



Figure S1. 48 periods interferometric synthetic aperture radar (InSAR) displacement time series data relative to November 8, 2014 (because the displacement of the first period is the reference zero value, considering the spatial layout of the drawing, the displacement of the first period is ignored, and this strategy is adopted below for processing) in central valley aquifer system (CVAS) after reference framework unified. Warm colors (i.e., positive values) denote surface displacements toward the satellite, and the cold colors (i.e., negative values) denote the away-motion from the satellite. Circles represent locations of global navigation satellite system sites, and filled colors represent the deformation values.

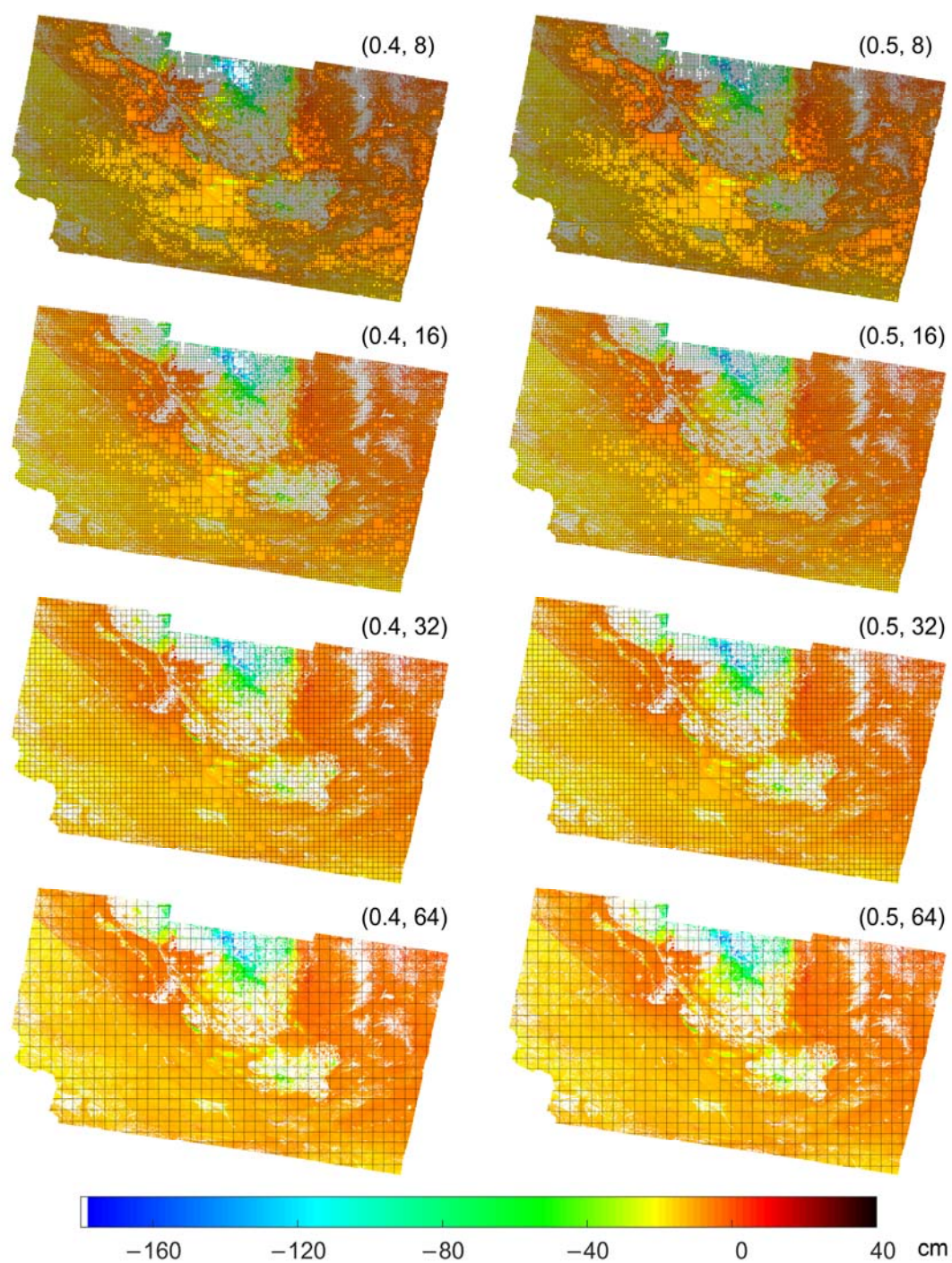


Figure S2. Classification results corresponding to the quadtree decomposition method with eight different sets of minimum block size and block homogeneity threshold.

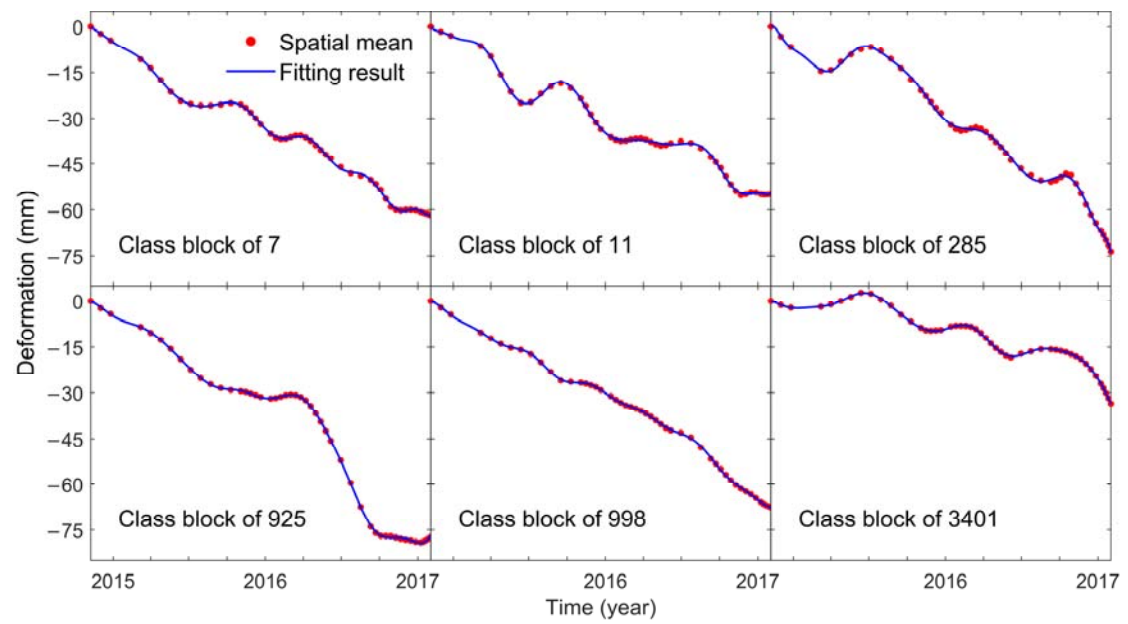


Figure S3. The spatial mean of the deformation values corresponding to the 6 segmented blocks and the Fourier curve fitting results. The red dot represents the spatial mean of the deformation value corresponding to the class block, and the blue solid line represents the Fourier curve fitting result.



Figure S4. The spatial modeling results corresponding to the 48 periods interferometric synthetic aperture radar (InSAR) displacement time series data relative to November 8, 2014 in central valley aquifer system (CVAS). Warm colors (i.e., positive values) denote surface displacements toward the satellite, and the cold colors (i.e., negative values) denote the away-motion from the satellite. Circles represent locations of global navigation satellite system sites, and filled colors represent the deformation values.



Figure S5. Interferometric synthetic aperture radar (InSAR) displacement residuals of spatial modeling results in central valley aquifer system (CVAS). Warm colors (i.e., positive values) denote surface displacements toward the satellite, and the cold colors (i.e., negative values) denote the away-motion from the satellite. The value in the upper right corner represents the root-mean-square error value of the spatial modeling result.

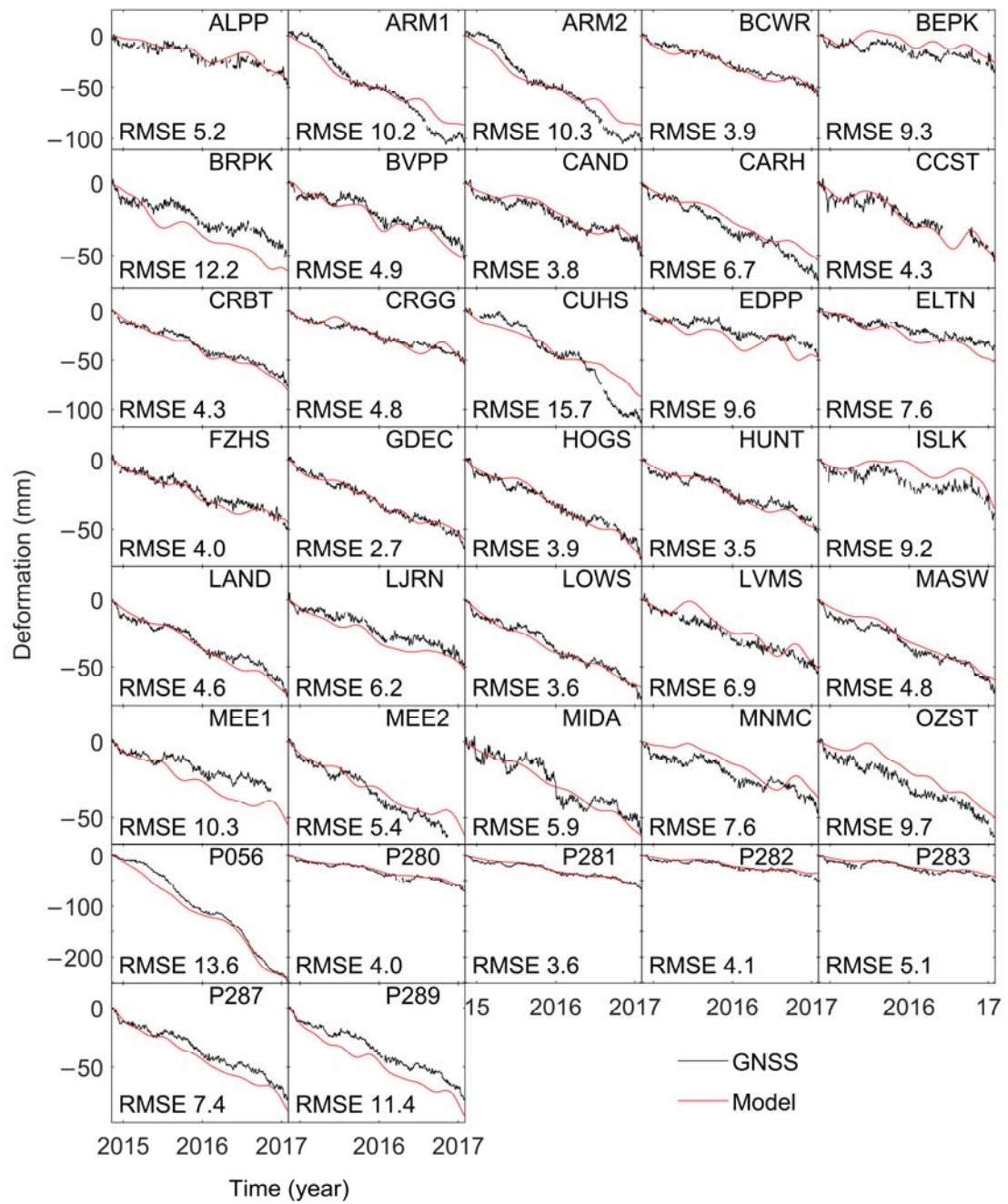


Figure S6a. The spatial modeling results and original displacements in the line-of-sight (LOS) direction of 37 global navigation satellite system (GNSS) sites in central valley aquifer system (CVAS). The red line is the spatial modeling results, the black line is the original GNSS displacement in the LOS direction. The value in the lower left corner represents the root-mean-square error value of the spatial modeling result.

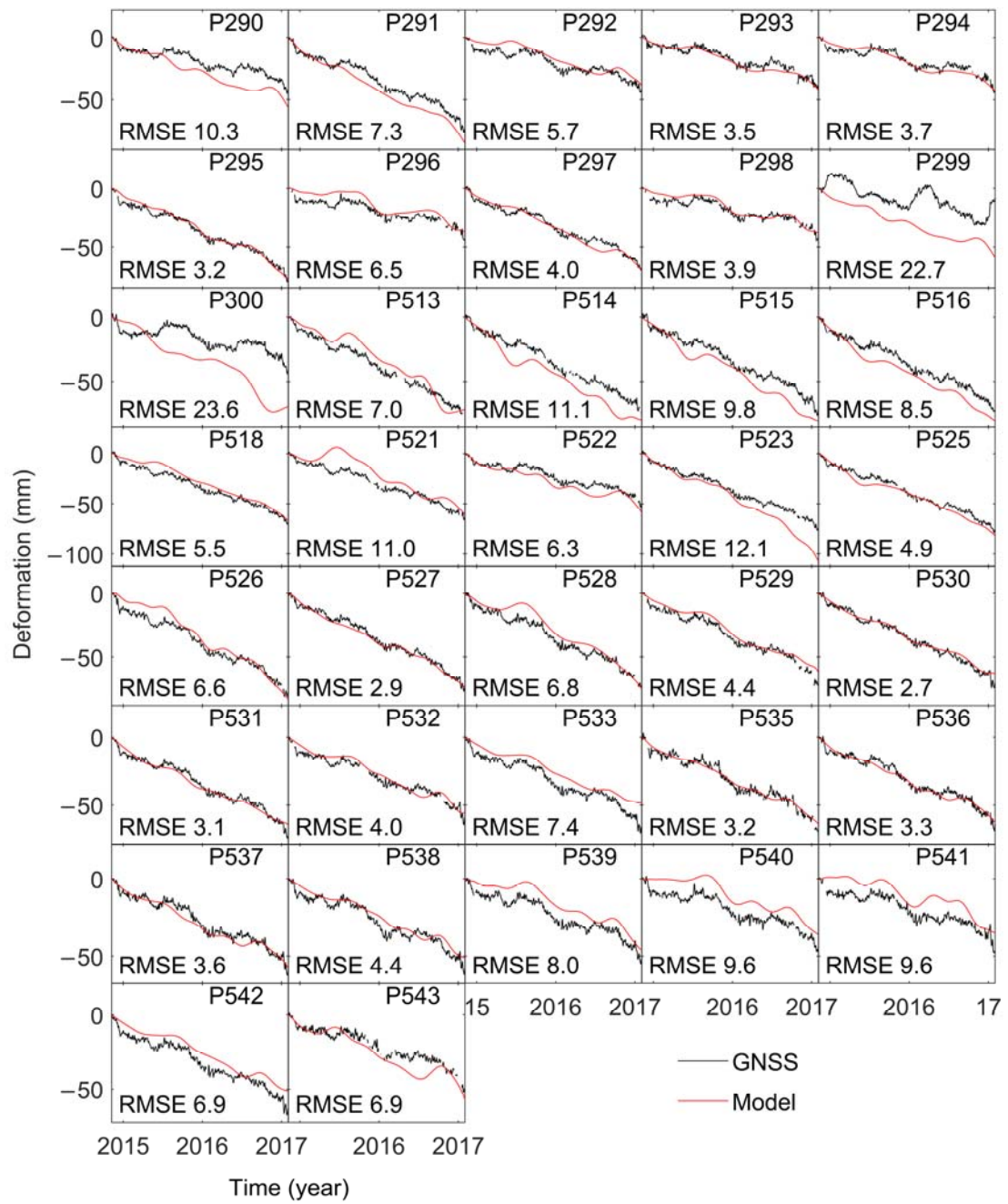


Figure S6b. The spatial modeling results and original displacements in the line-of-sight (LOS) direction of other 37 global navigation satellite system (GNSS) sites in central valley aquifer system (CVAS). The red line is the spatial modeling results, the black line is the original GNSS displacement in the LOS direction. The value in the lower left corner represents the root-mean-square error value of the spatial modeling result.

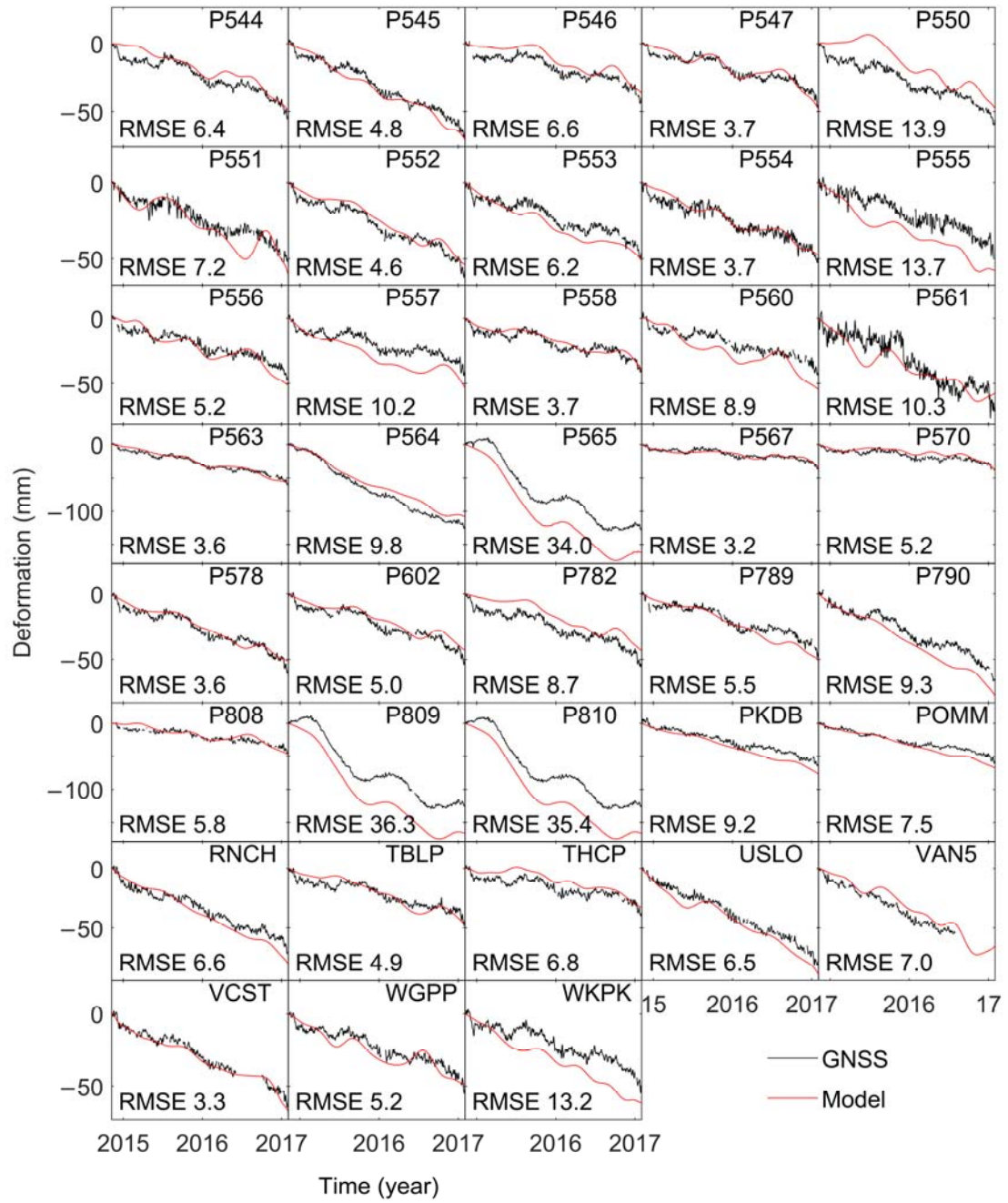


Figure S6c. The spatial modeling results and original displacements in the line-of-sight (LOS) direction of other 38 global navigation satellite system (GNSS) sites in central valley aquifer system (CVAS). The red line is the spatial modeling results, the black line is the original GNSS displacement in the LOS direction. The value in the lower left corner represents the root-mean-square error value of the spatial modeling result.



Figure S7. The fusion results corresponding to the 48 periods interferometric synthetic aperture radar (InSAR) displacement time series data relative to November 8, 2014 in central valley aquifer system (CVAS). Warm colors (i.e., positive values) denote surface displacements toward the satellite, and the cold colors (i.e., negative values) denote the away-motion from the satellite. Circles represent locations of global navigation satellite system sites, and filled colors represent the deformation values.

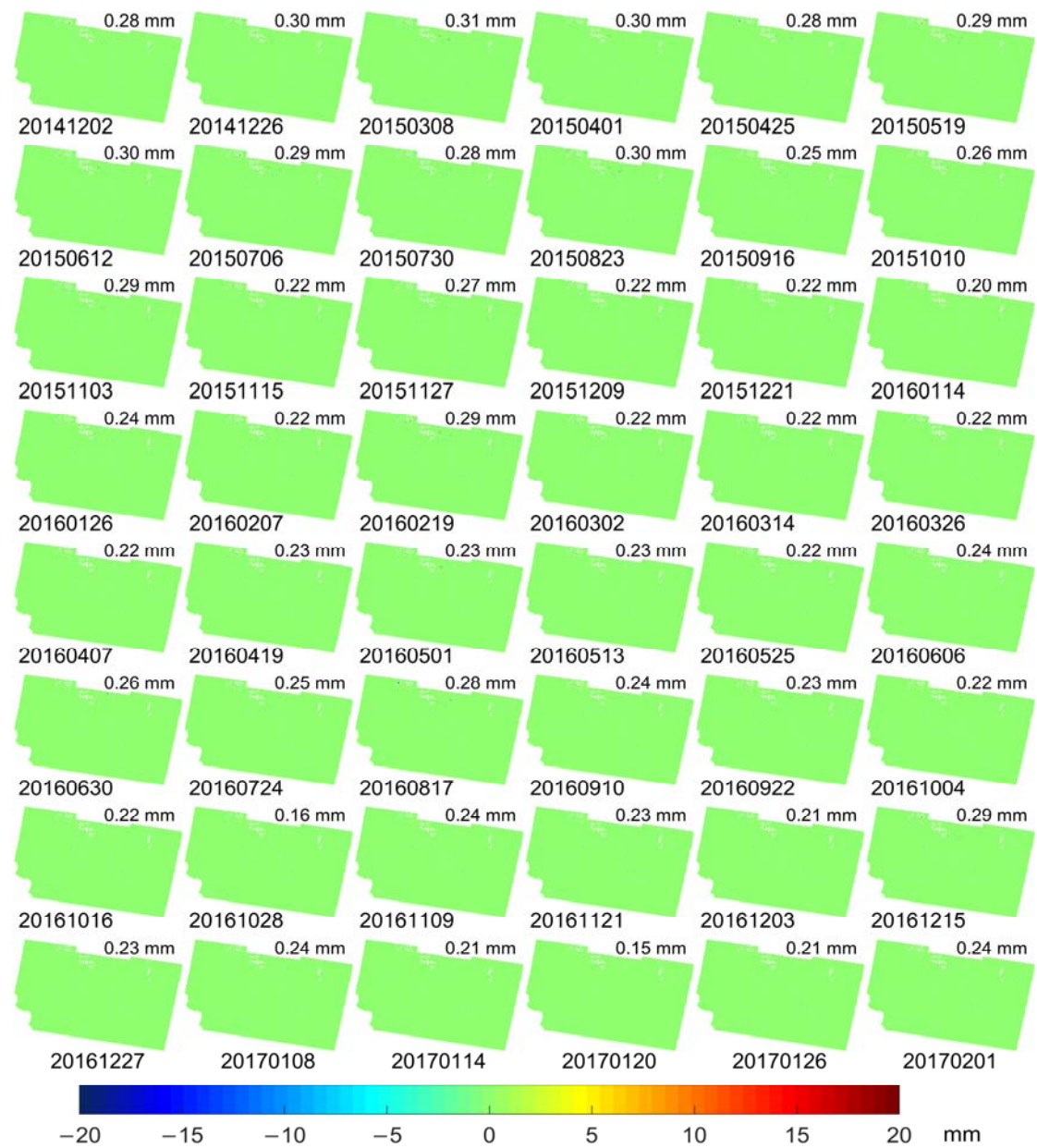


Figure S8. Interferometric synthetic aperture radar (InSAR) displacement residuals of fusion results in central valley aquifer system (CVAS). Warm colors (i.e., positive values) denote surface displacements toward the satellite, and the cold colors (i.e., negative values) denote the away-motion from the satellite. The value in the upper right corner represents the root-mean-square error value of the fusion result.

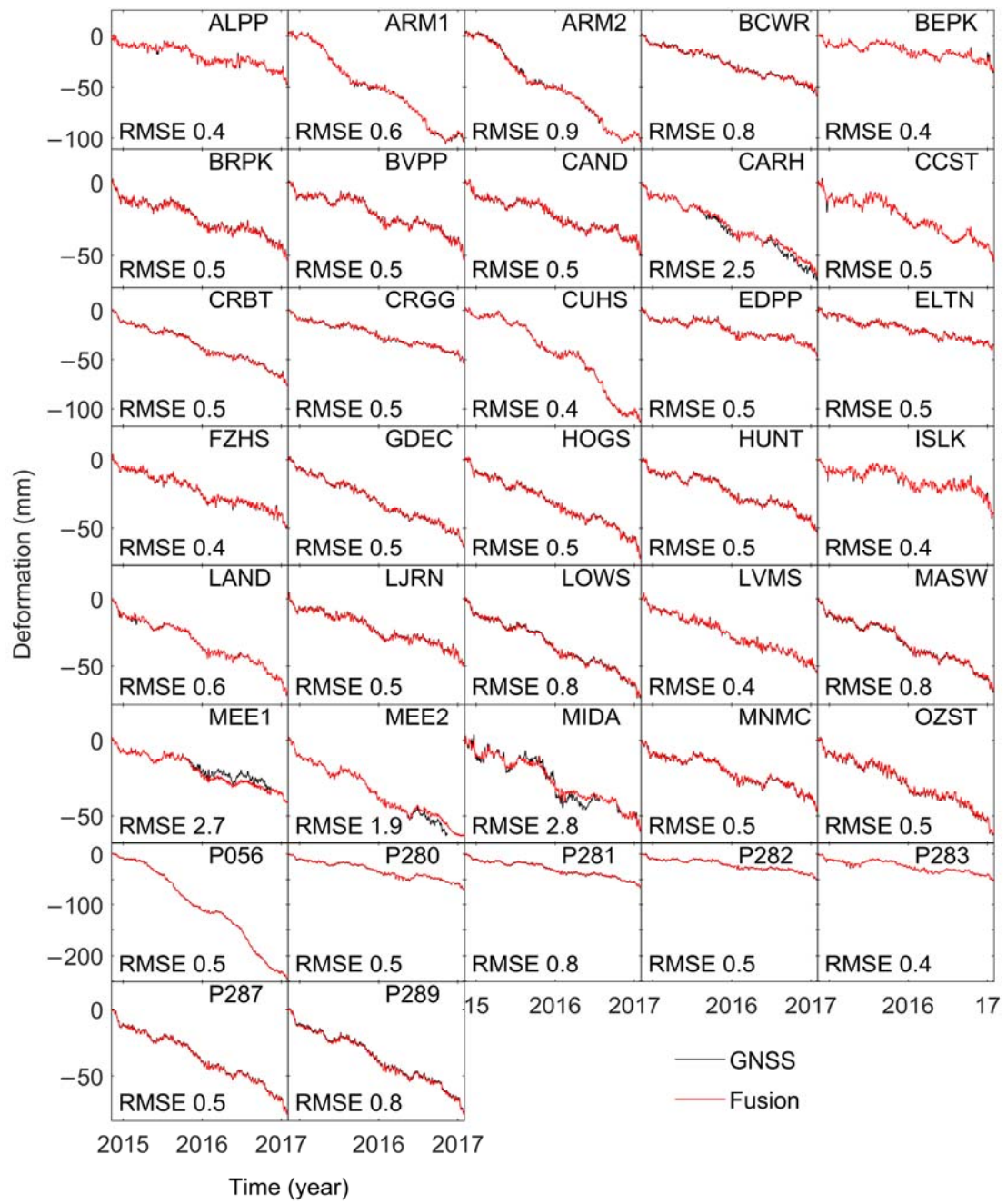


Figure S9a. The fusion results and original displacements in the line-of-sight (LOS) direction of 37 global navigation satellite system (GNSS) sites in central valley aquifer system (CVAS). The red line is the spatial modeling results, the black line is the original GNSS displacement in the LOS direction. The value in the lower left corner represents the root-mean-square error value of the fusion result.

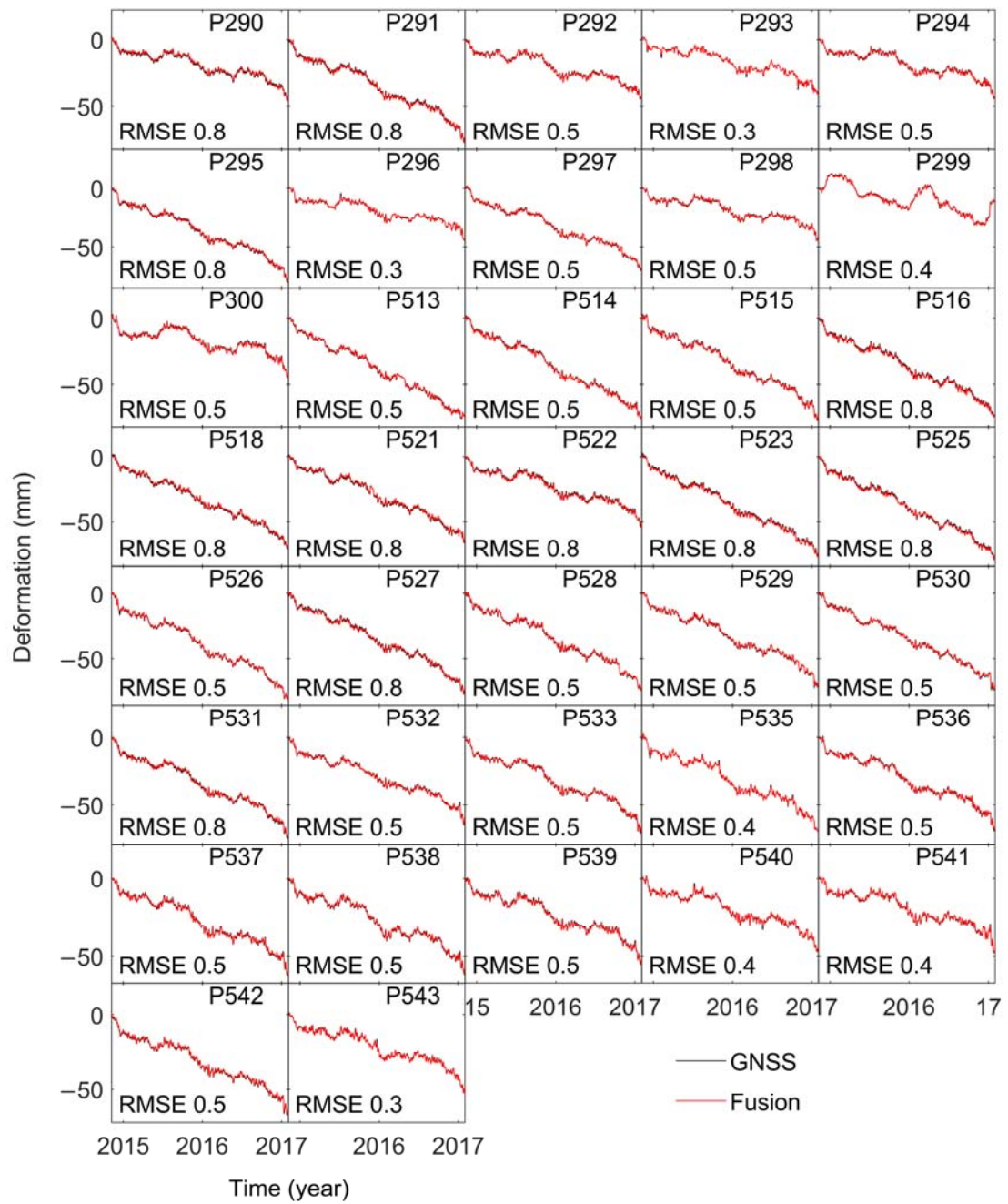


Figure S9b. The fusion results and original displacements in the line-of-sight (LOS) direction of other 37 global navigation satellite system (GNSS) sites in central valley aquifer system (CVAS). The red line is the spatial modeling results, the black line is the original GNSS displacement in the LOS direction. The value in the lower left corner represents the root-mean-square error value of the fusion result.

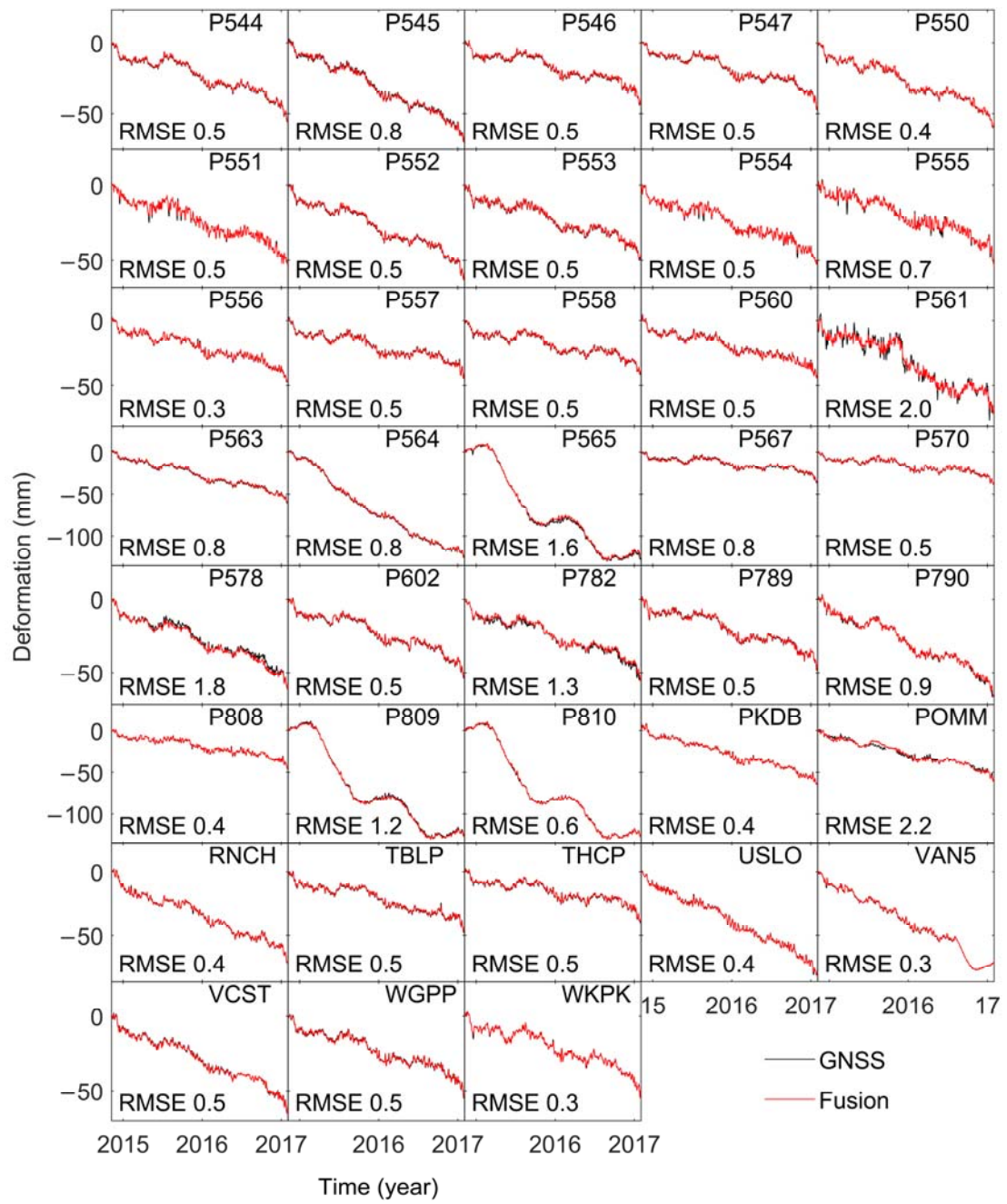


Figure S9c. The fusion results and original displacements in the line-of-sight (LOS) direction of other 38 global navigation satellite system (GNSS) sites in central valley aquifer system (CVAS). The red line is the spatial modeling results, the black line is the original GNSS displacement in the LOS direction. The value in the lower left corner represents the root-mean-square error value of the fusion result.



Figure S10. The leave-one-out cross-validation results corresponding to the 48 periods interferometric synthetic aperture radar (InSAR) displacement time series data relative to November 8, 2014 in central valley aquifer system (CVAS). Warm colors (i.e., positive values) denote surface displacements toward the satellite, and the cold colors (i.e., negative values) denote the away-motion from the satellite. Circles represent locations of global navigation satellite system sites, and filled colors represent the deformation values.



Figure S11. Interferometric synthetic aperture radar (InSAR) displacement residuals of leave-one-out cross-validation results in central valley aquifer system (CVAS). Warm colors (i.e., positive values) denote surface displacements toward the satellite, and the cold colors (i.e., negative values) denote the away-motion from the satellite. The value in the upper right corner represents the root-mean-square error value of the leave-one-out cross-validation result.

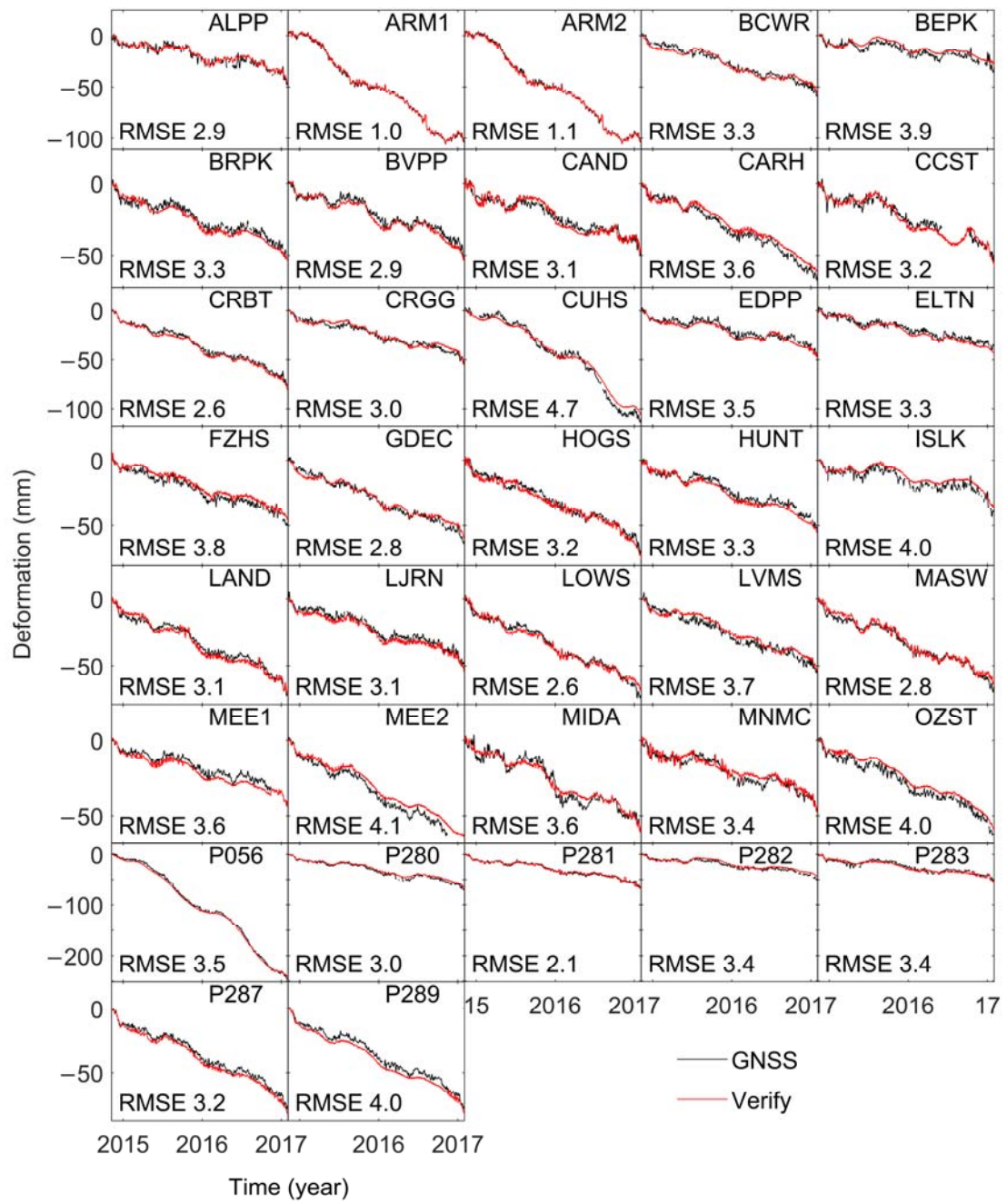


Figure S12a. The leave-one-out cross-validation results and original displacements in the line-of-sight (LOS) direction of 37 global navigation satellite system (GNSS) sites in central valley aquifer system (CVAS). The red line is the spatial modeling results, the black line is the original GNSS displacement in the LOS direction. The value in the lower left corner represents the root-mean-square error value of the leave-one-out cross-validation result.

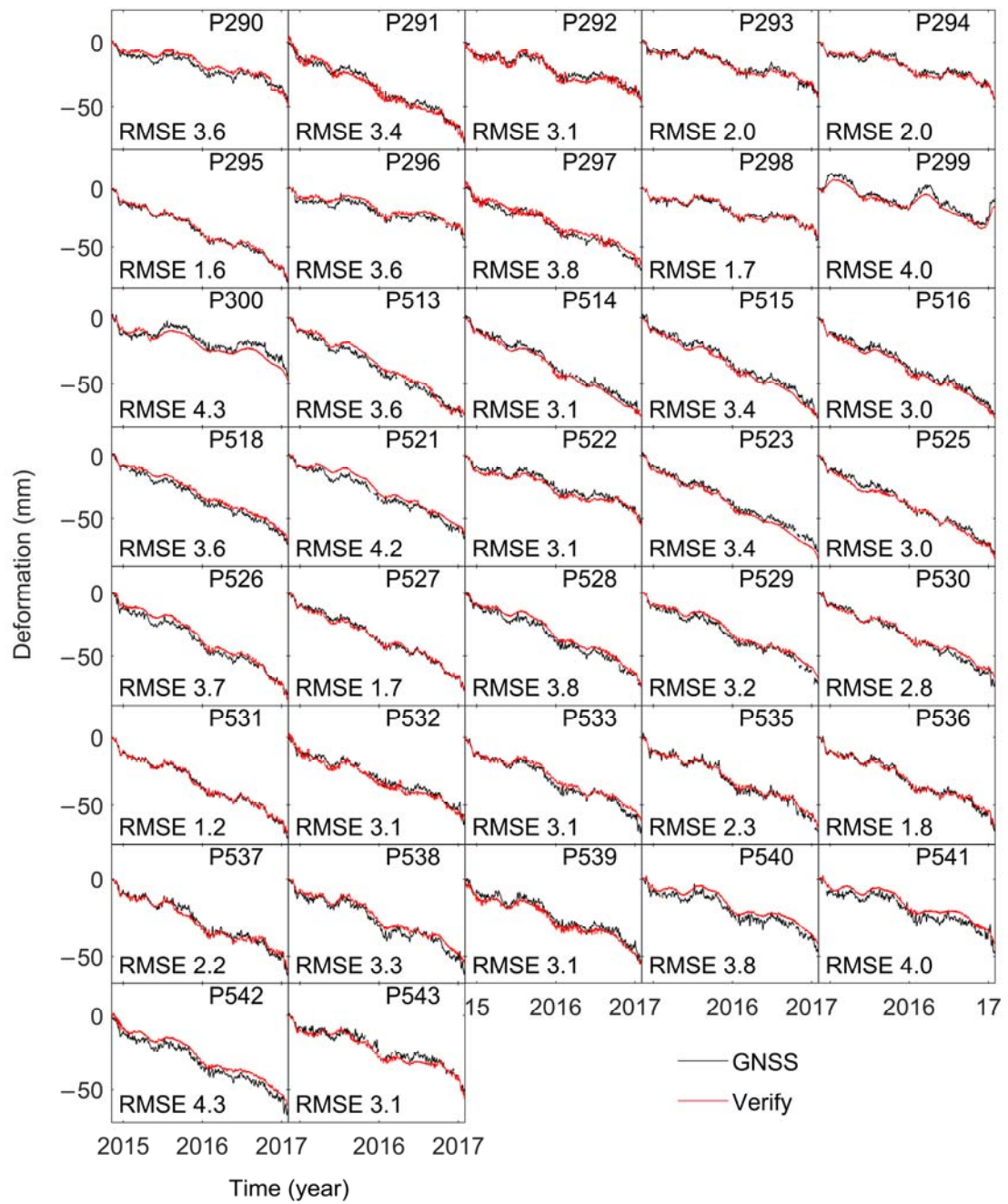


Figure S12b. The leave-one-out cross-validation results and original displacements in the line-of-sight (LOS) direction of other 37 global navigation satellite system (GNSS) sites in central valley aquifer system (CVAS). The red line is the spatial modeling results, the black line is the original GNSS displacement in the LOS direction. The value in the lower left corner represents the root-mean-square error value of the leave-one-out cross-validation result.

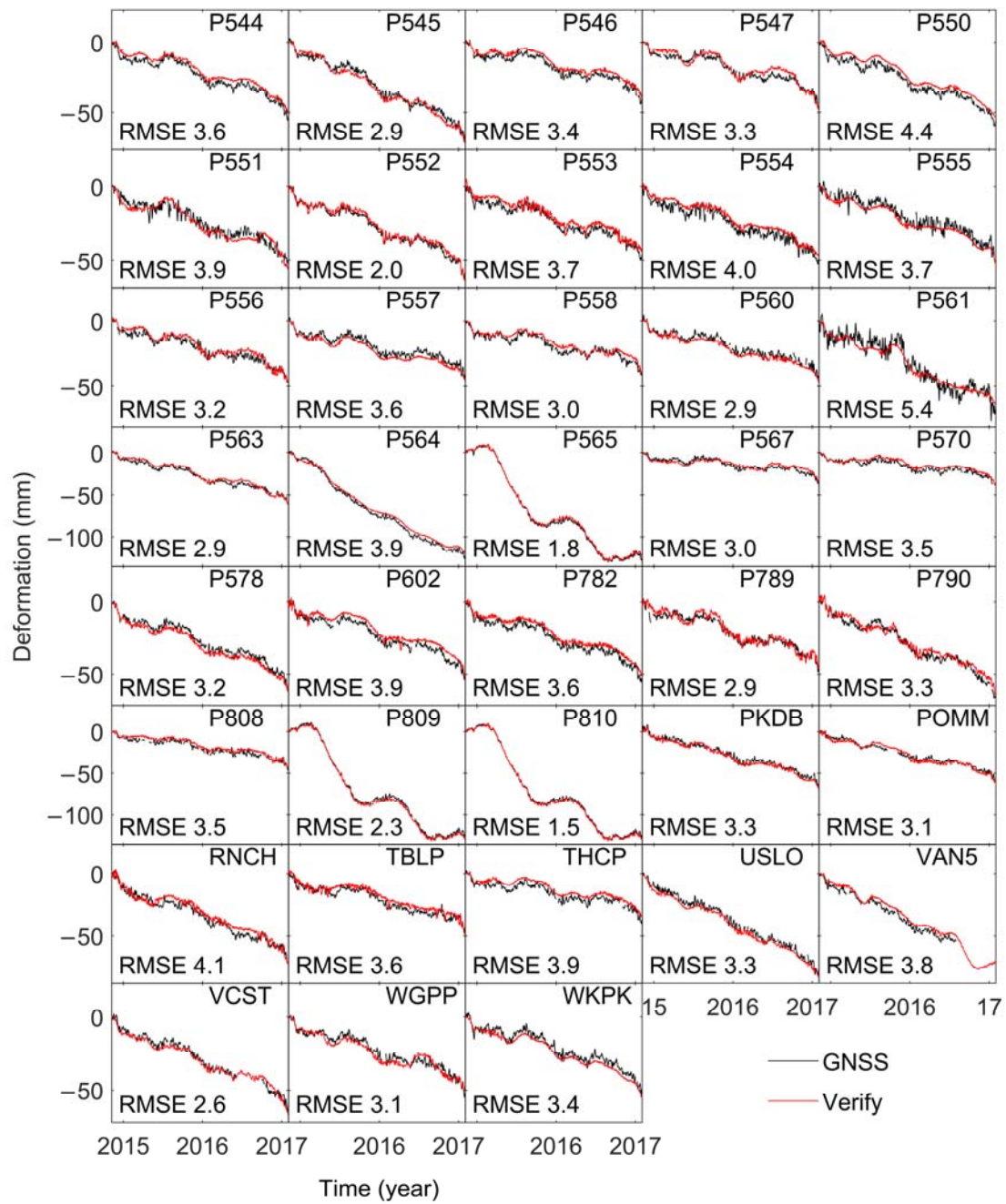


Figure S12c. The leave-one-out cross-validation results and original displacements in the line-of-sight (LOS) direction of other 38 global navigation satellite system (GNSS) sites in central valley aquifer system (CVAS). The red line is the spatial modeling results, the black line is the original GNSS displacement in the LOS direction. The value in the lower left corner represents the root-mean-square error value of the leave-one-out cross-validation result.

Table S1. Date values corresponding to simulated interferometric synthetic aperture radar (InSAR) data

137A_04234_141413	137A_04439_131313	115D_04601_131313
2011-06-03	2011-06-03	2011-06-01
2011-06-15	2011-06-15	2011-06-13
2011-06-27	2011-06-27	2011-06-25
2011-07-09	2011-07-09	2011-07-07
2011-07-21	2011-07-21	2011-07-19
2011-08-02	2011-08-02	2011-07-31
2011-08-14	2011-08-14	2011-08-12

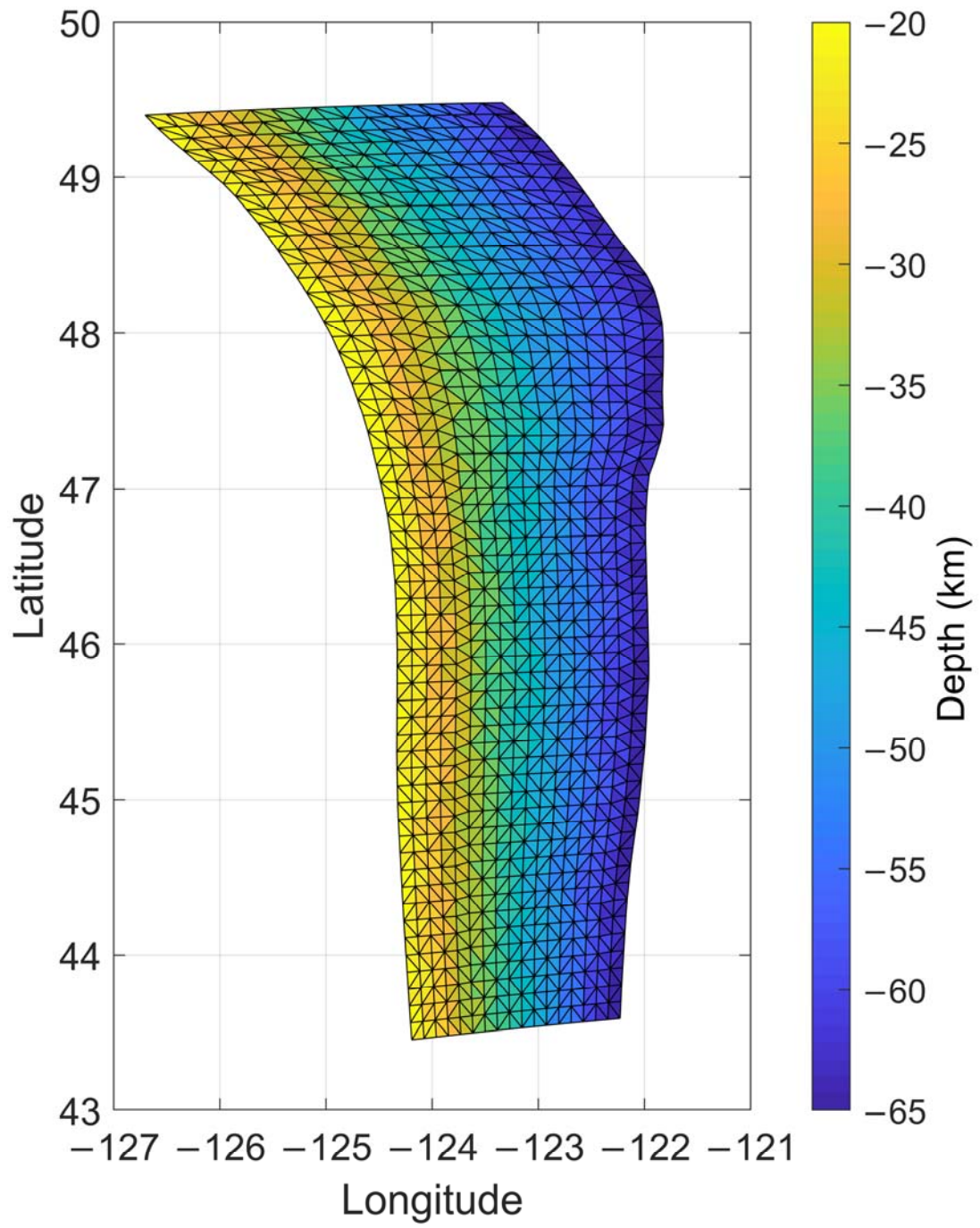


Figure S13. The spatial distribution map of the triangular dislocation grid of the Cascadia subduction zone. The value corresponding to the colorbar is the depth value from the surface.

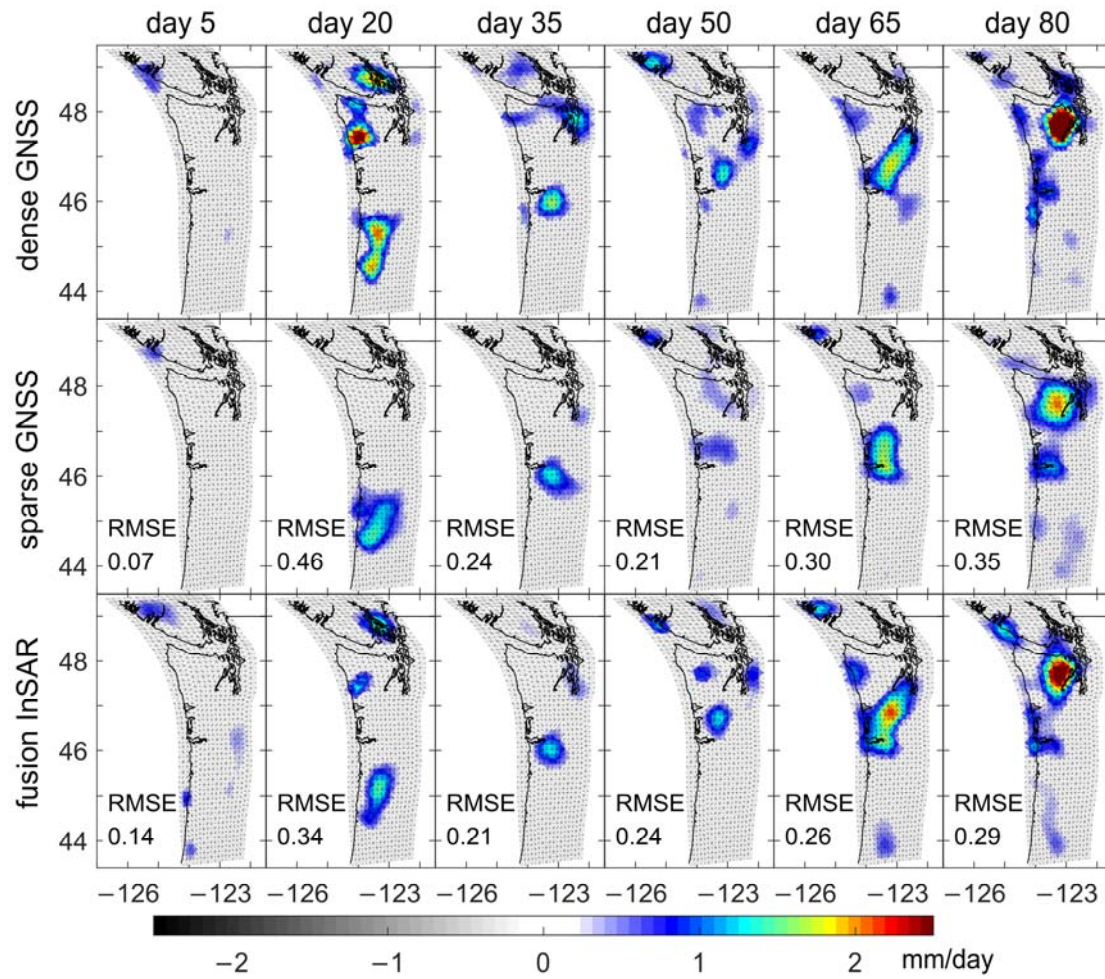


Figure S14a. The spatial distribution of the slip rate (day 5 to day 80 in 15-day intervals) corresponding to the three experimental schemes. The value of days is the accumulated days corresponding to the first day. Root-mean-square error values were calculated relative to the difference of the first experimental scheme.

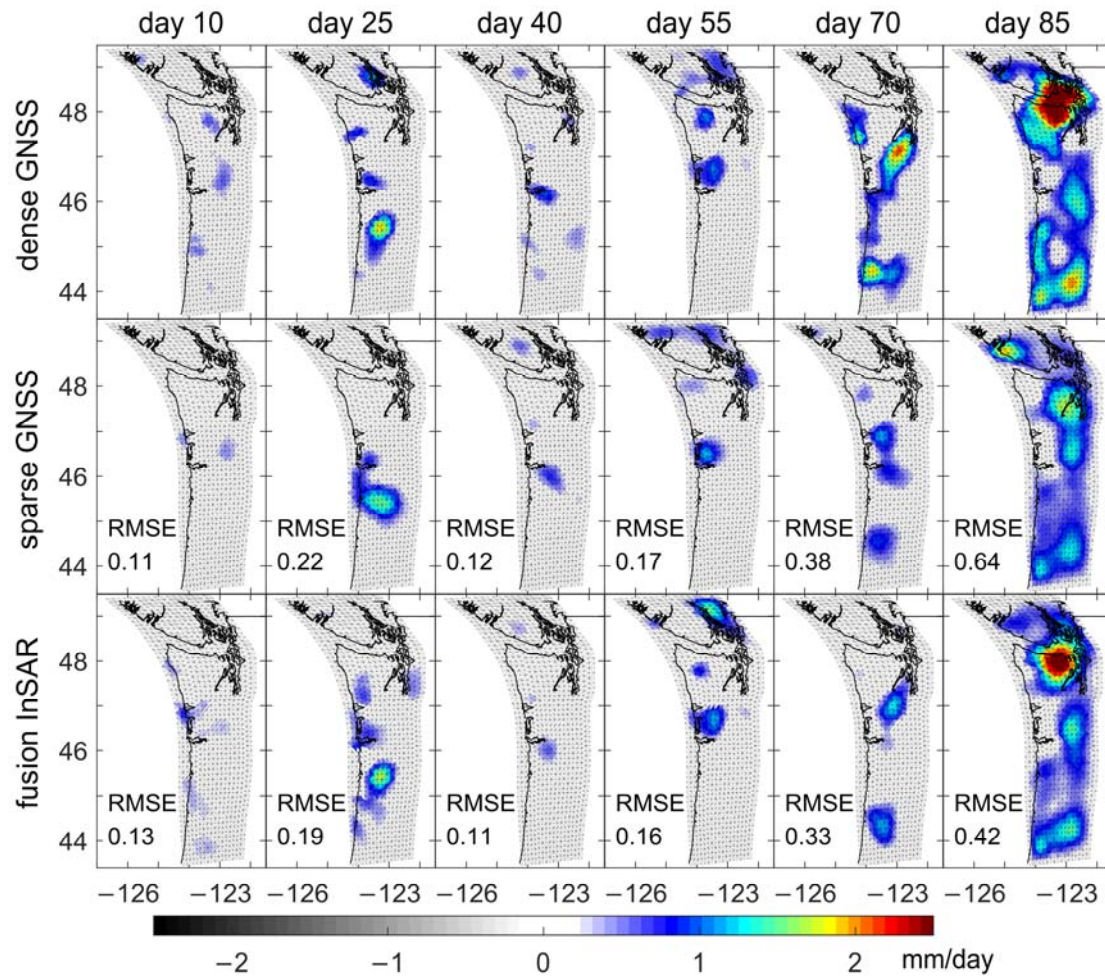


Figure S14b. The spatial distribution of the slip rate (day 10 to day 85 in 15-day intervals) corresponding to the three experimental schemes. The value of days is the accumulated days corresponding to the first day. Root-mean-square error values were calculated relative to the difference of the first experimental scheme.

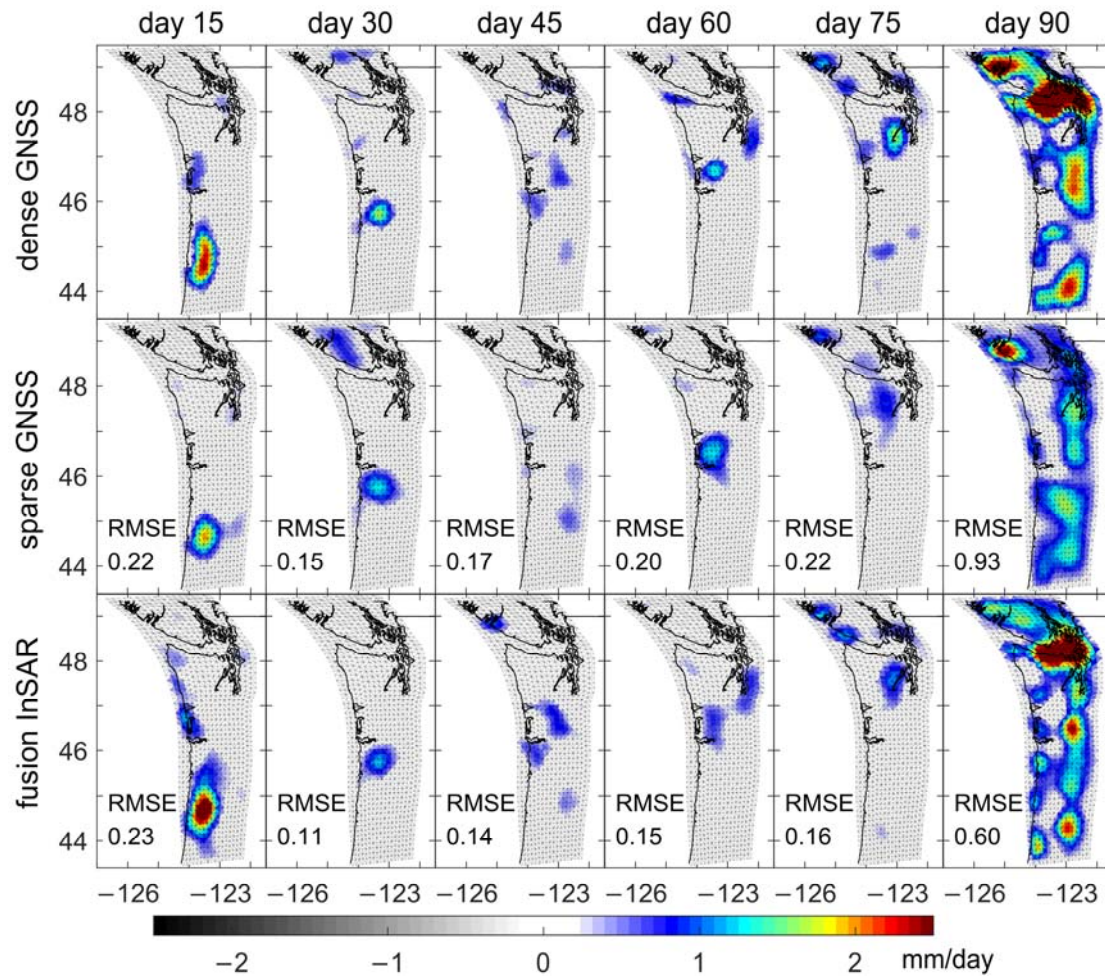


Figure S14c. The spatial distribution of the slip rate (day 15 to day 90 in 15-day intervals) corresponding to the three experimental schemes. The value of days is the accumulated days corresponding to the first day. Root-mean-square error values were calculated relative to the difference of the first experimental scheme.