

MMS ENVIRONMENTAL STUDIES PROGRAM: ONGOING STUDIES

Region: Alaska

Planning Areas: Cook Inlet

Title: High-Resolution Numerical Modeling of Near-Surface Weather Conditions over Alaska's Cook Inlet and Shelikof Strait (AK-93-48-52)

MMS Information Needs to be Addressed: These results are important for NEPA analysis and documentation for Cook Inlet Lease Sales and DPP's and in reviewing oil spill contingency plans.

Total Cost: \$300,000

Period of Performance: FY 2003-2007

Conducting Organization: CMI, UAF

MMS Contact: [Chief, Alaska Environmental Studies Section](#)

Description:

Background Along the north Gulf of Alaska coast, terrain plays an important role in determining local weather. The interaction of terrain with synoptic and mesoscale pressure gradients frequently produce gap and channel winds, often called low-level jets in places like Cook Inlet and Shelikof Strait. These winds may at times be quite strong, with gusts occasionally exceeding 50 meters per second. These winds are not currently included in existing wind modeling products used to drive Cook Inlet circulation and oil spill models. Low-level wind jets occur in Cook Inlet and Shelikof Strait but are not captured by currently used wind products. Such jets affect oil spill trajectories to unknown degree. This study will provide high resolution wind fields incorporating the jets which will improve the reliability and accuracy of MMS's circulation and spill trajectory models in Cook Inlet and Shelikof Strait.

Objectives Develop an atmospheric modeling capability for the Cook Inlet/Shelikof region suitable for nowcast/forecast and research purposes. Use the model to:

1. Systematically study low-level wind jets and other wind and precipitation phenomena in Cook Inlet and Shelikof Strait.
2. Develop an understanding of the mechanisms which drive low-level wind jets in the region.
3. Develop a climatology of low-level jet occurrence and likelihood in wind-prone locations.
4. Study the vertical and thermal structure of wind jets.
5. Study the cloud fields and precipitation associated with high wind events in the region.

Methods The modeling will use the parallel computing capability being developed at the Alaska Experimental Forecast Facility in Anchorage. An automated modeling system will run daily, using current initialization data that comes to the facility via a dedicated T1 line from the National Weather Service in Alaska. The model will produce real time, three-dimensional data

sets of winds, pressure and temperature throughout the troposphere and lower stratosphere. Accurate topography and nested, finer grids in preliminary model runs result in development of the jets.

Current Status: MMS is waiting for the revised final report from CMI.

Final Report Due: September 2006

Publications Completed:

Olsson, P. Q. High-Resolution Numerical Modeling of Near-Surface Weather Conditions over Alaska's Cook Inlet and Shelikof Strait [abstract]. University of Alaska Coastal Marine Institute. Annual Report No. 10. 2004. Fairbanks, AK, University of Alaska, Coastal Marine Institute and USDOl, MMS, Alaska OCS Region.

Olsson, P. Q. High-Resolution Numerical Modeling of Near-Surface Weather Conditions over Alaska's Cook Inlet and Shelikof Strait. University of Alaska Coastal Marine Institute. Annual Report No.11. 2005. Fairbanks, AK, University of Alaska, Coastal Marine Institute and USDOl, MMS, Alaska OCS Region.

Liu H, Olsson PQ, Volz KP, and Yi H. A climatology of mesoscale model simulated low-level wind jets over Cook Inlet and Shelikof Strait, Alaska. Estuarine, Coastal and Shelf Science 2006; 70: 551-66.

Liu, H., Olsson, P. Q., Volz, K. P., and Yi, H. RAMS Simulated and SAR Observed Flow Interaction in the Lower Cook Inlet, Alaska. American Meteorological Society 2006 Annual Meeting. JP1.11. 2006. American Meteorological Society.

Olsson, P. Q. High-resolution Numerical Modeling of Near-Surface Weather Conditions over Cook Inlet and Shelikof Strait. Proceedings of the Tenth MMS Information Transfer Meeting and Barrow Information Update Meeting. MMS OCS Study 2005-036, pp. 16-17. 2005. Anchorage, AK, Prepared by MBC Applied Environmental Sciences, Costa Mesa, CA for MMS Alaska OCS Region.

Affiliated WWW Sites: <http://aeff.uaa.alaska.edu/AEFF/CI/index.html>
<http://www.mms.gov/alaska/>
<http://www.sfos.uaf.edu/cmi/>

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