



Minimizing Edge Effects from Grid Filling

Short Technical Note

Many grid-based operations, such as 2D-FFT filtering, require a square or rectangular periodic grid. In Geosoft, we achieve this result via a grid preparation operation that:

1. Removes a trend.
2. Expands the grid dimensions to dimensions acceptable for Winograd 2D-FFT (less than 2520 by 2520 grid cells) or Cooley-Turkey 2D-FFT, and adds dummies.
3. Replaces dummies with interpolated values from the valid part of the grid.

After preparation, the grid is ready for 2D-FFT processing operations such as Reduction-to-the-Pole, Butterworth Filtering, etc. via the MAGMAP menu in **OASIS montaj™**.

Understanding and Controlling Ringing Effects

Occasionally when running MAGMAP filtering, you may notice "ringing" effects. These effects are the result of the grid expansion process or the presence of strong anomalies near grid edges.

a) Expansion Effects

Expansion effects typically occur as large ridges that extend away from the edges of the grid. These effects are a function of the grid dimensions and the selection of a corresponding expansion factor that is suitable for Winograd FFT processing.

Normally, a default of 10% of the grid dimension (number of cells) is used for expansion. However, if this dimension is not one of the allowed Winograd FFT values, the expansion algorithm selects the next appropriate dimension. Ringing can occur when this

dimension becomes too large.

To control this type of ringing, set the roll-off distance parameter in the MAGMAP / Grid Preparation option or MAGMAP / MAGMAP 1-Step Filtering / Set Fill option. We recommend setting the distance to a value at least the wavelength of the anomalies of interest.

(For more information on the Winograd grid expansion algorithm and acceptable dimensions, please refer to the MAGMAP for Windows manual on page 31.)

b) Effects from Strong Edge Anomalies

These types of effects typically occur as a streak in a filtered grid that extends away from a strong anomaly or a streak on the opposite side of the grid (from periodic interpolation). They are caused by the propagation of high amplitude anomalies into the filled borders of the grid.

To control this ringing, set the maximum edge amplitude and distance parameters in the MAGMAP / Grid Preparation option or MAGMAP / MAGMAP 1-Step Filtering / Set Fill option. These parameters enable you to smoothly attenuate all large amplitude anomalies.

The amplitude represents a user-specified maximum amplitude. The distance represents the number of grid cells to the half amplitude limit.

Recent Changes to Maximum Entropy Prediction (MEP) Interpolation Parameters

Ringing effects may have been exaggerated by v4.1 programming changes to internal MEP filtering parameters. Specifically, we changed the MEP filter length and sample number to cell size values of 10 and 20, respectively, to achieve greater computational efficiency.

After reviewing the previous defaults for these parameters, we restored them to their original 32 and 64 cell sizes for better grill filling results.