

Evaluation of Inversion of Final Tile Product to Backscatter, MAMM

Introduction:

The Antarctic Mapping Mission (AMM1) products were distributed in a form that minimized radiometric artifacts in the Final Tile Product. Distributed as such, the products required invertible smoothing functions to be applied to the input data, and software for inverting the data from the “smoothed” version to backscatter values (“sigma naught” or σ^0). Such a system allowed for the distribution of a single product. The software distributed with the final AMM1 product for inverting the data is “GETSIG0,” an ASCII C program which inverts all the radiometric functions applied to Final Tile Product on a coordinate-by-coordinate basis.

The Ascending portion of the second Antarctic Mapping Mission (MAMM) has a distribution scheme similar to AMM1, including a Final Tile Product which minimizes radiometric artifacts. Figure 1 shows the processing scheme from the smoothed version of the mosaic to σ^0 . More information on this process can be found in the AMM1 document, AMM1_Sig0_evalr4.doc

The Descending MAMM dataset, unlike the Ascending MAMM and AMM1 datasets had no radiometric smoothing functions applied. As such, inversion to σ^0 required merely converting to the linear version of σ^0 , scaling to appropriate spatial tiers, and then conversion to σ^0 in dB. Figure 2 shows this processing. The data were originally in a version of 16-bit scaled amplitude. Conversion to dB required the following equation:

$$dB = 10 \times \log_{10} \left(\left(\frac{DN_{16\text{-bit_scaled_amplitude}} - 500}{10700} \right)^2 \right)$$

Converting to the linear form of sigma 0 for the intermediate step of resampling require the following equation:

$$\sigma^0_{linear} = \left(\left(\frac{DN_{16\text{-bit_scaled_amplitude}} - 500}{10700} \right)^2 \right)$$

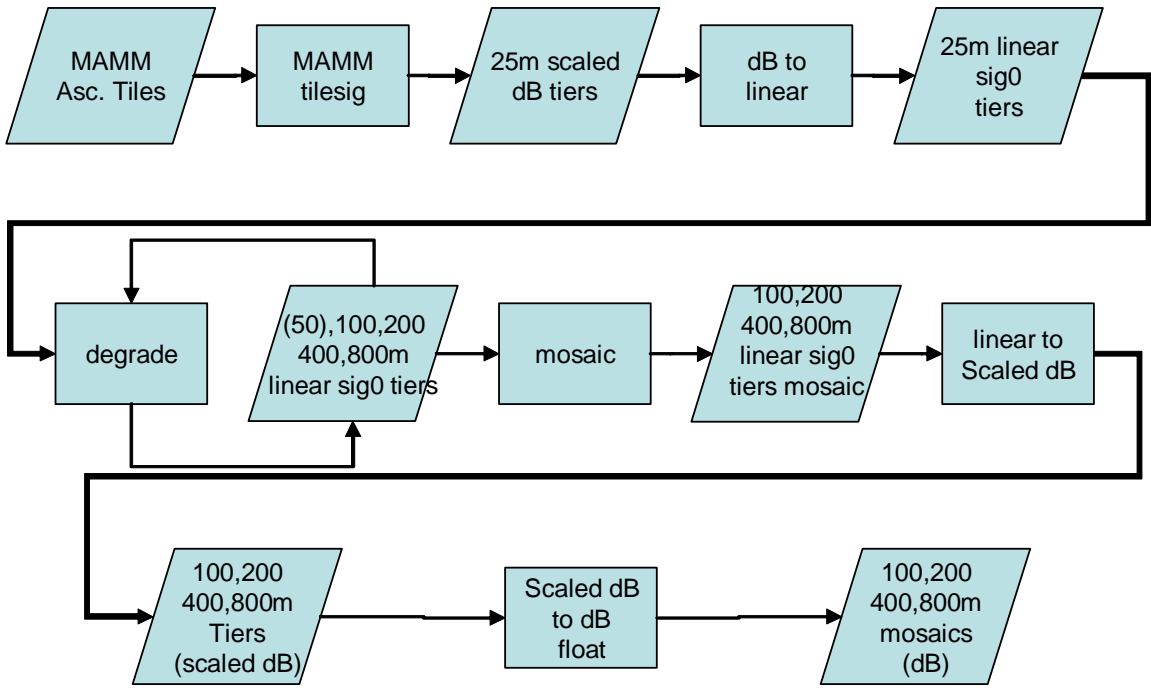


Figure 1. MAMM Ascending Sig0 Processing

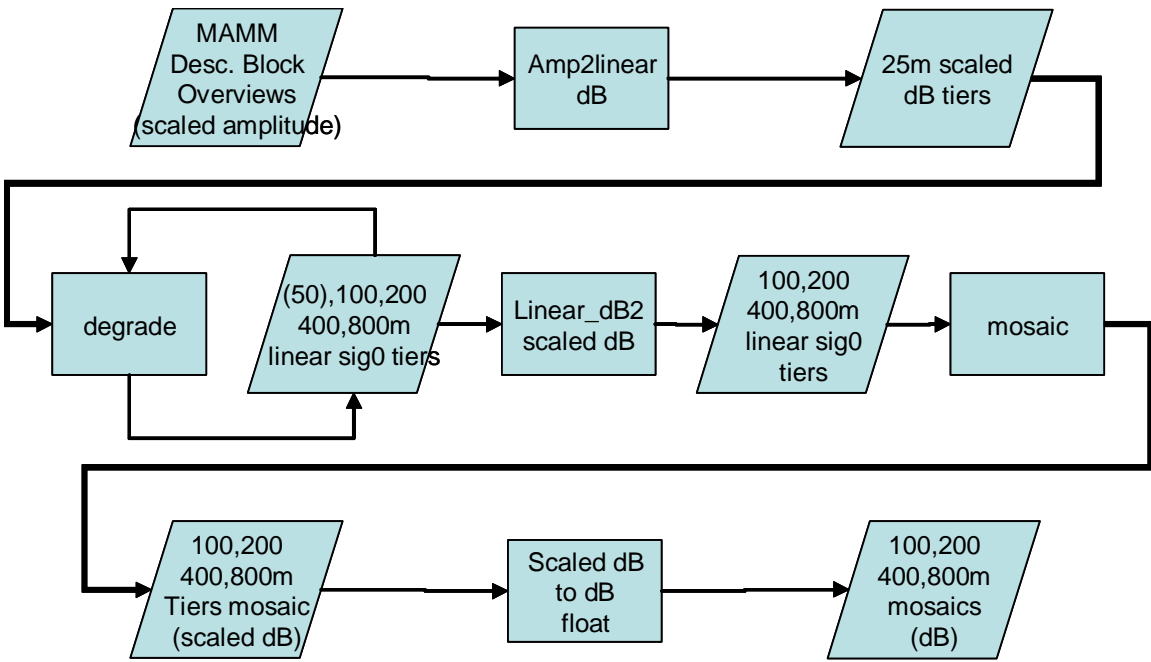


Figure 2. MAMM Descending Sig0 Processing