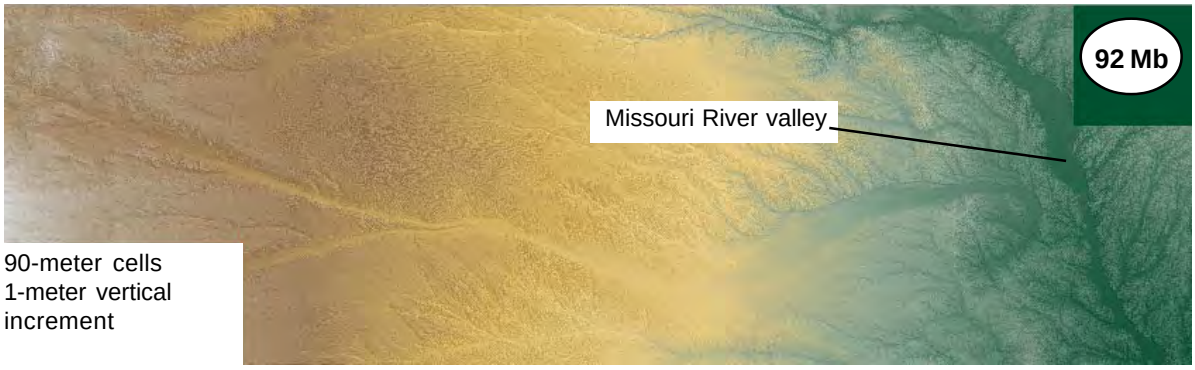
JPEG2000: Almost Lossless

A Digital Elevation Model is just a model of the surface and not the true surface. The ruggedness of the relief, the cell size and elevation interval, and the modeling method will determine how well the DEM represents the real surface. The usefulness of a DEM depends upon the specific application. Estimating a cut and fill earth moving operation requires a far more accurate DEM than using the same DEM in a sales simulation. Visual lossy effects are minor in a JPEG2000 exported from TNTmips with compression selected as "Lossy (best quality)." This is a DEM of Nebraska, which has no mountains and very little rugged terrain. Although this lossy JPEG2000 DEM is a further abstraction of the surface, it produces a smaller DEM which is quite suitable for flight simulations and small scale applications, but of reduced value for others.

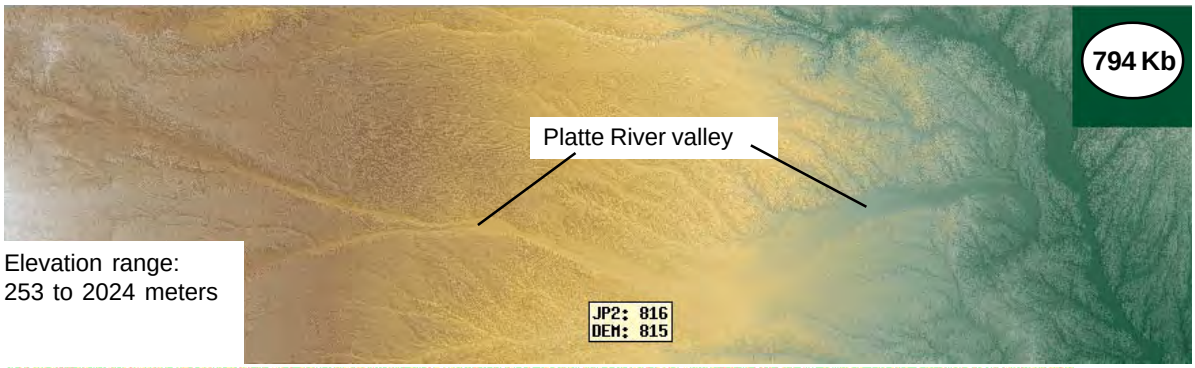


16-bit DEM

(3601 x 12001 cells)

Project File

90-meter cells
1-meter vertical increment

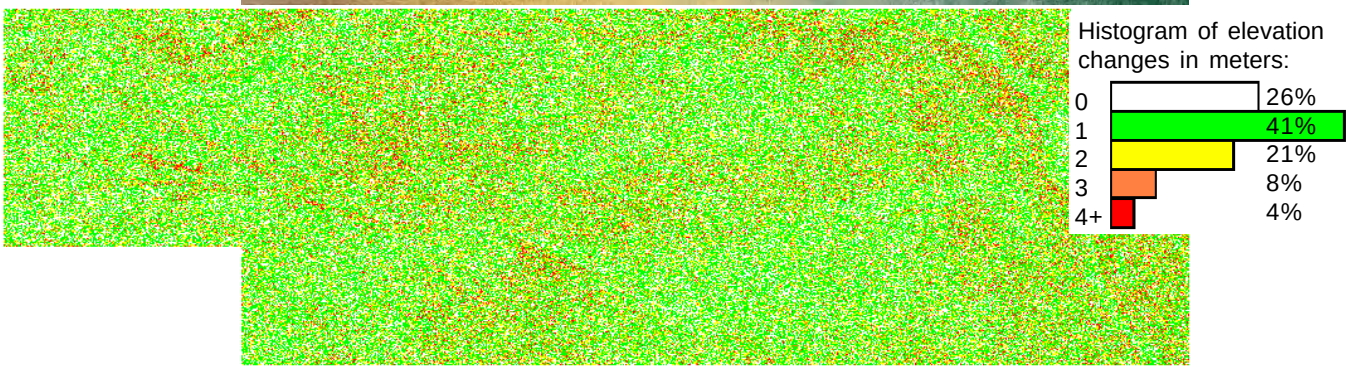


JPEG 2000

116:1 compression

JP2 file

Elevation range:
253 to 2024 meters



The image above is a difference raster, which shows a cell-by cell comparison of the original 92Mb 16-bit integer elevation raster and the lossy 794KB JPEG2000 compressed JP2 file.

- 88% of the cells have a difference of 2 meters or less.
- < 2% of the cells have a difference greater than 4 meters.
- < 1% of the cells have a difference greater than 5 meters.

The general changes in elevation in the compressed DEM are 2 meters or less. Close inspection of the difference raster indicates that the largest shifts in elevation (red cells) occur along the edges of major flood plains and hilly areas.

For this DEM the "Lossy (best quality)" compression reduced the size of the file by 116:1. Yet, this new DEM is still quite suitable for uses such as flight simulation, as a base for a large but detailed 3D perspective rendering, and even for image restitution.