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Deformation model for Europe: Application of the least-square collocation

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One of the goals of the EUREF working group is to develop a deformation model for entire Europe. However, the irregular and partly sparse distribution of GPS stations makes it difficult to obtain a complete picture of the horizontal deformation for Europe. The solution for this problem is to use an interpolation. However, most well-known interpolation techniques (e.g., triangulation, spline interpolation) have the disadvantage that the entire signal is used while every signal always includes noise due to unknown errors or local effects. Additionally, those interpolation techniques can only be applied to one component at a time. The least-square collocation solves both problems of dividing the dataset into a signal and noise component and applying different datasets simultaneously. This method of filtering and interpolation is widely used in Physical Geodesy. However, when applied to velocity fields, the advantage of the collocation with using more than one dataset at the same time is not utilized. This implies that no correlation between the horizontal components is assumed. Here, we will show results of applying a combined least-square collocation for the example of Europe. Different European-wide GPS datasets will be tested as well as the effect of reducing a background model for northern Europe due to glacial isostatic adjustment. The effect of interpolation parameters (e.g., choice of covariance function, correlation length) will be presented as well.