

NUMERICAL STUDY OF THE EFFECT OF OROGRAPHY ON THE MESOCLIMATE OF UST-KAMENOGORSK

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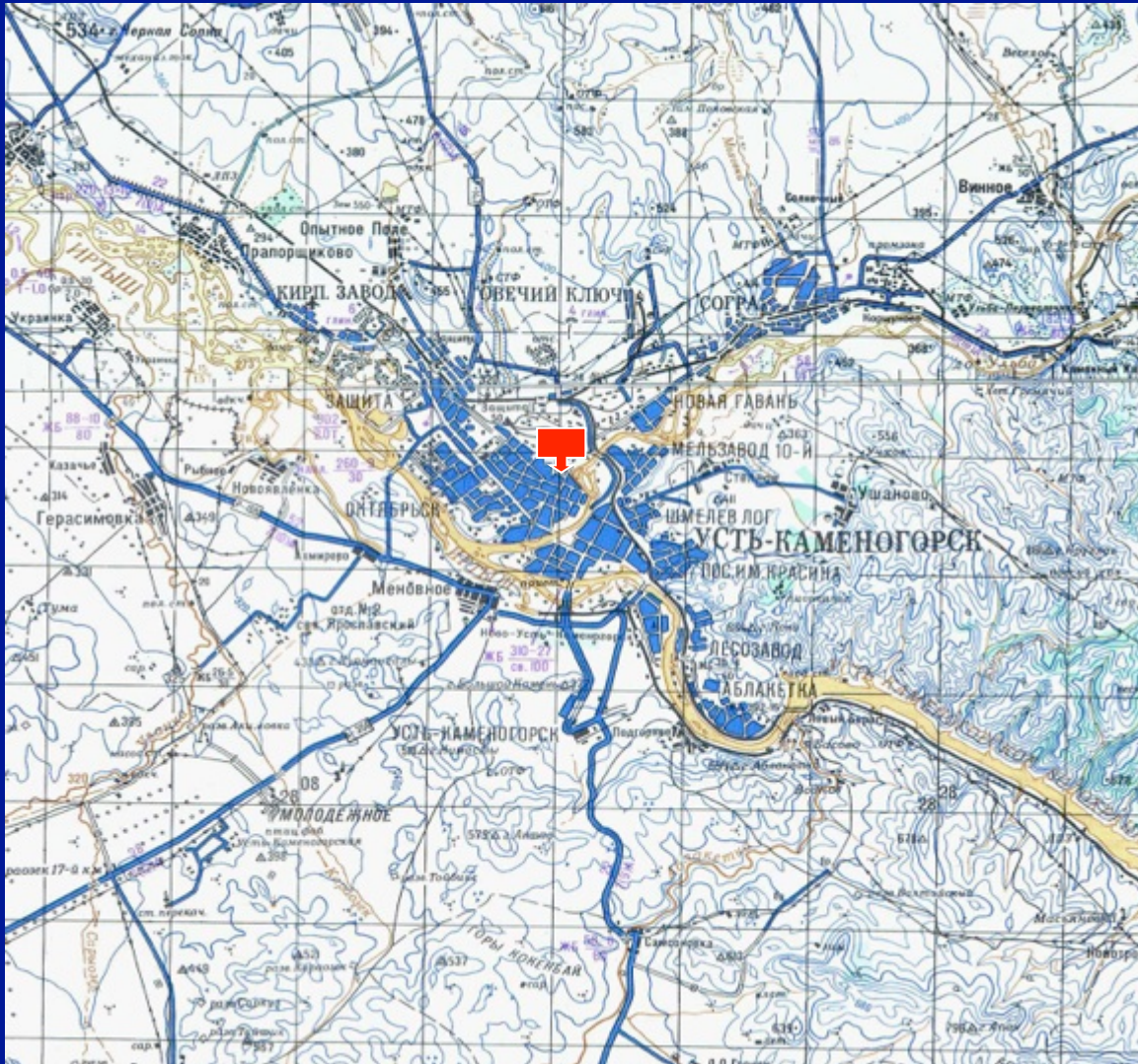
ЧИСЛЕННОЕ ИССЛЕДОВАНИЕ ВЛИЯНИЯ ОРОГРАФИЧЕСКИХ ОСОБЕННОСТЕЙ НА ФОРМИРОВАНИЕ МЕЗОКЛИМАТА В УСТЬ-КАМЕНОГОРСКЕ

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Simulation domain and one of the pollution sources in the city of Ust-Kamenogorsk



- mountains (250-861 m in height)
- grass
- river
- wetland
- deciduous forest
- mixed forest
- village
- city

Model equations

$$\frac{\partial \rho u}{\partial t} + \text{div} \rho u \vec{\mathbf{U}} = -\frac{\partial p'}{\partial x} + l \rho v + \Delta_u u ,$$

$$\frac{\partial \rho v}{\partial t} + \text{div} \rho v \vec{\mathbf{U}} = -\frac{\partial p'}{\partial y} - l \rho u + \Delta_v v ,$$

$$\frac{\partial \rho w}{\partial t} + \text{div} \rho w \vec{\mathbf{U}} = -\frac{\partial p'}{\partial z} + \lambda \rho \vartheta' + \Delta_w w ,$$

$$\frac{\partial \rho \vartheta'}{\partial t} + \text{div} \rho \vartheta' \vec{\mathbf{U}} = -S \rho w + \rho \frac{L_w}{c_p} \Phi + \Delta_\theta \vartheta' ,$$

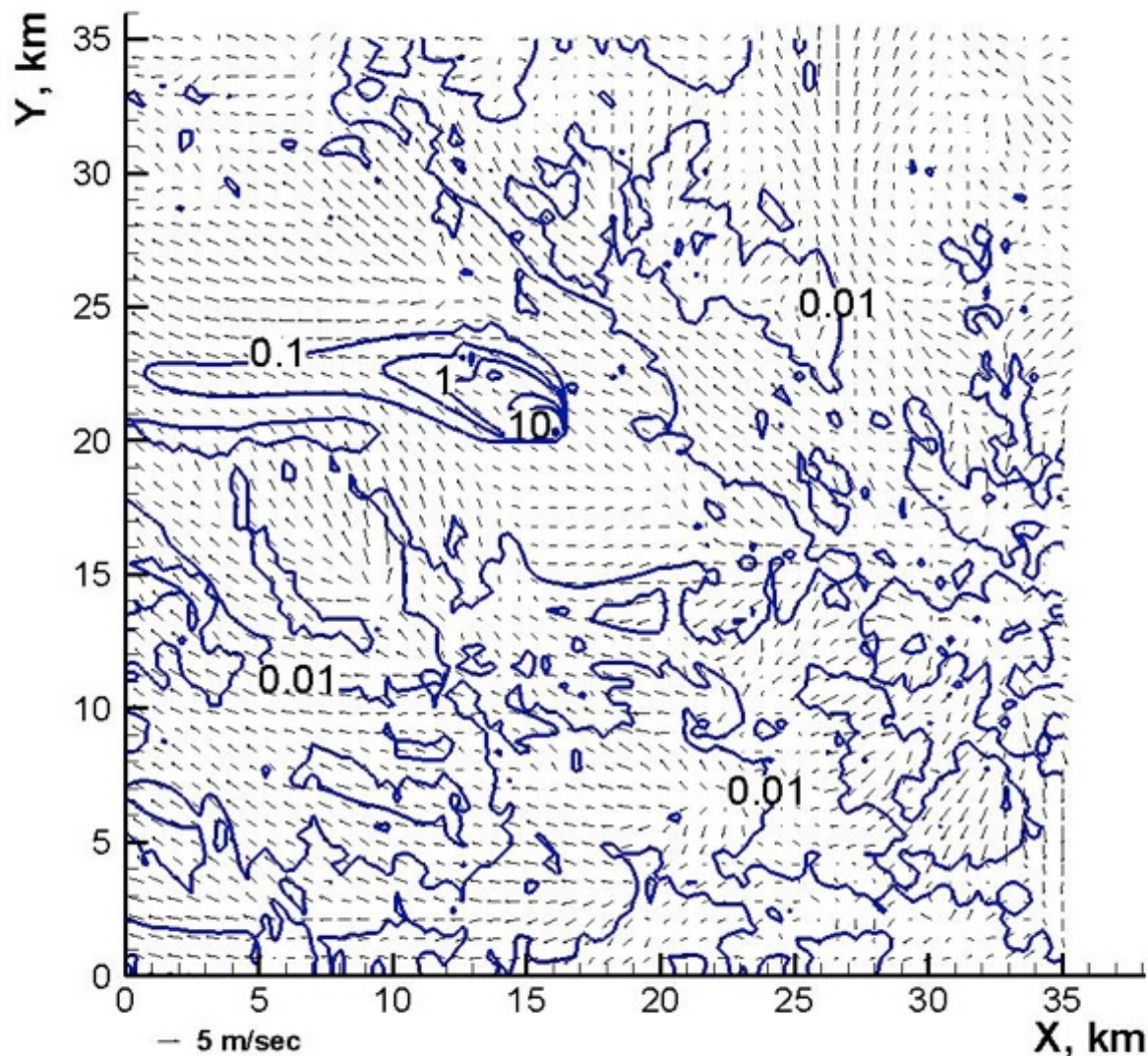
$$\frac{\partial \rho q'}{\partial t} + \text{div} \rho q' \vec{\mathbf{U}} = -\rho w \frac{\partial Q}{\partial z} - \rho \Phi + \Delta_q q'$$

$$\frac{\partial \rho u}{\partial x} + \frac{\partial \rho v}{\partial y} + \frac{\partial \rho w}{\partial z} = 0 ,$$

$$\vec{\mathbf{U}} = (u, v, w),$$

$$\rho = \rho(z) ,$$

$$\Delta_\alpha = \frac{\partial}{\partial x} \mu_{\alpha x} \frac{\partial}{\partial x} + \frac{\partial}{\partial y} \mu_{\alpha y} \frac{\partial}{\partial y} + \frac{\partial}{\partial z} \nu_\alpha \frac{\partial}{\partial z}$$



Horizontal section of wind velocity and passive pollution concentration (non-dimensional units) at 50 m above terrain at $t = 24$ h.

$U_g=0, V_g=0$ – geostrophic wind components at $z=H$

- Спасибо за внимание!

- Thank you!