Eastern Mediterranean Altimeter Calibration Network – *e*MACnet

E. C. Pavlis[1], K. Evans[2], P. Milas[3], D. Paradissis[3], B. Massinas[3], and X. Frantzis[4]

1) Goddard Earth Sciences and Technology Center (GEST/UMBC), Baltimore, MD, USA
2) Joint Center for Earth Systems Technology (JCET/UMBC), Baltimore, MD, USA
3) Nat. Technical University of Athens (NTUA), Athens, Greece
4) Technical University of Crete (TUC), Chania, Greece

epavlis@umbc.edu

Abstract

The eastern Mediterranean Altimeter Calibration network—eMACnet, is the result of collaborative efforts in the Aegean since 2001. Originally with one permanent absolute calibration facility (Gavdos) and recently with a second site at Kasteli, Crete, Greece, both of these sites in collaboration with a local team from the Tech. Univ. of Crete. Since 2008 our team expanded to include the Nat. Tech. Univ. of Athens (NTUA). The primary purpose of the extended network is the calibration and validation of altimetry missions. The location of our sites though is also of interest to tsunami warning networks. We thus intend to provide our observations in near real-time to the European Tsunami Warning System (ETWS). At present, KASTELI in western Crete is delivering 1-minute sampled data every 15 minutes via EUMETCAST. Four more tide gauges are in operation at the sites of PALEKASTRO, eastern Crete (with CGRS), MANI- KARAVOSTASI, in southern Peloponnese, EMPORIO, Chios, and THASOS, in Northern Aegean. An additional system along with a CGRS receiver will be deployed at KYMI, north of Athens on the island of EVIA, followed by one on northern mainland Greece. This Aegean-wide network samples at the moment the following OSTM tracks, some of them in more than one location: 18, 33, 94, 109, and 185. We will present an overview of the project and results from the expanded network based on the latest release of GDRs and our plans for supporting the future altimeter missions of JASON-3, JASON-CS and SWOT.

During the summer of 2011 the MANI site was completed with the installation of a Continuously Operating Reference Station (CORS) and the required power generating facility since the location is not on the national grid.
The facility is designed to support the addition of a telemetry system that will send the sea-level measurements directly to EUMETSAT and release them to GTS, in a similar manner as in KASTELI.

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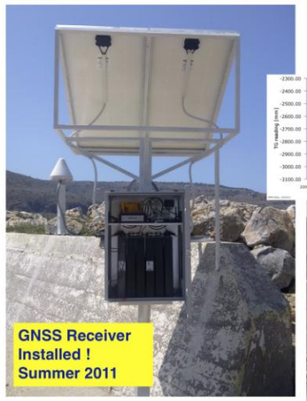
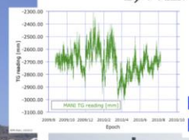
Pavlis, E. C. 1999. Tectonics, Sea-level Monitoring and Altimeter Calibration With a Regional GPS Array, G. Maul ed. *Proc. of the International Symposium on Marine Positioning, INSMAP 98*, Nov. 30 – Dec. 4, 1998, Melbourne, Florida.

Pavlis, E. C., S. P. Mertikas and the GAVDOS Team. 2004. The GAVDOS Mean Sea Level and Altimeter Calibration Facility: Results for Jason-1, 3rd Jason special issue, *Mar. Geod., (27), 3-4,* DOI:10.1080/01490410490902106, pp. 631-655.

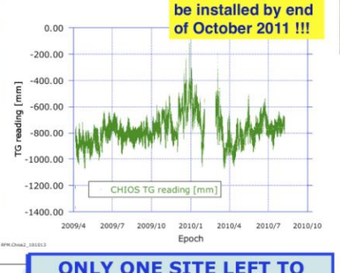
Somieski, A., B. Buerki, A. Geiger, H.-G. Kahle, E. C. Pavlis, H. Becker-Ross, S. Florek and M. Okruss. 2006. Tropospheric Water Vapor from Solar Spectrometry, and Comparison with JASON Microwave Radiometer Measurements, accepted, *J. of Geophys. Res.,* (Atmospheres).

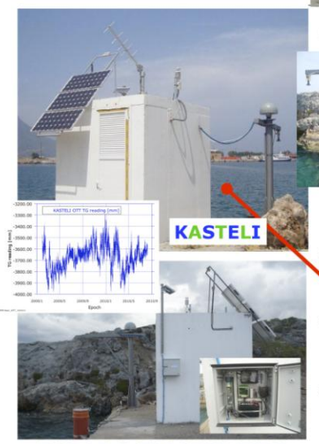




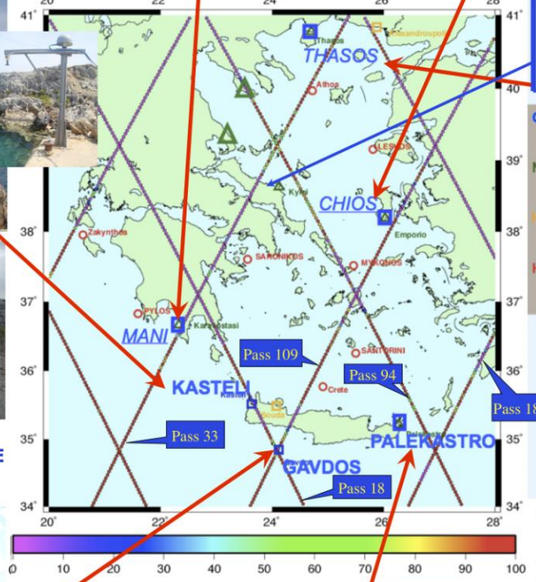
MANI-KARAVOSTASI

EMPORIO, CHIOS





RADAR & FLOATER TIDE GAUGES AT KASTELI, CRETE



ONLY ONE SITE LEFT TO BE INSTALLED: KYMI, ON EVIA, TIDE GAUGE PLUS GPS (Spring '12)

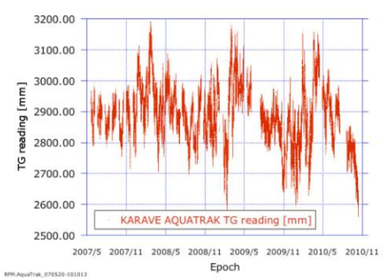
GEST - Goddard Earth Science and Tech. Center

NTUA - National Technical University of Athens

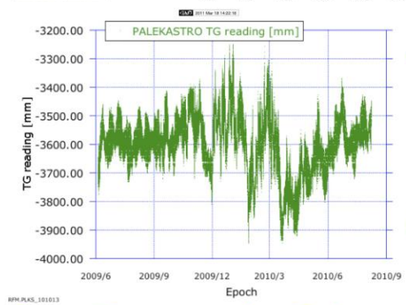
HNHS - Hellenic Navy Hydrographic Service

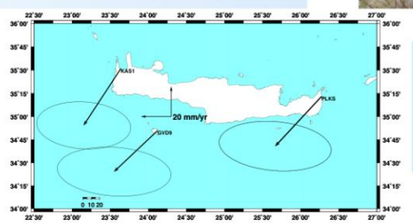
HCMR - Hellenic Center for Marine Research

RELOCATED (FALL 2010) GAVDOS KARAVE, CRETE



PALEKASTRO, CRETE GPS

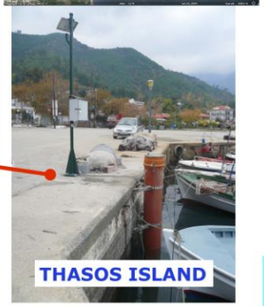




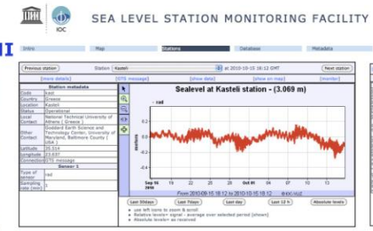
GPS-derived velocities from GAMIT/GLOBK based on the recent 2008-2011 data set

Aegean region tracks of OSTM and the eMACnet network. In cyan the operational sites, in yellow the future site of KYMI (EVIA).

Future Sites

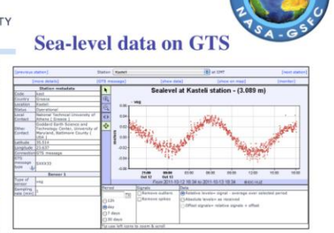


Typical Installation of a Thalimedes™ System



Sea-level data on GTS

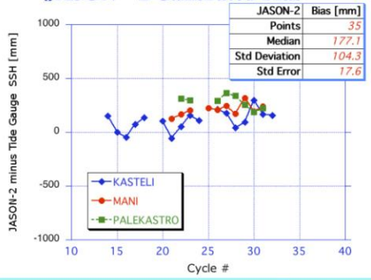
Data from KASTELI are placed online (GTS) every 15 minutes via EUMETSAT and they are available to view and download through IOC's web site.



Remotely Controlled GNSS Receivers

MANI

PALEKASTRO



Summary

The Aegean network *eMACnet* is the outgrowth of the Gavdos facility that was established during 2001-2003. The current network encompasses the KARAVE site on Gavdos, the KASTELI site that was established during 2004-2008, and five new sites that are now instrumented under the new network. One of these is co-located at KASTELI, to calibrate the new float-type tide gauges (Thalimedes™ of OTT) with the RADAR-type system (VEGAPULS 61™) which we installed in 2007. The data are collected locally as well as via DCP upload to METEOSAT and then downloaded from EUMETSAT's internet facility. A new site with identical system and a CORS GNSS is now operating at PALEKASTRO, at the easternmost tip of Crete. Three other tide gauges were installed and now operate at MANI, THASOS, and EMPORIO, Chios. The last site is slated to go to KYMI, Evia in early 2011 and it will be equipped with a CORS GNSS also. The MANI site now has a GNSS receiver installed and EMPORIO, Chios will also have a GNSS receiver installed by the end of October 2011. The old KARAVE site on Gavdos was relocated to its final position at a permanent housing provided by the Hellenic Navy Hydrographic Service in the fall of 2010. The new site (GVD9) was tied to the old one (GVD5) via GPS and leveling surveys.

Data collected by the network have been used with the JASON-2 GDR records from cycles 14 to 32 and the latest corrections released by the project , to estimate the absolute bias of the Poseidon altimeter. A total of 35 comparisons resulted in the following estimate:

- **Editing at 3-σ: 177 ± 18 mm scatter about mean: 104 mm**

The collected sea-level data will be used along with the 20 Hz JASON-2 data from the GDR-T and PISTACH releases as they become available, to obtain refined bias estimates , eliminating possible land-contamination errors, on a continued basis.

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