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Crustal motion of the Calabrian Arc from the CALARCO GPS deployment

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Here we report the first results of the analysis of the time series from the continuous GPS stations deployed in the framework of the joint NSF-UNICAL-INGV supported Calabrian Arc Project (CALARCO) (<http://www.calabarco.org>) in the Calabrian Arc (Italy). In Calabria, the Ionian lithosphere subducts northwestward beneath the Arc and can be traced by seismicity and tomography down to >500 km beneath the Tyrrhenian Sea. Despite the large historical earthquakes the rate and style of crustal deformation and the state of activity of the subduction interface are still poorly known. The main scientific targets of the project are: (1) the evaluation of the crustal deformation rates and strain accumulation on the active normal faults mapped in the Calabrian Arc; (2) investigation of the subduction activity and seismogenic potential of the subduction interface; (3) definition of the contemporary vertical motion.

The GPS network consists of 9 continuous GPS stations installed in 2006 in collaboration with UNAVCO along a NNE-SSW oriented transect perpendicular to the local trend of the Calabrian Arc. The first results of the velocity field shows highly oblique velocity relative to the trend of the Arc if Nubia is chosen as a reference for the lower (Ionian) incoming plate. We instead suggest that the Ionian Sea is moving independently relative to Nubia and a more appropriate reference frame for the lower plate of the subduction zone is defined by stations on the Apulia and Hyblean regions. In this reference frame CALARCO GPS stations on the Ionian coast move southeastward at 3 mm/yr towards the deepest part of the Ionian Sea. The velocity gradient in the emerged part of the Arc shows 2-3 mm/yr of E-W active extension across the Crati Valley and the Sila Plateau, where active normal faults have been previously described.