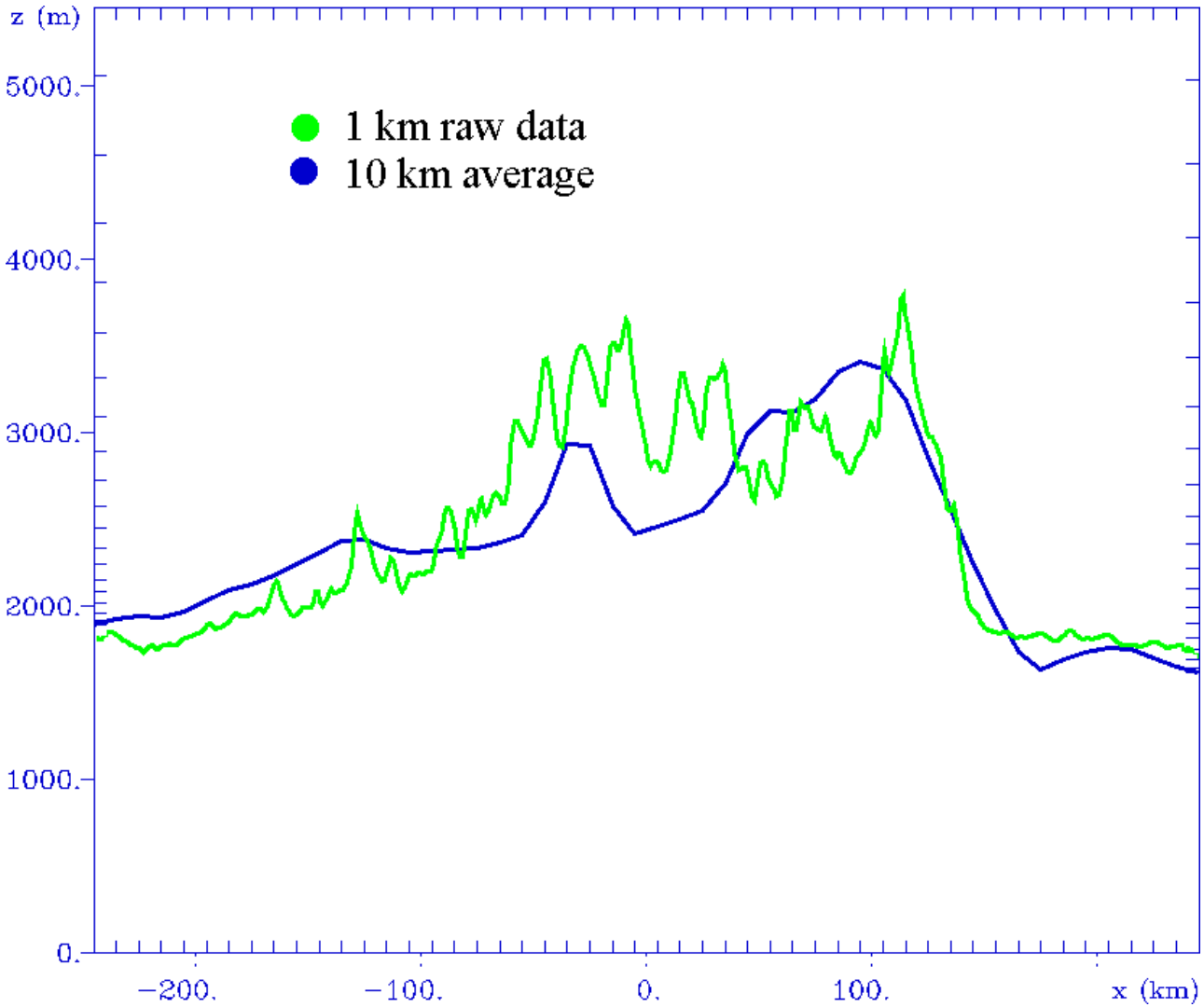
Definitions and Issues with RAMS Topography and the Vertical Grid Structure

- **New topographic representations**
  - *Marty Bell*
- **Reformulation of diffusive horizontal gradients**
  - *Mike Weissbluth*
- **Shaved vertical coordinate system**
  - *Bob Walko*

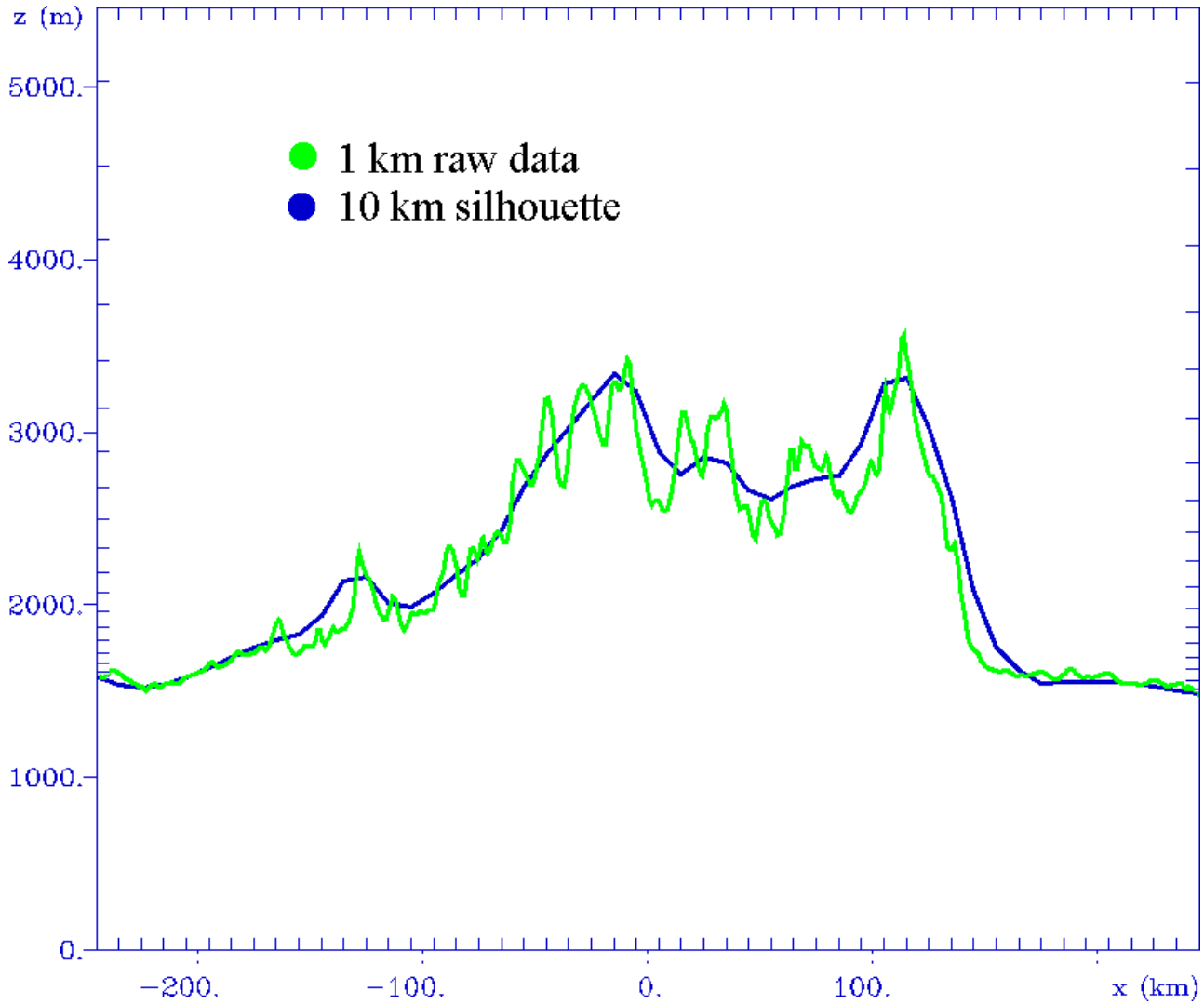
Topography Schemes

- **Average**
- **Silhouette**
- **Envelope**
- **Reflected Envelope**
- **Sub-Grid**

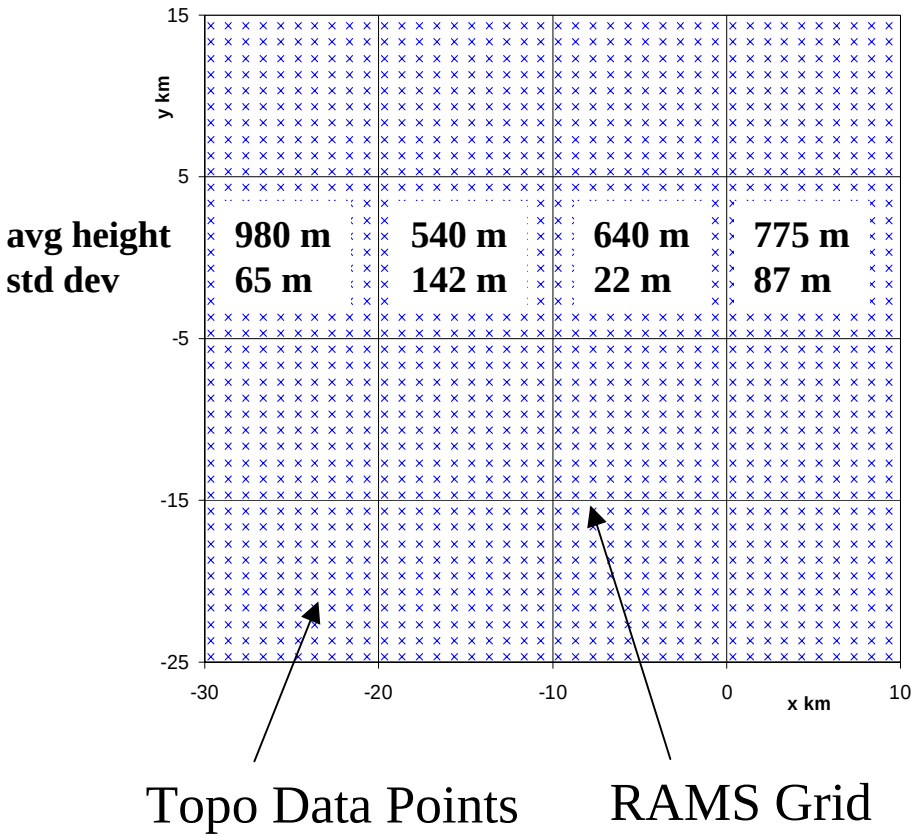
Average Topography

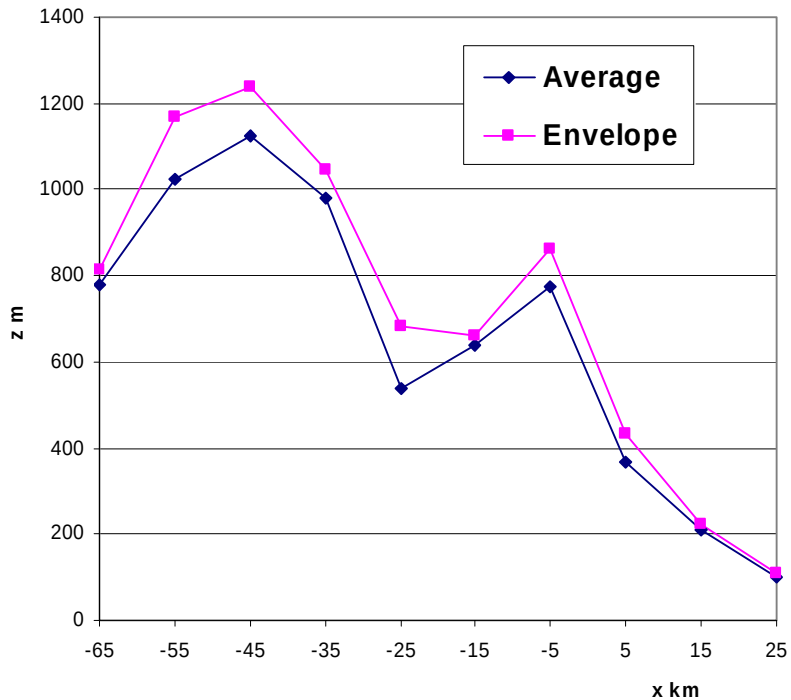


Silhouette Topography



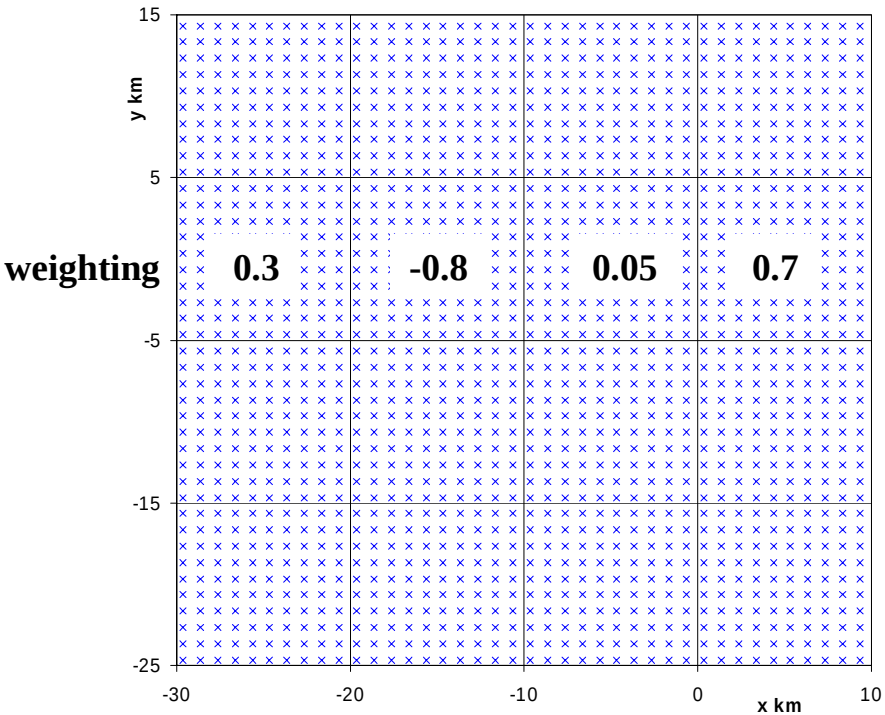
Envelope Orography

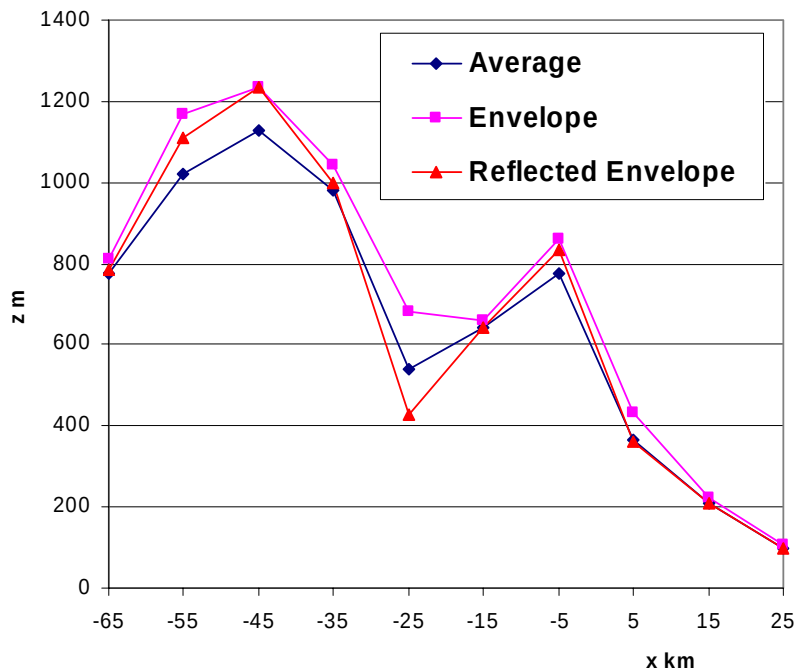




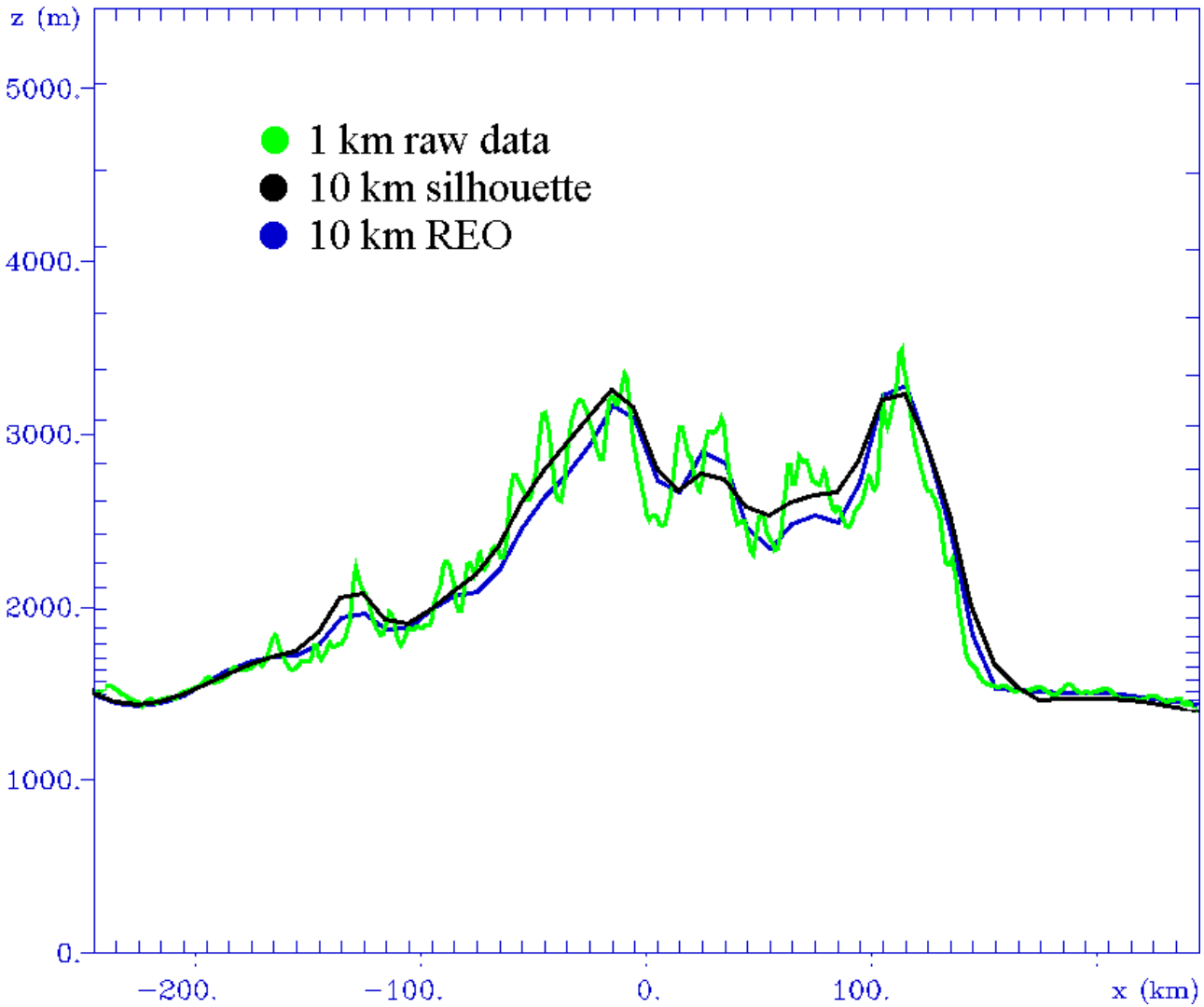
(*Wallace et al, 1983*)

Reflected Envelope Orography





Reflected Envelope Orography



Sub-grid Topographic Roughness

$$z_{0t} = k\ sd_{topo}$$

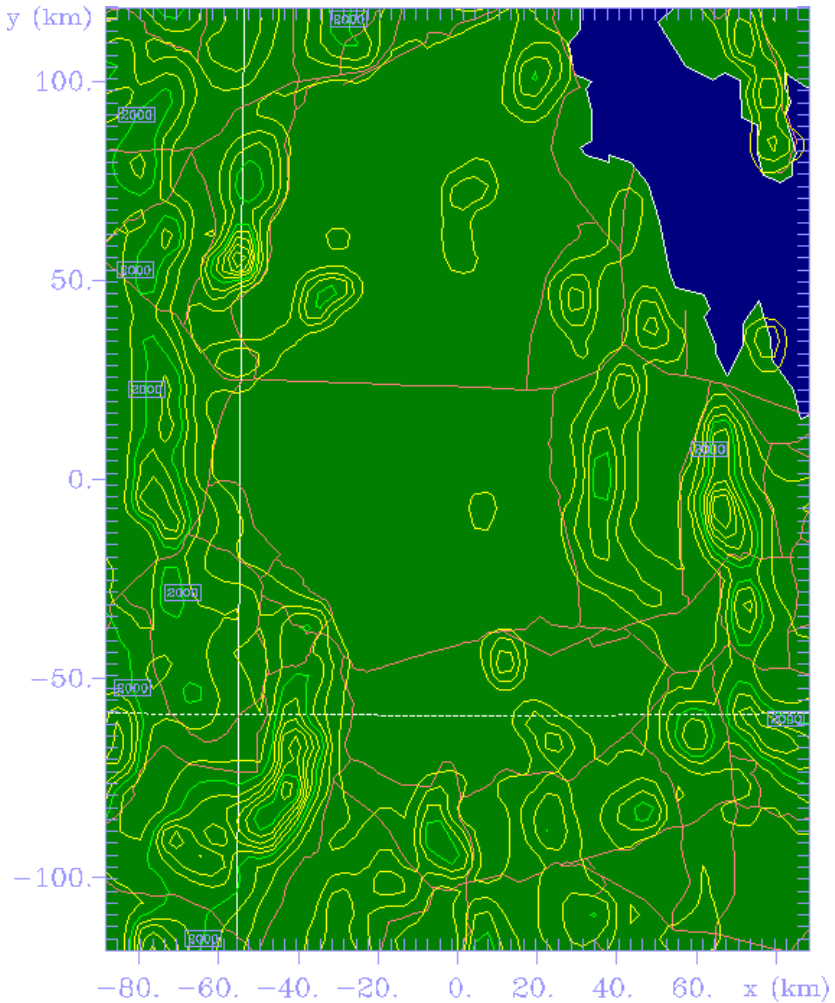
z_{0t} is the **topographic** roughness length

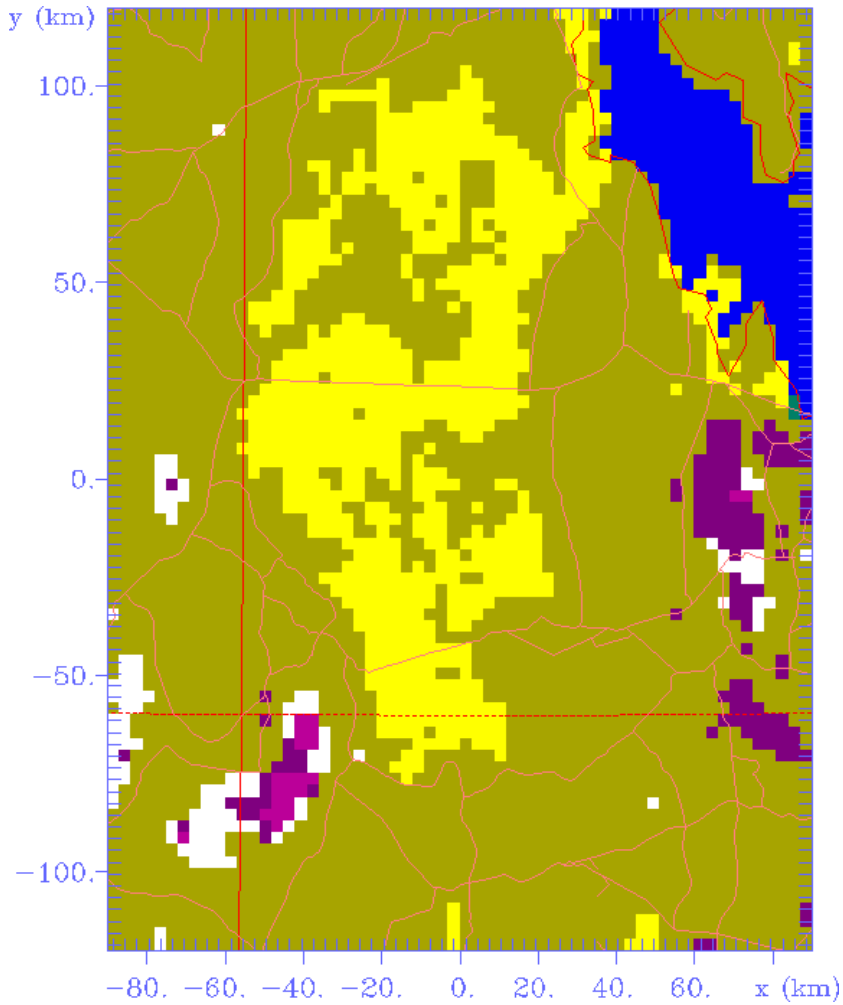
sd is the **standard deviation of topographic heights**

k is an empirical factor (0.005 - 0.02)

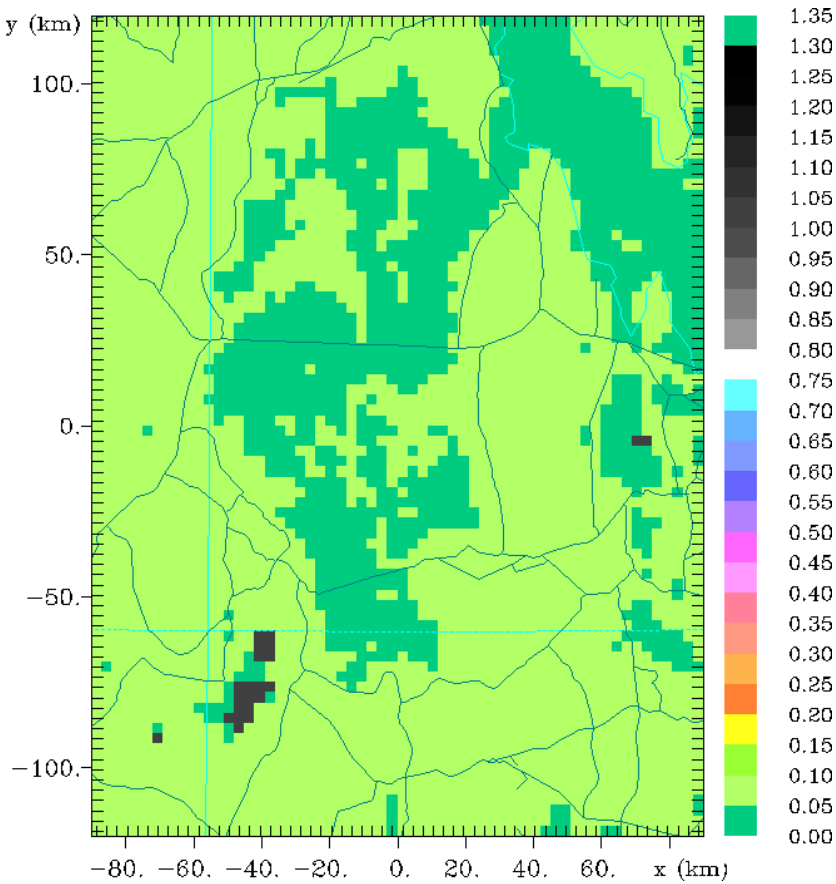
(*Uno et al, 1995; Stull 1988)*

Topography and Vegetation - Utah

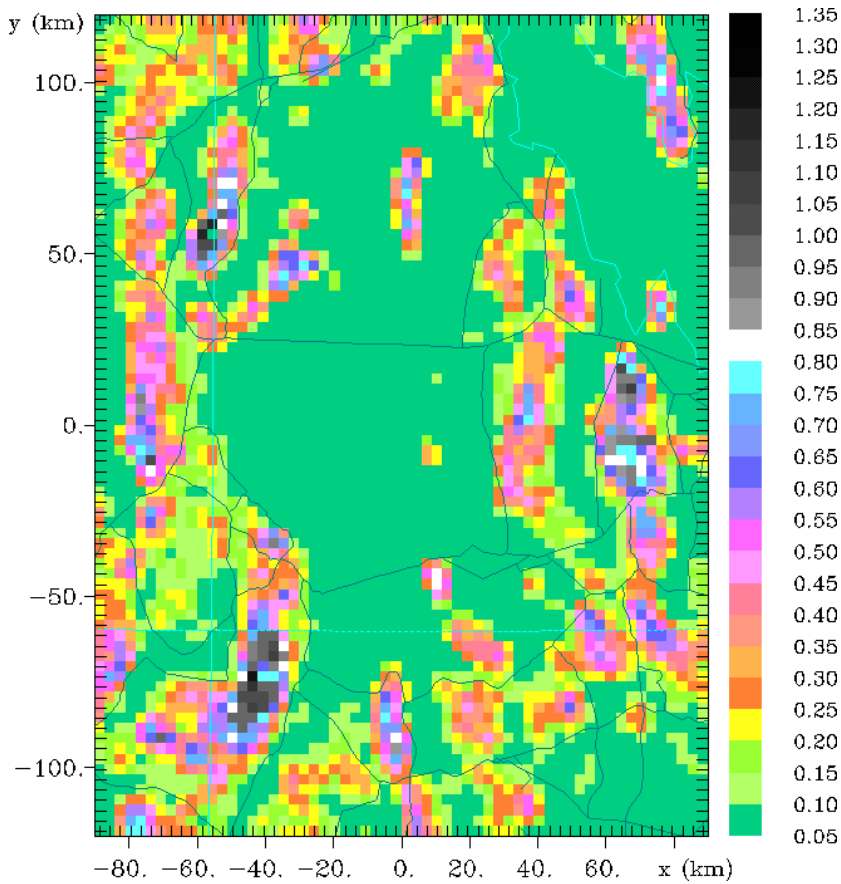




Modified Surface Roughness Field

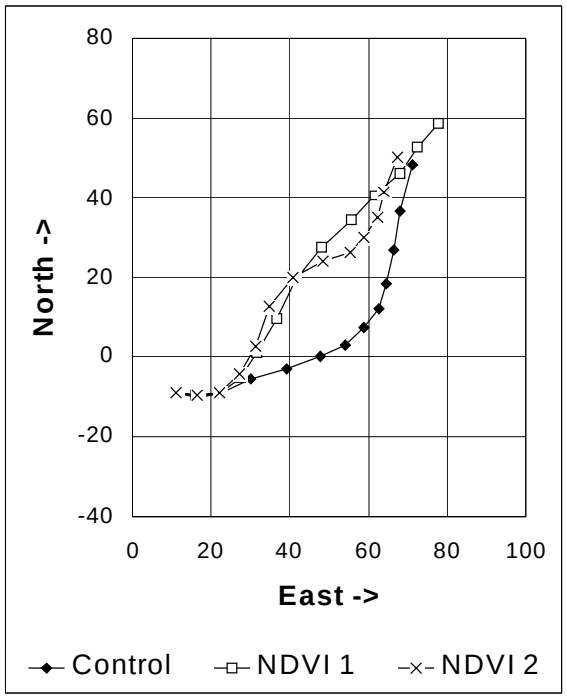


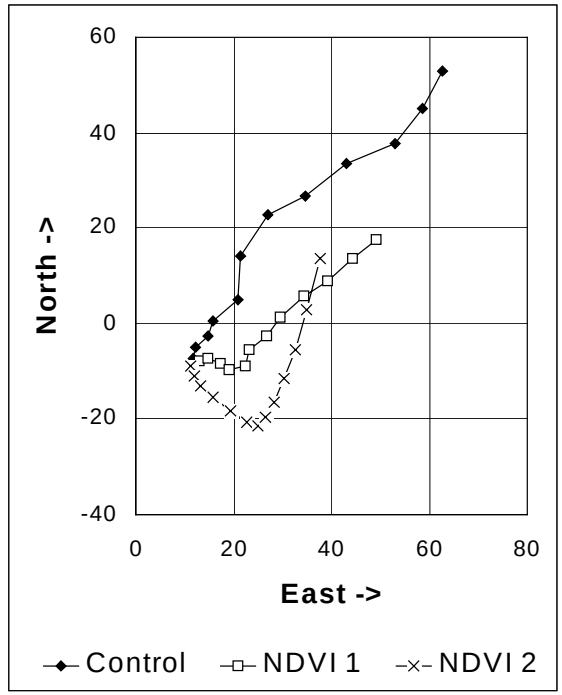
Vegetation Only



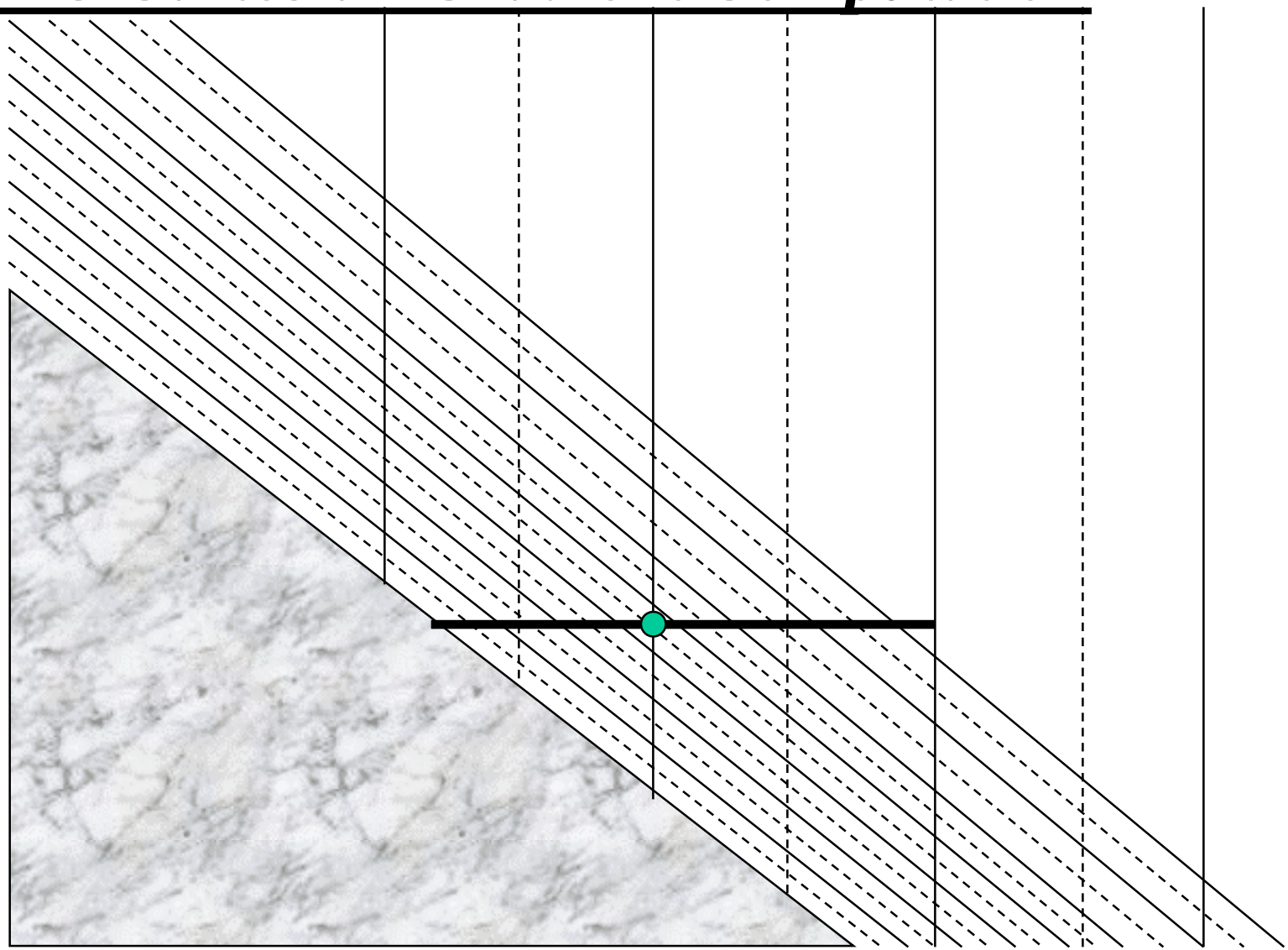
Vegetation and Topographic

Effect on Dispersion





RAMS Cartesian Gradient Computation



RAMS Cartesian Gradient Computation

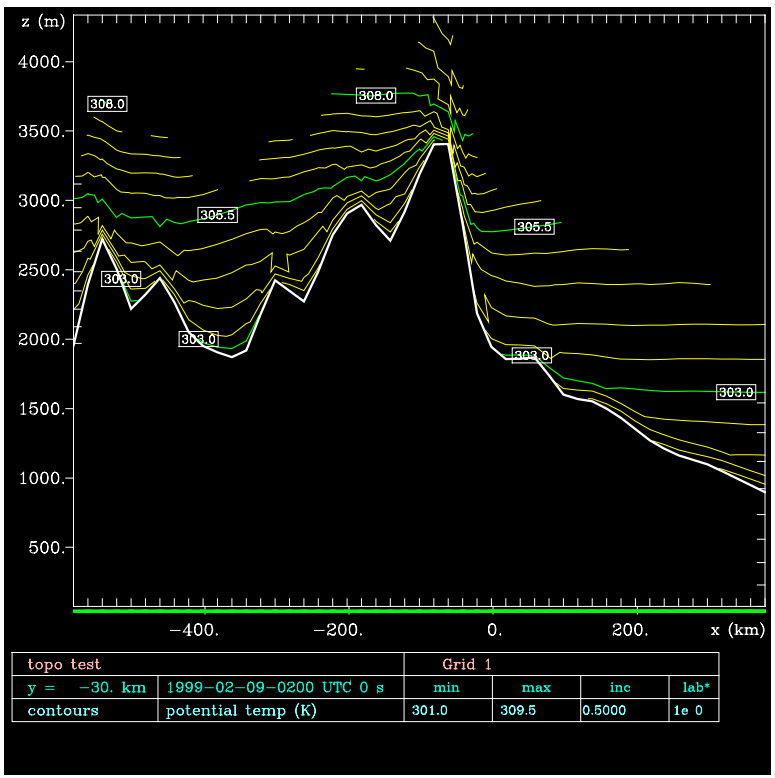
- Gradient computation changed to evaluate finite difference along Cartesian level
- Requires vertical interpolation from sigma-z to z levels
- Special handling required near the surface

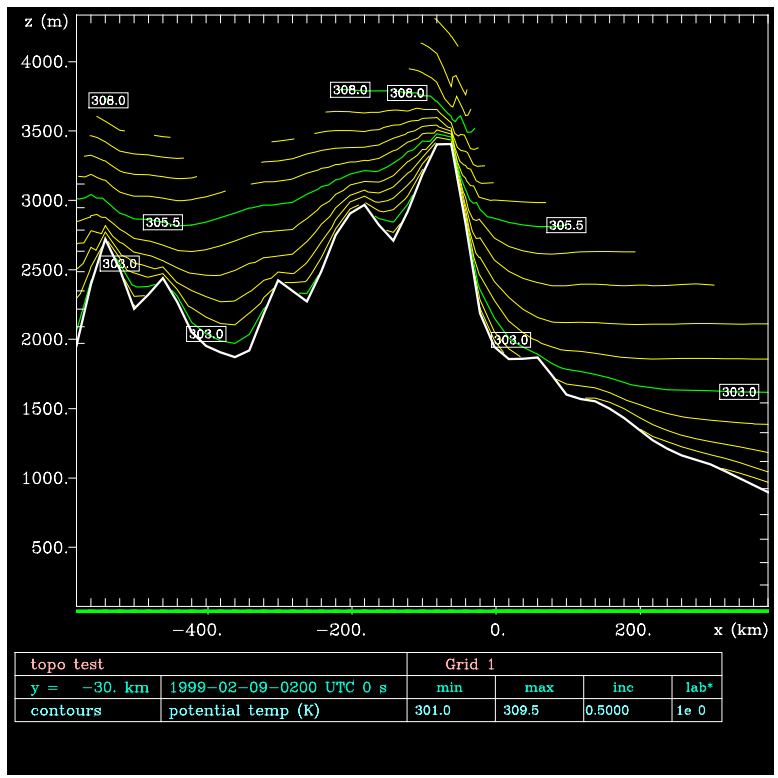
Status

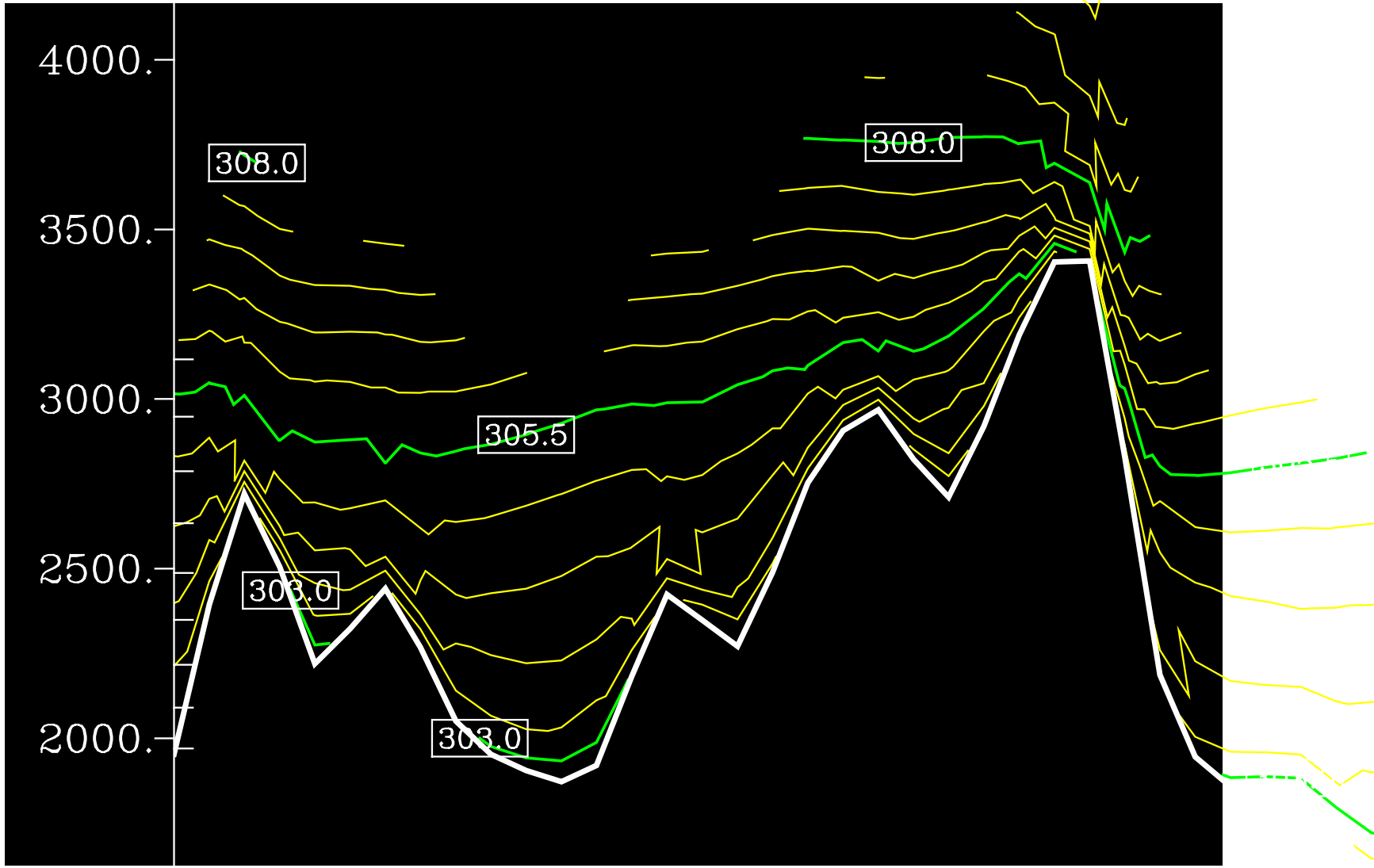
- Horizontal diffusion scheme modified, significant improvements in vertical grid spacing allowed
- Advection and pressure gradient terms may still be suspect.

OLD vs. NEW horizontal diffusive gradients

Dz=150m ; dx=20 km; 2 hour simulation



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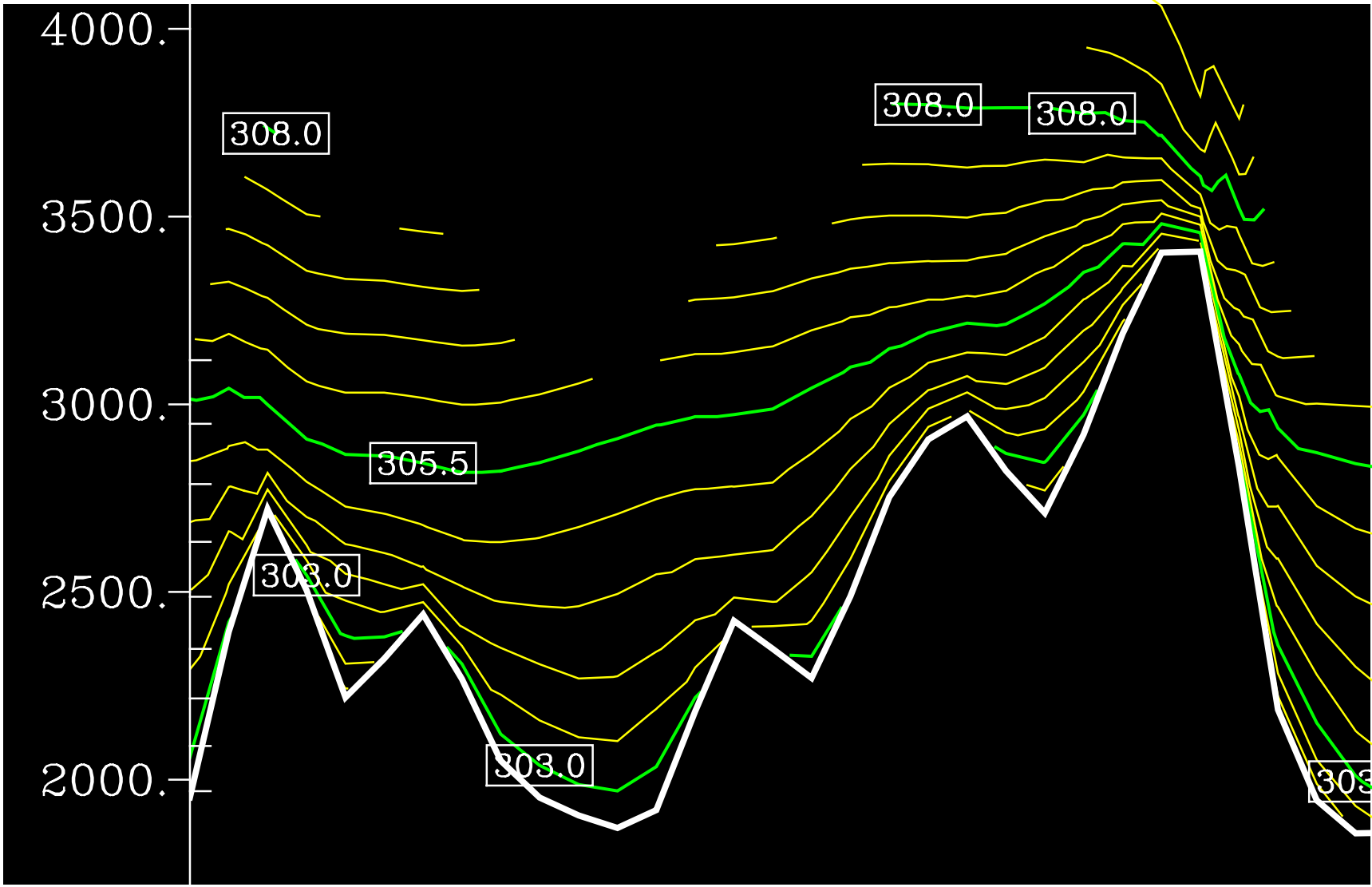
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