Organizing *Internationally* to Defeat an Enemy of Long-Term Sustainability (LTS)

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The ENEMY of LTS on Earth and in Space
is
WASTE ACCUMULATION
from
careless industrial practices.

Careless industrial *practices* have accumulated ***WASTE**** on the Earth, in orbit, and on the Moon.

* trash, debris, refuse, garbage, litter, tailings, etc.

-- 269,000 tonnes of plastic infests Earth's oceans.

-- 8000 tonnes of debris clutters Earth orbits.

-- 181 tonnes of trash*clutters portions of the Moon (including >100 bags of human waste).

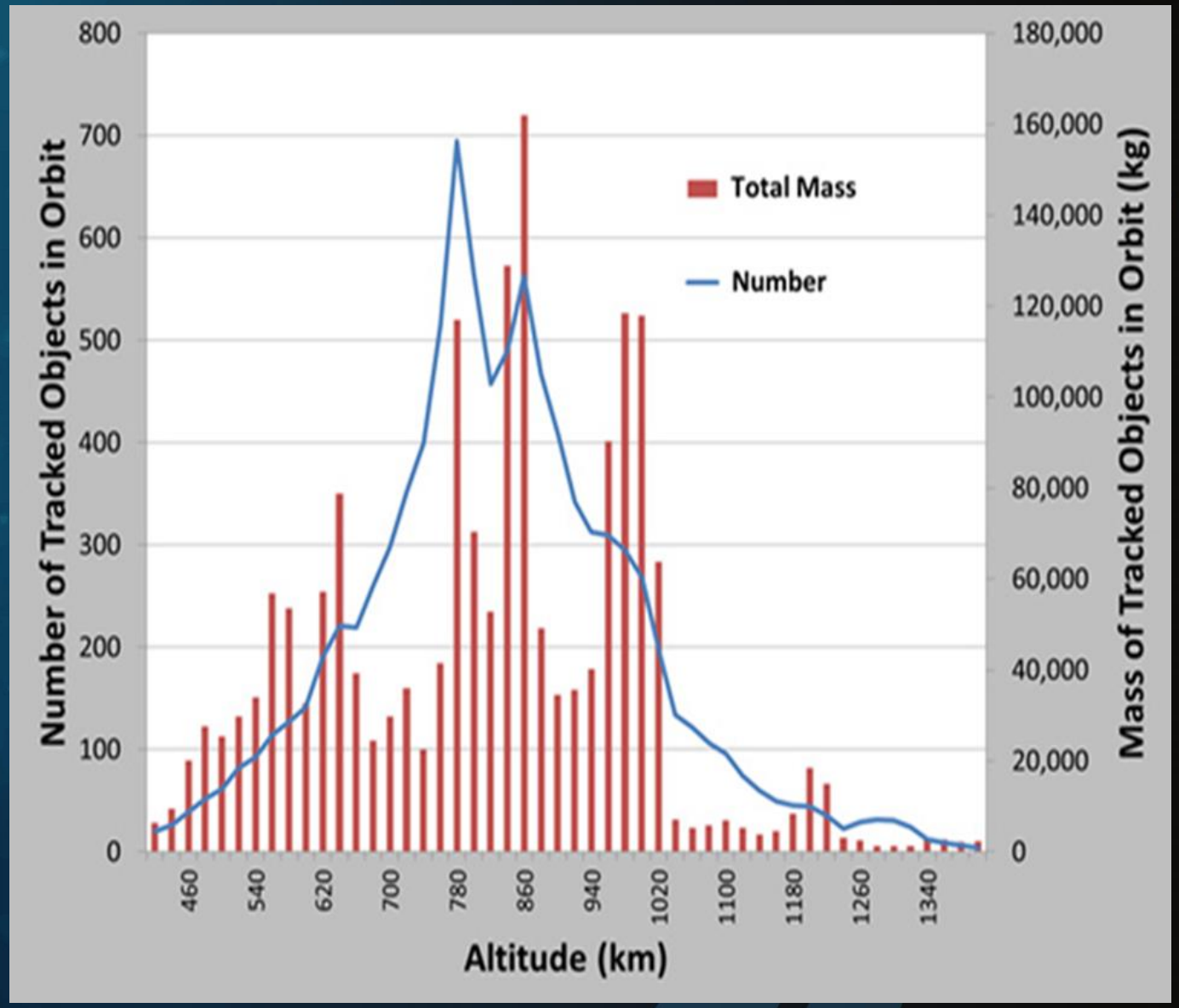
*Caveat: Some of what is considered "trash" on the Moon are articles like defunct landers, rovers, rocket bodies, which must be protected as heritage items, along with sites on which they are located.

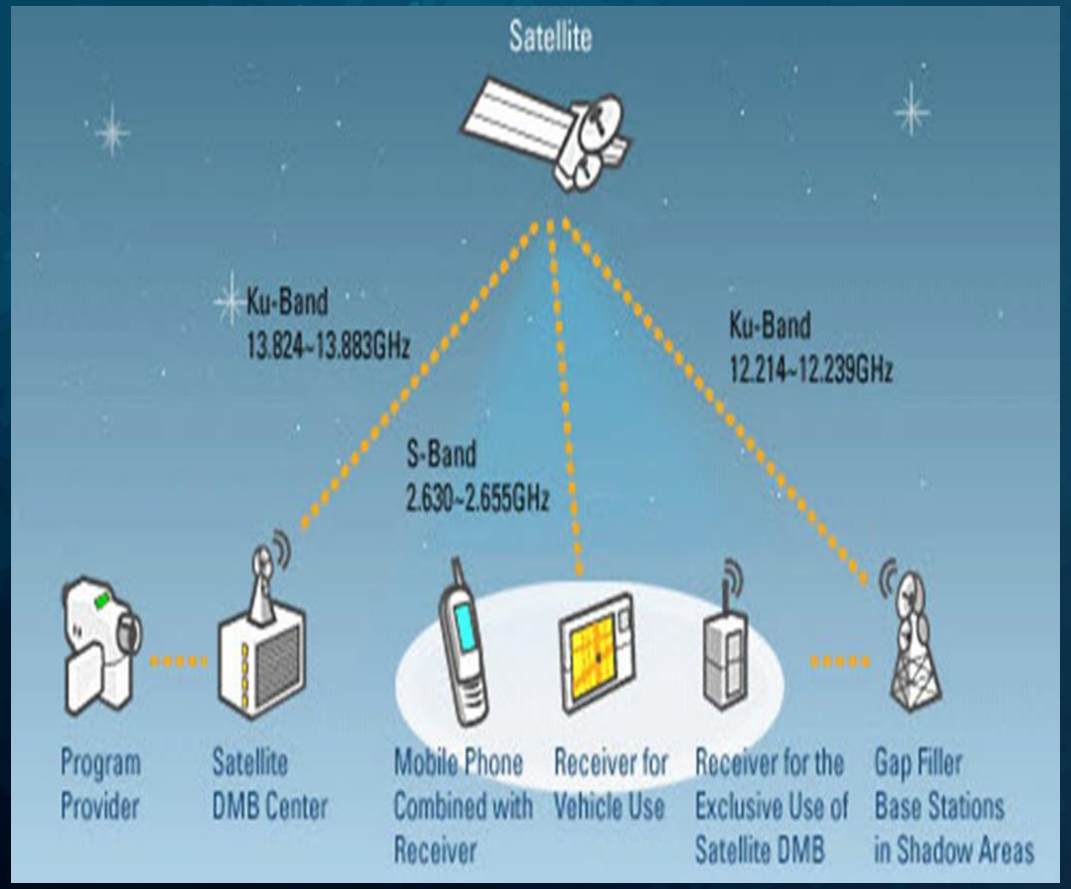
Plastics in the oceans, seas, & lakes – and (microplastics) in human blood. (30 March 2022, Earth.org)

-- 36,500 *trackable* debris objects > 10 cm.

-- 330 million *untrackable dangerous debris* objects (shrapnel) < 10 cm in size.

-- Relative impact velocities in LEO reaching 56,000 km/hr. (35,00 mph).





Services *threatened* by orbital debris:

1) Navigation on land, sea, and air.

2) Radio, TV, cell phones.

3) Credit cards, ATMs, blockchain transactions, banking/investing.

4) Weather reporting.
(Before sats: 8,000 people died in 1900 when Galveston hit by hurricane.)

5) Climate and environmental monitoring, including water and land stewardship, farming.

6) Search and Rescue.

What is the consistent impact of careless waste-accumulation practices on the Long-Term Sustainability of anything?

"Best practices" in industry and business can *eliminate waste* and defeat this enemy of LTS.

No promotion of "best practices" in the Outer Space Treaty (OST).

In line with OST Art. IX, calling for cooperation, mutual assistance, consultations, and avoiding harmful contamination --

How about “best practices” evolving from transparent consultations and cooperative activities among *all* space stakeholders, public and private?

International Framework Agreements

incorporating "best practices" and enabling norms can evolve from *COPUOS consultative bodies,* which include state parties, private industry, and civil society.

But how do you know if given industrial practices are “best”?

Best practices *must be better* than GREEN.

UN GREEN Economy Definition

-- A low carbon, resource efficient, and socially inclusive economy… driven by public and private investment into economic activities, infrastructure, and assets that allow *reduced* carbon emissions and pollution, enhanced energy and resource efficiency, and prevention of loss of biodiversity and ecosystem services.*

*UN Environment Program

Green is not good enough!

BEST practices should come from Renewable Space Economy Tactics. (ReSpEcT)

ReSpEcT for Life in Space and ReSpEcT for Life on Earth.

Renewable Space Economy Tactics (ReSpEcT)

Economic model dedicated to creating *sustainable* ecosystems by transforming previously *wasted* substances into *profitable* commodities or *utilitarian* substances.

ZERO waste accumulation is the goal of the global ReSpEcT economy.

But from *WHERE* might come best practices leading to internationally ReSpEcT(ful) industries and economies?

SPACE IS THE PLACE

Orbital debris: why deorbit it, creating air pollution, when you can salvage, repair, service, or refurbish it instead?

Every kg in orbit is potentially worth many times the value of that kg on the ground!

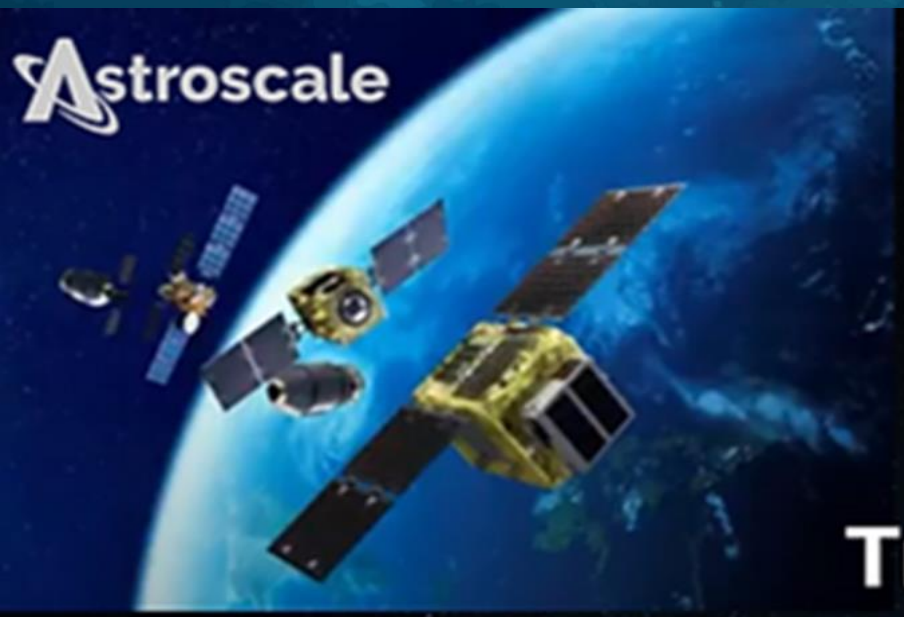
Costs and benefits?

1) What is the *cost* (in profits/lost services/health/safety) of *NOT* clearing debris on Earth or in Outer Space?

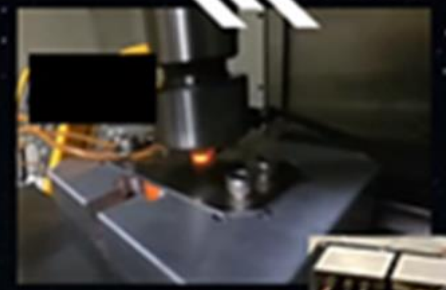
2) How much is it worth to have satellites repaired, refueled, or upgraded, *while they are still earning profits* and/or *providing vital services*?

3) How much are Quieter and Darker Skies worth?

Astroscale



Nanoracks



Trash to Treasure

Space Debris Recycling Ecosystem

Live Demonstration

October 19, 2021

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NEUMANN SPACE

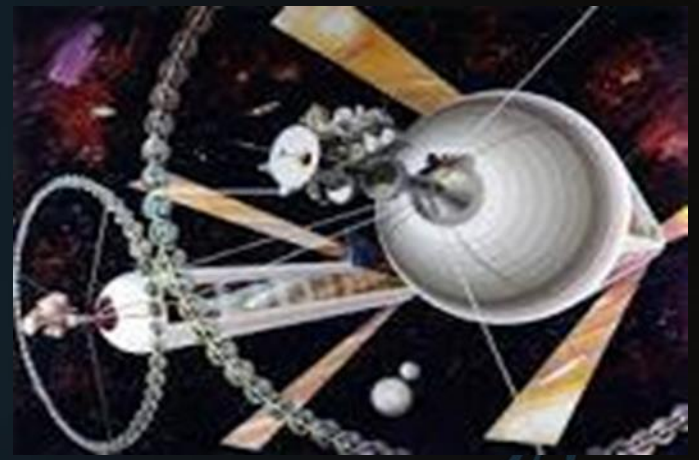
Moreover, *LIVING* in OUTER SPACE is where Renewable Space Economy Tactics (ReSpEcT) must be used for ***survival***.

Human communities in space (living within contained atmospheres and ecosystems) must learn to completely recycle gaseous, liquid, and solid wastes.

But the ReSpEcT(ful) lessons learned in communities there can be brought to Earth!

Human expansion into space help fulfill the UN SDGs

Impact on SDG 6: Clean Water and Sanitation



Early space communities contained by structures to protect them from vacuum and cosmic radiation.

People downwind and downstream from each other. So, cannot pollute air and water at all!

Waste converted into useful products. Water & vital gases recycled.

Technologies developed for this can be used on Earth!

OVER 70 SPACE ORGANIZATIONS HAVE JOINED NSS IN CALLING FOR AN 18TH SDG FOR WORKING & LIVING IN SPACE TO HELP FULFILL THE OTHER 17 SDGS!

Thank you for your time and attention!

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18th SDG concept from 2018 is in honor of David Dunlop.

EXTRA SLIDES