

# Remote sensing and field investigation of the earthquake cycle

CCHED - Newton Agham PhD Programme

by John Dale Basas Dianala (Grantee), University of the Philippines, Diliman  
Host Supervisor : Professor Richard Thomas Walker, University of Oxford

## Introduction

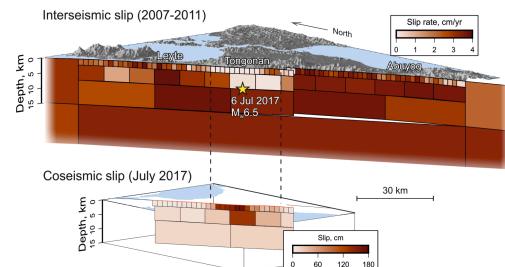
Satellite observation has helped push rapid advances in Earth sciences in the past several decades. Economic demands, however, have outpaced our knowledge of seismic hazard and the application of cutting-edge techniques. This threatens the sustainability of growing and urbanizing communities.

The goal of my PhD was to understand the potential for earthquakes in less studied but developing regions in the Philippines and central Asia. With the training from the expertise and resources at the University of Oxford, I achieved this by refining and combining techniques in remote sensing and field investigation of active faults.



At the Department of Earth Sciences,  
University of Oxford.

## Key outcomes



Slip models of the Philippine Fault in Leyte. Lighter patches in the interseismic model (top) comprise the fault section capable of recurring seismic ruptures. One such event is the magnitude 6.5 earthquake in 2017, as shown by the coseismic slip model (bottom).

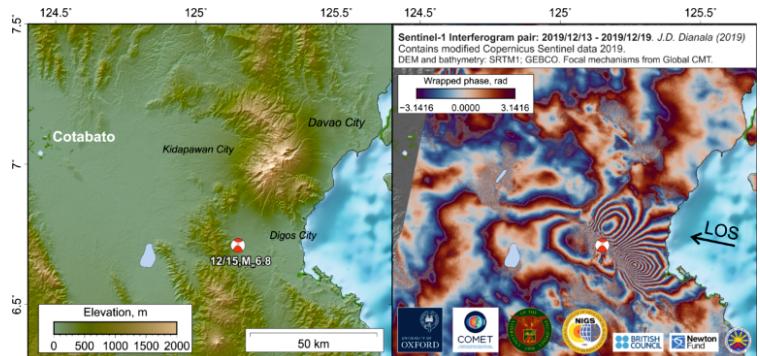
Periodic and emergency satellite radar observations allowed us to identify the location and potential source of recurring magnitude 6.5 earthquakes on the Philippine Fault on Leyte island, which was previously thought to be aseismic

Full paper published in the Journal of Geophysical Research: Solid Earth in 2020; with an Editor's highlight in [EOS: Science news magazine](#)

Also received the Student Presentation Award at the 2021 Seismological Society of America conference

## Key outcomes (cont'd)

In coordination with the European Space Agency and COMET, rapid satellite data acquisition and analysis following a series of four devastating earthquakes in Mindanao in 2019 helped guide local disaster response efforts and research development



Shaded relief (left) and satellite radar interferogram of the ground deformation in a 15 December 2019 earthquake (right), which is fourth and strongest disastrous earthquake to hit the Cotabato-Davao region of Mindanao that year.



Recording the vertical profile of a fault scarp in Kyrgyzstan using high-accuracy GPS, with the mountains of the Tien Shan in the background. Photo courtesy of Christoph Grützner.

We gathered and analyzed data that could help fill gaps in the published record of major earthquakes in developing areas, through surveying active faults in Kyrgyzstan and Kazakhstan in the field and generating digital elevation models using images from drones and satellites

## How did the PhD benefit you and your research?

“ Doing my work at Oxford has allowed me to build connections and collaborate directly with respected scientists in my field not only from the UK, but from eight different countries! It was wonderful to experience the openness of U.K. academia, which draws researchers from around the world and facilitates rapid scientific development. ”



Courtesy call to the Municipal Disaster Risk Reduction and Management Officer (MDRRMO) of Abuyog, Leyte, Erik Barcelo (right), and MDRRMO assistant, Reinz Corbeza (left) during my field work to study the Philippine Fault.



Dinner at St Edmund Hall with the participants of the Active Tectonics of Central Asia Workshop in Oxford, led by my supervisor Prof. Richard Walker (5th from left), and me at the extreme left.

## Contact Information

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