Ecuador velocity field using InSAR UNIVERSITY OF LEEDS methodology COMET *eepabe@leeds.ac.uk

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Atmospheric correction

Background

Ecuador is located on the Pacific coast at the northwestern of South America between 1° N and latitude 4° S. It lies at the southern end of the Northern Andes (oriented NNE-SSW), and its geodynamics is directly related to the subduction of the oceanic Nazca plate beneath the edge of the South American continent. The Nazca Plate is subducting at a rate of 55-58 mm/yr beneath the coastal margin from at least 3-6 Ma ago. Ecuador has a large continental transcurrent fault system stretching from the active margin at the Guilf of Guayaquil to the Colombia border. This fault system traverses the Ecuadorian Andes and Jus Korpen as the Chingual-Cosanga-Pallatanga-Puná (CCPP) fault system. The CCPP fault system corresponds to the eastern boundary and is a sasociated with the movement of the North Andean Sliver (NAS). It extends northward into Colombia, where it is referred to as the Afiladores-Sibundoy Fault (ASF). The Ecuadorian Andes mountain range is part of the North Volcanic Zone (NZV), which is defined the 2005.

the North Volcanic Zone (NZV), which is defined from 1° N to 2° S and exhibits concentrated volcanic activity. At least 84 Quaternary volcances have been identified in this zone, including extinct, potentially active, active, and erupting volcances. Currently, three of these volcances (Reventador, Sangay, and Cotopaxi) are in eruption.



We combine our InSAR line of sight velocities and GNSS north-south motion to decompose them into vertical and horizontal motion, developing a velocity field for Ecuador between 2017 and 2021. This helps us identify surface deformation, although a significant challenge arises in much of the country due to the lack of coherence with C-band SAR





GACOS

Linear Correction

Decomposed velocities

We used the "decompose_insar_velocities" (DIV) to determine the **vertical and horizontal components** of the entire Ecuador. DIV is an open-source set of matlab scripts for performing a velocity decomposition (Watson et al. 2022) on multiple overlapping InSAR velocity fields.

1) GNSS-InSAR residual is smoothed using a median filter and merging overlapping frames within each track an difference)



2) GNSS-InSAR residual is smoothed using a second order polynomial function, wiithout merging overlapping es within each track



