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Inversion of Monthly GRACE Potentials for Mass Transports in the Amazon Area

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We show the applicability of a novel method called the Regularized Functional Matching Pursuit (RFMP) to the local analysis of mass transports. We consider monthly GRACE potentials for South America during one year and subtract a temporal mean. The resulting difference fields are denoised with Freeden's spherical wavelets. Finally, the obtained monthly potential anomalies are inverted for volumetric mass density anomalies with the RFMP. The calculated results clearly show seasonal variations in the mass density distribution in the Amazon area. One main feature of the novel algorithm is its ability to combine different redundant basis systems. From this overcomplete supply of trial functions, it chooses a sparse best basis to represent the solution of the inverse problem. In particular, spherical harmonics based orthogonal polynomials (to cover trends on large global scales) can be combined with hat-functions of different localizations (to take into account different spatial uncertainties of particular structures). As a result, the concentration of the selected hat-functions in particular areas is connected to the regions with the most significant details in the solution.