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## High Rate Real Time GNSS monitoring of active volcanoes: 20 years of applications to Italian volcanoes

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Since 2000 an intense development of remote stations, transmission device, data processing software and tools for time series analysis aimed to high rate GNSS surveillance and monitoring of active Italian volcanoes has been realized or implemented at INGV. Since the very first case study (the 2001 Mt.Etna's eruption) to the 2019 paroxysms of Stromboli, many observations and a lot of specific experience has been achieved on Italian active volcanoes (Etna, Stromboli) to track rapidly developing deformation patterns associated to different volcanic processes, as dike intrusions or explosive activity. Moreover, we here describe the hardware and software improvements for High Rate GNSS monitoring network with a specific attention to the recently realized network in the densely populated area of the Campi Flegrei caldera.