

Supporting Information: Trajectory Auto-Corrected Image Reconstruction

Julianna D. Ianni^{1,2} and William A. Grissom^{1,2,3,4*}

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¹Vanderbilt University Institute of Imaging Science, Nashville, TN, United States

²Department of Biomedical Engineering, Vanderbilt University, Nashville, TN, United States

³Department of Radiology, Vanderbilt University, Nashville, TN, United States

⁴Department of Electrical Engineering, Vanderbilt University, Nashville, TN, United States

*Corresponding author:

William A Grissom

Department of Biomedical Engineering

Vanderbilt University

5824 Stevenson Center

Nashville, TN 37235 USA

E-mail: will.grissom@vanderbilt.edu

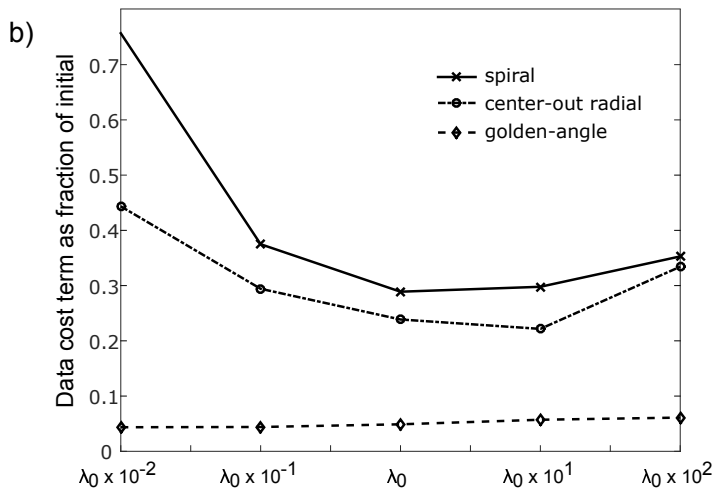
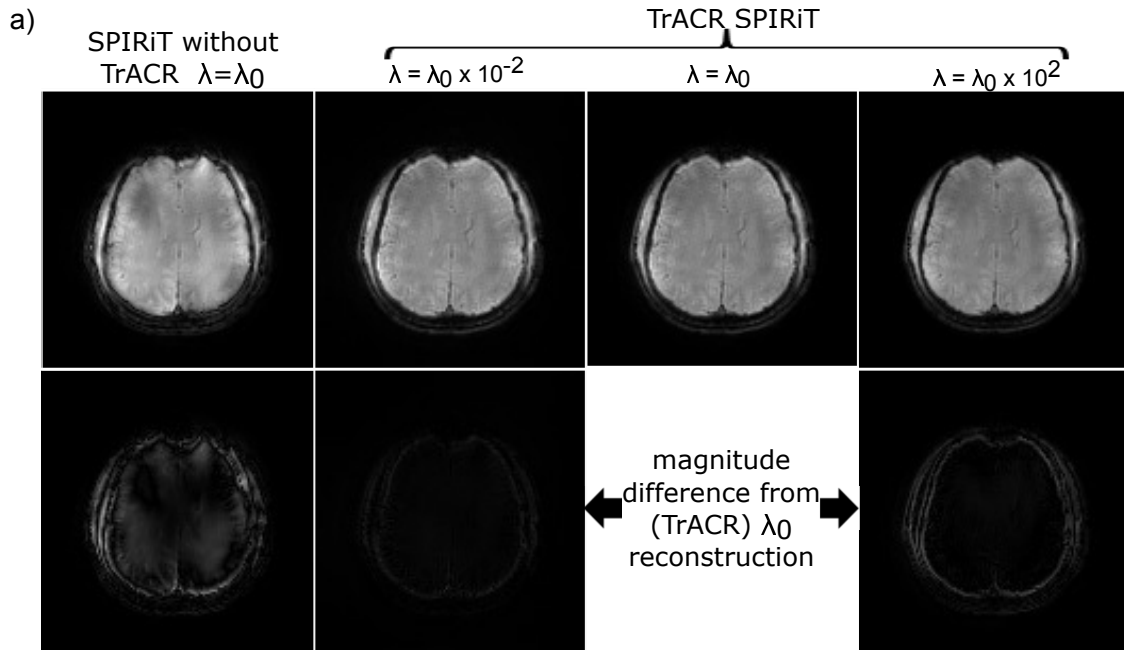


Figure S1: TrACR-SPIRiT performance across SPIRiT regularization parameters (λ in Eq. 2 of the main text). (a) (Left) Spiral image reconstruction with the nominal trajectory and with the regularization set to λ_0 (the same value used in the rest of this work), and (Right) spiral images reconstructed with TrACR with $\lambda = \lambda_0 \times 10^{-2}$, $\lambda = \lambda_0$, and $\lambda = \lambda_0 \times 10^2$. Images and errors are on the same color scale. (b) The data fidelity term of the cost function in Eq. 2 as a fraction of initial, versus SPIRiT regularization parameter for all 3 trajectories. These results indicate that TrACR-SPIRiT is robust to λ settings over two orders of magnitude or more, depending on the trajectory.

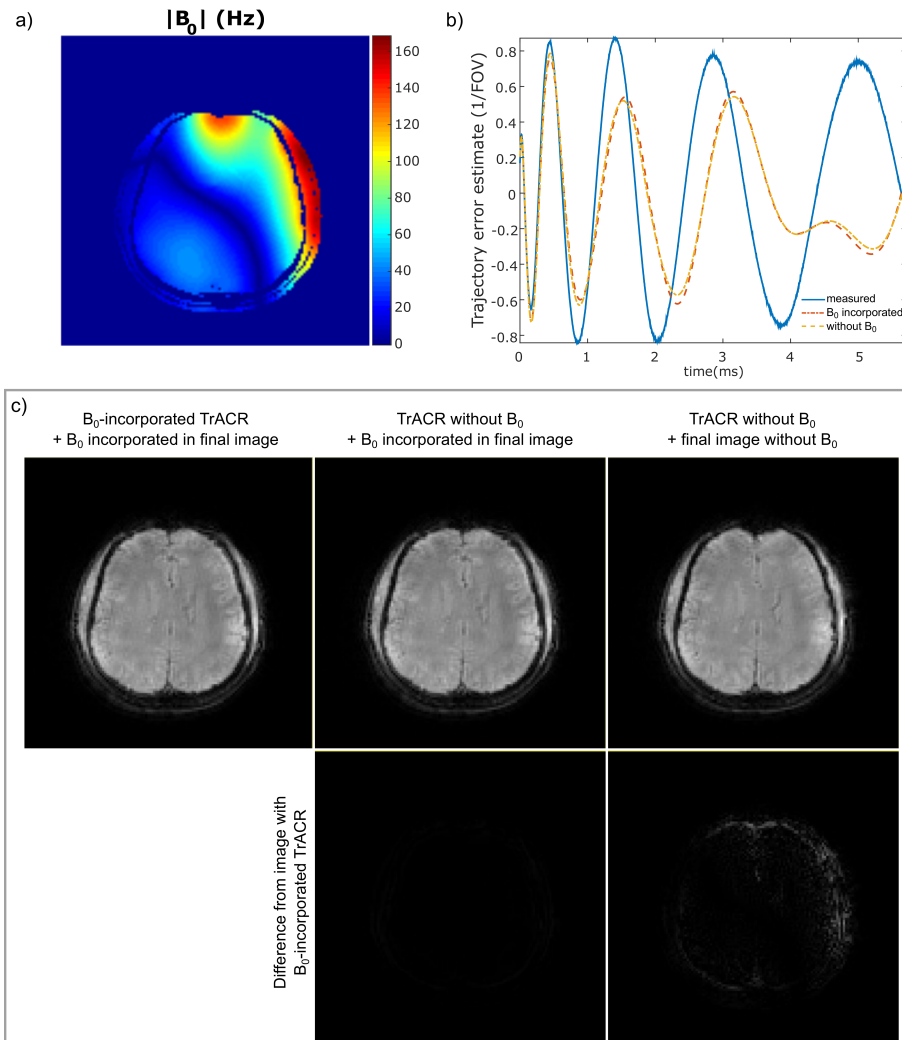


Figure S2: TrACR-SENSE with off-resonance compensation. (a) The magnitude of the measured off-resonance map in Hz for one subject. The map is masked for display. The approximate 150 Hz offset in the front and right side of the brain would result in an approximately 1 cycle of phase across the spiral readouts. (b) Measured spiral trajectory error (solid blue), TrACR-estimated error with off-resonance incorporated (red dot-dashed), and TrACR-estimated error without off-resonance incorporated (yellow dashed). (c) Final reconstructed spiral images: (Left) Image reconstructed with the measured off-resonance map incorporated both in TrACR and the final reconstruction, (Center) image reconstructed with the off-resonance map incorporated in the final image reconstruction but not in TrACR, and (Right) Image reconstructed without off-resonance compensation in TrACR or the final reconstruction. Magnitude differences are also shown from the left reconstruction, on the same color scale. Off-resonance was incorporated in the reconstruction sys-

tem matrices using time-segmentation [1].

References

- [1] Fessler JA, Lee S, Olafsson VT, Shi HR, Noll DC. Toeplitz-based iterative image reconstruction for MRI with correction for magnetic field inhomogeneity. *IEEE Trans Sig Proc* 2005; 53:3393–3402.