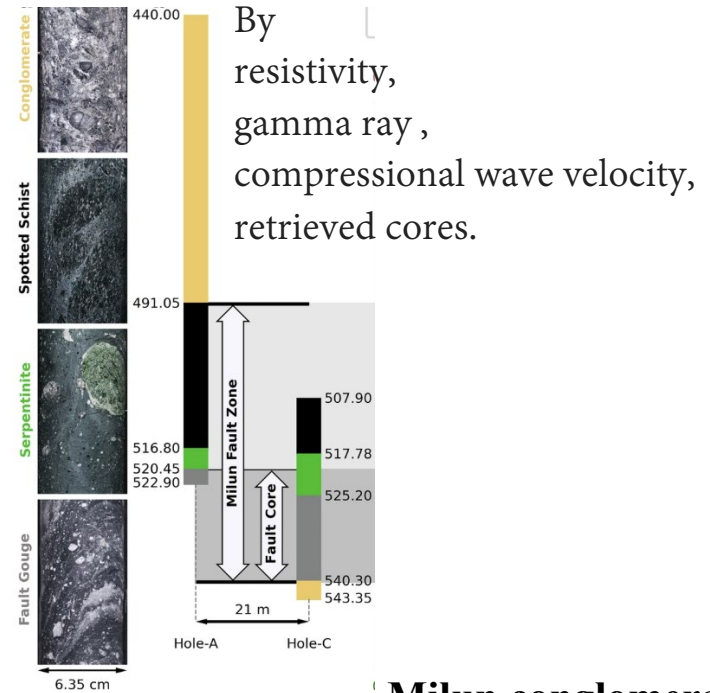
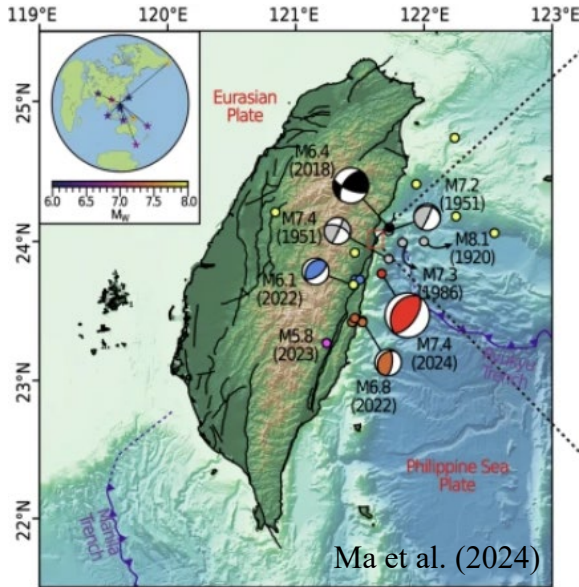


# Microanalytic characteristics of extremely fractured quartz in fault damage zone and implications

Supplementary material

# Milun Fault

## Milun fault Drilling and All-inclusive Sensing project, MiDAS



**Milun conglomerate**



**garnet-bearing spotted schist**

## Methodology

### **Conventional XRD**

1. Bulk powdered samples
2. Mineral identification and alteration-phase characterization
3. Confirmation of quartz, serpentine-group minerals, and associated phases

### **Synchrotron XRD (in National Synchrotron Radiation Research Center in Taiwan)**

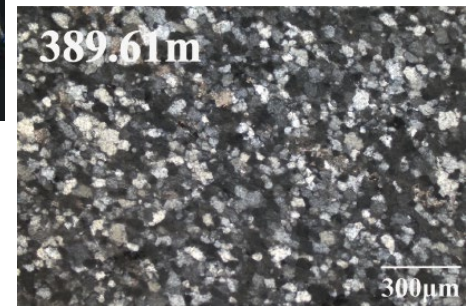
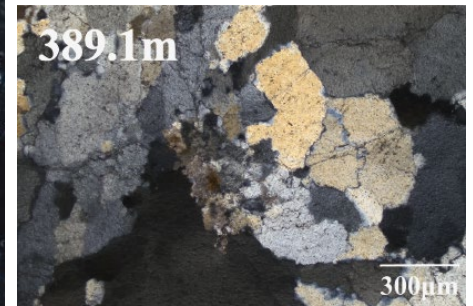
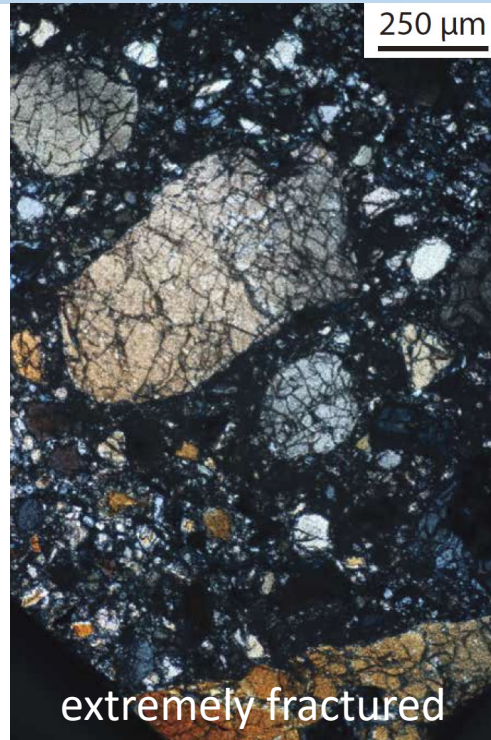
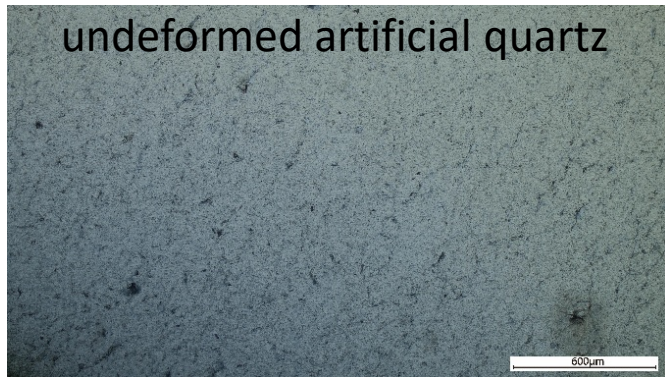
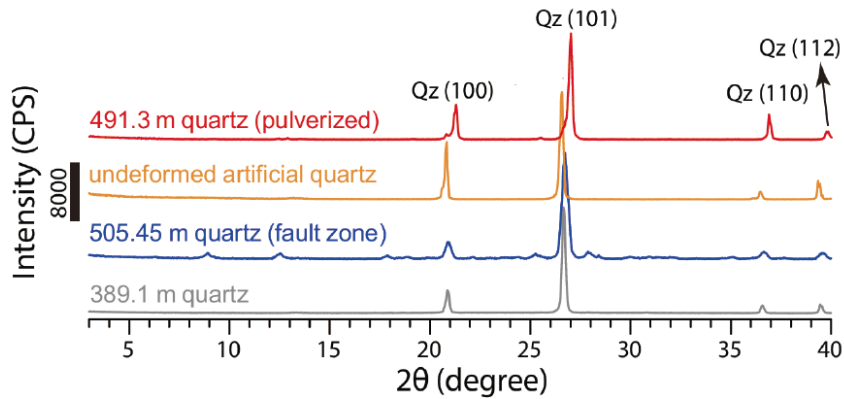
1. Selected areas on thin sections
2. Local crystallographic analysis of quartz
3. Comparison of mineral phases among different domains

### **Laue microdiffraction (in National Synchrotron Radiation Research Center in Taiwan)**

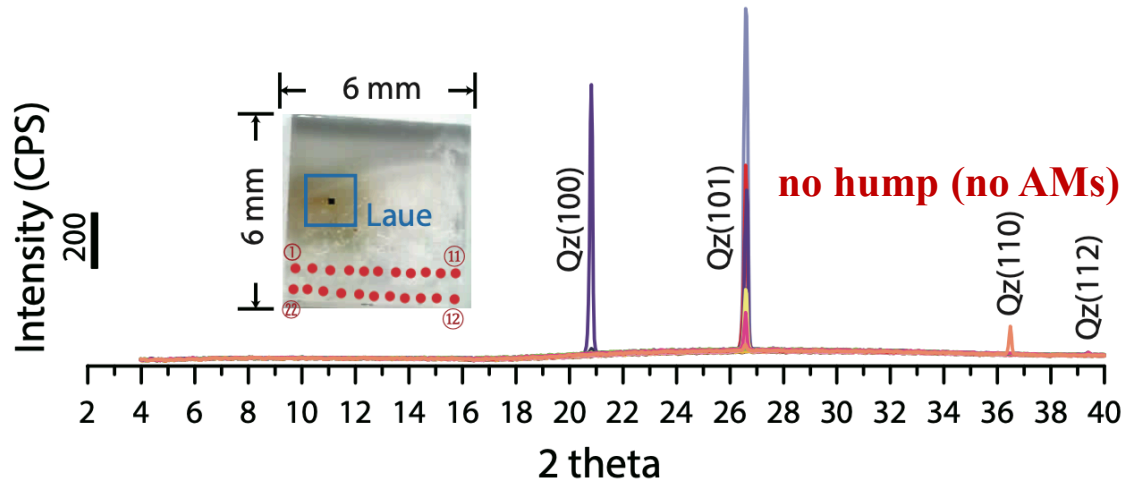
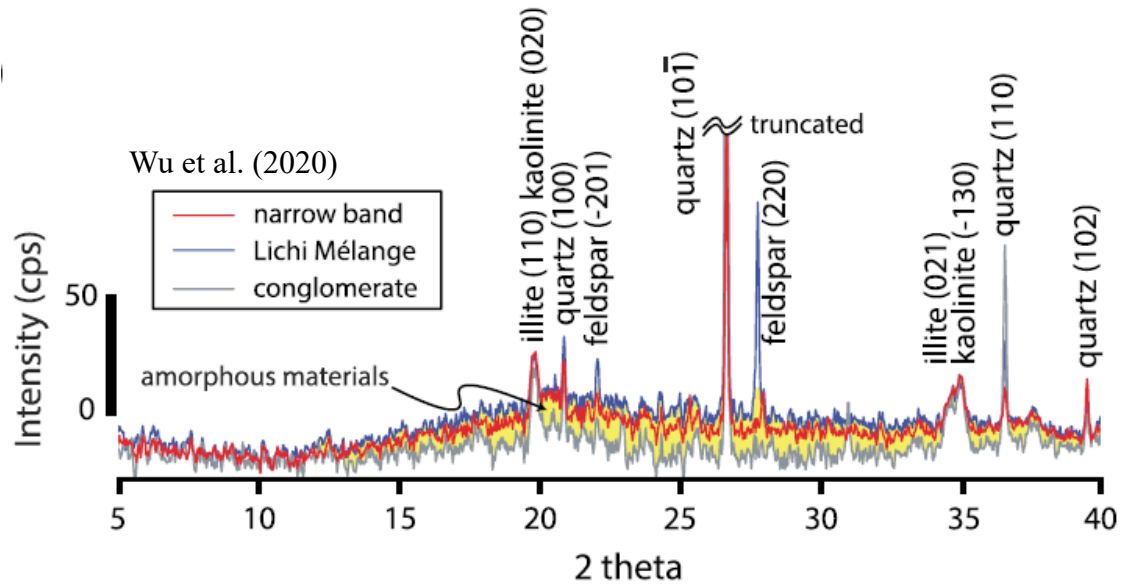
1. Quartz grains in selected thin-section areas
2. Analysis of Laue spot patterns
3. Evaluation of lattice distortion and internal strain

# Quartz

## Quartz at depths in MiDAS hole-A

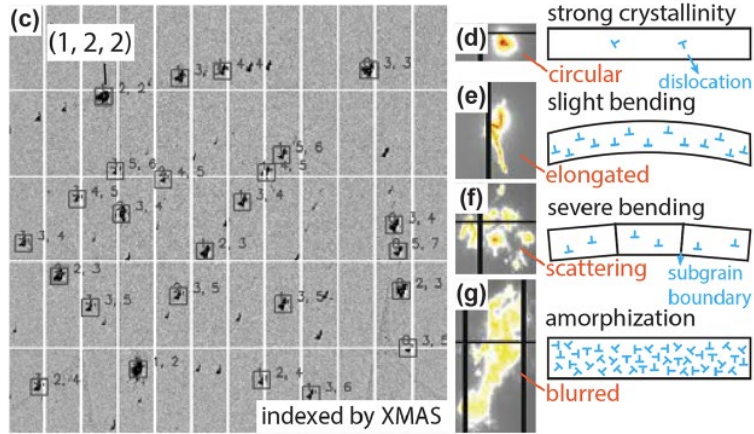


# Synchrotron X-ray diffraction



# Synchrotron X-ray diffraction

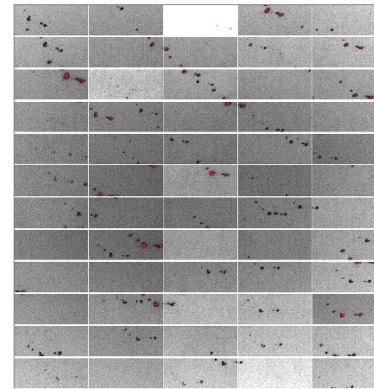
Wu et al. (2020)



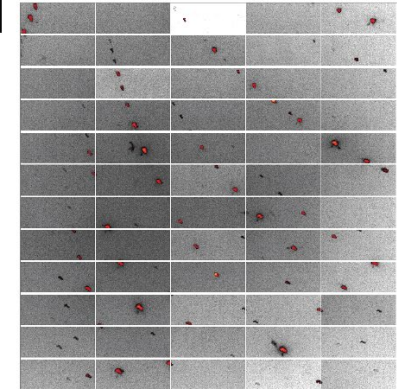
Laue spot pattern

strain in lattice

Laue spot pattern



pulverized quartz

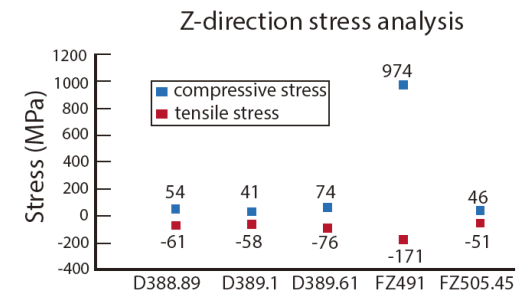
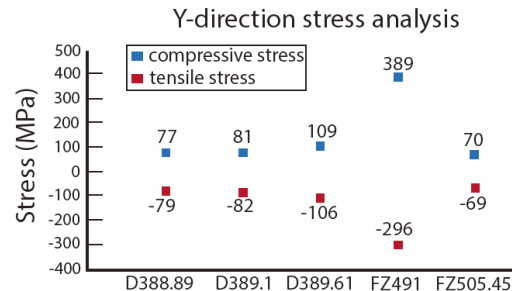
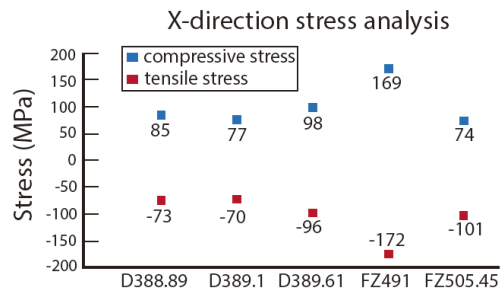


quartz at 505.45 m

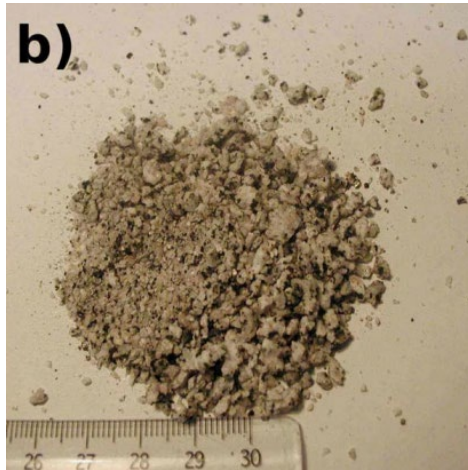
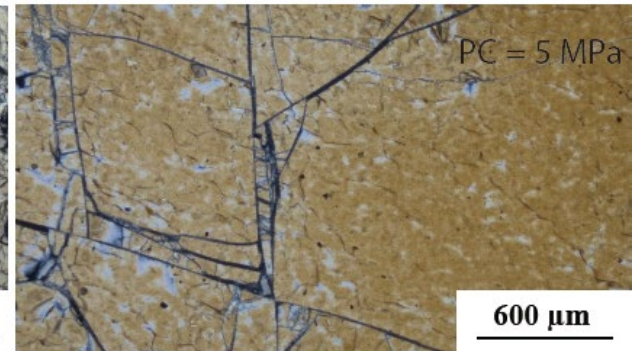
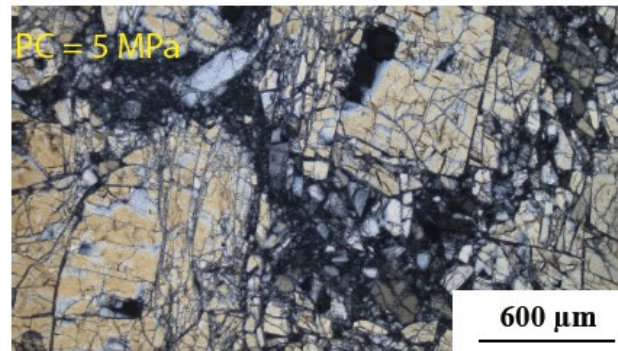
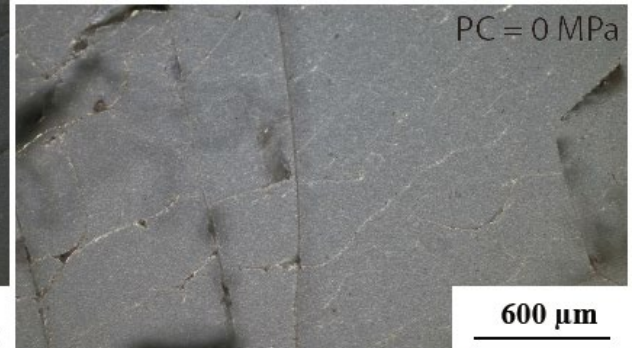
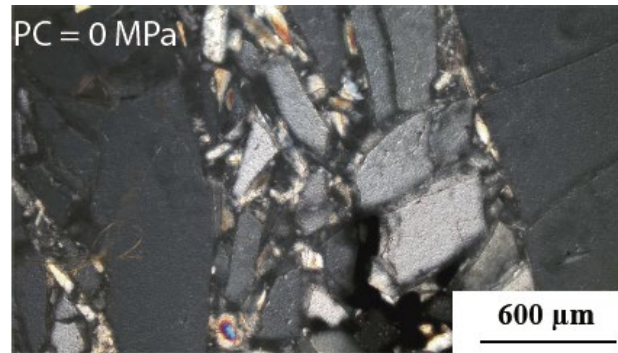
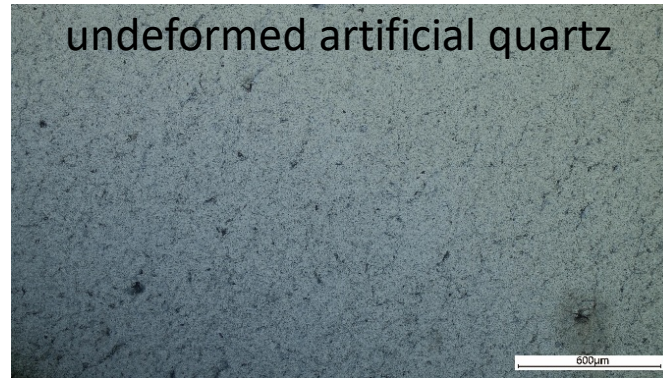
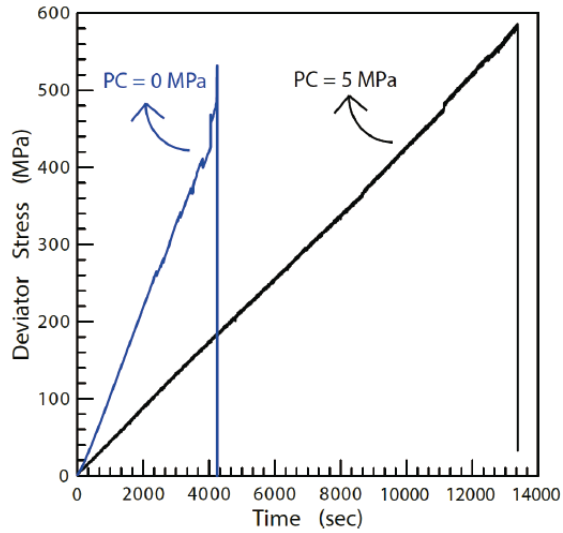
indexing



evaluating stress

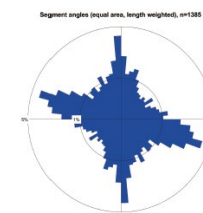
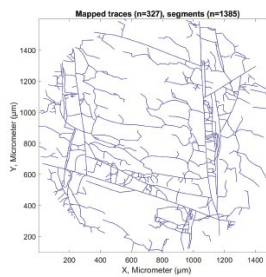
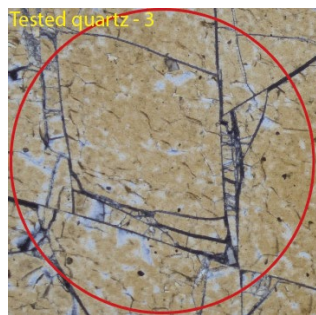
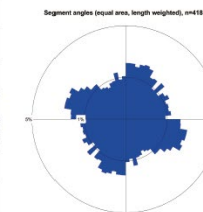
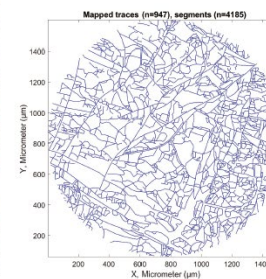
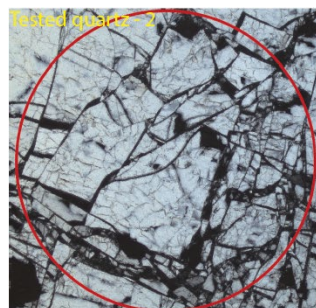
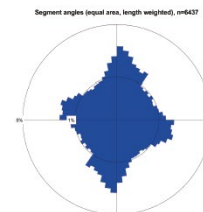
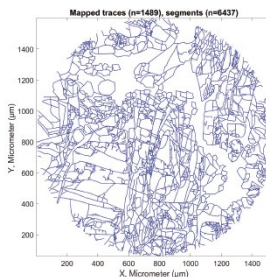
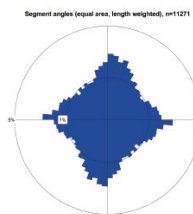
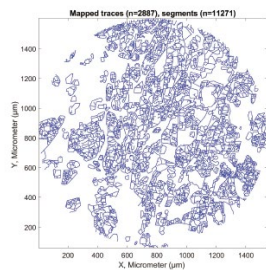


# Triaxial compression experiments

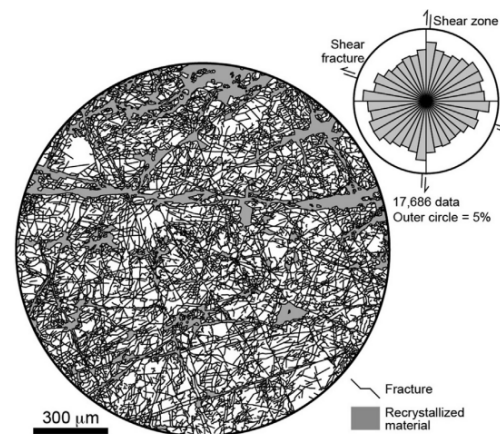


# Fracture analysis

By Matlab FracQ



Fracture networks exhibit only weak preferred orientations



Sullivan and Peterman (2017)

## Take-home message

**We identified an extremely fractured quartz body within the Milun Fault zone. Microscopically, it shows no clear shear fabric and no shear-induced amorphous phase. However, Laue microdiffraction reveals lattice distortion and residual stress, suggesting that the quartz may record coseismic pulverization dominated by high-strain-rate loading and transient tensile fracturing.**