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On the role of systematic errors in multi-spacecraft gradient computation

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An essential objective of multi-spacecraft missions is the disentanglement of spatial and temporal variations. The computation of space-time gradients is a basic tool to accomplish this. Systematic errors on the measurements, however, can easily overwhelm the information content in the measurement differences between closely spaced spacecraft. Therefore, they form a major obstacle for computing gradients from multi-spacecraft data. We show that it is possible to identify and compensate for such systematic errors while computing the gradient with least-squares techniques. In spite of a number of intrinsic limitations to the approach, this method opens up new avenues for scientific exploitation of multi-spacecraft data from experiments that have turned out to be hard to calibrate.