SUPPLEMENTARY TABLES AND FIGURES

Supplementary Table S1. Comparison between the number of PS of the original datasets and those of the subsets obtained through the outliers exclusion process to perform statistical normal distributions of PSs.

PS original dataset	Number of PSs	PS normal subsets	New number of PSs	PSs numeric difference
ERS_T358_F819_CL003_CAPOSELE_A	38864	ERS_T358_F819_CL003_CAPOSELE_A_NORM	36951	1913
ERS_T358_F819_CL002_BENEVENTO_A	45672	ERS_T358_F819_CL002_BENEVENTO_A_NORM	43481	2191
ERS_T494_F2781_CL001_POTENZA_D	75178	ERS_T494_F2781_CL001_POTENZA_NORM_D	69966	5212
ENVISAT_T86_F816_CL001_FOGGIA_A	391518	ENVISAT_T86_F816_CL001_FOGGIA_A_NORM	346281	45237
ENVISAT_T358_F801_CL001_SALERNO_A	248986	ENVISAT_T358_F801_CL001_SALERNO_A_NORM	22649	22495
PST2009_ENVISAT_T358_F819_CL001_BENEVENTO_A	532482	PST2009_ENVISAT_T358_F819_CL001_BENEVENTO_A_NORM	506151	26331
ENVISAT_T265_F2781_CL001_AVELLINO_D	463801	ENVISAT_T265_F2781_CL001_AVELLINO_D_NORM	435579	28222

Supplementary Table S2. Number of ERS PSs in the subsets deriving from the selection with Cluster and Outlier Analysis mapping tool.

PS ERS SUBSETS - extraction of PS HH and LL	Number of PSs
ERS_T494_F2781_CL001_POTENZA_NORM_D_marzano	40113
ERS_T494_F2781_CL001_POTENZA_NORM_D_marzano_CO_2k_IDW*	40113
ERS_T494_F2781_CL001_POTENZA_NORM_D_marzano_CO_2k_IDW_nout°	15702
ERS_T358_F819_CL003_CAPOSELE_NORM_ASCE_marzano	14783
ERS_T358_F819_CL003_CAPOSELE_NORM_ASCE_marzano_CO_2k_IDW*	14783
ERS_T358_F819_CL003_CAPOSELE_NORM_ASCE_marzano_CO_2k_IDW_nout°	8063
ERS_T358_F819_CL002_BENEVENTO_A_NORM_marzano	5853
ERS_T358_F819_CL002_BENEVENTO_A_NORM_marzano_CO_2k_IDW*	5853
ERS_T358_F819_CL002_BENEVENTO_A_NORM_marzano_CO_2k_IDW_nout°	1495

*Subsets with "... CO_2k_IDW" are obtained through Cluster and Outlier Analysis and have the same number of PSs of the "... NORM_D_marzano" or "... NORM_A_marzano"

°PSs in the subsets with "... CO_2k_IDW_nout" not include those classified as "not significant", "high outlier (HL)" and "low outlier (LH)"

Supplementary Table S3. Number of ENVISAT PSs in the subsets deriving from the selection with Cluster and Outlier Analysis.

PS ENVISAT SUBSETS - extraction of PS HH and LL	Number of PSs
PST2009_ENVISAT_T265_F2781_CL001_AVELLINO_DESCE_NORM_marzano	64427
PST2009_ENVISAT_T265_F2781_CL001_AVELLINO_DESCE_NORM_marzano_CO_2k_IDW*	64427
PST2009_ENVISAT_T265_F2781_CL001_AVELLINO_DESCE_NORM_marzano_CO_2k_IDW_nout°	23579
ENVISAT_T86_F816_CL001_FOGGIA_ASCE_NORM_marzano	87762
ENVISAT_T86_F816_CL001_FOGGIA_ASCE_NORM_marzano_CO_2k_IDW*	87762
ENVISAT_T86_F816_CL001_FOGGIA_ASCE_NORM_marzano_CO_2k_IDW_nout°	31085
PST2009_ENVISAT_T358_F819_CL001_BENEVENTO_ASCE_NORM_marzano	5200
PST2009_ENVISAT_T358_F819_CL001_BENEVENTO_ASCE_NORM_marzano_CO_2k_IDW*	5200
PST2009_ENVISAT_T358_F819_CL001_BENEVENTO_ASCE_NORM_marzano_CO_2k_IDW_nout°	1363
ENVISAT_T358_F801_CL001_SALERNO_ASCE_NORM_marzano	26327
ENVISAT_T358_F801_CL001_SALERNO_ASCE_NORM_marzano_CO_2k_IDW*	26327
ENVISAT_T358_F801_CL001_SALERNO_ASCE_NORM_marzano_CO_2k_IDW_nout°	9811

*Subsets with "... CO_2k_IDW" are those obtained through Cluster and Outlier Analysis and they have the same number of PSs of the "... NORM_D_marzano" or "... NORM_A_marzano"

° PSs in the subsets with "... CO_2k_IDW_nout" not include those classified as "not significant", "high outlier (HL)" and "low outlier (LH)".

Supplementary Table S4. ERS PSs selection with Cluster and Outlier Analysis.

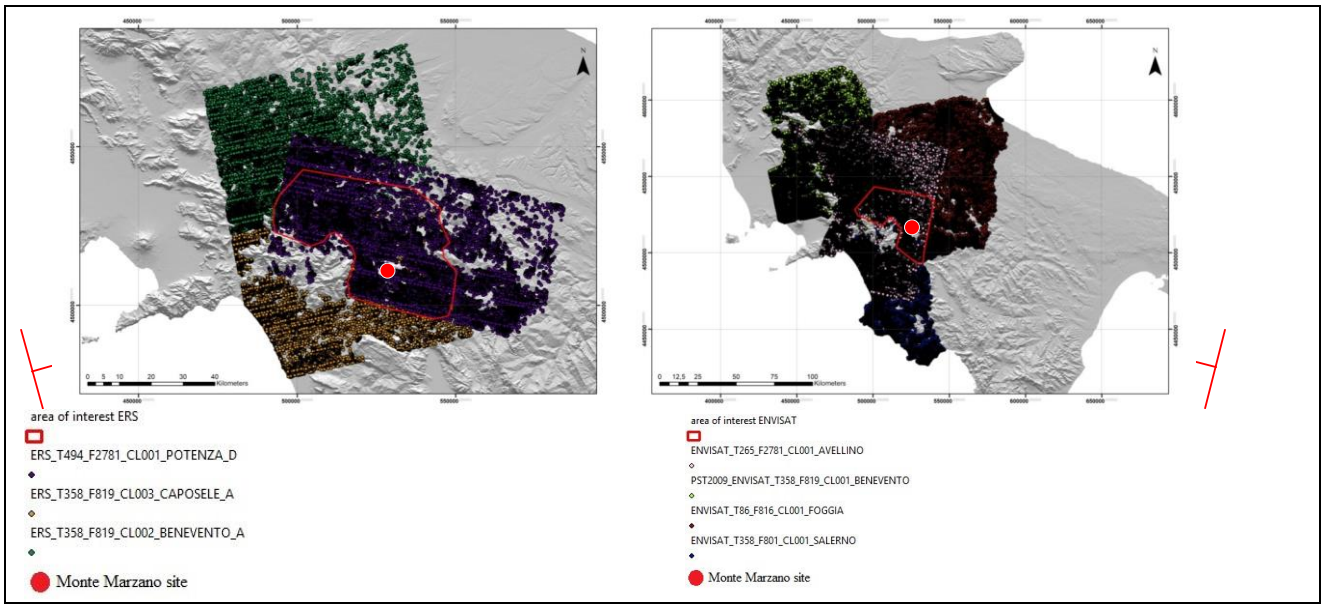
PS ERS SUBSETS - extraction of PS HH and LL	Number of PSs
ERS_T494_F2781_CL001_POTENZA_NORM_D_marzano_CO_2k_IDW	
Not Significant*	21100*
Cluster: High (HH)	8145
Cluster: Low (LL)	7559
High Outlier (HL)*	1500*
Low Outlier (LH)*	1811*
ERS_T358_F819_CL003_CAPOSELE_NORM_ASCE_marzano_CO_2k_IDW	
Not Significant	6116*
Cluster: High (HH)	4243
Cluster: Low (LL)	3820
High Outlier (HL)*	126*
Low Outlier (LH)*	478*
ERS_T358_F819_CL002_BENEVENTO_A_NORM_marzano_CO_2k_IDW	
Not Significant*	4017*
Cluster: High (HH)	840
Cluster: Low (LL)	655
High Outlier (HL)*	105*
Low Outlier (LH)*	236*

* PS that are not included in the vertical mean velocity deformation maps processing

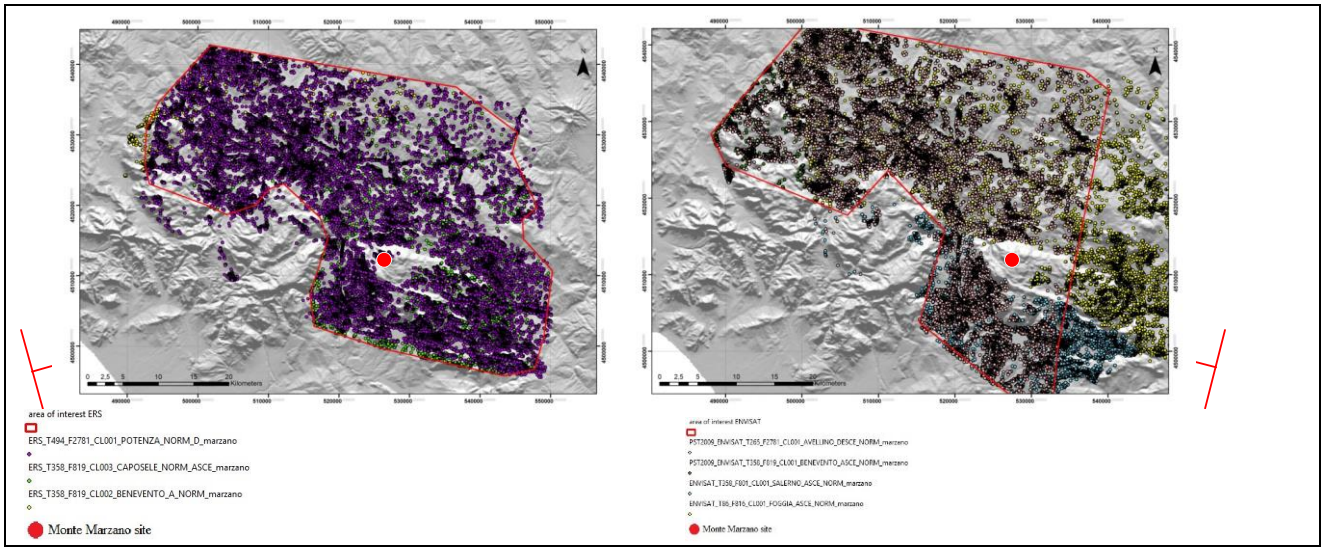
Supplementary Table S5. ENVISAT PSs selection with Cluster and Outlier Analysis.

PS ENVISAT SUBSETS - extraction of PS HH and LL	Number of PSs
PST2009_ENVISAT_T265_F2781_CL001_AVELLINO_DESCE_NORM_marzano_CO_2k_IDW	
Not Significant*	38683*
Cluster: High (HH)	12080
Cluster: Low (LL)	11499
High Outlier (HL)*	856*
Low Outlier (LH)*	1309*
ENVISAT_T86_F816_CL001_FOGGIA_ASCE_NORM_marzano_CO_2k_IDW	
Not Significant*	54212
Cluster: High (HH)	16366
Cluster: Low (LL)	14719
High Outlier (HL)*	1065*
Low Outlier (LH)*	1400*
PST2009_ENVISAT_T358_F819_CL001_BENEVENTO_ASCE_NORM_marzano_CO_2k_IDW	
Not Significant*	3701*
Cluster: High (HH)	716
Cluster: Low (LL)	647
High Outlier (HL)*	59*
Low Outlier (LH)*	77*
ENVISAT_T358_F801_CL001_SALERNO_ASCE_NORM_marzano_CO_2k_IDW	
Not Significant*	15410*
Cluster: High (HH)	4905
Cluster: Low (LL)	4905
High Outlier (HL)*	618*
Low Outlier (LH)*	488*

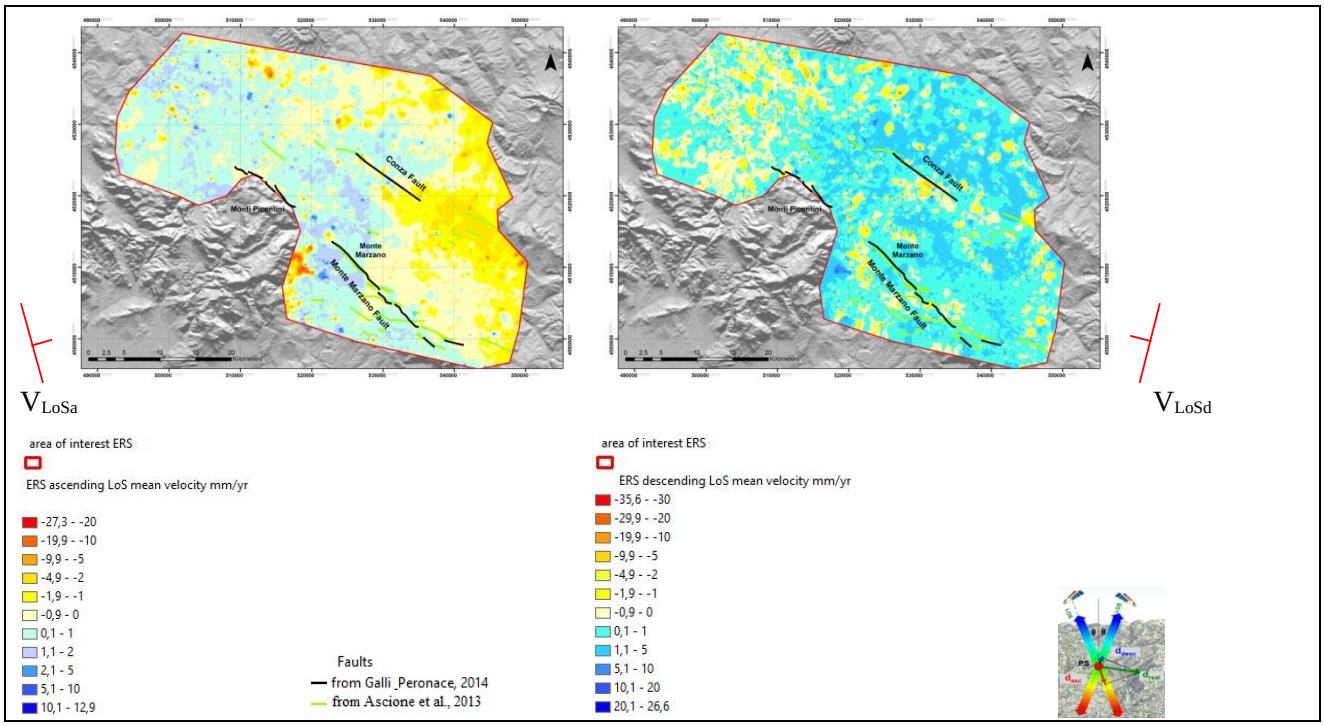
* PS that are not included in the vertical mean velocity deformation maps processing



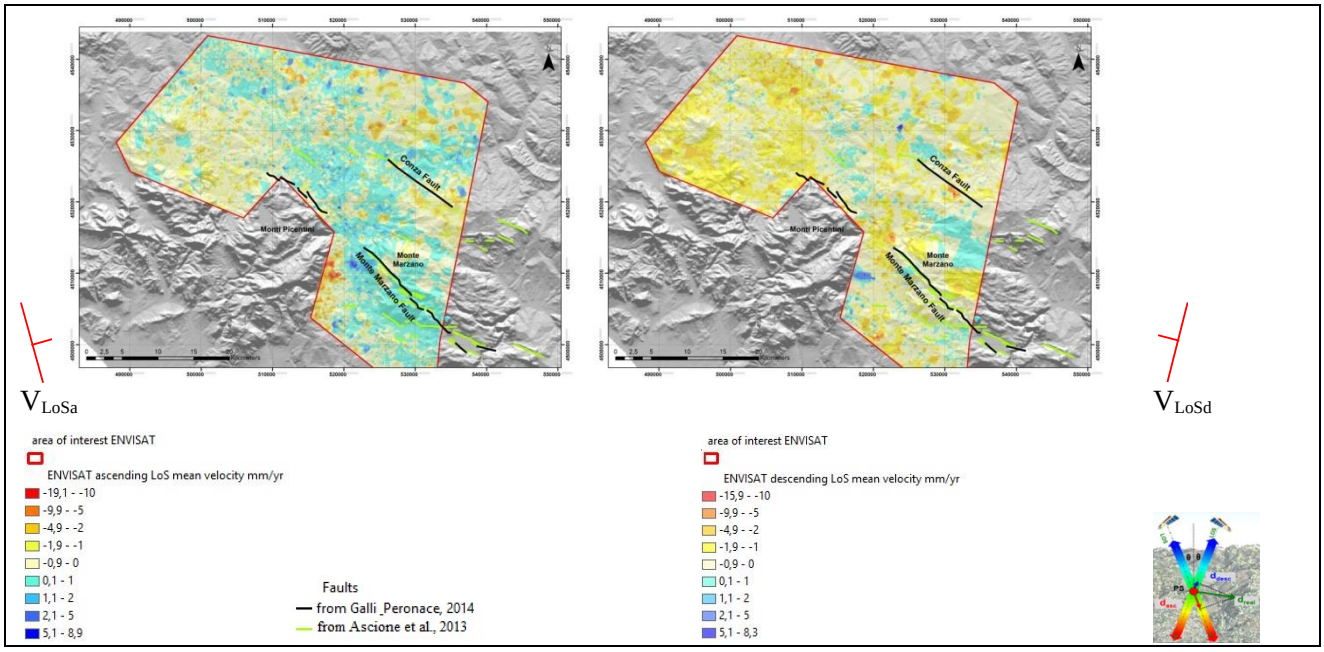
Supplementary Figure S1. Maps showing the original PS datasets. The diagram in the left shows ERS area of interest, where the three ascending and descending PS original datasets in the legend (below the diagram) overlap well each other. The diagram in the right shows the ENVISAT area of interest, where the four ascending and descending PS original datasets in the legend (below the diagram) overlap well each other.



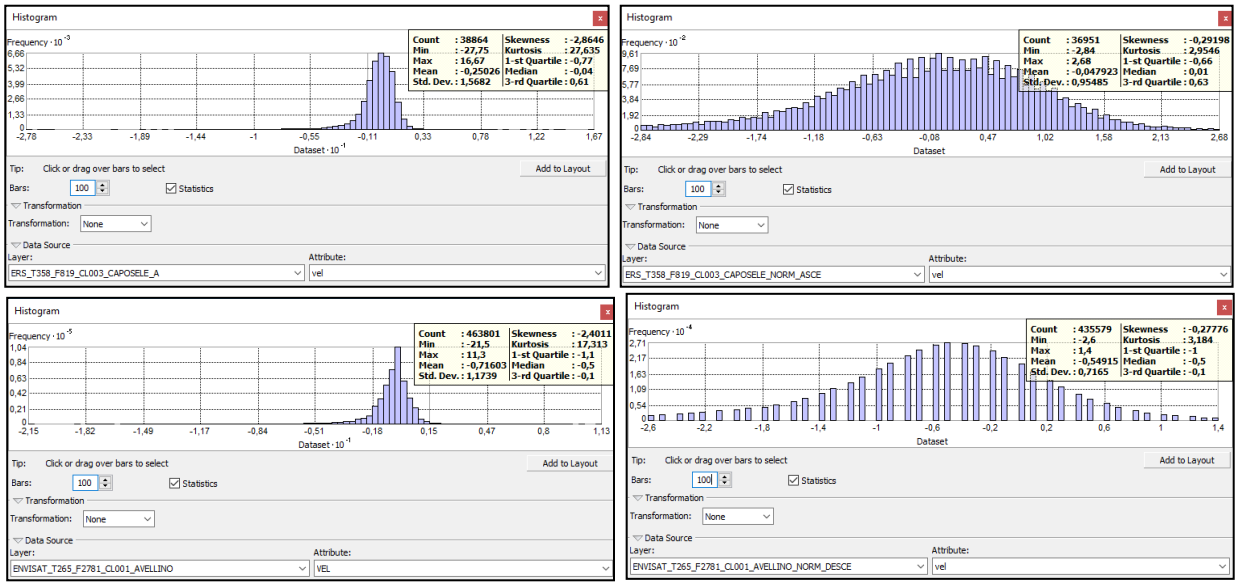
Supplementary Figure S2. Spatial selection of PS data. The diagram in the left shows the selected ERS PS data, which fall in the area of interest and form the three ERS subsets in the legend below the diagram. The diagram in the right side shows the selected ENVISAT PS data, which fall in the area of interest and form the four subsets in the legend below the diagram.



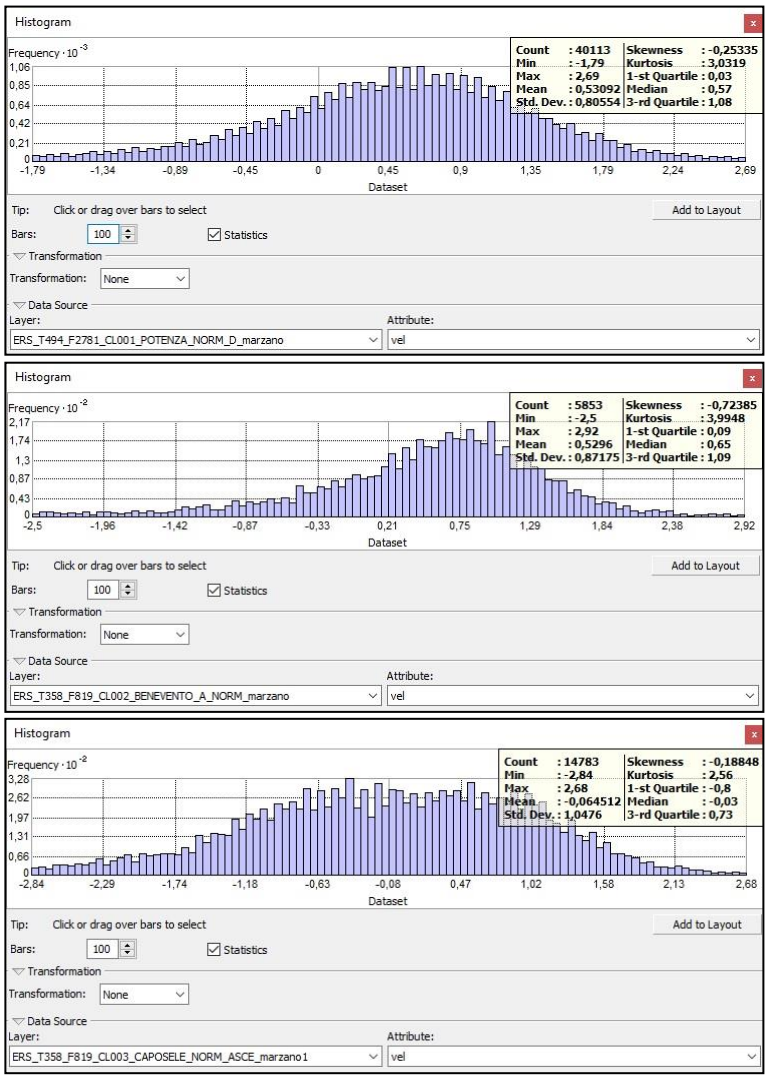
Supplementary Figure S3. LoS-oriented ascending and descending mean velocity maps in the 1992-2000 time span (IDW interpolation - cell size 50x50 m) of ERS 'native' PS datasets (normal + outliers). The maps are clipped around the area of interest.



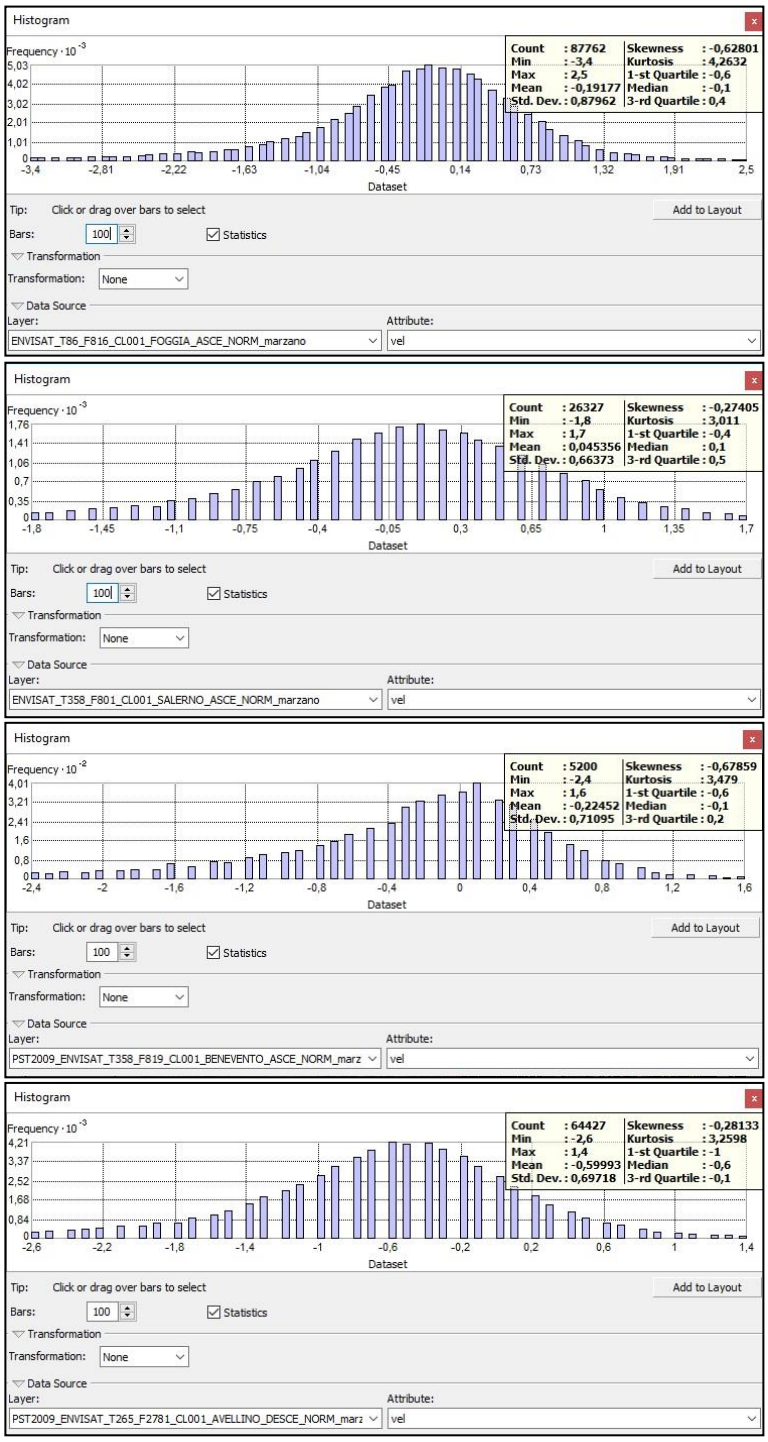
Supplementary Figure 4. LoS-oriented ascending (left side) and descending (right side) mean velocity maps in the 2003-2010 time span (IDW interpolation - cell size 50x50 m) of ENVISAT 'native' PS datasets (i.e. the datasets that include both normal and outlier PSs).



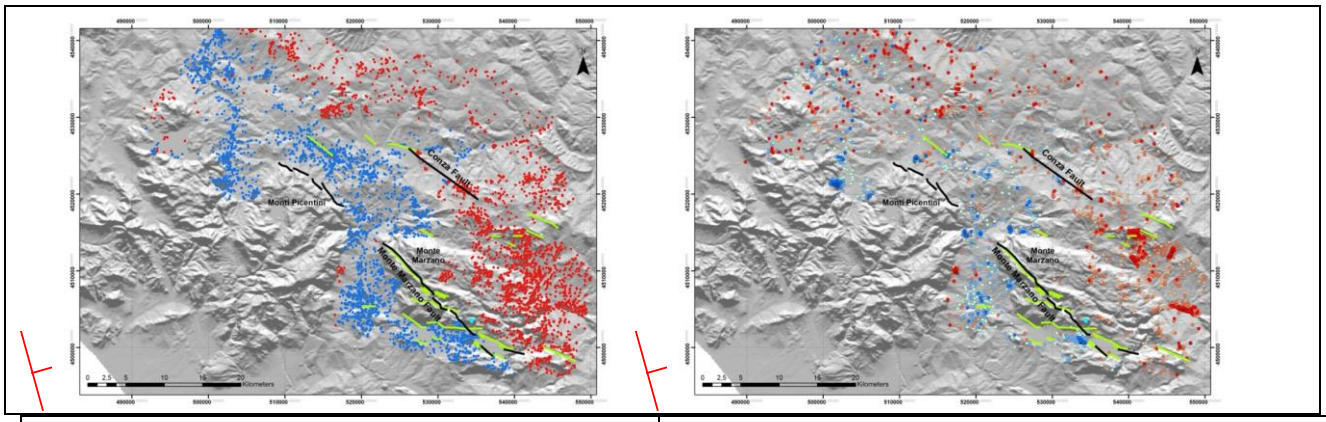
Supplementary Figure S5. Comparison between 'PS normal subsets' and 'native' datasets. Differences between distribution histograms of the original datasets ERS_T358_F819_CL003_CAPOSELE_A and ENVISAT_T265_F2781_CL001_AVELLINO_D, which do not have a normal distribution, with the extracted subsets, labelled ERS_T358_F819_CL003_CAPOSELE_A_NORM and ENVISAT_T265_F2781_CL001_AVELLINO_NORM_DESCE, which show normal distributions. In the left side, distribution histograms of the two original PS datasets are shown. In the right side, after applying the elimination of the outliers, are obtained two PS subsets with a normal distribution, which are renamed by adding "*norm*"



Supplementary Figure S6. The three ERS '*marzano*' subsets, which are characterised by statistically normal distribution.

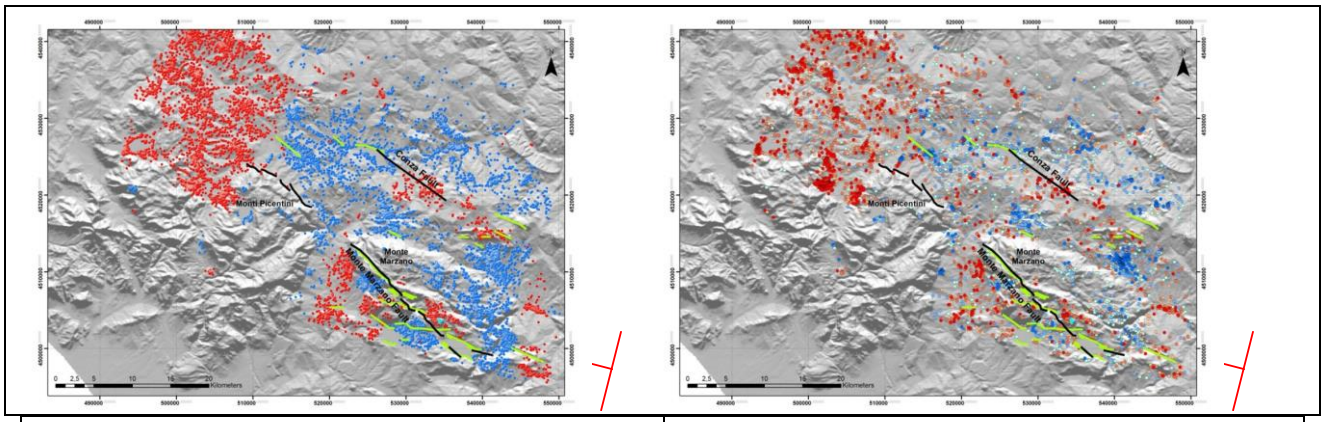


Supplementary Figure S7. The four ENVISAT "*marzano*" subsets, which are characterised by statistically normal distribution.



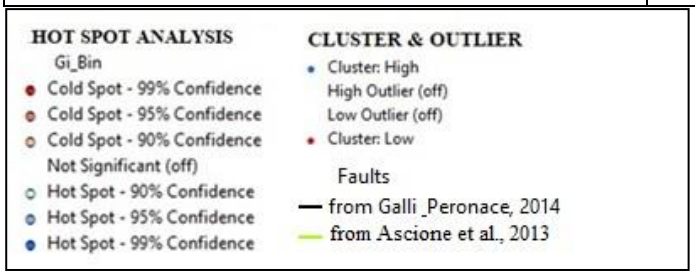
(a) Spatial distribution of the following PS ascending subsets from *Cluster and Outlier Analysis* : ERS_T358_F819_CL003_CAPOSELE_NORM_ASCE_marzano_CO_2k_IDW; ERS_T358_F819_CL002_BENEVENTO_A_NORM_marzano_CO_2k_IDW.

(b) Spatial distribution of the following PS ascending subsets from *Hot Spot Analysis* : ERS_T358_F819_CL003_CAPOSELE_NORM_ASCE_marzano_HS_2k_IDW; ERS_T358_F819_CL002_BENEVENTO_A_NORM_marzano_HS_2k_IDW.

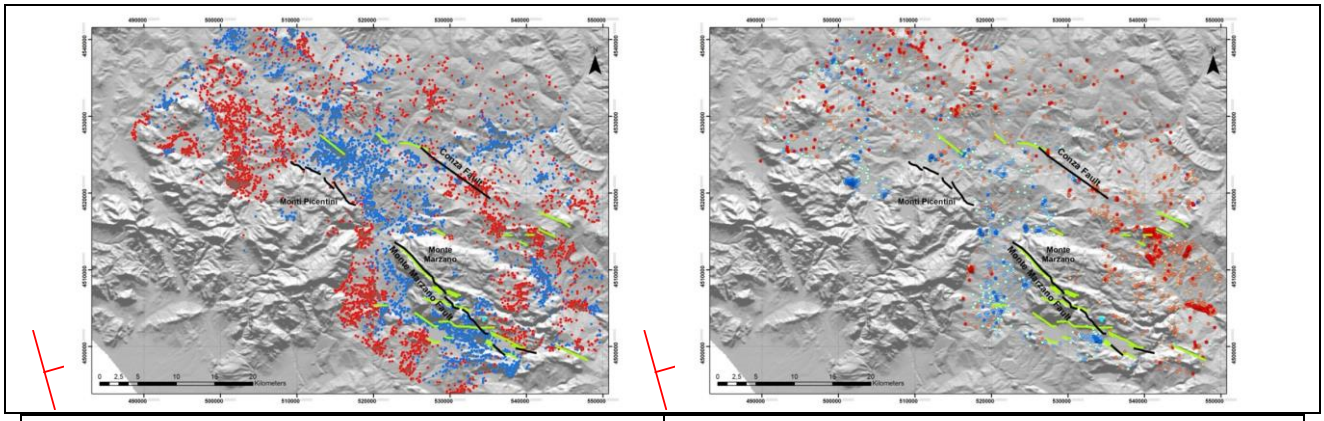


(c) Spatial distribution of the following PS descending subset from *Cluster and Outlier Analysis* : ERS_T494_F2781_CL001_POTENZA_NORM_D_marzano_CO_2k_IDW.

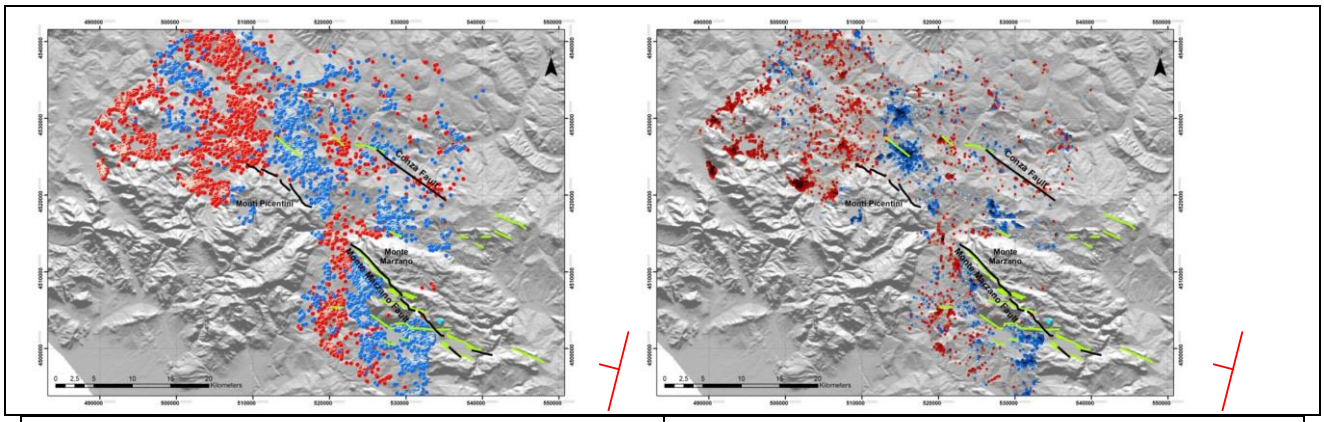
(d) Spatial distribution of the following PS descending subset from *Hot Spot Analysis* : ERS_T494_F2781_CL001_POTENZA_NORM_D_marzano_HS_2k_IDW.



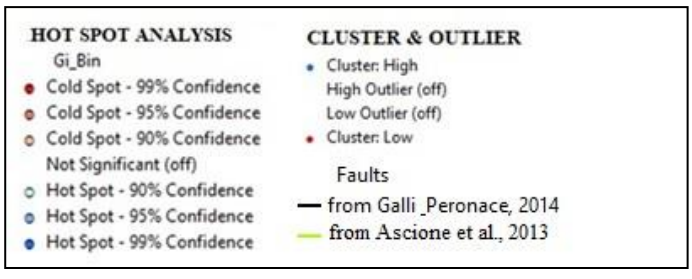
Supplementary Figure S8. Comparison of the results obtained applying the *Cluster and Outlier Analysis* (diagrams a and c) vs. the Hot Spot Analysis (diagrams b and d) to the ERS PS data subsets. In the representation of the Hot/Cold Spot maps, the PSs classified, in the legend, as "not significant" (with z-score between -1.65 and 1.65) are turned off. In the representation of the Cluster and Outlier maps, the PSs classified, in the legend, as "high/low outlier" (with z-score minor of -1.96 and between -1.96 and 1.96) are turned off



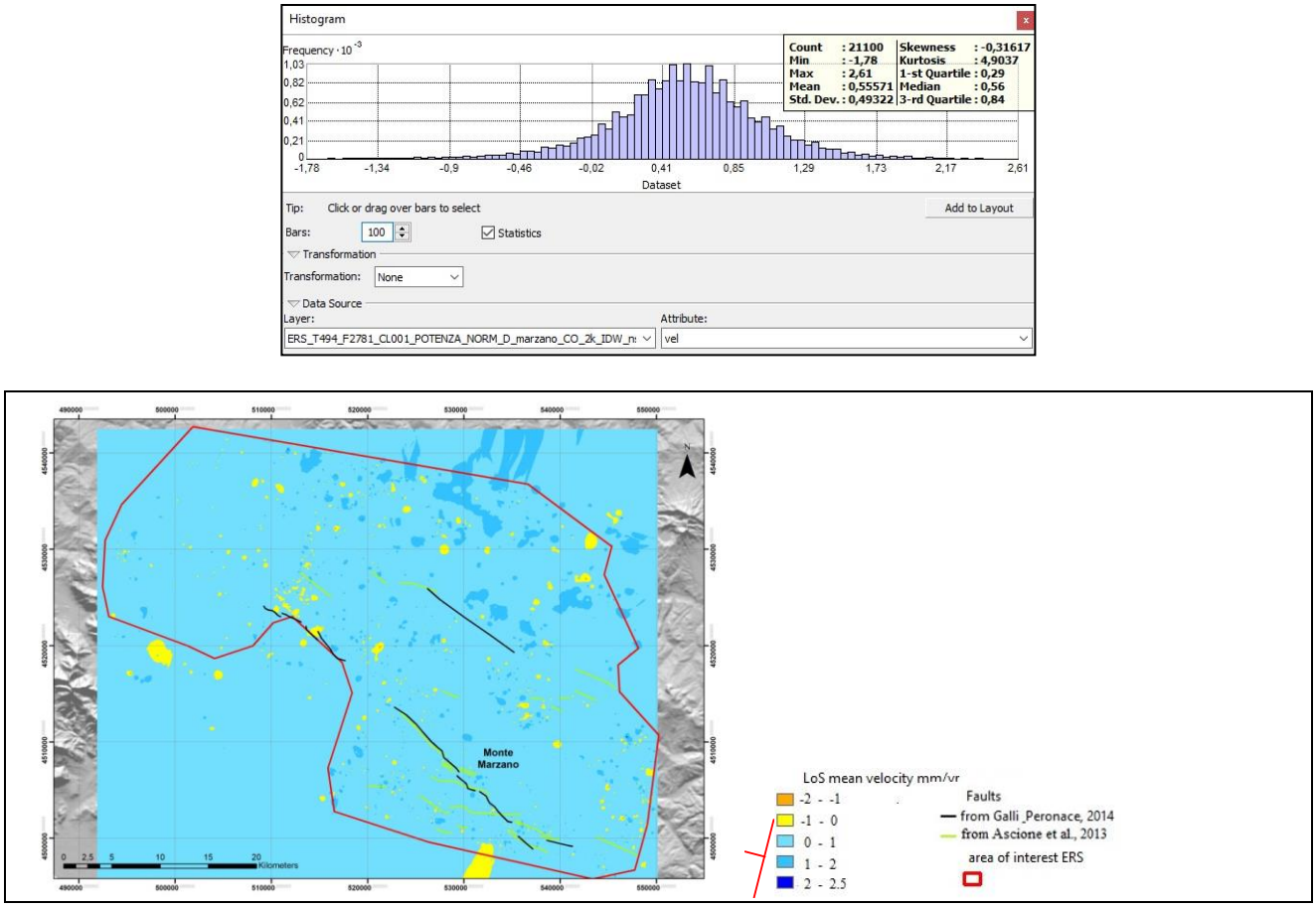
(a) Spatial distribution of the following PS ascending subsets from *Cluster and Outlier Analysis* : ENVISAT_T86_F816_CL001_FOGGIA_ASCE_NORM_marzano_CO_2k_IDW; PST2009_ENVISAT_T358_F819_CL001_BENEVENTO_ASCE_NORM_marzano_CO_2k_IDW; ENVISAT_T358_F801_CL001_SALERNO_ASCE_NORM_marzano_CO_2k_IDW.	(b) Spatial distribution of the following PS ascending subsets from *Hot Spot Analysis:* ENVISAT_T86_F816_CL001_FOGGIA_ASCE_NORM_marzano_HS_2k_IDW; PST2009_ENVISAT_T358_F819_CL001_BENEVENTO_ASCE_NORM_marzano_HS_2k_IDW; ENVISAT_T358_F801_CL001_SALERNO_ASCE_NORM_marzano_HS_2k_IDW.



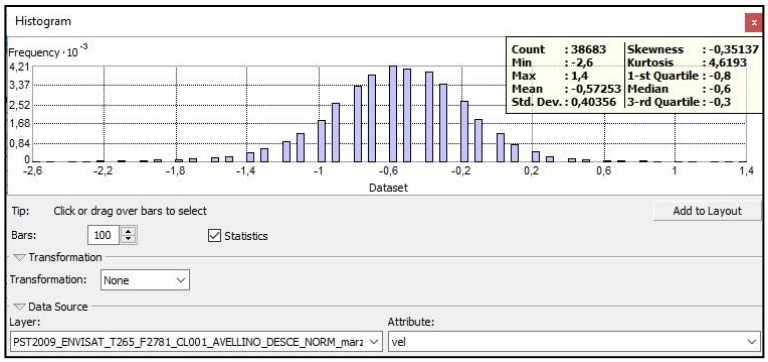
(c) Spatial distribution of the following PS descending subset from *Cluster and Outlier Analysis* : PST2009_ENVISAT_T265_F2781_CL001_AVELLINO_DESCE_NORM_marzano_CO_2k_IDW.	(d) Spatial distribution of the following PS descending subset from *Hot Spot Analysis*: PST2009_ENVISAT_T265_F2781_CL001_AVELLINO_DESCE_NORM_marzano_HS_2k_IDW.

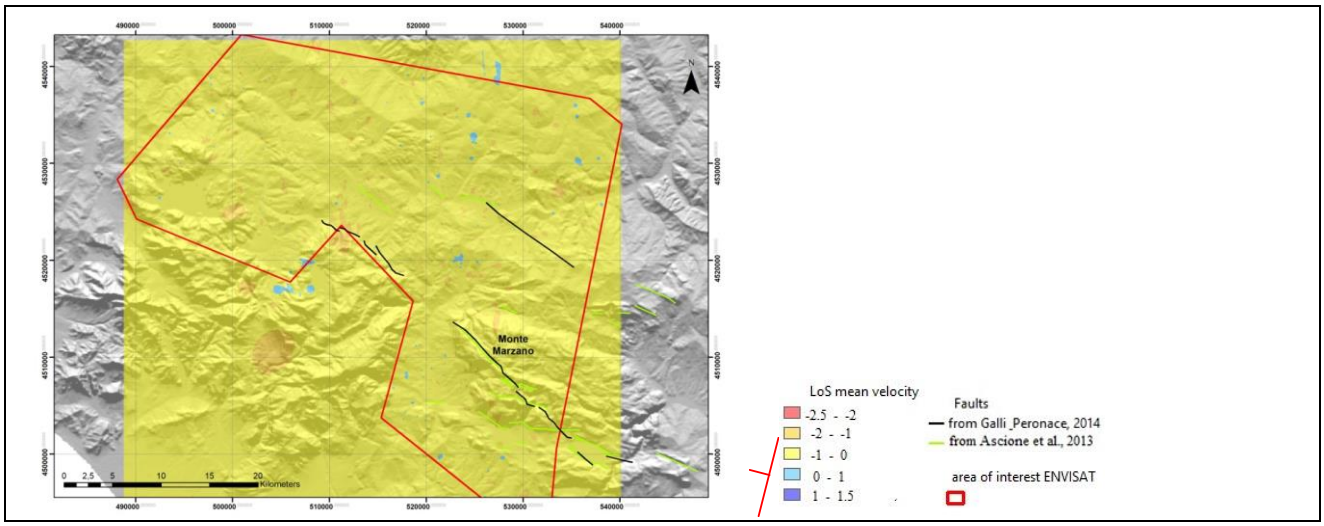


Supplementary Figure S9. Comparison of the results obtained applying the Hot Spot Analysis (diagrams **a** and **c**) vs. Cluster and Outlier Analysis (diagrams **b** and **d**) the to the ENVISAT PS data subsets. In the representation of the Hot/Cold Spot maps, the PSs classified, in the legend, as "not significant" (with z-score between -1.65 and 1.65) are turned off. In the representation of the Cluster and Outlier maps, the PSs classified, in the legend, as "high/low outlier" (with z-score minor of -1.96 and between -1.96 and 1.96) are turned off.

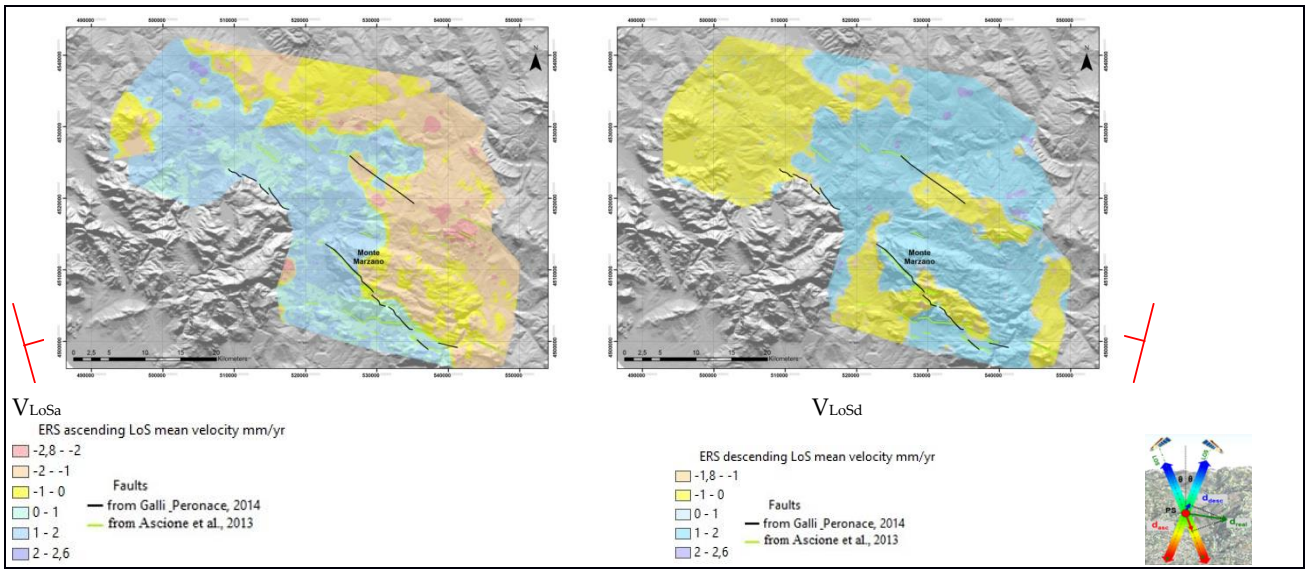


Supplementary Figure 10. Upper diagram: ERS_T494_F2781_CL001_POTENZA_NORM_D_marzano_CO_2k_IDW _nsig normal data distribution, which contains 21100 PSs (see Supplementary Table S4). Lower diagram: Mean velocity IDW interpolation map realized with PSs classified as "not significant" in the descending subset ERS_T494_F2781_CL001_POTENZA_NORM_D_marzano_CO_2k_IDW_nsig. Note that the map is almost entirely occupied by the mean velocity class 0 ÷ -1 mm/yr (statistic mean value 0.55 mm/yr). The map does not show any significant ground deformation gradient, except for very local gravitational phenomena or landslides.

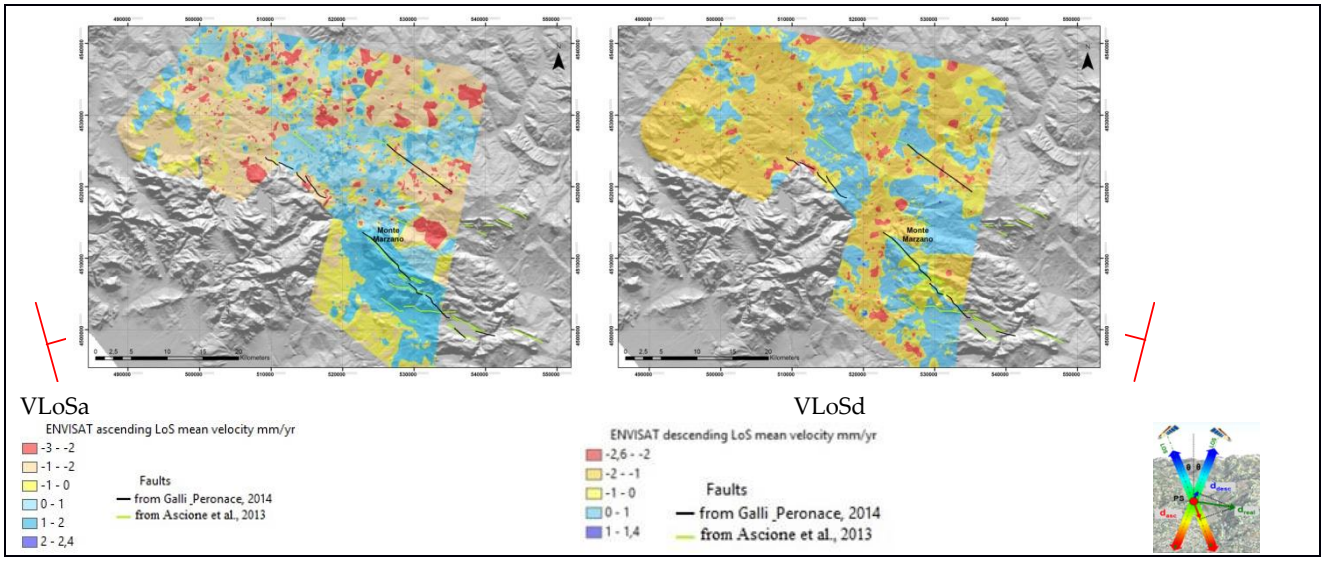




Supplementary Figure S11. Upper diagram: PST2009_ENVISAT_T265_F2781_CL001_AVELLINO_DESCE_NORM_marzano_CO_2k_IDW_nsig, which contains 38683 PSs (see Supplementary Table S5). Lower diagram: mean velocity IDW interpolation map constructed with the PST2009_ENVISAT_T265_F2781_CL001_AVELLINO_DESCE_NORM_marzano_CO_2k_IDW_nsig subset, constructed using PSs classified as "not significant". Note that the map is almost entirely occupied by the mean velocity -1 ÷ - 0 mm/yr class (statistic mean value in the subset -0.57).



Supplementary Figure 12. ERS IDW interpolation map realized with PSs classified as 'Cluster: High (HH)' and 'Cluster: Low (LL)', ascending (left) and descending (right) subsets.



Supplementary Figure 13. ENVISAT IDW interpolation map realized with PSs classified as 'Cluster: High (HH)' and 'Cluster: Low (LL)', ascending (left) and descending (right) subsets.