

Study of Ionospheric Total Electron Content (TEC) Variations before The 2019 M 6.9 Sunda Strait Earthquake in Indonesia

Ali Azimi

Poster No. P3.3-073



BMKG

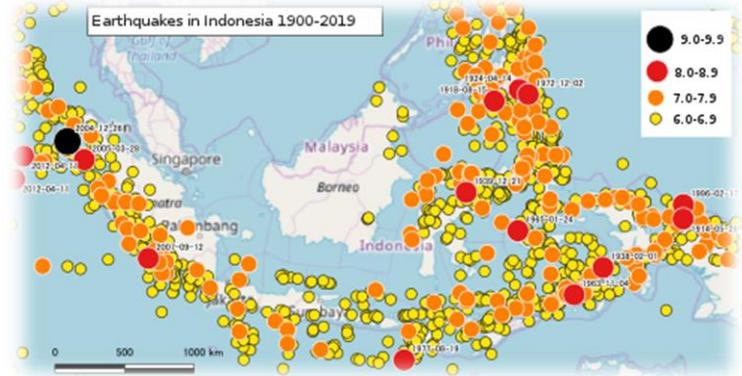
The Agency for Meteorology, Climatology, and
Geophysics (BMKG)



ABSTRACT

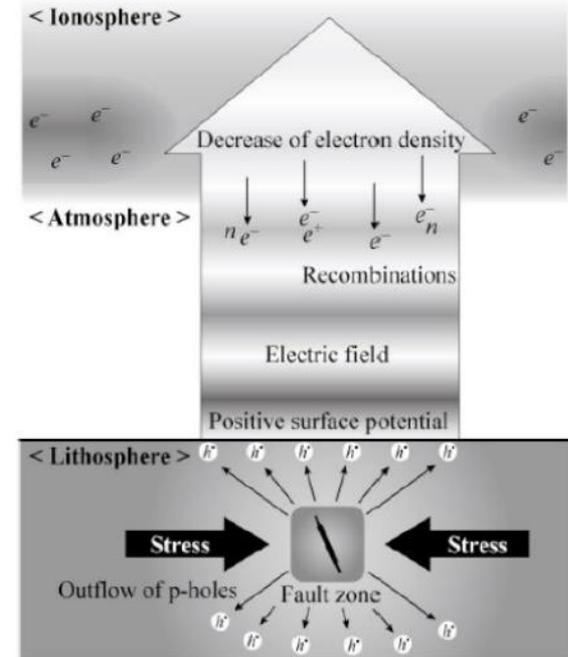
Indonesia is a country prone to earthquakes due to its tectonic complexity. Lies among three major plate tectonics, making Indonesia hit by the earthquake on daily basis.

Many kinds of ways to mitigate the earthquake have been studied. One of them is by observing the initial anomaly signal possibilities prior to an earthquake. It is commonly called the precursor.



Stress accumulation in the lithosphere can cause microfractures resulting in charged particles possibly release from those microfractures around the earthquake preparation zone toward the atmosphere and disturb the TEC variations.

The variation of total electron content (TEC) in the ionosphere is one of variable used by researchers to find initial emergence of precursor before an earthquake event.



INTRODUCTION

Earthquake Parameter,

- Origin Time:
19:03:25 Local Time or 12:03:25 UTC,
2 August 2019
- Episenter: $-7,32^{\circ}$ S dan $104,75^{\circ}$ E
- Magnitude: M 6,9
- Depth: 48 km
- Location: 147 km Southwest
Pandeglang reGENCY, Banten, Indonesia.

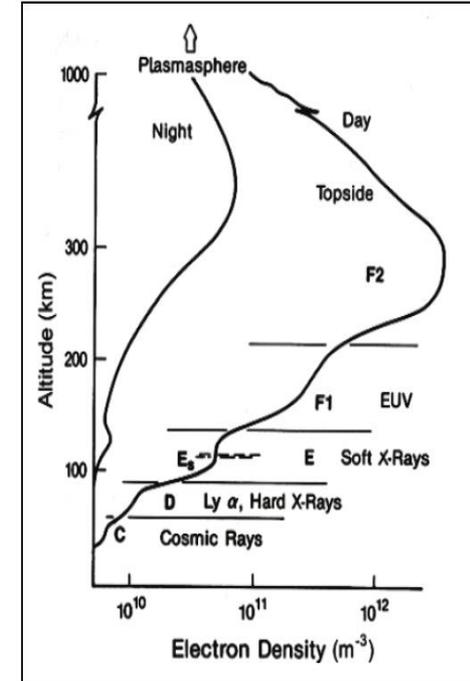
This research is intended to study the initial appearance before an earthquake occurs and to broaden scientific knowledge about earthquake precursors.



★ = Earthquake Epicenter ▲ = Nearest TEC data point (27.8 km)

The data processing method in this study uses the correlation technique method with a threshold.

- Process 30 days TEC data before the earthquake occurrence.
- Disturbance Storm Time Index data is used to confirm the observed anomaly is not caused by the magnetic storm

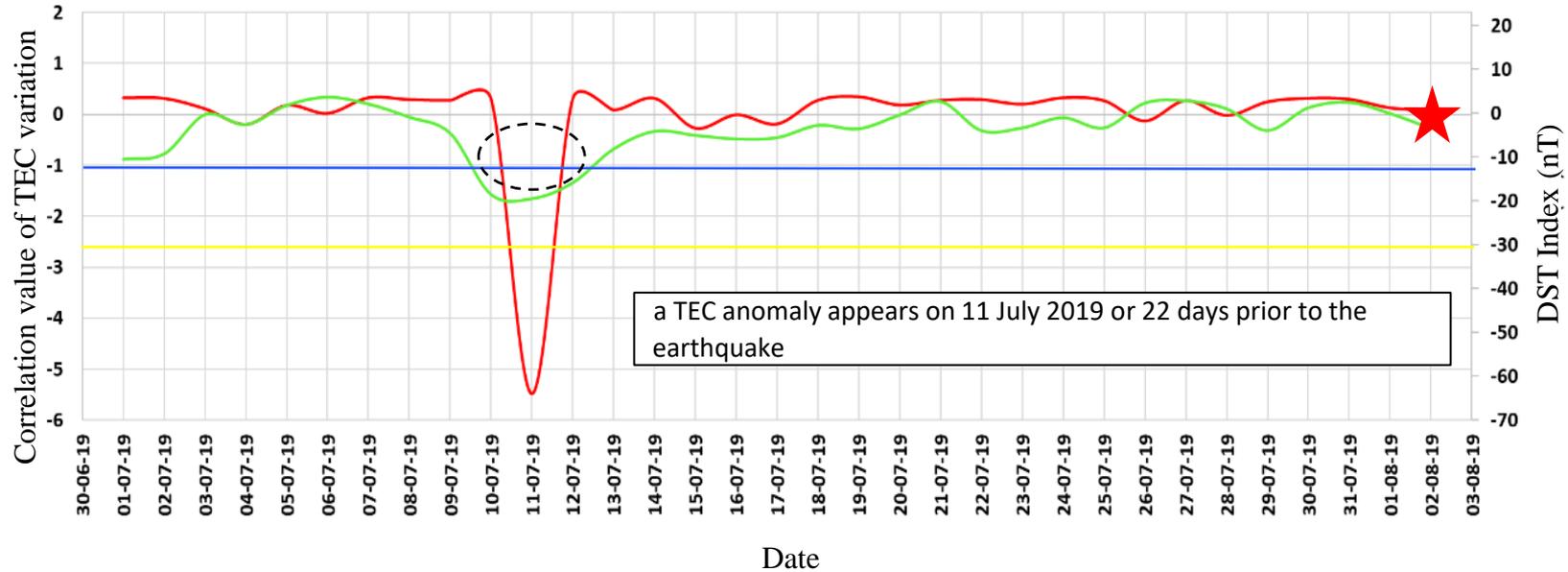


Ionosphere Structure

Earthquake Data Parameter → www.repogempa.bmkg.go.id/query.php

Data of *Total Electron Content (TEC)* → <http://ftp.aiub.unibe.ch/CODE>

Data of *Dst Index* → http://wdc.kugi.kyoto-u.ac.jp/dst_realtime



RESULTS

Red Line: TEC Variation

Green Line: DST Index Variation

Blue Line: TEC Anomaly Threshold

Yellow Line: Magnetic Storm Threshold

- a TEC variation anomaly appears before the earthquake with a magnitude of 6.9 on August 2, 2020. The anomaly appeared on July 11, 2019, 22 days before the earthquake.
- The anomaly does not originate from magnetic storm activity because the results of the analysis of the Dst index variation data in that period do not show a Dst index value of less than -30 nT.