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## Calibrating a compressible firn rheology and application to firn in shear zones

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Most existing firn densification models are one-dimensional and empirical, limiting their ability to accurately represent complex stress regimes. For instance, they fail to account for enhanced densification in shear zones. In contrast, the Gagliardini and Meysonnier 1997 (GM97) model offers a more comprehensive approach by incorporating a compressible firn rheology. This allows modelling densification under arbitrarily complex stress regimes. Unfortunately this model not as constrained empirically, and less practical to implement in a typical one dimensional use case. Here we report on progress on bridging the gap in the firn model hierarchy. How can the GM97 model be reformulated so that it can be used in 1D models, such as the Community Firn Model, while still accounting for horizontal shear? How can we calibrate the model so that it performs as well as simpler models without case by case tuning?