

Martedì 18 giugno 2019, ore 18.00, Aula Magna della Scuola Galileiana di Studi Superiori

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The earliest asteroidal bombardment of the Earth-Moon system

In the aftermath of the giant collision resulting in the formation of the Moon, about 4.5 billion years ago, the Earth experienced a protracted time of bombardment by leftover planetesimals. In this talk I will present a new bombardment model of the Hadean Earth that has been calibrated using existing lunar, asteroidal and terrestrial geochemical data. We find that the surface of the Hadean Earth was widely reprocessed by impacts through mixing and burial by impact-generated melt. This model may explain the absence of early terrestrial rocks. In addition, by tracking the magnitude and timing of large collisions, we find that existing oceans would have repeatedly boiled away into steam atmospheres as late as about 4 billion years ago. These findings have important implications for the formation and stability of early habitable environments and the onset of life. Finally, I will discuss recent developments in understanding the effects of collisions on the tectonic evolution of the early Earth, as well as the formation of impact-induced geochemical heterogeneities that could still persist in terrestrial mantle rocks.



An artistic conception of the Hadean Earth. Huge, impact-generated lava lakes coexisted with surface liquid water, under a thick greenhouse atmosphere sustained by lava outgassing (credit: SwRI/Simone Marchi, Dan Durda).

Short bio:

My research interests span from the formation and geology of terrestrial planets, the moon and asteroids, to the spectroscopy and dynamics of minor bodies and meteorites.

I am associate with several space missions, including: NASA's Dawn, Lucy, Psyche, and ESA's Rosetta, BepiColombo, JUICE.

I have been a fellow at the NASA Lunar Science Institute, the Observatoire de la Cote d'Azur, the German Aerospace Agency, and Padua University. I hold a PhD in Applied Physics from the Pisa University. More details can be found here: <http://www.boulder.swri.edu/~marchi/index.html>