Permanent GPS sites over Crete for precise geodynamics applications

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GeoMatLab

TheAegean andits surrounding area is one of the most activeseismic regions in theMediterraneanand West Eurasia. This arealiesonthecollision zone between the Eurasianandthe Africanlithosphericplates.Nonetheless,thelevelofourknowledgeaboutthegeologicalstructureoftheregionanditstectonicdeformationremainslimitedasaresultofthelackofgeodetic measurementsofhighquality.Since1997,theTechnicalUniversityofCrete(TUC),Greece,hasbeenoperatingapermanentGPSstationTUC1.

In2004,asecondstation,namedTUC2,wasinstalled at theTUCcampusnexttoTUC1. Afteraperiodoftesting,thestation was acceptedintheEUREF PermanentNetwork (EPN).The hourly data feed and meteorological data upstream have been established. The TUC2 is collocated with a satellite laser ranging facility . The measurement campaign with the French TransportableLaserRangingStationhadbeencarriedoutin2004. Newcampaignsareplannedforthefuture.An additional permanent GPSsite,namedGVD0,hasbeen also installedon theislandofGavdos,about80kmsouthofChania.TheGVD0iscollocatedwith a DORISbeacon.

Thesepermanent GPS siteshaveprovidedawealthofprecisedataforanumberofresearchactivities,suchastheEstablishmentofaEuropeanradaraltimetercalibrationandsea-level monitoringsiteforJASON,ENVISATandEuro-GLOSS,thedevelopmentofstatisticalquality control algorithms, and themonitoringofthe "silent and slow earthquakes"happening in the boundaryzone.Wepresent some resultsderivedfromthepermanentGPSmeasurementscarriedoutbyTUCandourplansforextendingourarrayoverotherpartsofCrete.

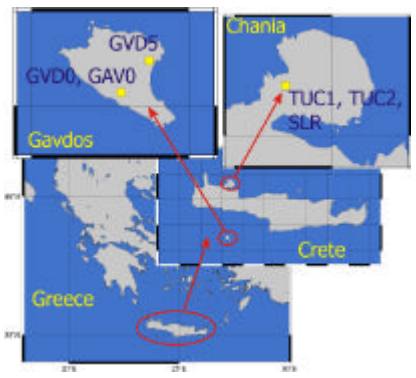
TUC Geodetic Equipment

TheTechnicalUniversityofCrete
- *OperatesthreeGPSpermanentstations(TUC1,TUC2, GVD0),*
- *Maintains a DORISbeacon(GAVB),a GPSpermanent station(GVD5,ownedbyUMBC-NASA,USA)anda SatelliteLaserRanging(SLR) site.*

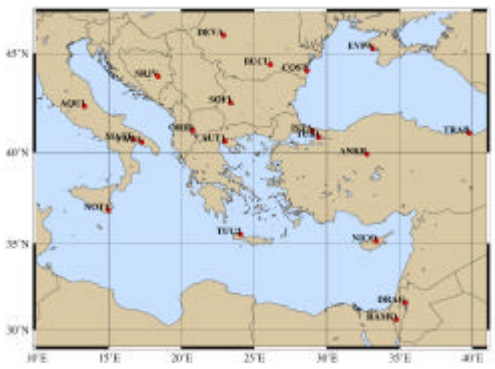
TUC1
TUC1GPSstation since1997, ontheroofoftheMineral ResourcesEngineering Dept.

TUC2
TUC2GPSstationsince2004. It ispartoftheEUREF permanentnetwork.It is plannedtojoinIGSnetwork soon.

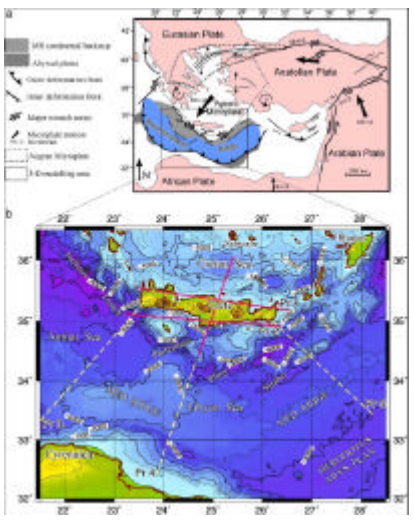
GVD5
GVD5 GPS station, since2003ontheislandofGavdos southofCrete.Itiscollocatedwithtidegauges.



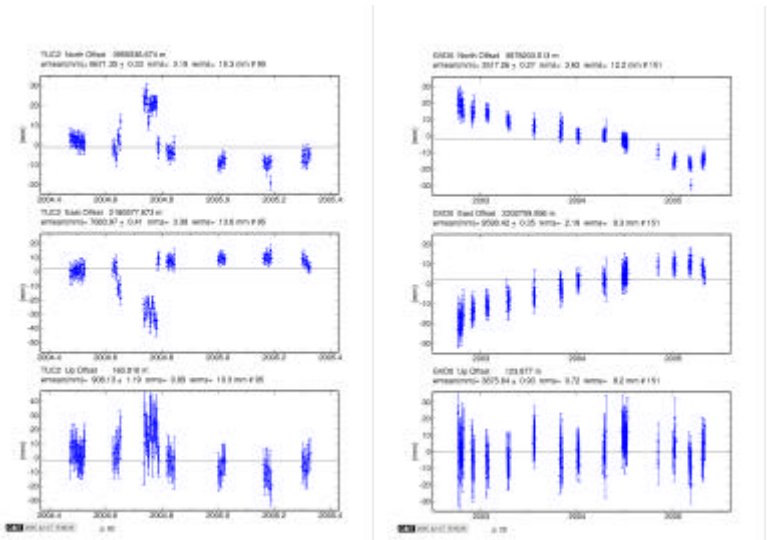
LocationsofTUCgeodeticsites.



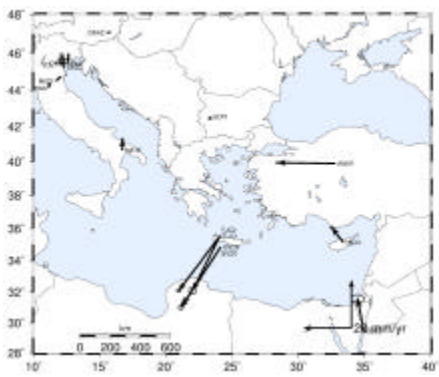
CORSstation locations in theEasternMediterranean.



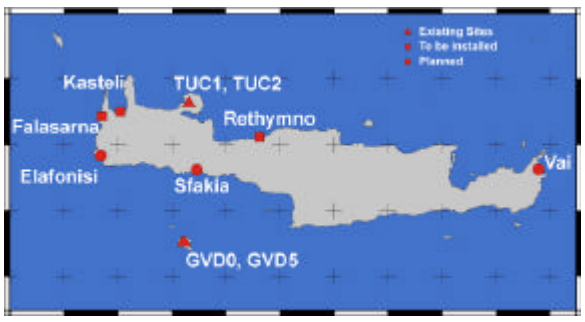
Tectonics intheEasternMediterranean and bathymetry overCrete,(Makris,Yegorova2006).



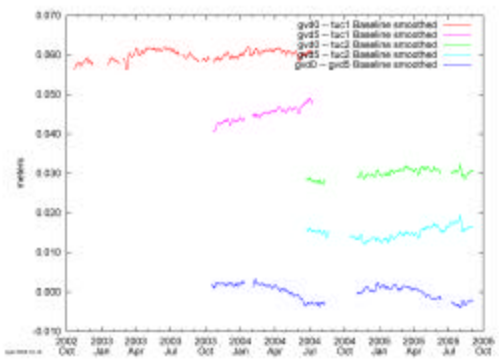
RepeatabilityplotsforTUC2 inCrete (left)andGVD0 inGavdos (right)stations.Intermittentdayclustersused forpreliminaryanalysis. Full analysisisinprocess. TheoutliersinTUC2timeseriesinthesummerof2004are duetoanantennamalfunction.



Preliminaryvelocitymap (2002-2005).



PresentandfutureGPSsites in Crete.



Baselines as function of time. Results smoothed using 5-day runningaverage.

GVD0
GVD0GPSstation, since2003ontheislandofGavdos southofCrete.ItisplannedtojoinEUREFandIGS networkssoon.

GAVB
GAVB DORISbeaconontheislandofGavdos.

SLR
TheSLRsiteoccupiedbyFTLRS(FrenchTransportable LaserRangingSystem)in2003attheTechnicalUniversity ofCreteCampus.Thesiteisgoingtobere-occupied.

Future Plans

- *To continueprovidingtheservicesofthepermanentsatellite calibrationfacilityonGavdosformonitoringanddeterminingthe absolutesystematicerrorsinsatellitealtimetermeasurements;*
- *To transmitreliably,securelyandimmediatelygeodeticdatafrom theregiontothecentralfacility at TUCandfromtheretothe internationalscientificcommunity;*
- *Todeveloproceduresfortheautomaticanalysisandarchivingof data;*
- *To extendtheexistingGNSSarraytomonitortectonicallyactive regionsofCrete.ThreemoreGNSSsitesaretobeinstalledin westernCrete(On-goingresearchproject). StationsintheEast areforfutureinstallation;*
- *Toassessthespatialandtemporaldistribution of silentslip events in subductionzone;*
- *Toimprovedatamanagement;*
- *TomonitoranactiveregionatFalasarna(WesttipofCrete). This*

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