Stages of Iron Absorption and Deposition in a Star

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Abstract: Stars deposit iron in three basic levels. First they form the core in a very pure form alloyed with nickel. Secondly once that inner core is formed, material then deposits that is chemically combined with the iron forming molecules. Third, anymore deposited iron lands on the surface as meteorites. This shows how different the star was throughout its metamorphosis.

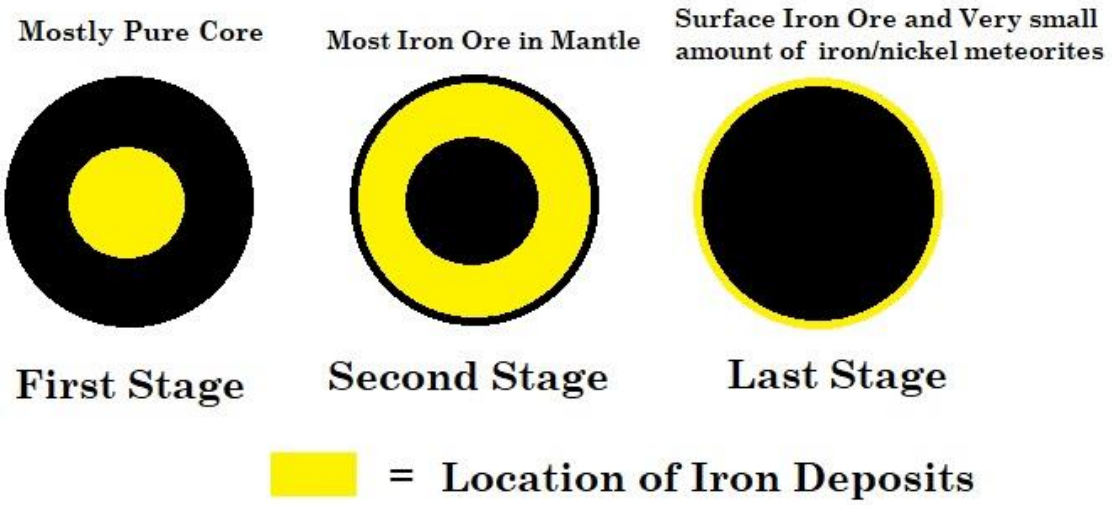
To form a core of something as large as Earth's inner core, made of almost completely pure iron/nickel, we need to realize that the iron has to be too energetic to form chemical compounds. This energy is provided by the star when it is very young. The purification process of the vast majority of incoming material towards a star is done with the star's extreme external and internal heat, as well as its strong gravitational attraction. Only the most stable nuclear arrangements will survive the deposition process (core formation) of early stellar metamorphosis. We also know the star is too hot to form molecules at this stage as the cores of really old stars are composed of iron/nickel almost in its purest form. If it was cool enough for chemistry, then there would be molecules formed on large scales, which exist in ores.

The second stage of iron deposition happens as the middle aged star collects lots of interstellar iron which slams into Earth while it was more about Jupiter sized. The iron supplied will not be able to be purified and then immediately deposited, because it is not hot enough in the gas stages of the star's metamorphosis. But it will break apart enough molecularly to combine with other elements that form the mantle and crust. These chemical compounds and molecular structures are called hematite, magnetite, limonite, marcasite, pyrrhotite, siderite and my childhood favorite, fool's gold (pyrite).

Lastly, long after the core is formed, and the majority of the iron ore is already chemically combined, asteroids that enter into the Earth's atmosphere just break apart in the high atmosphere and land on the ground or in the ocean. They can be picked up off the ground and examined. They will never be able to reach the core, as fully ionized material, as well will never combine enough with the atmosphere on large scales, forming ore deposits that can be mined. Iron ore deposits were formed long before Earth even had a crust that we are familiar with, as they compose the crust itself. It is only logical to realize that the crust cannot exist before the material that composes it even appeared! As well, the core was formed long before the crust (as covered in the CBC principle, or core before crust principle based on the geological principle known as superposition). The core formed when the star was more around early red dwarf, all the way to early ocean world stages. Without it there could be no mantle formed, and the crust would have had nothing to solidify on.

So what we have here are three distinct stages to land and Earth formation concerning iron. We can also look at the iron ore deposits to determine what the atmosphere of Earth was like during those periods. The fact that most of the surface iron has combined with oxygen is telling, and in the case of limonite, which is hematite with water, we can tell how much water was in the vicinity. In the case of pyrrhotite (FeS), we can determine how much nickel was also

present in the asteroid that hit early Earth (when it was a bit larger than Jupiter all the way down to Neptunes size), as it is usually accompanied with pentlandite, which has a high nickel and iron content. The sulfur just indicates it should be found in deeper areas of the mantle.



By examining the top picture, we can see that yellow that indicates the location of the iron. During early stellar metamorphosis the core forms first, as the star has the capacity to rip the incoming iron apart and reassembly it in the interior. Next the mantle is formed as the star cools and shrinks, and any incoming iron is not energetic enough to form large pure deposits of iron/nickel alloy in the interior. It does have the ability to mix the material both physically and chemically on grand scales forming ore deposits. This happens in the interior of the gas type star. Lastly, the gas type star begins cooling and losing its atmosphere even further, and it reaches the point that no more incoming iron/nickel from asteroids can form ore, or deposit in the interior core. These last stage deposits just land in the oceans or break up almost completely in the high atmosphere, long after Earth has lost its thick gas giant atmosphere.