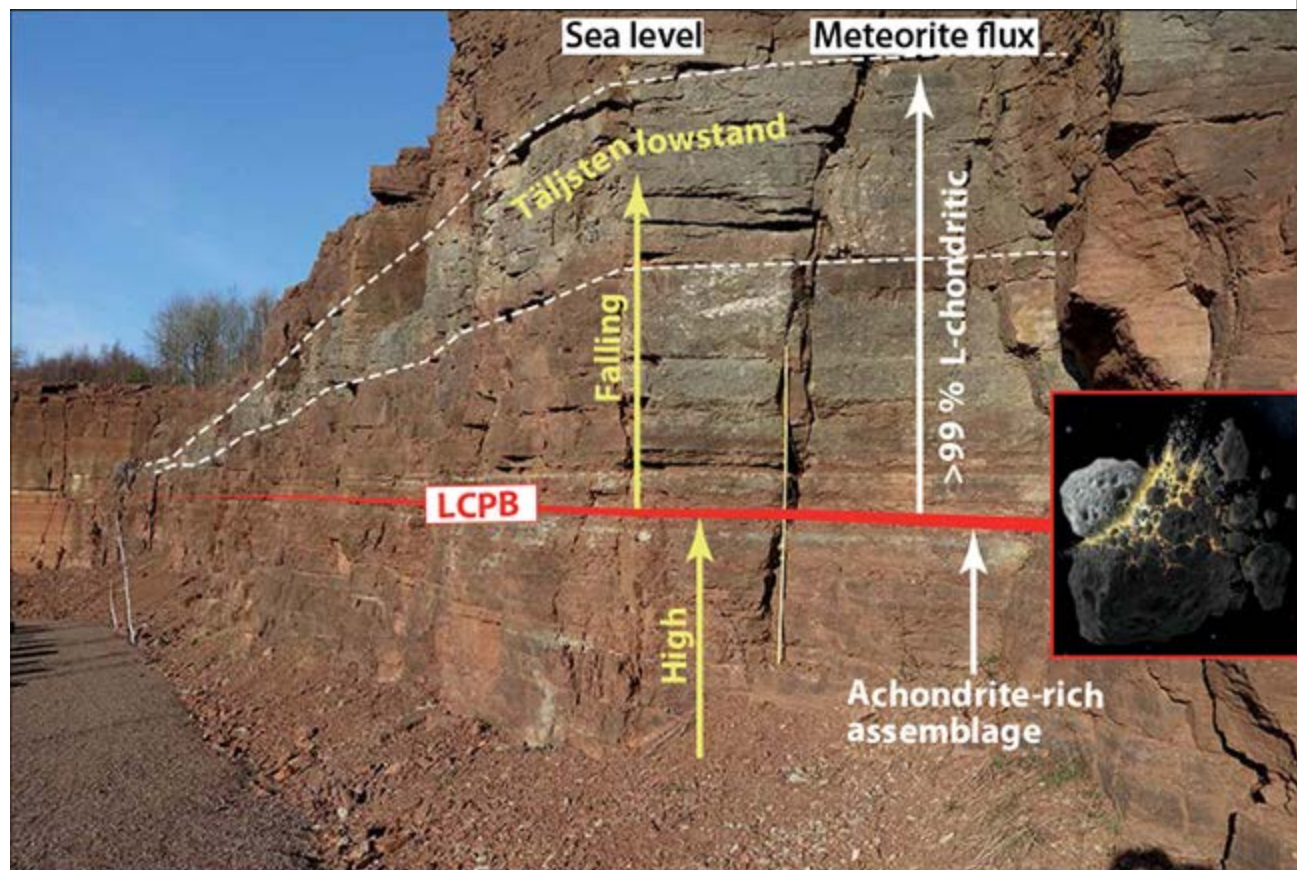


Dust Delivered to Earth from the Breakup of the L-chondrite Parent Body

From the Swedish quarries and Ordovician limestone outcrops that gave us the fascinating fossil meteorites and relict chromite grains credited to the breakup of the L-chondrite parent body (see **PSRD** article: ***Tiny Traces of a Big Asteroid Breakup***) comes a new story about extraterrestrial dust. Birger Schmitz (Lund University, Sweden) and an international team, well-known in this research area, collected additional data to support the idea that fallout from the breakup of the L-chondrite parent body brought about dramatic changes in climate and biota on Earth. For this they turned to the finest-grained extraterrestrial material in the rock layers.

The team's new analyses included chrome spinel grains and helium and osmium isotope compositions of the rocks in the layers studied earlier. The new work allowed them to establish a more precise location (at centimeter resolution) in the rock column corresponding to the L-chondrite parent body (LCPB) breakup. See the red line labeled LCPB in the figure below.



(From Schmitz, B., *et al.*, 2019, *Science Advances*, v.5 (9), eaax4184, doi: 0.1126/sciadv.aax4184.)

This photograph by Birger Schmitz (Lund University) of the limestone Hällekis Quarry wall in southern Sweden is annotated with a red line showing the position associated with the time of the breakup of the L-chondrite parent body. Yellow arrows relate to sea level, with "Falling" indicating an onset of a gradual drop in sea level. White arrows relate to types of meteoritic materials found in the rock. The small artwork depicting colliding asteroids and LCPB breakup is by Don Davis.

Beginning at the red-line level, meteoritic materials abruptly change to almost entirely L-chondritic and the abundances of extraterrestrial dust and chromite grains increase. These dramatic changes correspond to ~466 million years ago, at the same time as the onset of a global fall in sea level attributed previously to an Ordovician ice age.

Schmitz and colleagues say that after the breakup of the L-chondrite parent body the influx of extraterrestrial dust was three to four orders of magnitude more intense than beforehand. They propose this dust that was delivered to Earth (and to the entire inner Solar System) for at least two million years following the breakup of the L-chondrite parent body cooled Earth's climate, triggered Ordovician icehouse conditions, and a global drop in sea level. Schmitz and colleagues advocate that the increased flux of meteoritic dust to our planet from the breakup of the L-chondrite parent body contributed to the major increase of marine biodiversity known as the Great Ordovician Biodiversification Event.

See Reference:

· Schmitz, B., Farley, K. A., Goderis, S., Heck, P. R., Bergström, S. M., Boschi, S., Claeys, P., Debaille, V., Dronov, A., van Ginneken, M., Harper, D. A. T., Iqbal, F., Friberg, J., Liao, S., Martin, E., Meier, M. M. M., Peucker-Ehrenbrink, B., Soens, B., Wieler, R., and Terfelt, F. (2019) An Extraterrestrial Trigger for the Mid-Ordovician Ice Age: Dust from the Breakup of the L-chondrite Parent Body, *Science Advances*, v. 5:eaax4184, doi: 10.1126/sciadv.aax4184. [[article](#)]

See also:

Dust From a Giant Asteroid Crash Caused an Ancient Ice Age (18 Sept 2019) *Field Museum* [press release](#).

Schmitz, B., Harper, D. A. T., Peucker-Ehrenbrink, B., Stouge, S., Alwmark, C., Cronholm, A., Bergström, S. M., Tassinari, M., and Xiaofeng, W. (2007) Asteroid Breakup Linked to the Great Ordovician Biodiversification Event, *Nature Geoscience*, v. 1, p. 49-53, doi: 10.1038/ngeo.2007.37. [[abstract](#)]

Searching for Ancient Solar System Materials on the Moon, Earth, and Mars (11 Nov 2016) *PSRD*, www.psrд.hawaii.edu/Nov16/solar-system-materials.html

Tiny Traces of a Big Asteroid Breakup (9 March 2004) *PSRD*, www.psrд.hawaii.edu/Mar04/fossilMeteorites.html

When Achondrites Surpassed Ordinary Chondrites in the Meteorite Flux to Earth (January 2017) *PSRD*, www.psrд.hawaii.edu/CosmoSparks/Jan17/Ordovician.meteorite.flux.html

Written by Linda Martel, Hawai'i Institute of Geophysics and Planetology, for *PSRD*.



[[About PSRD](#) | [Archive](#) | [CosmoSparks](#) | [Search](#) | [Subscribe](#)]

[[Glossary](#) | [General Resources](#) | [Comments](#) | [Top of page](#)]



October 2019

<http://www.psrд.hawaii.edu>

psrd@higp.hawaii.edu