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Sudbury: a new theory of its formation

Author information – Christopher J. Irvine
Affiliation – retired

Abstract

A new property of Earth has been discovered. It is called Earth's 'non-metal signature'. A new theory explains the gravitational stratification of the non-metal compounds and noble gases throughout geologic time. This leads to a new explanation of how planets and moons formed in our solar system.

In this 'Accretionary' theory, the Sudbury Igneous Complex (SIC) is considered an excellent geological example of a 'Last Fragmentation'. The cause of formation of the vast majority of Large Igneous Provinces is shown.

The formation of the Sudbury Breccia is a key characteristic. This theory explains why the unmineralized Quartz Diorite (QD) was the first rock type deposited. The formation of the South Range Breccia Belt can also be understood.

The enigmatic very negative carbon isotopes in the overlying Onaping Formation and Whiterwater Group are explained. They are the end of the oldest non-metal accretionary compound called the 'Lomagundi' compound.

Method

A recently published book details the proof of the stratification of the non-metals (Irvine, 2022). This presentation focusses on the SIC. The oldest non-metal compound, the Lomagundi compound, is important to understand the source of the very negative carbon isotopes in the overlying Onaping Formation and Whitewater Group.

The cause of the Accretionary pattern in non-metal isotopes throughout geologic time is discussed. The sparse but adequate carbon isotope data for the Paleoproterozoic is examined. The accretionary pattern of isotope changes is discussed. The very negative carbon isotope values of $\delta^{13}C = -31‰$ (Heymann et al, 1999) at the SIC can be understood as part of the accretionary pattern of isotope changes.

The process of moon accretion is discussed. Moons are conglomerates of moonlets. Moonlets formed at the same time as the Hadean Earth after the condensation from a plasma state. Only those moonlets that were large enough and cooled slow enough to differentiate an iron moonlet core (IMC) and a mantle are important when moons accrete. An examination of the four outer planets shows the various stages of moon accretion that they exhibit. The IMC-fragments are somewhat similar to the original moonlets that had developed iron moonlet cores.

An IMC-fragment can enter and maintain a low Earth orbit as long as it maintained a solid mass. Once it orbited low enough, the gravitational stress from Earth caused a rise in temperature. Eventually, the mantle material melted first before the IMC (higher melting temperature for iron). A 'Last Fragmentation' occurred and the IMC-fragment separated into two parts. The first was all the mantle material which fell to Earth. The SIC is a geologic example of this. The second part was a pure IMC that continued to orbit until it also melted and accreted and formed a Large Igneous Province.

The curious Sudbury Breccia can be explained by this theory. As well, why the first facies to form, the unmineralized quartz diorite (QD), is shown. The cause of the South Range Breccia Belt, only on the southeast side, is explained.

Conclusions

In this Accretionary Theory, the SIC is a geological deposit resulting from a Last Fragmentation. The formation of the pseudotachylitic Sudbury Breccia is explained. The formation sequence shows why the unmineralized QD was the first facies to form. The very negative carbon isotopes of the Onaping Formation and Whiterwater Group is explained as the end of the Lomagundi non-metal compound.

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