Detecting field lines, as propagation, at fault lines with an Amateur HF-Radio

Goups.io user group: https://groups.io/g/MDSRadio

MDSR website: www.rf-seismograph.org

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Detecting field lines as propagation at fault lines
A discovery that belongs to all Amateur radio operators

Radio propagation at fault-lines is different, more localized and usually better then the solar model of propagation indicates, especially in the lower bands. Amateur Radio Operators (HAMs) have flocked all over the world to live near areas that have fault lines. DX stations that are located in volcanic and seismically active earthquake zones are frequently visited by HAMs. They know that propagation is different, but they do not know why. This discovery might just answer a lot of questions, but it also creates more questions…

Types of faults and their effect on propagation:

a. Deep fault lines are weak points of earth's outer crust and are mostly located under the ocean. They allow internal energy and processes to leak out. This mostly affects the atmospheric D layer and makes fissures in the ionosphere. Released energy also pushes the plasma further away from the planet's surface. Deep faults create big earthquake events that are usually attenuating, but smaller aftershocks will still create propagation and can last for months afterward.

b. Fault lines in mountainous areas provide a break in the rock and allow the edges of the rock to vibrate. The deeper and longer the cracks, the more area of rock can vibrate. This event creates electricity and magnetic fields when the rock is dry, through piezoelectricity. These are very long, slow vibrations and are caused by the moon as well as by earthquakes. The earthquake depth data provided by USGS seem to indicate that quakes above sea level are more likely to create propagation.

c. The energy is detected by subtle propagation changes in the shortwave radio bands. Interestingly, only the small local quakes within 1000 km and below M4 create short (up to 1 hour) openings in the lower bands when the solar flux is below 100. As the solar flux increases the band openings shift to the higher bands, but they are always triggered by a quake event, which are occurring all the time.

d. Since the RF-Seismograph is located on a small mountainous deep fault, the measurement and earth quakes detected are the result of the energy released by this ground feature. The measured impact is very localized and specific to the fault line. Moving just 10 m away is measurable as a significant drop in propagation. Active faults are narrow and deep, which has a focusing effect to the electro-magnetic waves and they shoot straight up into the sky. The radiation is weak, but fault lines are long and have a huge underground surface area for the energy to escape.

What are the best fault lines for propagation?

The best fault is dry and deep and narrow. They can be found in mountainous terrain and deserts. Still, most faults are water saturated rock, which does not create electricity; the dryer the rock the more prominent the effect is. If the fissure is filled with water the attenuating effect stops the radiation from leaking out as well, which is why the effect is reduced during the raining season. Fault lines cover the planet like a spider web and they also become a conduit for seismic events to dissipate energy.

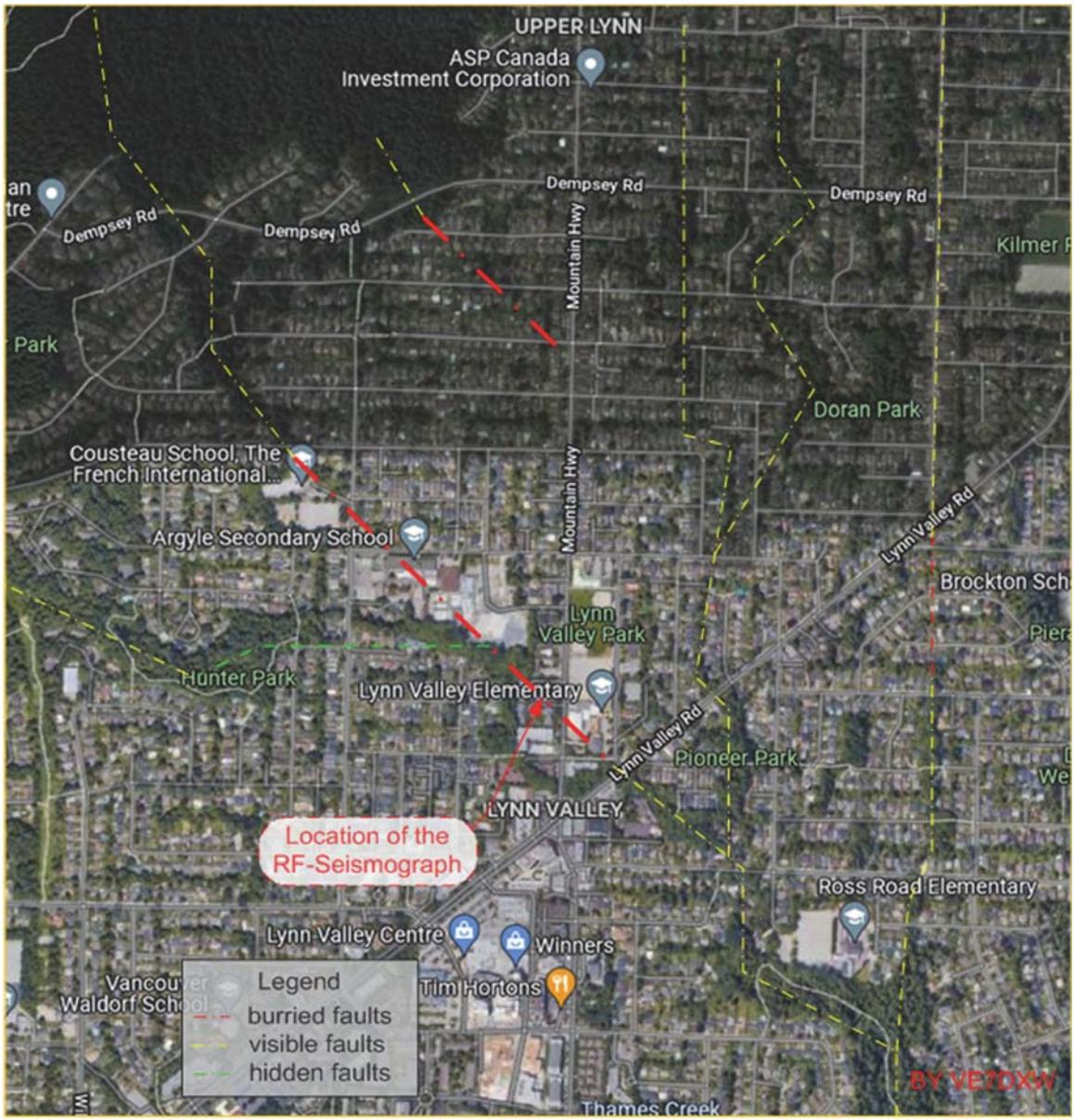
Weak spots in the ground can be measured, even if they are not visible with the naked eye, by using the EMF-390 tester.

Fault-lines are everywhere

Fault lines are misunderstood and a nuisance for most, but if we want to get the best propagation we need to find them and monitor them.

There are a lot of fault lines that are hidden and only when there is a quake within 500 km the fault becomes active. In order to see if a fault is active an EMF meter can be used that has a low cutoff frequency of 1 Hz or lower. I have been using the EMF-390 from GQ Electronics which is surprisingly affordable with great success.

Below is a map of the area with the RF-Seismograph in the center. It is located by sheer luck over a deep local fault that was hidden by development. Only if the antenna is over the fault the propagation data becomes interesting and will display quake activity.



Fault-lines found in the Lower Mainland

a.) Mount Seymour – near the RF-Seismograph -- has several fault-lines that are active. This is a fault that was listed by Earthquake Canada and it was active as the EMF-390 was indicating EMF radiation, while we were there.

b.) Small fault-line at Horseshoe Bay and White Cliff

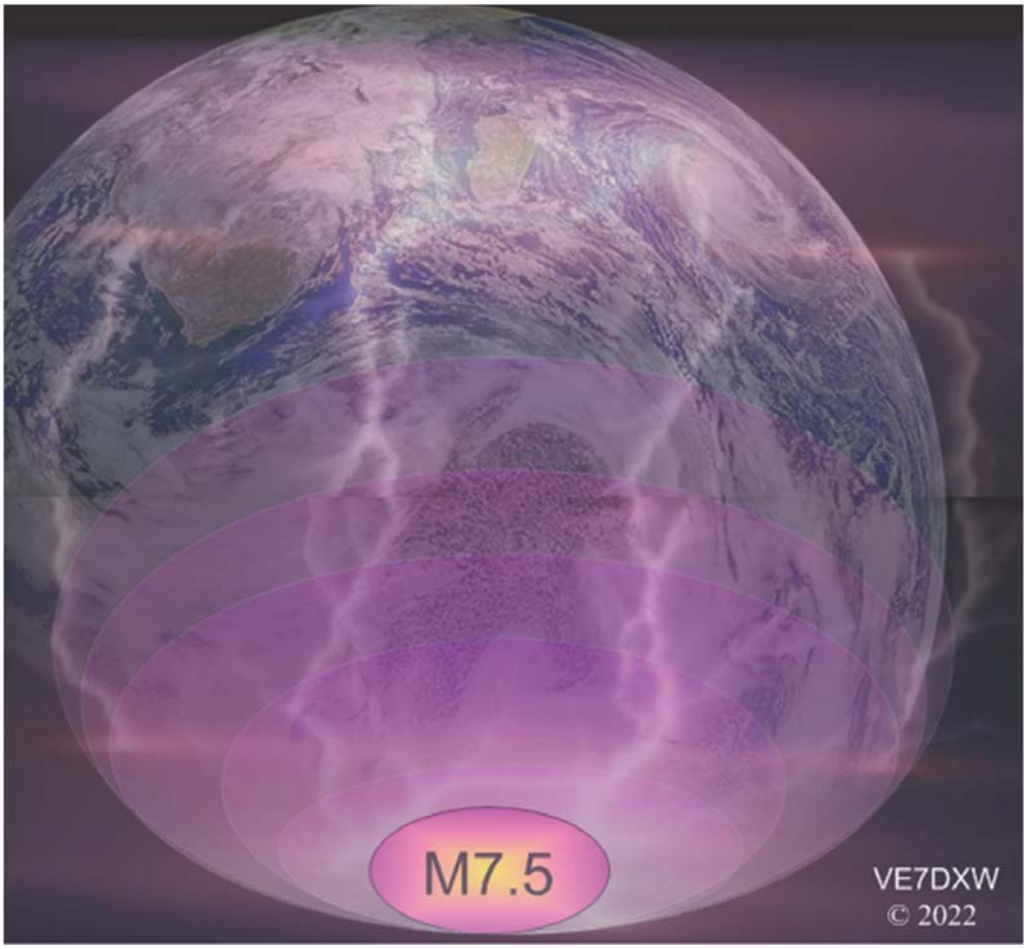
c.) Fault in upper Lynn Valley, which is at least 50 m wide. If there is plant life, it is always disturbed not only by the flow of the river, but also by the widening gap in perpendicular motion at the sides of the rift.

Where does the energy come from – is the moon supercharging the planet?

Energy from Quakes

Even if we do not include the electric effects of quakes, the mechanical shock wave of a quake > M6 nullifies any reflective layer and that is easily measurable with the RF-Seismograph or an Ionosonde. That was most visible with the M7.1 from Searles Valley in California at July 5th2019. The aftershocks though, changed propagation for month after and that was because of the vibrations of small aftershocks that fissure the rock. That rattles the fault lines all over the planet and in this process converts mechanical energy into electricity. Field lines pop out along all fault lines along the ground and as a result shortwave radio propagation changes.

M7.5 in the Falkland Islands shakes the planet creating an electrical tsunami (fictional)



When we convert the quake energy to a metric value there is not only a big number, but it also becomes something that can be integrated into the bigger picture. These are big numbers and the reason we have not integrated these effects, mostly located in the D-Layer is because it is measured in Richter scale – a logarithmic value and not metric. Because the M numbers are small, it leads us to underestimate the total amount of energy released. According to the Alabama University website M7.5 is really 1.122018 10^{+16} J of radiated waves power and 2.192895 10^{+20} J of Seismic Moment energy! Quakes or volcanic events that size do not occur very often so they do not add a lot of energy into the overall global energy budget.

Data provided by Alabama University website:

Earthquake Magnitude:	7.5	Enter Value
Seismic Energy in Waves Radiated from Earthquake Source:	1.122018e+16	Joules
Total "Seismic Moment Energy" (M_O):	2.192805e+20	Joules

Energy from the gravitational pull of the moon

Energy from tidal movements of water

It was estimated by the Ingenium Institute that 1 km of coast line can harness the tidal power of 21 GW of power at the highest tide area. If you add all the coastlines together and estimate on average that the tides only create 10 GW you get an estimate on the power of the global tidal cycle. There are 620000 km of coast line at 10 GW each, which ads 620 TW of power and It is generated by the change of the tides worldwide twice a day. The weight of water is bending the continental shelf and electricity is created by piezo electric energy, providing a shock absorber effect which keeps the oceans form eroding coast lines.

Energy from tidal movements of continents

The liquid waters most obvious effect of the lunar attraction pulls the water over coastal areas bending the coastal plates. Further, the gravitational pull of the moon raises the continents out of the lava bed they are sitting in and bends them, while the moon is overhead. Both processes create electricity and electromagnetic fields twice day in a very consistent way. If there is any energy build up in the crust small earthquakes are triggered, leveling the ground.
The moon is moving the continents up and down like a piston engine! This is supercharging the planet, creating electromagnetic energy that raises the elevation of the ionosphere.

Calculating the energy required to move the continents

The continents are floating on a sea of lava. As the moon moves above, measurements show that it lifts the continents between 11.4 cm to 35.6 cm away from the center of the earth and closer to the moon. If we can calculate the weight of the continents we can come up with the energy needed for this task.

- Lift of plates by the moon: 11.4 to 35.6 centimeters – average 25 cm
- Average depth of the continents is 40 km
- Average crustal density of 2700 kg/m^3
- Area of 150 x 10^9 m^2

Total weight of all the continents: M = area x crust thickness x density
150 x 10^9 m^2 x 40 x 10^3 m x 2700 kgm^{-3} = **1.62×10^{19} kg**

We have to use the ISO definition of mass; 1 kg is 9.8 N. Now we are able to calculate the work needed to move the continents by 25 cm; measured in Joules.

Work required moving the continents by 25 cm
W = 1.62 x 10^{19} x 9.8 ms^{-2} x 0.25 m = **4×10^{19} J = 40 EJ (exa = 10^{18})**

Process runs every 12 h and it creates: P = W / 43200 s = **9.26×10^{14} W of power**

Power from external sources mostly solar

Thermosphere Climate Index: 11.53 x 10^{10} W

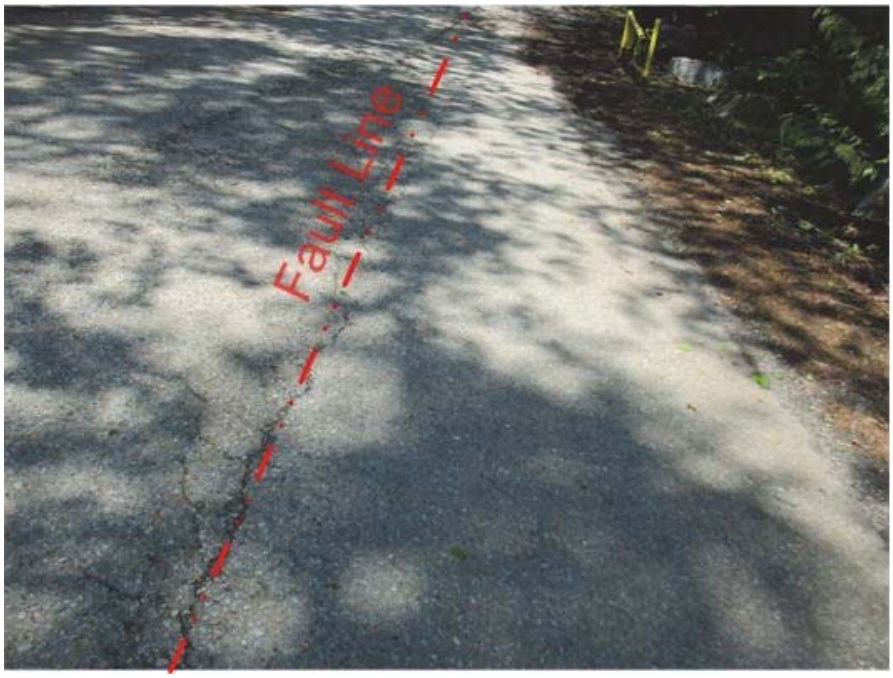
Earth solar received solar radiation: 1365.4 W/m2
Surface of earth: 510 x 10^{9} m^2, half of it receives radiation amounts to 3.48 x 10^{14} W

Aurora energy HPI ranges from 5 GW to 200 GW

Field Day Experiment 2022

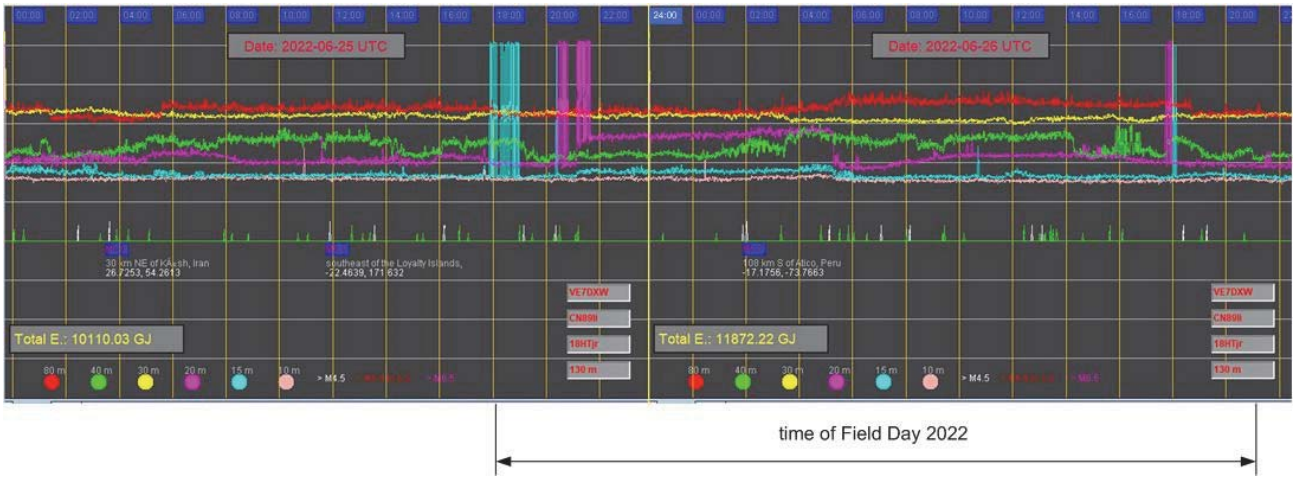
The statement that fault lines are everywhere holds really true, considering that we also found a sizable fault crossing our Field Day site! Visible clues are straight lines and cracks on pavement that break apart. As the fault widens the under-layer support material fills in the expanding gap, weakening the support and then the pavement cracks. The wide area view from Google Earth also reveals the fault coming down the mountain and across the field.

We have been using this site for many years, unaware of the fault and the potential danger during an earthquake.



The areal picture that was obtained using Google Earth also revealed the existing fault

Readings from the RF-Seismograph in Lynn Valley at a distance of 13 km



While we were trying to assess where the best place for the antenna for Field Day is, I was also using the EMF-390 to see if I could get a reading. As mentioned earlier, it was the same as the EMF reading that we were getting at the Seymour fault. Unfortunately we did not see a consistent indication and this can be contributed to two factors. First we had a very unusually cold spring and the ground was still wet. This keeps the underlying rock moist, inhibiting the piezoelectric effect. Secondly, if we look at the RF-Seismograph measurements, propagation was poor overall. Earthquake activity was at a minimum as well. Solar flux was at 130, which would have indicated better propagation overall. Earlier in 2022 we measured better propagation when the SF was below 100, but the quake activity was higher.

Since the NSARC has this field day site every year and it is only about 15 min away, we will keep on monitoring and if something worthwhile changes we will revisit the site and will provide an update.

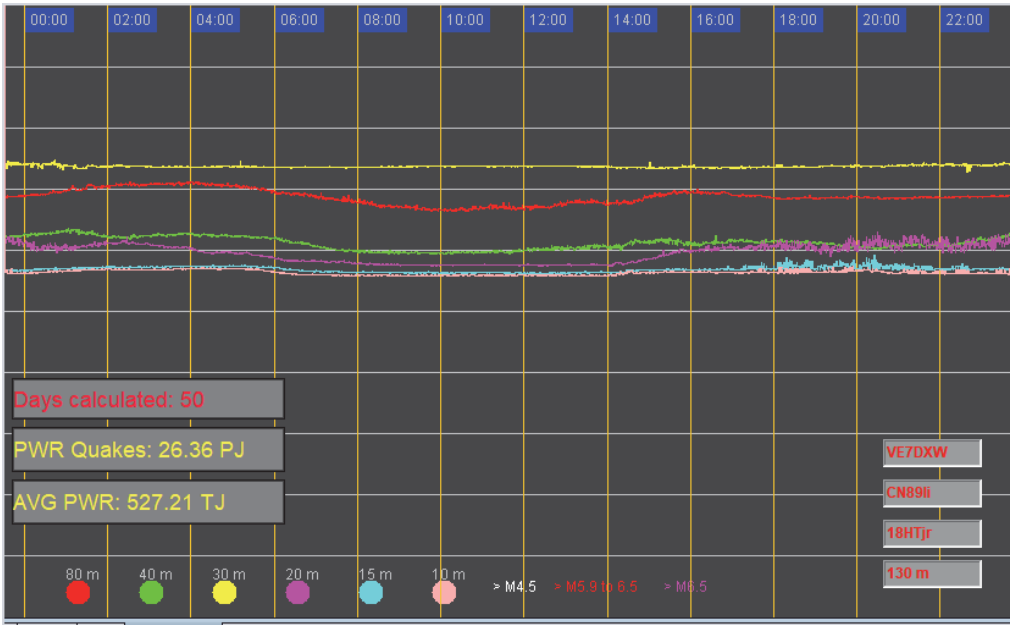
Conclusion of Field Day Experiment (25 % improvement of contacts)
The overall score was higher by 25 %, but Solar Flux also temporally higher topping out at 133 for the day. There were no local quakes and the total energy released by quakes was 11.872 GJ for the day, way below the 50 day running average of 527 TJ.

What are we planning next

Below is a preview of the new 50-day running average graph that will be released soon and be hosted on our website.

Scientific goal: getting a 50 running average allows us to estimate the total quake output and to estimate the average daily energy output of the quakes. Further, we can estimate if the risk of a big quake is higher, because of built up energy in the crust.

50 day running average created by new addition of the RF-Viewer, to be released shortly



Conclusion

When all the energy sources are added together, the energy transferred from moon to earth outnumbers the solar energy by at least a factor of 2! These energy transfers are also occurring on Jupiter and Saturn with their unusually warm moons.
Because earth and the moon are very unique, the combination has unforeseen consequences via gravitational energy transfer, and this has to be investigated further. If the fault lines are starting to radiate more and worldwide communication is easily obtained, could this mean a golden age for shortwave radio?

References

Article; using an airborne fault line detector in Salt Lake City.
https://www.abc4.com/news/top-stories/earthquake-fault-lines-new-study-pinpoints-wasatch-fault-zones/

Website for EMF-390: www.GQElectronics.com

The nature of fault lines
https://www.youtube.com/watch?v=qlk7IfYMufs

Convert the M Richter scale to metric values into moment and wave energy; ISO values of Joules
https://earthalabama.com/energy.html#/

Connection between small quakes and the moon
https://swisscows.com/video/watch?query=is%20there%20a%20cfonnection%20between%20the%20moon%20and%20earthquakes&region=iv&id=34670A7D6C8F8554937434670A7D6C8F85549374

Tidal energy
https://energy.techno-science.ca/en/energy101/tidal.php

The lifting of the continents
https://www.papertrell.com/apps/preview/The-Handy-Science-Answer-Book/Handy%20Answer%20book/Do-the-continents-move/001137021/content/SC/52cb009082fad14abfa5c2e0_Default.html

How much do all the continents weigh?
https://www.quora.com/How-much-does-the-continent-of-Asia-weigh

Total land mass of planet earth
https://hypertextbook.com/facts/2001/DanielChen.shtml

Thermosphere Climate Index
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