



**Abstract**

The new prototype microwave transponder has been used for the calibration of the Cryosat-2 mission. This transponder has been initially set up, in 2013 and 2014, for testing and evaluation at the SLR2 site within the University campus for the Cryosat-2 calibration, before its final and permanent deployment at the CDN1 site in west Crete, Greece. The permanent altimeter transponder site, CDN1, is located on a triple cross-over of the ESA Sentinel-3A & 3B missions, the Jason satellites, but is also adjacent to SARAL/AltiKa satellite. In this work, successful responses of the transponder as well as calibration results for the Cryosat-2 will be presented, even when the satellite is 7 km off the transponder location.

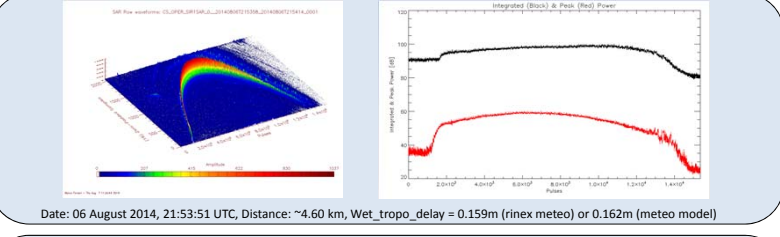
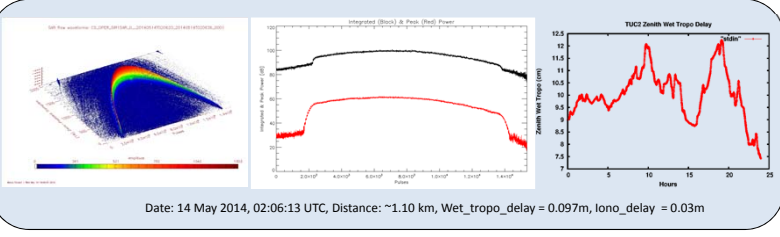
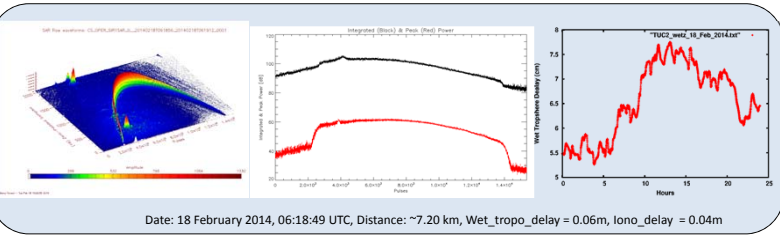
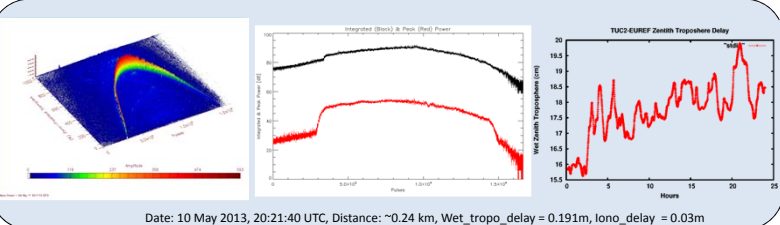
**1. Transponder Calibration with Cryosat-2 @ SLR2 site, Greece.**

The SLR2 site inside the TUC Campus, Chania, Crete, Greece has been used for the Cryosat-2 calibration using the microwave transponder.

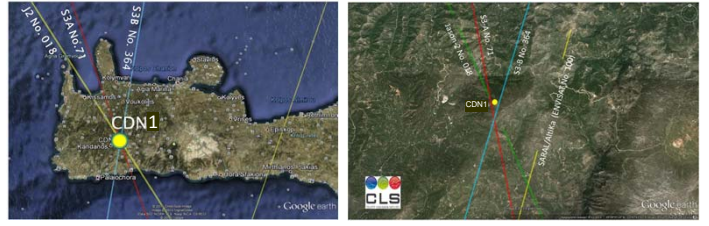


Five successful Cryosat-2 transponder calibration campaigns have been performed in 2013 & 2014 at the SLR2 site. For each campaign the transponder response was quite clean and smooth using the Cryosat-2. The atmospheric delays have been determined using permanent GNSS arrays collocated with the transponder site at SLR2.

Cryosat-2 SAR raw waveforms      Integrated & Peak signal power Versus pulses      Wet tropo delays over time



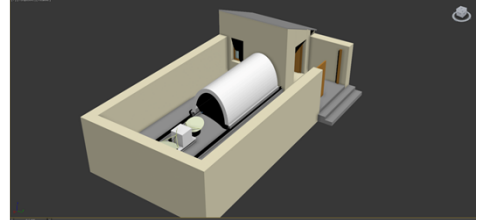
**2. CDN1 permanent Sentinel-3 Transponder Calibration Site**



**2.1 Transponder Housing**

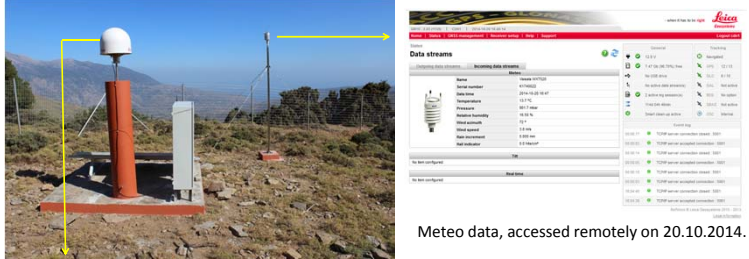


The transponder "igloo" roof (left) and current construction status (right)

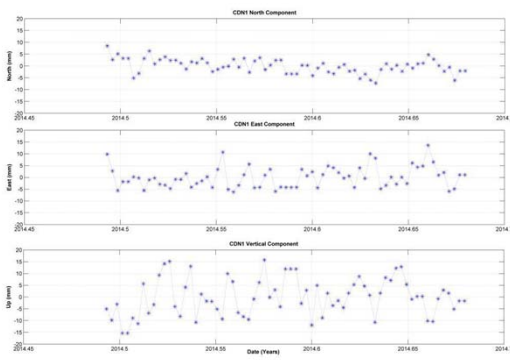


The polyester "igloo" moving roof.

**2.2 GNSS & Meteo stations operational @ CDN1 as of June 2014**



Meteo data, accessed remotely on 20.10.2014.



**CDN1 Coordinates:**  
 Lat= N 35°20'16.023939",  
 Long= E23°46'46.855157",  
 Height=1049.517m (ellipsoidal)

**3. Conclusions & Future Plans**

- The "CDN1" site will be fully operational in 2014 to support the Sentinel-3 commissioning phase;
- The "CDN1" will be used for S3A, S3B, Jason-2, and Cryosat-2 calibration;
- The transponder has been effectively used for five Cryosat-2 calibration campaigns at the "SLR2" site;
- Wet\_tropo and Iono delays have been determined by in situ GNSS arrays;
- Preliminary Cryosat-2 calibration values have been determined as: B = 0.638m (FBR data), and B = 0.745m (stack data) for May-2013 campaign; More Jason-2 & Cryosat-2 campaigns will take place in 2015.

**Acknowledgments:**  
 Part of this work has been produced with the financial assistance of the European Union. The views expressed herein can in no way be taken to reflect the official opinion of the European Union and/or European Space Agency.