MODELING OFFSHORE RELEASES

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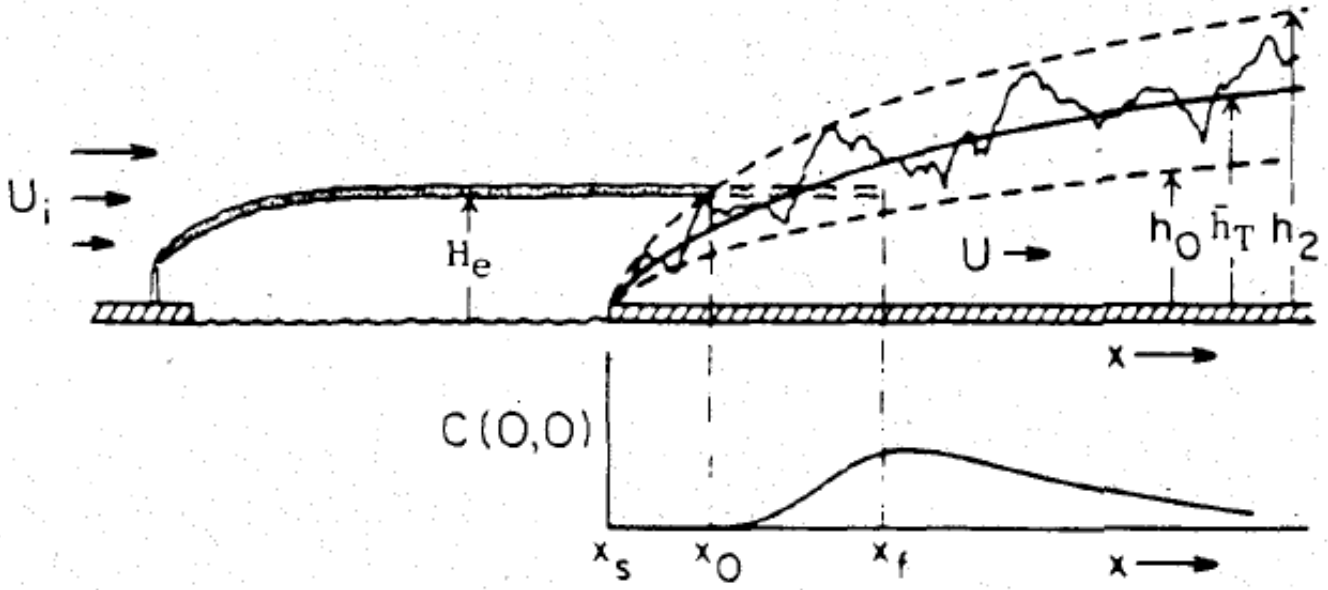
1. Currently, the Offshore and Coastal Dispersion (OCD) model is the EPA's preferred model for offshore and coastal modeling applications. The EPA is considering the eventual replacement of OCD with AERMOD. However, AERMOD does not contain key

2. In your opinion, what is the most immediate need or what should be the EPA's highest development priority with regard to addressing overwater and coastal modeling issues (e.g., shoreline

3. Do you envision priorities related to overwater/coastal modeling issues to shift in the near future (5 years) that could require the

Development and Evaluation of the Offshore and Coastal Dispersion Model

To cite this article: Steven R. Hanna , Lloyd L. Schulman , Robert J. Paine , Jonathan E. Pleim & Mitchell Baer (1985) Development and Evaluation of the Offshore and Coastal Dispersion Model, Journal of the Air Pollution Control Association, 35:10, 1039-1047, DOI: 10.1080/00022470.1985.10466003



Features of OCD Model

- Dispersion over water
  - Briggs formulas for dispersion-stability classes determined with M-O length
  - Uses AERMOD type formula under very stable conditions
- Thermal internal boundary layer over land
  - Linear growth with distance
- Dispersion over land
  - Briggs formulas for dispersion-stability classes determined with M-O length
- RTDM for complex terrain
- Linear chemistry
- Handles coastline geometry relative to sources
- Evaluated with two data bases

Dispersion over water

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AERCOARE: An overwater meteorological preprocessor for AERMOD

To cite this article: Herman Wong, Rob Elleman, Eric Wolvovsky, Ken Richmond & James Paumier (2016) AERCOARE: An overwater meteorological preprocessor for AERMOD, Journal of the Air & Waste Management Association, 66:11, 1121-1140, DOI: 10.1080/10962247.2016.1202156

- M-O similarity used to compute micrometeorological variables
- Need to account for water vapor

$$z_0 = A\frac{u_*^2}{g} + B\frac{\nu}{u_*} \quad \textit{Charnock}$$

$$u = \frac{u_*}{k}\left(ln\left(\frac{z}{z_0}\right) - \phi_m\left(\frac{z}{L}\right)\right)$$

$$z_i = 2400u_*^{3/2}$$

Modifying AERMOD to include OCD features

- Thermal internal boundary layer over land

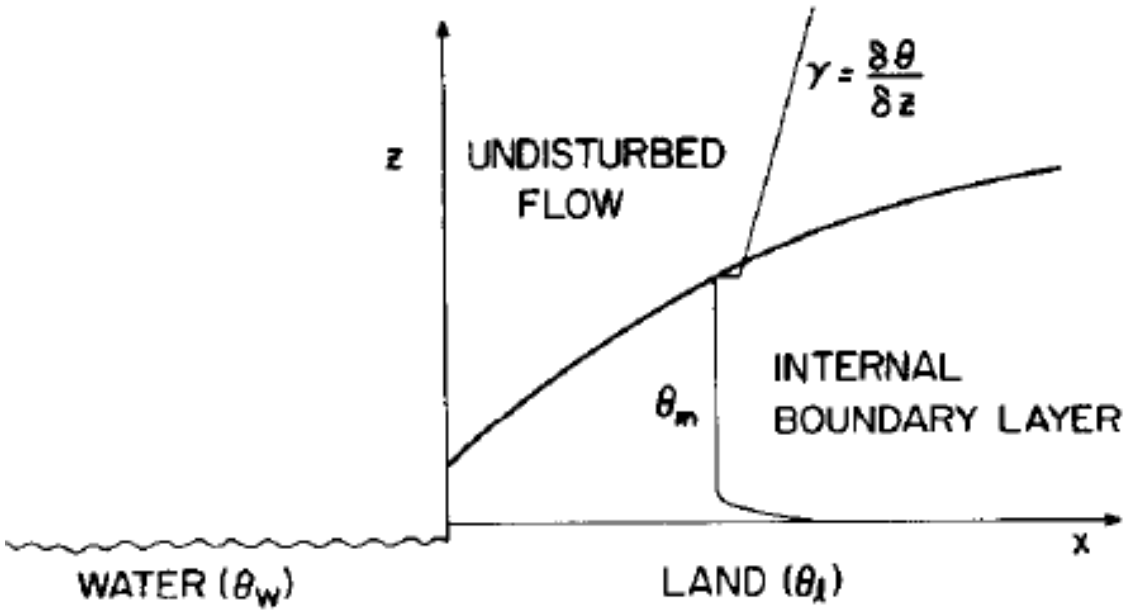

Fig. 1. Schematic of physical system.

$$h = A\frac{u_*}{U}\left(\frac{(\theta_l - \theta_w)}{\gamma}x\right)^{1/2}$$

INTERNAL BOUNDARY LAYER DEVELOPMENT AND FUMIGATION

A. VENKATRAM

Atmospheric Environment Service, Toronto, Ontario, Canada

Atmospheric Environment Vol. 11, pp. 479–482. Pergamon Press 1977. Printed in Great Britain.

AN EXAMINATION OF METHODS TO ESTIMATE THE HEIGHT OF THE COASTAL INTERNAL BOUNDARY LAYER

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Boundary-Layer Meteorology **36** (1986) 149–156.

$$h^2(x) = h^2(0) + (h_e^2 - h^2(0))\,(1 - e^{-x/L})$$

h_e = Boundary over land from AERMOD

$L = \beta h_e$

$h \sim x^{1/2}$ at small x

$h \rightarrow h_e$ at large x

Turbulence in the TIBL

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$$w_* = \left(\frac{g}{T_0} Q_0 z_i \right)^{1/3}$$

$$z_i = A x^{1/2}$$

$$w_* = \left(\frac{gA}{T_0} \right)^{1/3} Q_0^{1/3} x^{1/6}$$

w_* is not sensitive to distance from shoreline

Dispersion over land-Fumigation

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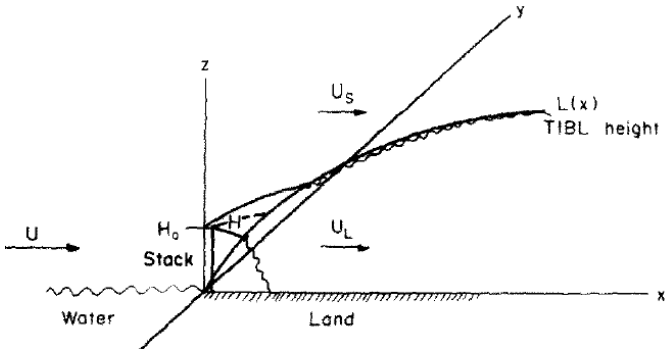
DISPERSION FROM TALL STACKS INTO A SHORE LINE ENVIRONMENT

P. K. MISRA

Atmospheric Environment Vol. 14, pp. 397–400.



$$\sigma_y^2 = \sigma_{ys}^2\left(x_0\right) + \sigma_{yu}^2\left(x - x_0\right)$$

$$\sigma_z^2 = \sigma_{zs}^2\left(x_0\right) + \sigma_{zu}^2\left(x - x_0\right)$$

x_0 = Distance at which plume intersects TIBL

Use z_i at receptor to compute concentrations

Conclusion

AERMOD can include offshore sources without major modifications to its structure

- AERMET has to be expanded to include overwater micrometeorology-AERCOARE
- TIBL behavior can be incorporated in AERMOD to compute concentration at a receptor