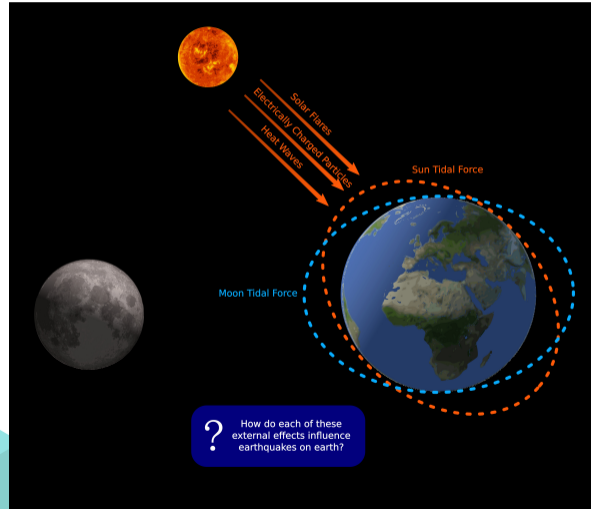


# Evaluating the Effectiveness of Precursor Data on Earthquake Forecasting Depending on Earthquake Depth

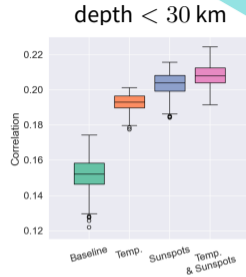
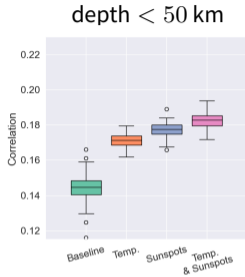
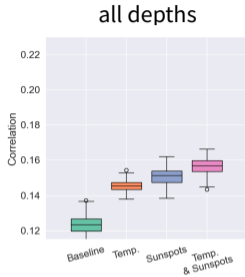
Matheus Junqueira<sup>a</sup>, Masanori Shiro, Yuji Yagi, Yoshito Hirata

<sup>a</sup> Graduate School of Science and Technology – University of Tsukuba

- ▶ Effective ways to forecast earthquakes are yet to be designed
- ▶ The literature gives evidence that external factors can change the patterns of earthquake occurrence
  - ↳ Solar magnetic field
  - ↳ Lunar tides
  - ↳ Atmospheric temperatures
- ▶ They cannot be expected that they will affect earthquakes equally regardless of depth
- ▶ Investigating how forecasting accuracy varies with the earthquake depths can give important insights on which precursors are most relevant
- ▶ Here we perform such analysis for surface temperatures and sunspot data



# A Glimpse of the Results



► We try to predict earthquakes in the Balkans using temperature data and/or sunspot numbers

- the correlation increases sharply as we decrease the threshold for the earthquake depths
- For earthquakes shallower than 30 km, we observe a correlation of approximately 0.21 when using both kinds of data
- An increase of  $\sim 35\%$  from the baseline.
- In the “all depths” model, not only the correlations were lower, but the increase was only of  $\sim 26\%$

- The results give pieces of evidence that support that depth is a very significant variable in precursor analysis
- This can also be used to reason about the mechanism by which the Sun affects earthquakes
- The evidence strongly suggests that the Sun affects earthquakes by means of the heat that it is constantly transferring to our atmosphere