Will my next phone be from space?

Linda Ritter
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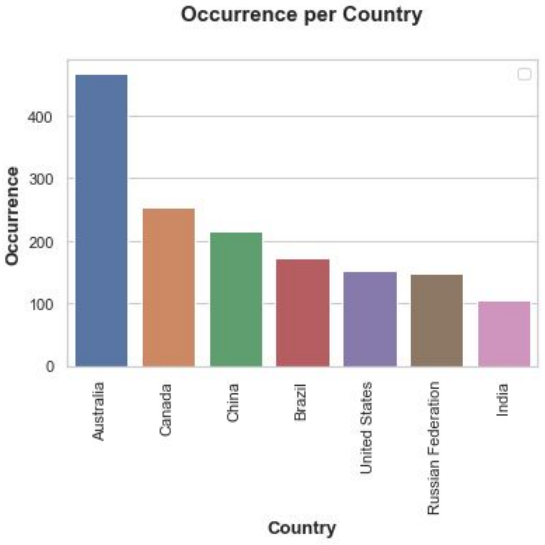
The idea behind the question „will my next phone be from space?“ was arised from my admiration regarding Elon Musk, (co-) founder of Paypal, Tesla, SpaceX and many more. His madness about establishing a human colony on Mars arouse my interest in space. But also the debate regarding the availability and sustainability of rare earth which is necessary for all this great technologies we are using, e.g. Phones, TV-screens, solar panels and much more.

To illuminate this topic more exactly, I searched for datasets for rare earth occurrence in the world, analysed it if there could be a conflict between occurrence country | export country and no-occurrence country | import country. Another step was to analyse an alternative to the procurement of these necessarily material - the space mining. I considered the progress regarding the research in the private sector and afterwards the effort based on each government.

My results are that the occurrence of rare earth elements (REE) in the world aren't so rare as expected. The biggest occurrence is in Australia, with 466 deposits, Canada with 254 deposits and China on place three with 214 known deposits. REE as a final end product is rare because of the little mining. The biggest producer with 43 spots of extraction is China. Far behind the middle empire are Vietnam(6), Russia(5), Australia(2), Thailand(2),...[1] That concludes China is the biggest exporter of REE. Since the United States and China are in a trade war, experts warn against a rise of the REE price.[2]



Is there an alternative to REE from China? Sure! Our space is full of metal ressources - the near-earth asteroids. Space mining becomes now more and more realistic since the concepts become more affordable. Which lead to a research by Laszlo Kestay, a research geologist at the U.S. Geological Survey's Astrogeology Science Center.[3] The estimate value in space is around 700$ billion.[4] Can we expect now a race to space regarding the next gold rush? First I will illuminate the private sector of space companies and after that the effort of the governmental side.

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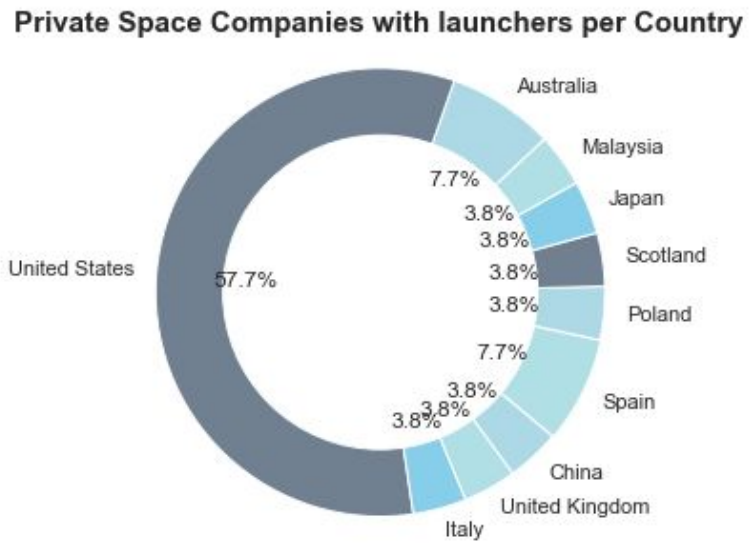
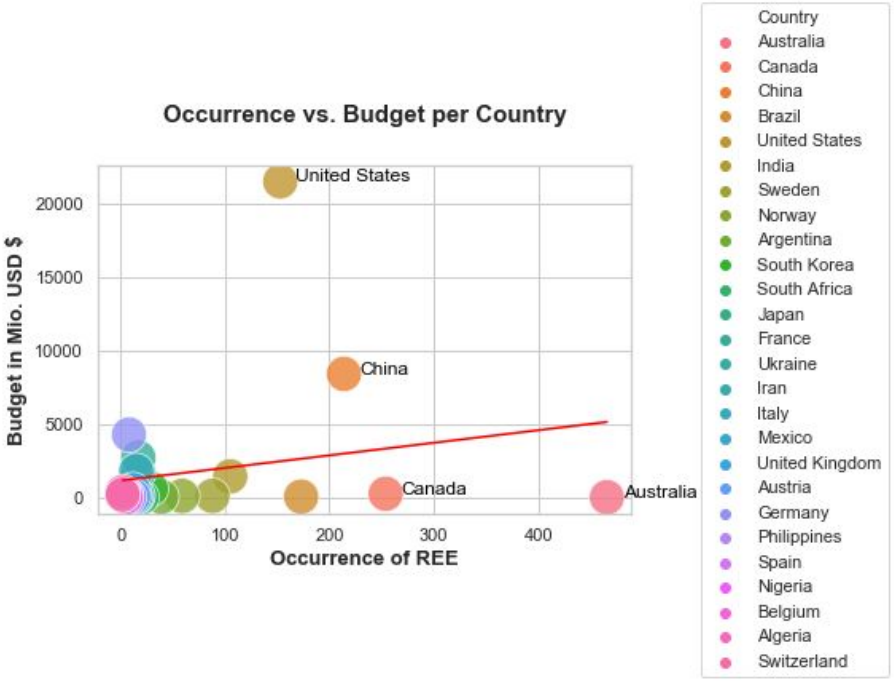
[1] https://www.sciencebase.gov/catalog/items?filter0=party%3D%7BoldPartyId%3A17162%7D&&max=20&q=&facetDetail=tagSchemes&facetSize=20
[2] https://kopp-report.de/seltene-erden-chinas-ultimative-waffe/
[3] Feasibility Study for the Quantitative Assessment of Mineral Resources in Asteroids By Laszlo Keszthelyi, Justin Hagerty, Amanda Bowers, Karl Ellefsen, Ian Ridley, Trude King, David Trilling, Nicholas Moskovitz, and Will Grundy
[4] https://www.sciencefocus.com/space/space-mining-the-new-goldrush/



After some researches there is no significant company with successful space mining right now. The focus of the most companies is on developing launchers. Those launchers enable the achievement of the outer space - the first step for space-mining. However only a few companies had gone to the start - 57.7% of them are american companies. Founded by well-known entrepreneurs, e.g. Jeff Bezos with Blue Origin, Elon Musk with SpaceX and Richard Brawson with Galactic.[5]

Nevertheless my interest was also regarding the governmental effort. For that I compared the budget for each national space program. The United States spent the most money for NASA 21,500$ billion, China with 8,400$ billion for CNSA and the European Union with 6,406$ billion for ESA.[6] Compared to the occurrence of REE in the world, there is no trend to correlate to the budget of each nation. On the one hand countries with no or little deposits of REE spent not more money in the national space program to become independent to China. On the other hand countries with more deposits of REE spent not less money in the national space program.



[5] https://en.wikipedia.org/wiki/List_of_private_spaceflight_companies
[6] https://en.wikipedia.org/wiki/List_of_government_space_agencies

Finally back to my question, if my next phone will be from space, I had a look into the research program of the space program with the highest budget - NASA. They published at 11.06.2019 their mission of developing the Mini-Bee as a technology of optical mining.[7] In conclusion of my studies I can say, that my next phone, which I will properly have to buy in the next 2-3 years, won't made out of REE from space. Justified by the short time and the not yet far developed program of space mining. But who knows - maybe the phones in 10-20 years will implement batteries made with REE from space.

[7] https://www.nasa.gov/directorates/spacetech/niac/2019_Phase_I_Phase_II/Mini_Bee_Prototype/