

JASON-1 Absolute Calibration Results from the Eastern Mediterranean GAVDOS Project

Erricos C. Pavlis¹, S. Mertikas²,
and THE GAVDOS TEAM

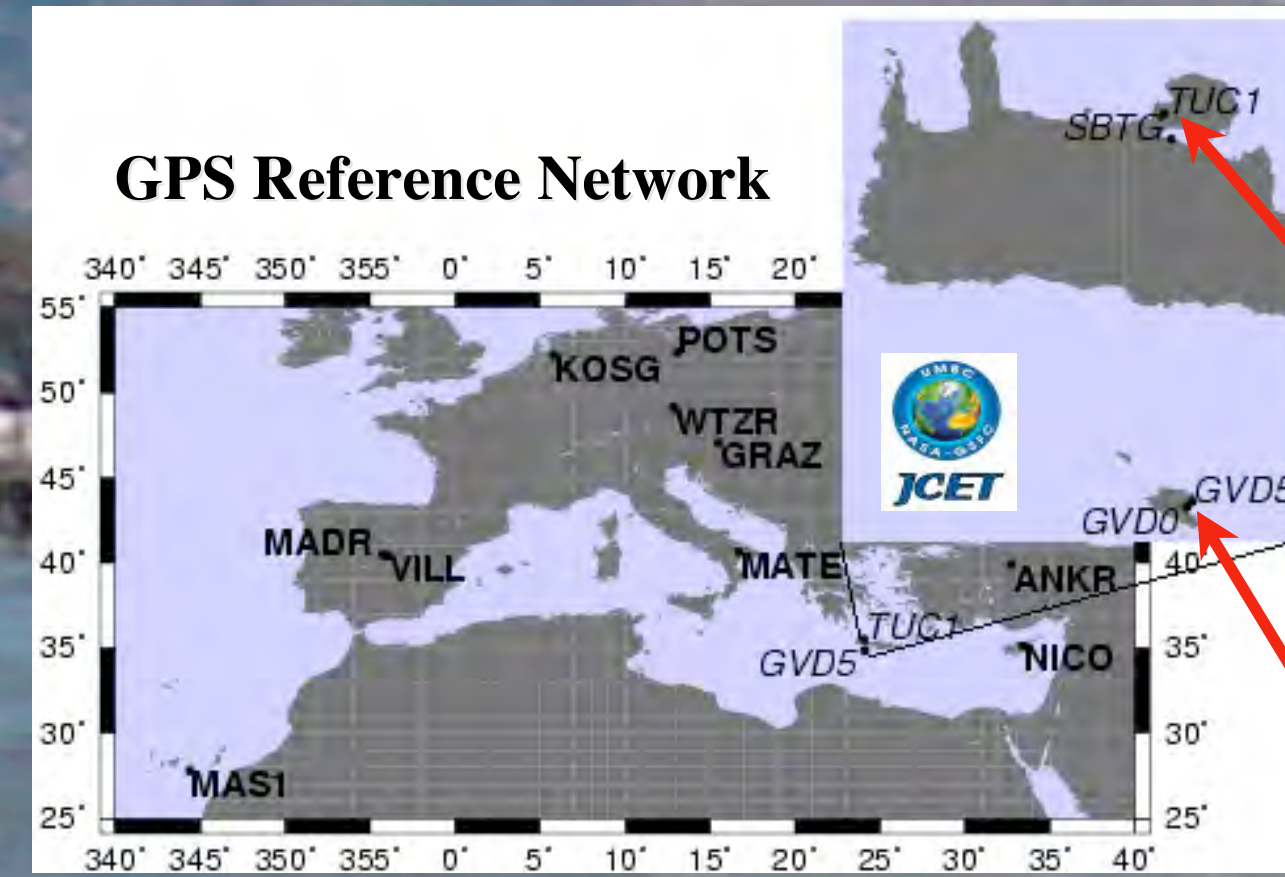
¹University of Maryland Baltimore County (UMBC),
Joint Center for Earth Systems Technology (JCET),
UMBC and NASA Goddard, epavlis@jcet.umbc.edu
²Technical University of Crete, Chania, Crete, Greece



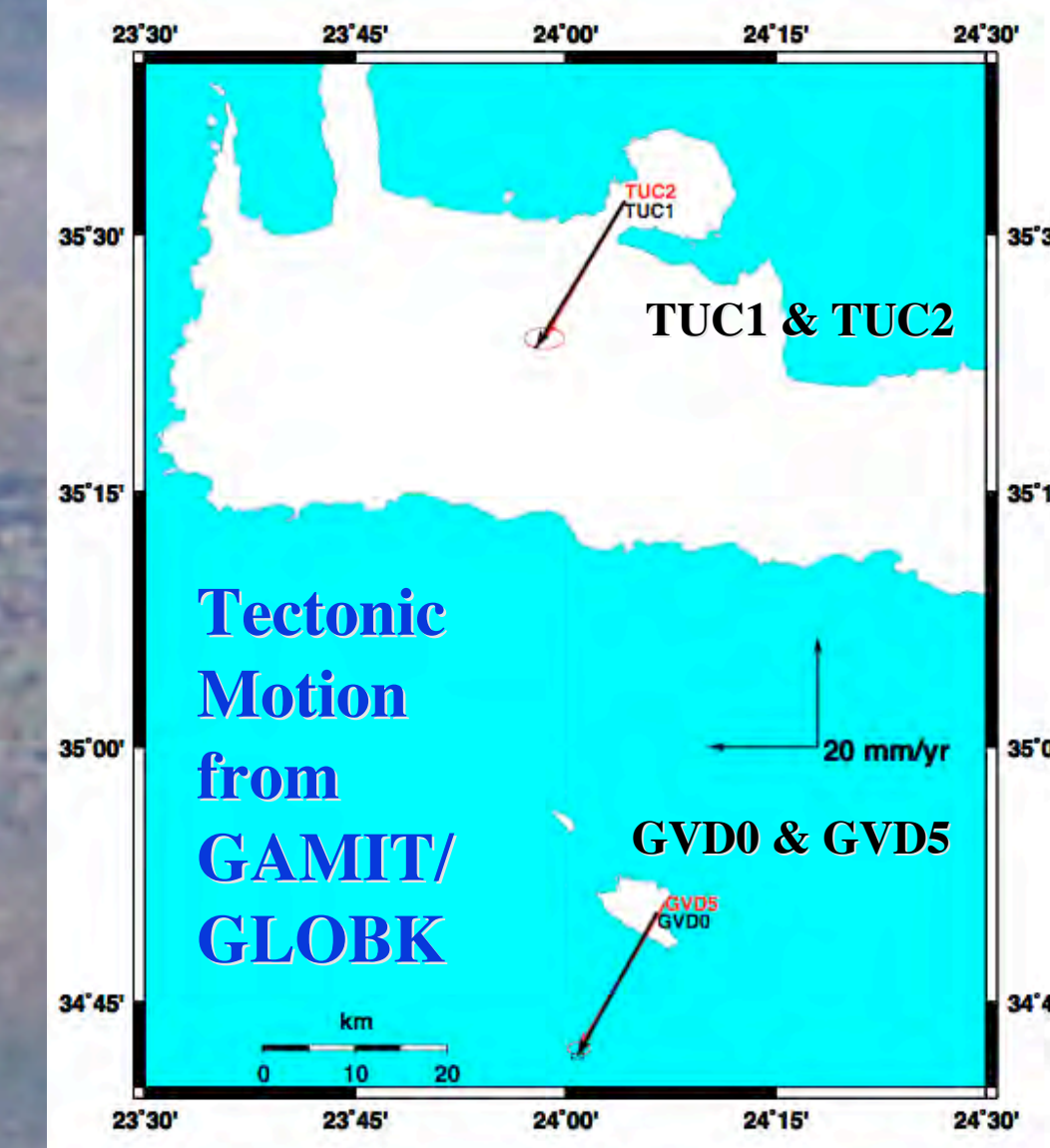
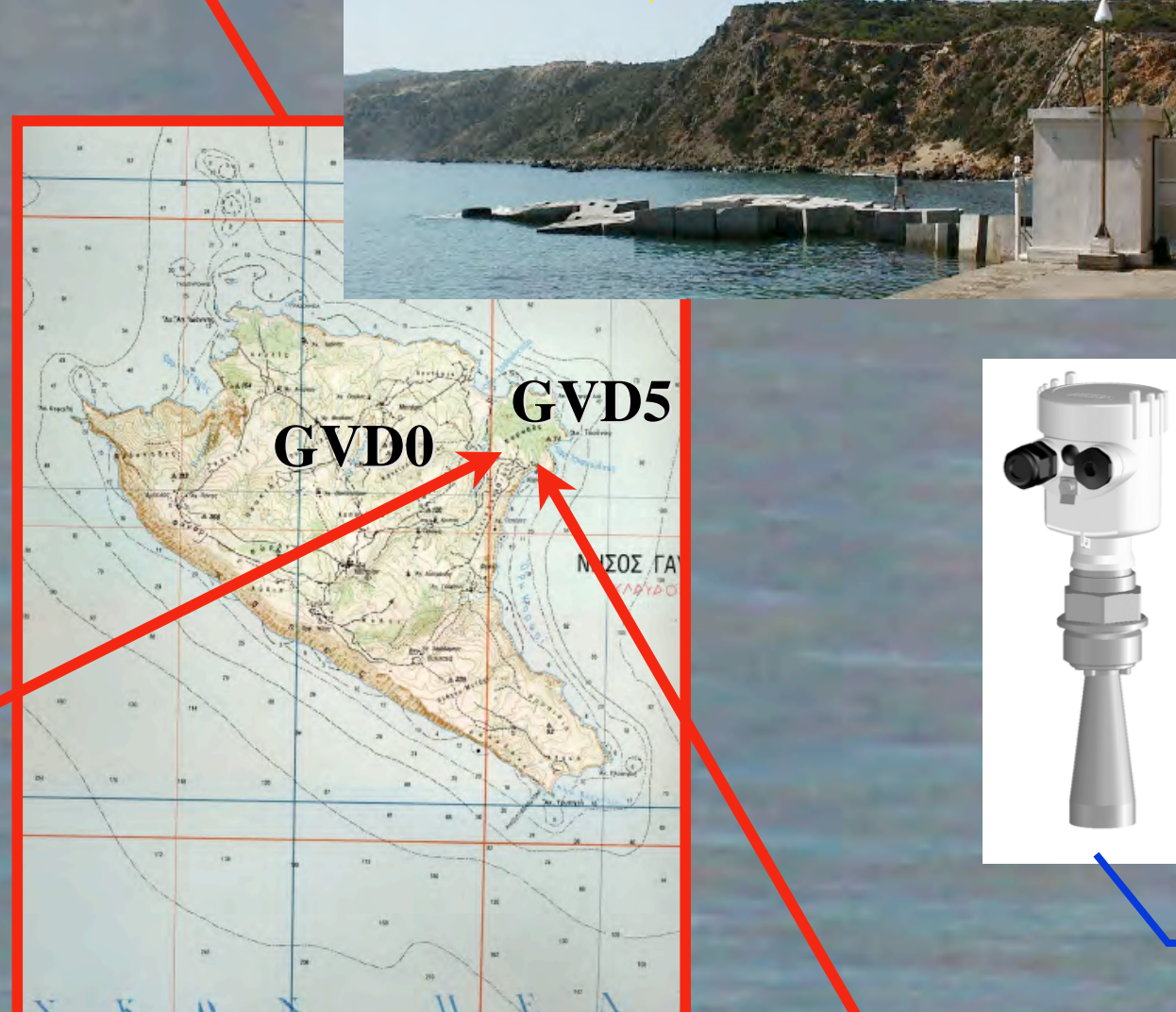
Abstract

The Gavdos permanent absolute calibration facility, initially established with joint EU, NASA, and Swiss Federal Government funding in 2002, while fully operational at the moment, it is also being expanded to a regional absolute sea level monitoring and altimeter calibration facility applicable to many missions, in the Eastern Mediterranean. The main site is still at Karave, located under a crossing point of the Jason-1 ground-tracks (passes 018 and 109), and adjacent to an ENVISAT pass, on the isle of Gavdos, about 50 km to the south of the main island of Crete, Greece. The project is now continuing under the OSTM program with funding from NASA and the Greek government. The current plans include the relocation of the Gavdos "Karave" facility to the final and originally intended location, on a new pier (finally constructed!), a move that will improve vastly the protection of the facility from heavy winter storms and minimize the need for maintenance. The Karave GPS receiver operated continuously throughout the past years, the tide gauges however were placed in storage to avoid damage during the construction period, and they have been redeployed as of last fall. The facility now has "off the wall" electric power at all times, and it will be upgraded to include an ISDN line and a computer, so that we will be able to download all of the data, including GPS observations, on a hourly/daily basis. This is expected to happen in early 2007. We have already selected the location for the establishment of an identical setup at a site on the main island of Crete, at Kastelli, near the TUC site (60 km west of TUC), on a TUC-owned area and situated exactly under the descending Jason-1 pass 018. We have selected a radar gauge as well as a backup system of similar type for the new location. Once tested and calibrated, we plan to replace the Karave system with one of these since they are much less demanding in terms of maintenance, always a concern during the winter months. This gives us access to a second site and use of the altimeter measurements made to the north of Crete, in the Aegean Sea. It will thus allow the collection of additional information on the circulation and currents of the area between the Cape Maleas and Western Crete (e.g. Cretan cyclone). The project is now producing results on the basis of the new GDRs and extending our efforts to include the ENVISAT and GFO missions. We are also planning to repeat the co-location at the TUC facility site with the French Transportable Laser Ranging System (FTLRS) that established an initial link of the entire GAVDOS network of sites with the ITRF2000 frame, in order to update the link to the global TRF. This is contingent on FTLRS' availability, which in turn is tied to its deployment in Australia and the launch of JASON-2.

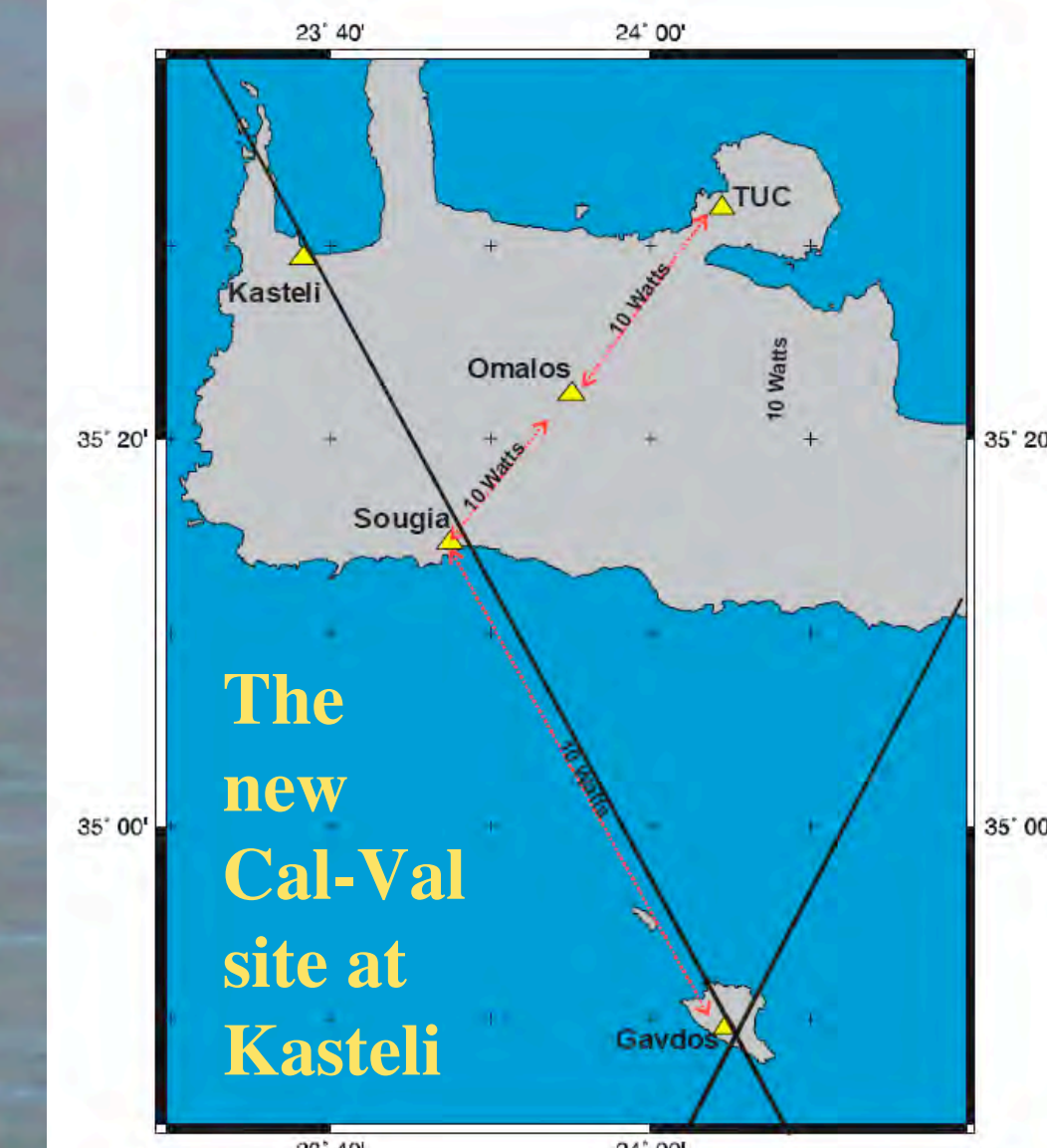
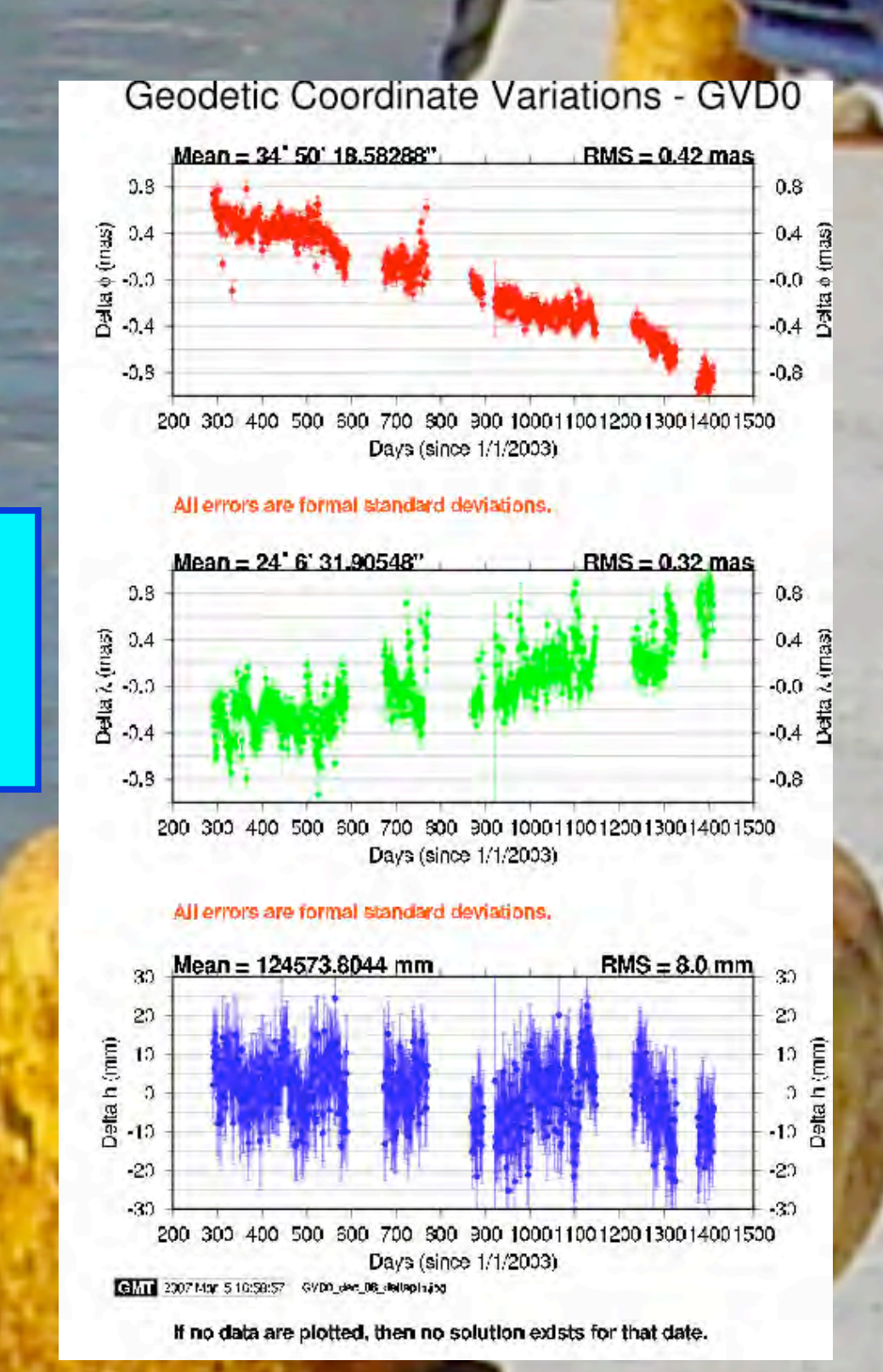
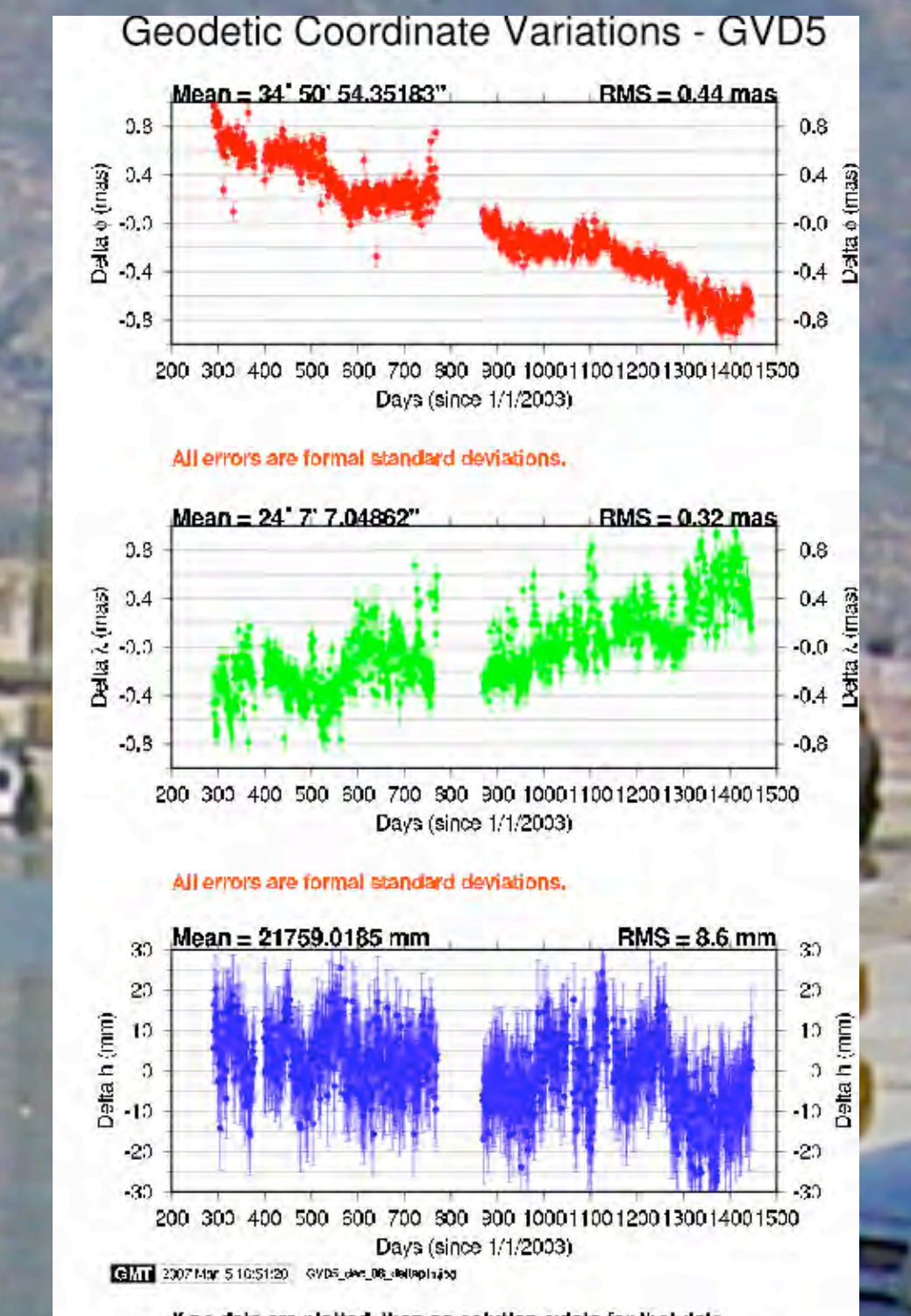
TECTONICS



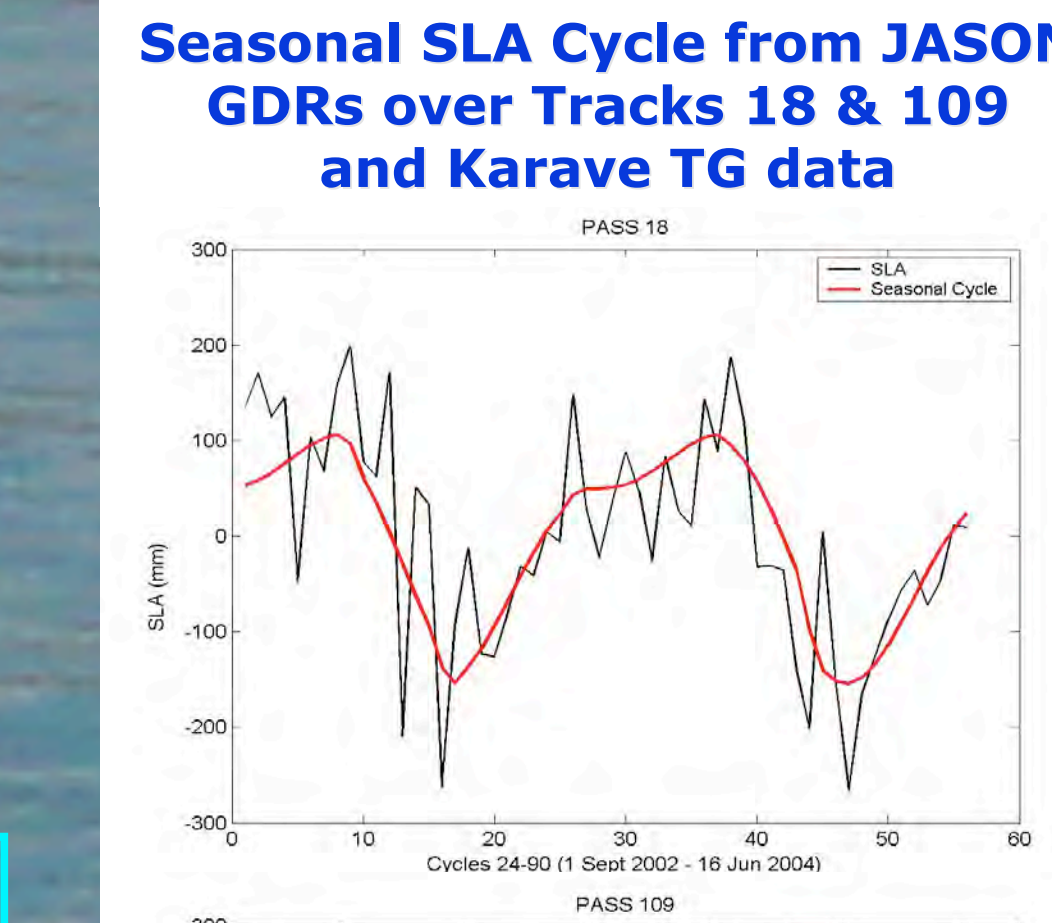
New Jetty Construction!!!



Daily TUC1 GPS coordinates
From IGS Rapid and Final Orbits
Posted daily on our web site:
www.jcet.umbc.edu/~epavlis/interdisciplinary.html



The new RADAR tide gauge to be installed at the Kastelli site and at Karave, in parallel to the AQUATRAK for calibration and validation.



JASON Re-Calibrations over Gavdos for Cycles 70-90 With the Release of ITRF2005

ITRF2000 Re-Analysis (2006)

ITRF2000 Gavdos GPS Site Positions & Rates

Geocentric Coords. & Epoch	X	Y	Z
GVD0 @ 2004.6	4783636.3296 ± 0.0003	2140711.9860 ± 0.0002	3623246.2746 ± 0.0002
Rates [mm/yr]	North: -25.98 ± 0.08	East: -14.40 ± 0.16	Up: -2.00 ± 0.37
GVD5 @ 2004.6	4782619.7314 ± 0.0003	2141235.1602 ± 0.0002	3624092.1771 ± 0.0003
Rates [mm/yr]	North: -26.50 ± 0.15	East: -15.67 ± 0.28	Up: -1.40 ± 0.66

Gavdos TG (GVD5) Height: 21.775 m

ITRF2005 Re-Analysis with

New GDRs from GDR-A + Corrections (≈ GDR-B)

Coordinates converted to ITRF2005 (Helmert-transformed)

ITRF2005 Orbits (GSFC, Luthcke et al.)

JMR corrections (Desai model)

New Parametric SSB (ITRF2005-compatible, Beckley/GSFC)

Revised Gavdos GVD5 Height: 21.7750 m

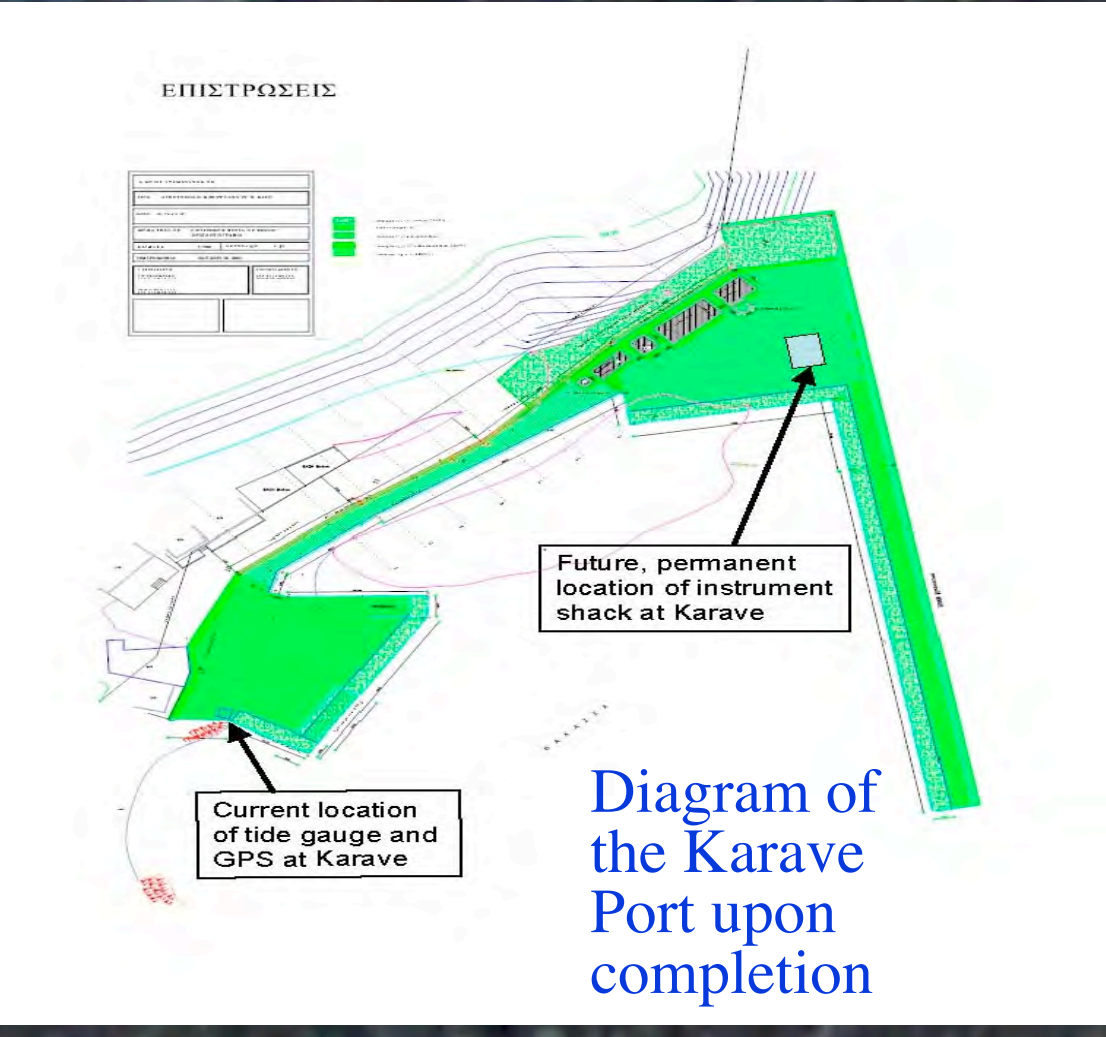
Previous Gavdos GVD5 Height: 21.7620 m

Δh Correction to previous Bias: -0.0130 m

Δh Correction due to TRF change: 0.0246 m

Δh due to ΔGDR from v.A to ≈ v.B (GSFC) (cycle dependent)

REVISED CALIBRATED BIAS: 121 ± 10 mm



Summary

The 2006 re-analysis of the Gavdos GPS network data with an extended set of 3 years of data and the strict "navigation" of the sites in the ITRF2000 TRF, resulted in a 13 mm reduction of the estimated JASON-1 bias. A small correction of 2 mm was also applied, based on the SLR monitoring of the origin of the TRF wrt the "geocenter".

Following the release of the new TRF, ITRF2005, in late 2007, we have initiated a new reanalysis of the GPS data to produce coordinates for all of our network sites, compatible with the new ITRF. In the meantime, as a first step, we have generated the ITRF2005 coordinates for all these sites, using the standard ITRF2000-to-ITRF2005 Helmert similarity transformation parameters available from ITRS.

The adoption of the new coordinates allows us to use the newly available GDRs from NASA Goddard [B. Beckley], based on improved ITRF2005 orbits, corrected for JMR errors and using an ITRF2005-consistent parametric SSB model [B. Beckley].

The net effect of all these changes resulted in a revised bias value of 121 ± 10 mm on the basis of our data set for cycles 70 through 90.

The new jetty at Karave was recently completed, and the instruments were successfully re-deployed in November of 2006. The new data will be evaluated as soon as the corresponding GDRs are available.

We are proceeding with the instrumentation of our second location on mainland Crete, at Kastelli, where a second calibration facility will be constructed this spring and functional by this summer.

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