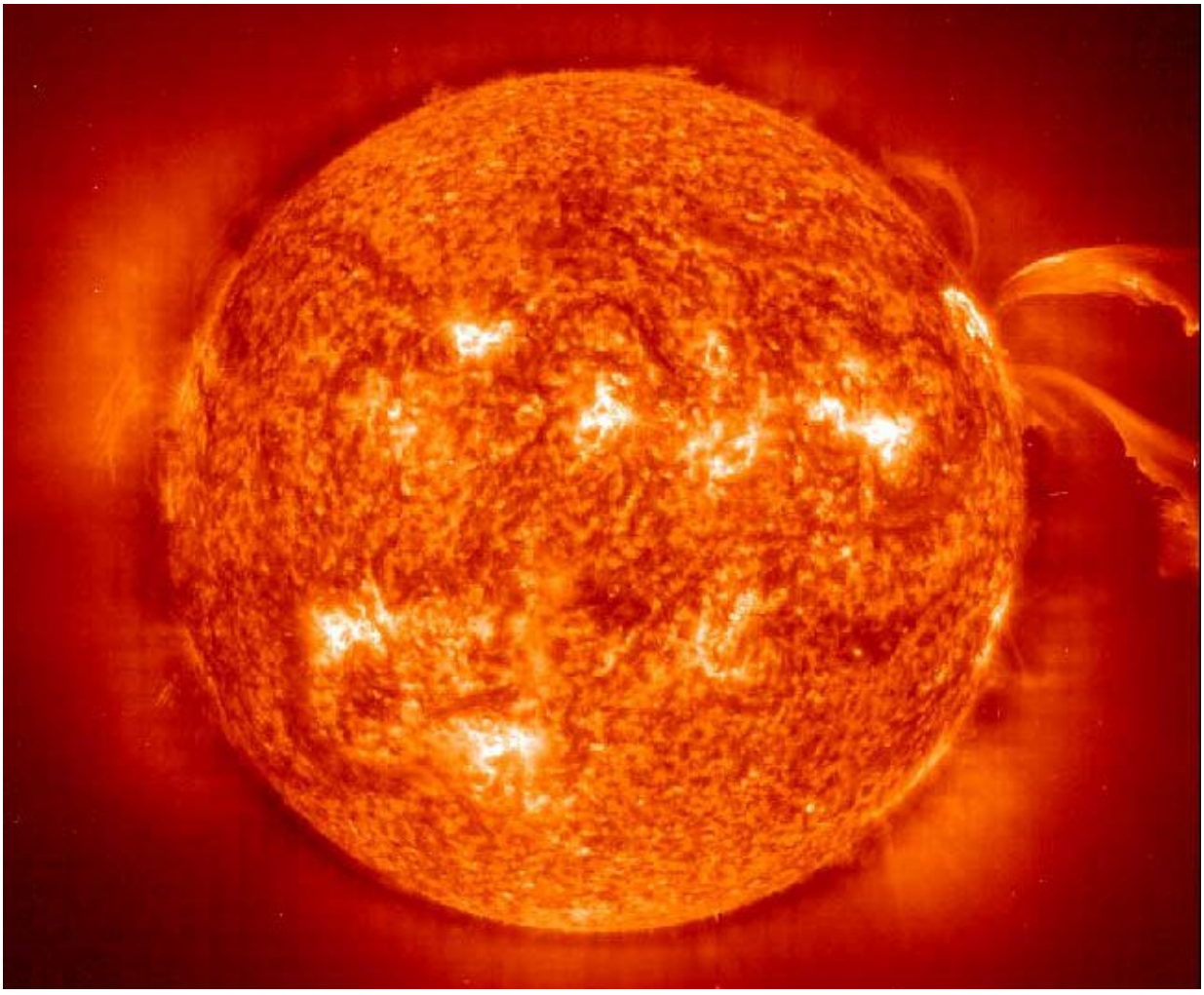
Could we terraform the sun?

September 11 2015, by Fraser Cain



The sun. Credit: NASA & European Space Agency (ESA)

In the list of crazy hypothetical ideas, terraforming the sun has to be one

of the top 10. So just how would someone go about doing terraforming our sun, a star, if they wanted to try?

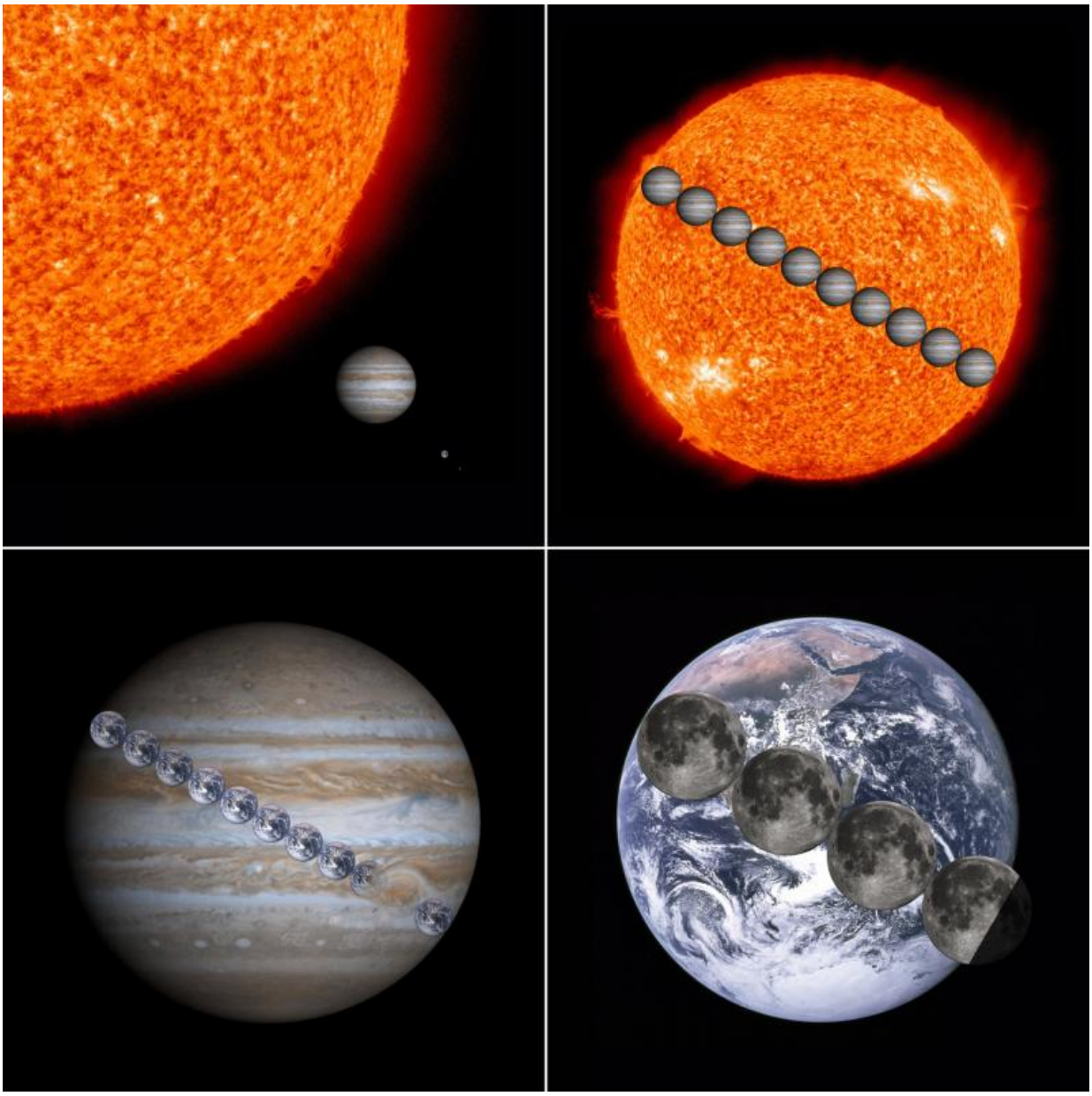
In our series on terraforming other worlds. We've covered Mars, Venus, the Moon and Jupiter. Even though I solved the problem of how to terraform Jupiter (you're welcome, science), you wanted to take things to the next level and you demanded I sort out how to terraform the sun. Seriously? The sun. Fine… here we go.

Let's see what we've got to work with here. It's a massive ball of plasma, containing 333,000 times more mass than the Earth. It's about 74% hydrogen and 25% helium with a few other trace elements. There's no solid surface to stand on it, so we need to fix that.

The average temperature on the surface of the sun is about 5,500 Celsius, while the average temperature on Earth is about 15 C. Iron boils at only 2,800 degrees, so… that's probably too hot. We'll need to cool it down.

The gravity on the surface of the sun is 28 times the gravity of Earth. If you could stand on the surface of the sun, which you can't, you'd be crushed flat. Okay, so we'll add reduce the gravity… check.

There's no breathable atmosphere, there's no solid ground, the sun generates deadly X-rays. Oh, and don't forget about the terrible sunburns from the ultraviolet radiation.



Jupiter/Earth comparison. Credit: NASA/SDO/Goddard/Tdadamemd

So, what's the list? Hot fire unbreathable pressure cooker goo surface gravity crushing machine. Sounds impossible, or does it?

First, the gas. As we covered in a previous episode, scientists have

actually considered ways that you might extract the hydrogen and helium off of a star like the sun, known as "stellar lifting". There are a few ways you could work this. You could zap the surface of the sun with a powerful laser, increasing the speed of solar wind in that area, forcing the sun to throw its mass off into space.

Another method is to set up powerful magnetic fields around the sun's poles, and channel its hydrogen into jets that blast out into space. I'm not sure how you actually set up those magnetic fields, but that's not my problem.

Once you're done with the sun, you've stripped away all its hydrogen and helium gas. What are you left with? About 5,600 times the mass of the Earth in heavier elements, like oxygen, silicon, gold, etc. Great!

Except 5,600 sounds like a lot. Jupiter is only 316 times the mass of the Earth. We're looking to reform a "planet" with more than 10 times the mass of Jupiter. And not only that, but we had to kill the sun to make this work. You monsters.

This is a terrible idea. What else could we do? If you're a science fiction fan, you've heard of a Dyson sphere. If not, you've got some TNG to catch up on.

First proposed by Freeman Dyson, you cover an entire sun in a metal ball. Instead of the measly amount of energy that falls on Earth, this would allow you to capture 100% of the energy released by the sun: 384 yottawatts.

According to Dyson and a variety of matheletes, you could dismantle all planets in the solar system and build a sphere at a distance of 1 Earth radii at 8 to 20 centimeters thick. That would give you a surface area 550 million times more than the Earth.

Although, building an actual rigid sphere is probably unfeasible because it would be pretty unstable and eventually collapse. It probably makes more sense to build a swarm of satellites surrounding the sun, capturing its energy.

Source: Universe Today