

ACTIVE FAULTS MAPPING AND PALEOSEISMOLOGY PROGRAM IN THE PHILIPPINES

PHIVOLCS started its Active Faults Mapping and Paleoseismology Program after the 16 July 1990 Luzon Earthquake. The program conducts mapping and studies using interpretation of remotely-sensed images, extensive detailed field mapping and paleoseismological investigations along known active faults in the Philippines. The focus in the last 2 decades has been the Philippine Fault Zone (PFZ) and the Valley Fault System (VFS).

Right after the 1990 Luzon earthquake, a team from Hiroshima University, Japan and PHIVOLCS conducted a detailed mapping of the 120 km-long surface rupture. Observation of the surface rupture and related ground deformation provided a rare opportunity to understand the character of displacements, and behavior of individual fault segments in response to the propagation of a large coseismic rupture.

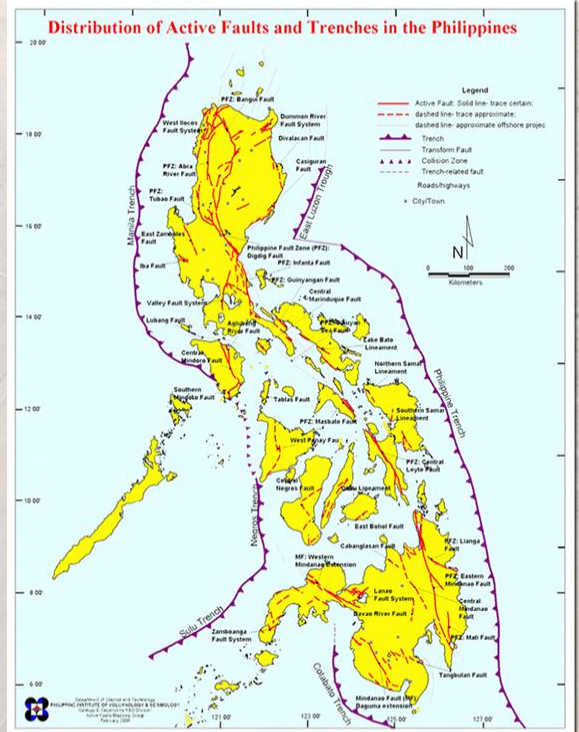
In 1992, PHIVOLCS Geologists Jessie Daligdig, Norman Tuñgol and Glenda Besana embarked on the paleoseismological study of the Marikina Valley Fault System (renamed in 2002 as the Valley Fault System). At that time, it is a pioneering work in the Philippines when the first-ever trench for the paleoseismological study was dug at San Rafael, Rodriguez, Rizal Province. A follow-through study of the VFS was conducted in 1994 by PHIVOLCS with the United States Geological Survey (USGS). Later in 1996, the south segment of the West VFS was studied in partnership with Tokyo Institute of Technology (TITech), Japan.



Trench site at San Rafael, Rodriguez, Rizal Province, 1992. The result of this paleoseismological study of the VFS was presented in the PHIVOLCS Professional Paper 01 entitled "The Marikina Valley Fault System: Active Faulting in Eastern Metro Manila, 1997"

In 2000, the revised Active Faults Map of the Philippines was released. This is continuously being updated based on more detailed field data. From initial regional-scale

(1:1,000,000 to 1:250,000 scale) mapping efforts based largely on various remote sensing imageries, active faults are now being detailed in the large scale (1:50,000 to 1:10,000 scale) utilizing conventional aerial photograph interpretation, field mapping and paleoseismic studies. The revised active faults map is also now incorporated in the National Structural Code of the Philippines published by the Association of Structural Engineers in the Philippines (ASEP) in 2002.



Active Faults Map of the Philippines developed in 2000



PHIVOLCS geologists with Kyoto university scientist map active faults in the field

Geomorphic and paleoseismic investigations of the PFZ have been conducted since 2003 with Kyoto University, Japan. Trenches were excavated along Digdig fault (2003, 2004), San Jose fault (2004), Gabaldon fault (2006) and San Manuel fault (2006) in Central Luzon. After the 2003 magnitude 6.2 earthquake, trenches were also dug in Masbate (2004) under a PHIVOLCS-TITech collaborative project.



Trench site along San Jose fault in Central Luzon, 2004

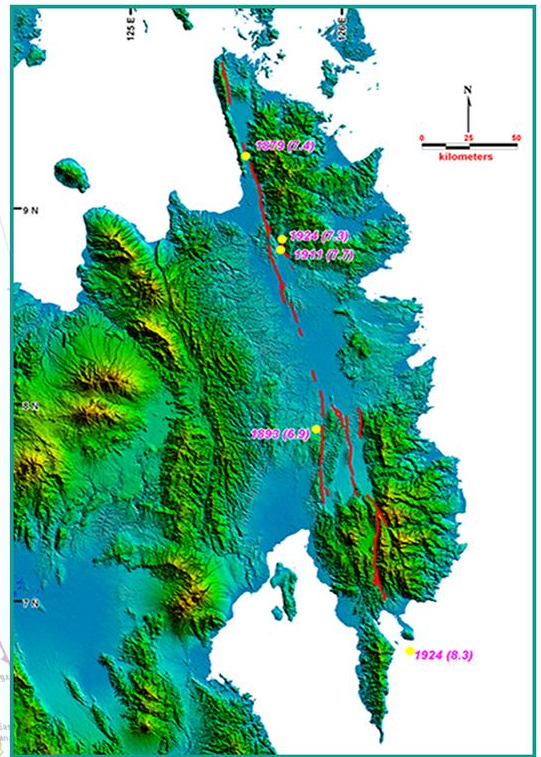
Paleoseismic trenches were excavated in Agusan del Norte (2009), Compostela Valley (2009) and Davao Oriental (2010) to study the Eastern Mindanao segment of the PFZ. Such studies enable us to learn about the location, recurrence interval and size of large-magnitude prehistoric earthquakes, as well as produce large-scale active fault maps of the PFZ. A planned paleoseismological investigation is lined up for the Infanta, Guinayangan and Leyte segments of the PFZ.



Trench site at Barangay La Paz, Santiago, Agusan del Norte, 2009



Trench site at Barangay Sto. Nino, Butuan City, Agusan del Norte, 2010



Revised map of the Eastern Mindanao segment of the PFZ (red lines) (Perez et al, 2010). Dots represent epicenters of historical earthquakes with year, and magnitude (in parentheses)



PHIVOLCS personnel use Total Station surveying instrument to map active faults in the field

Revised active fault maps for the whole country are now incorporated in Geographic Information System (GIS) platforms for systematic archiving and utilization. The VFS Map is available in 1:10,000 scale. GIS-format hazards data are currently being shared with end-users and stakeholders such as planners, administrators, policy-makers and the general public. Active fault maps and paleoseismic data are being utilized in various applications such as land use planning, hazards assessment and policy formulation.

PHIVOLCS Bldg., C.P. Garcia Ave.,
UP Campus, Diliman, Quezon City 1101
Tel. Nos. (632) 426-1468 to 79
www.phivolcs.dost.gov.ph

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