 **Key points:** This study investigates the effect of core formation on the surface composition and habitability of rocky planets. It focuses on how the core mass fraction (CMF) influences the thickness, composition, and mineralogy of the planet's crust, which in turn affects volatile cycling and habitability.

 **Important formulas or discoveries:** The paper doesn't present specific formulas but uses petrological modeling to simulate mantle decompression melting and crust production in planets with varying CMFs.

 **Limitations:** The study's model assumes simplified conditions for mantle melting and crust formation and doesn't account for all potential factors influencing planetary evolution.

 **Summary:** The study concludes that the extent of core formation significantly impacts a planet's surface environment and habitability. Planets with large CMFs tend to have thin, anhydrous crusts, while those with smaller CMFs develop thicker crusts capable of sequestering volatiles and supporting a water cycle.