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Accelerating generalized blocked Cholesky factorization using multiple processors

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Least-squares collocation (LSC) may be used for modelling the gravity field, estimating parameters, errors and error-covariances of derived quantities like predicted height anomalies. The associated normal equations may be extended with the matrices representing the relationship between data and parameters (A) as well as the matrix of covariances between observations and quantities to be predicted. This total positive semi-definite matrix may be Cholesky factorized by changing from positive accumulation to negative accumulation when the first column of the A-matrix is reached.

In order to enable the use of LSC for large sets of observations (the upper-triangular part of) this extended system of matrices must be stored blockwise in one or more files on disk. This enables the use of multiprocessors for the blockwise Cholesky-factorization. This has been tested successfully on various servers with large computational savings in time.