

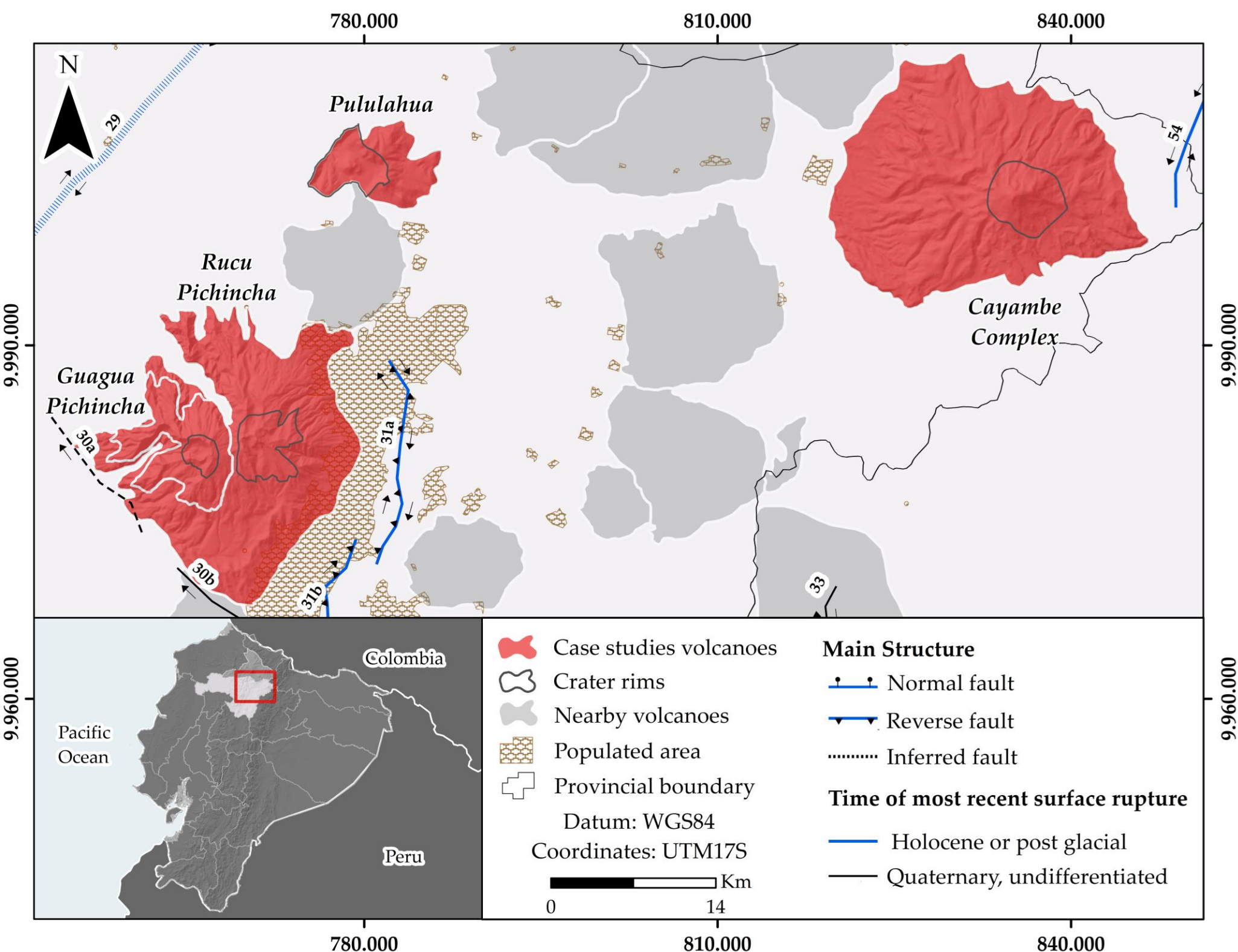
Deformation monitoring in northern Ecuadorian volcanoes using the InSAR technique

PROBLEM

Volcanic surface deformation is a **key indicator of internal processes**. In Ecuador, several volcanoes are located near densely populated areas, yet some have limited instrumental monitoring. This restricts the detection of **early signs of unrest** and the **generation of information for volcanic risk management**.

GENERAL OBJECTIVE

Analyze **surface deformation patterns** between 2017 and 2024 in the Pichincha Volcanic Complex, Pululahua, and the Cayambe Volcanic Complex using **multitemporal InSAR techniques**, providing scientific evidence to support volcanic monitoring and risk management in Ecuador.



METHOD

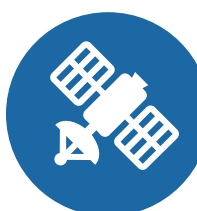
PHASE I

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Bibliographic review
- Case study selection
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SAR image acquisition
- Selection of time period
 - Identification of orbits
 - Polarization type

PHASE II

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Interferometric processing
- Image corrections (orbital, geometric, topographic)
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Interferogram generation
- Creation of displacement maps

PHASE III

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Multitemporal deformation analysis
- Merging of interferograms
 - Reference point selection and analysis
 - Calculation of the accumulated deformation (cm/yr)

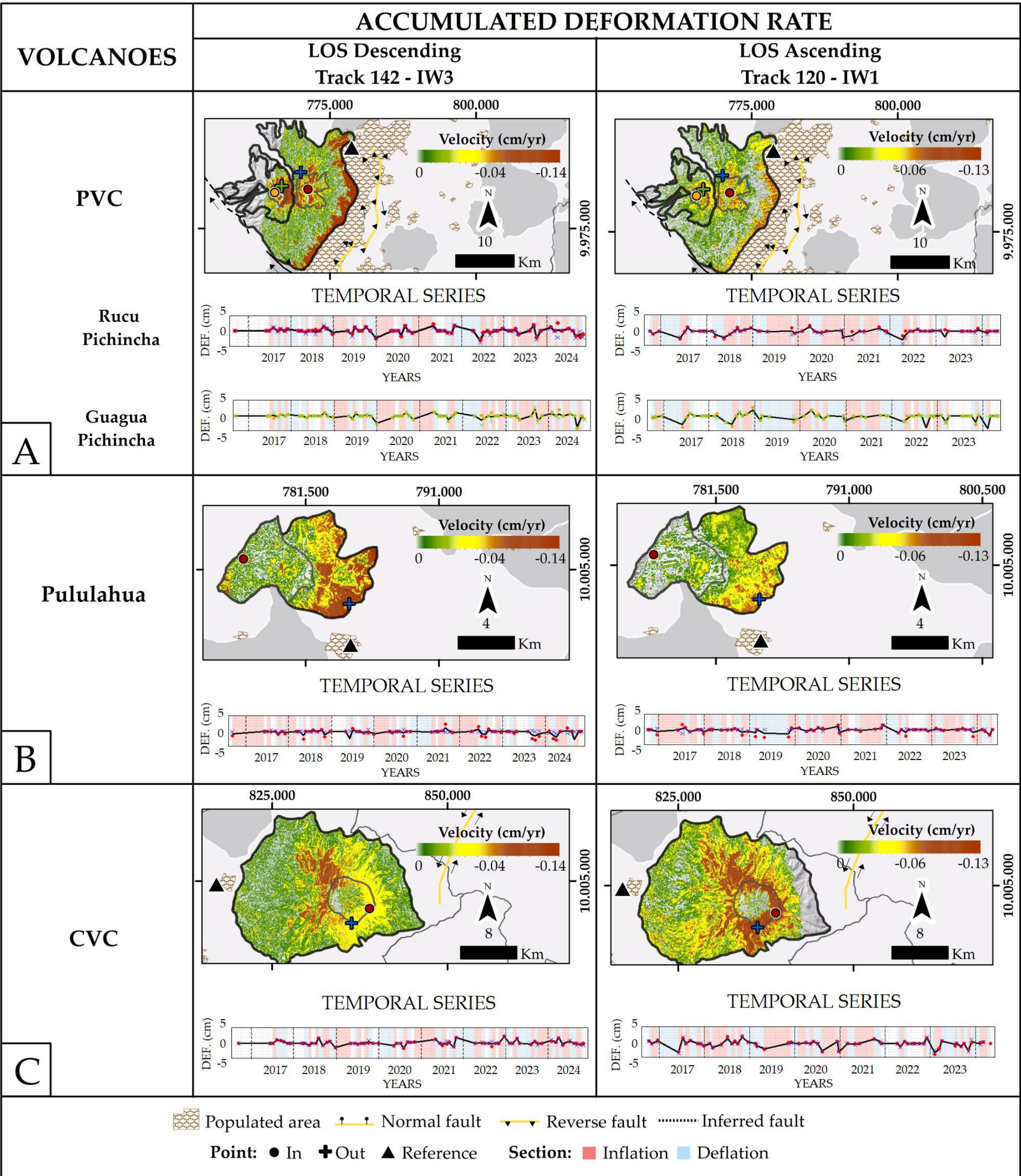
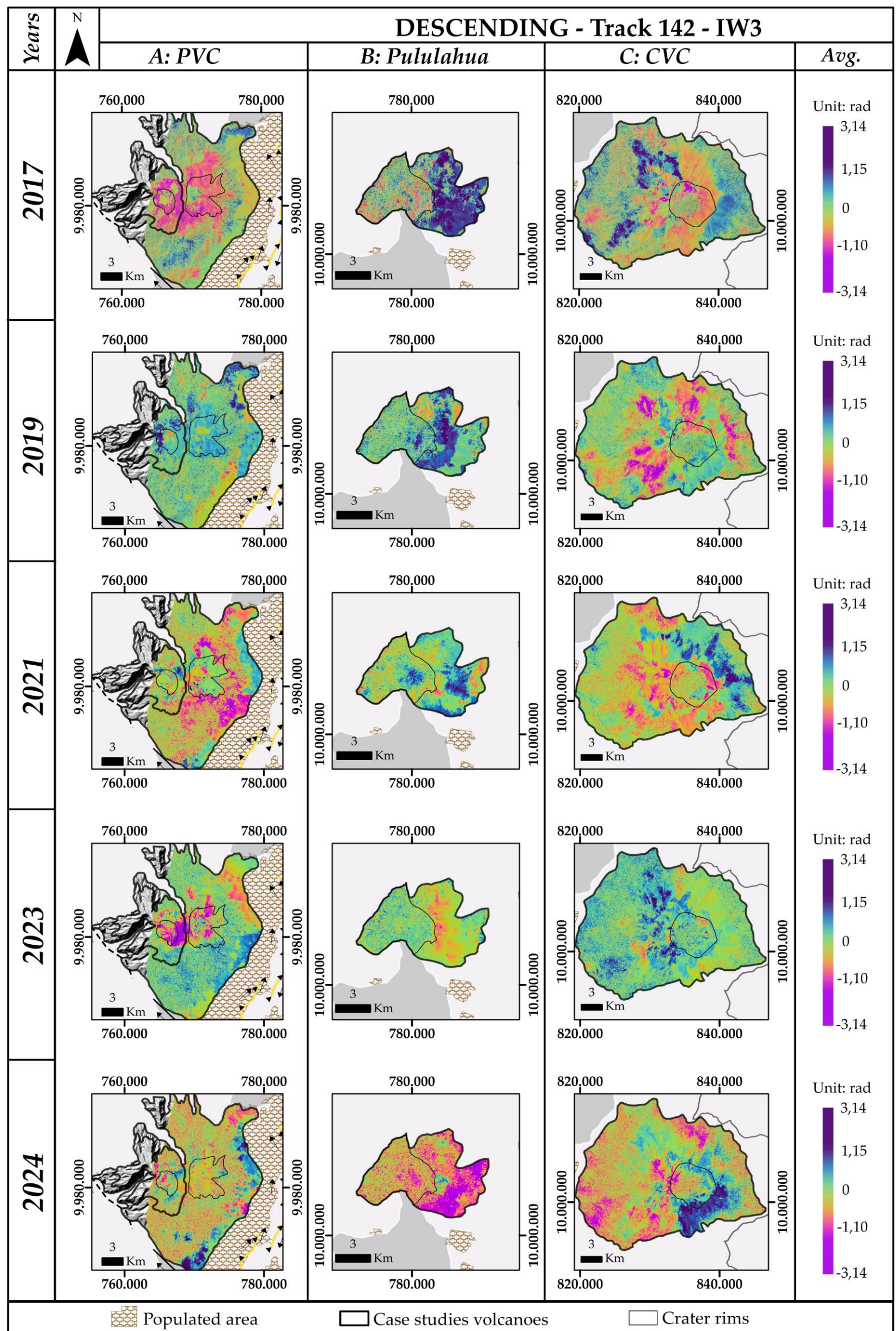
PHASE IV

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Analysis by observation and interpretation
- Analysis of deformation behaviour
 - Interpretation of deformation processes

RESULTS

The analysis identified **low-magnitude deformation signals** in all studied volcanoes. The Pichincha Volcanic Complex and Pululahua showed **inflation–deflation cycles**, with inflation signals detected during the study period. The Cayambe Volcanic Complex exhibited more complex and spatially variable deformation patterns, likely **influenced by volcanic, tectonic, and anthropogenic factors**.



CONCLUSIONS

The detected deformation signals are subtle and should be interpreted cautiously due to atmospheric effects and methodological limitations. Nevertheless, the study establishes a methodological framework for systematic volcanic deformation monitoring and **identifies areas that warrant continued geodetic, seismic, and geophysical surveillance**.

