Subgrid Orography

Subgrid Horography

Contents

Description

GenPhysX has 3 modes for generating subgrid orography fields (LEGACY, STD and SPLIT).

History

Until recently, Genesis was the only tool available for creating geophysical fields, including subgrid horography fields. See Geophy_pkg_2.x.x.
GenPhysX is now capable of reproducing the same fields as produced by Genesis, including the subgrid horography fields (LEGACY). The computations and formulas inside GenPhysX are derived from Genesis. And actually they are the same, converted from Fortran (Genesis) to C (GenPhysX).

Difference Genesis vs GenPhysX, explained

However, when compared, most resulting fields are identical. Except for subgrid horography fields.
The reason for this is as follow : In order to make this calculation, two sets of subgrids are produced, the first containing values of source topography and the second the values of filtered topography, interpolated to the subgrid, a fine 11 x 11 mesh. Where both subgrids are centered around each grid point of the target grid. (see Fig 1), where the outer largest grid in black is the target grid, the blue grid with a angle is the source topography data grid and the blue dot is the target grid point, where the subgrids in black is centered

But by examining closely, Genesis is doing thing differently (a bug? see Fig 2), the source topography subgrid (in red) is centered on target grid point with a slight shift of half grid point of the true centered subgrid (dashed black). And the filtered topography subgrid (yellow) is not centered with its lower left corner sits at center of the grid point.

We believe centered subgrids is the correct way and it is what is implemented in GenPhysX.

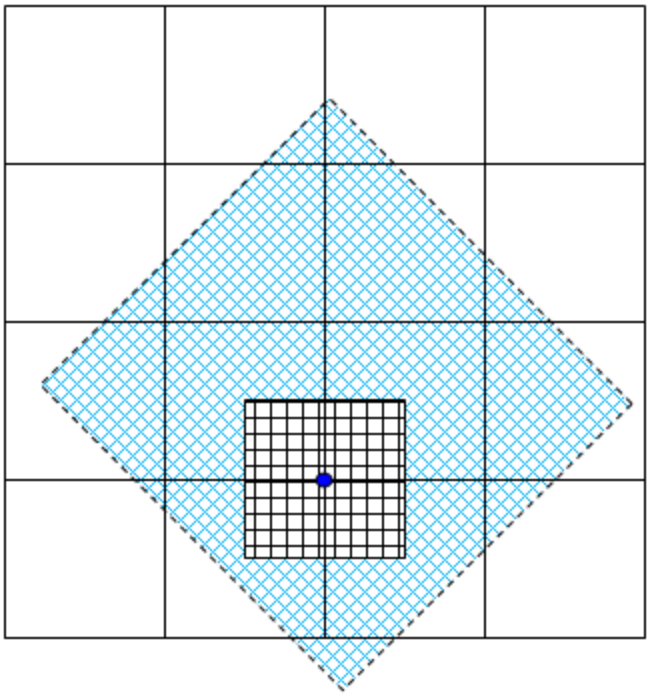

Figure 1 : Centered subgrid

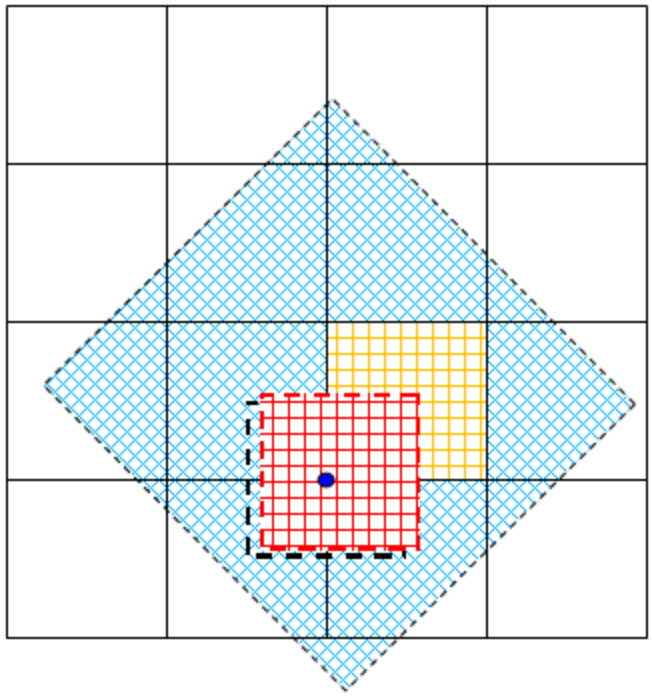

Figure 2 : shifted subgrid as found in Genesis

Documentation

Subgrid SPLIT option in GenPhysX: Notes on the orography variance and slope covariances: filling gaps and separating scales

Orography Filter options in GenPhysX: Notes on the old 2dx filter and the new low-pass filter for orography

See also

- Digital Elevation Model