translation codes to pass oil properties between GNOME and TAMOC. The AOSM algorithms will soon be operational at NOAA for oil spill response and forecasting in the Arctic.

