Some Ethical Constraints on Near-Earth Resource Exploitation

James S.J. Schwartz (Wichita State University, USA)
james.schwartz@wichita.edu
Tony Milligan (King's College London, UK)
anthony.milligan@kcl.ac.uk

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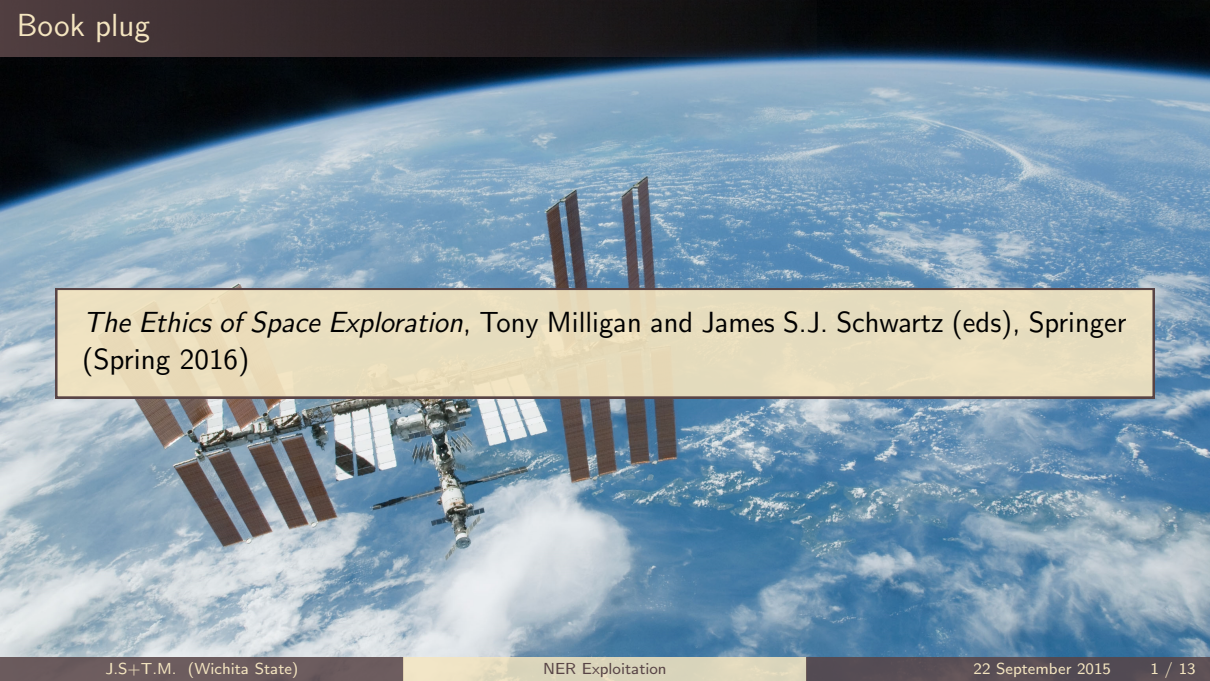
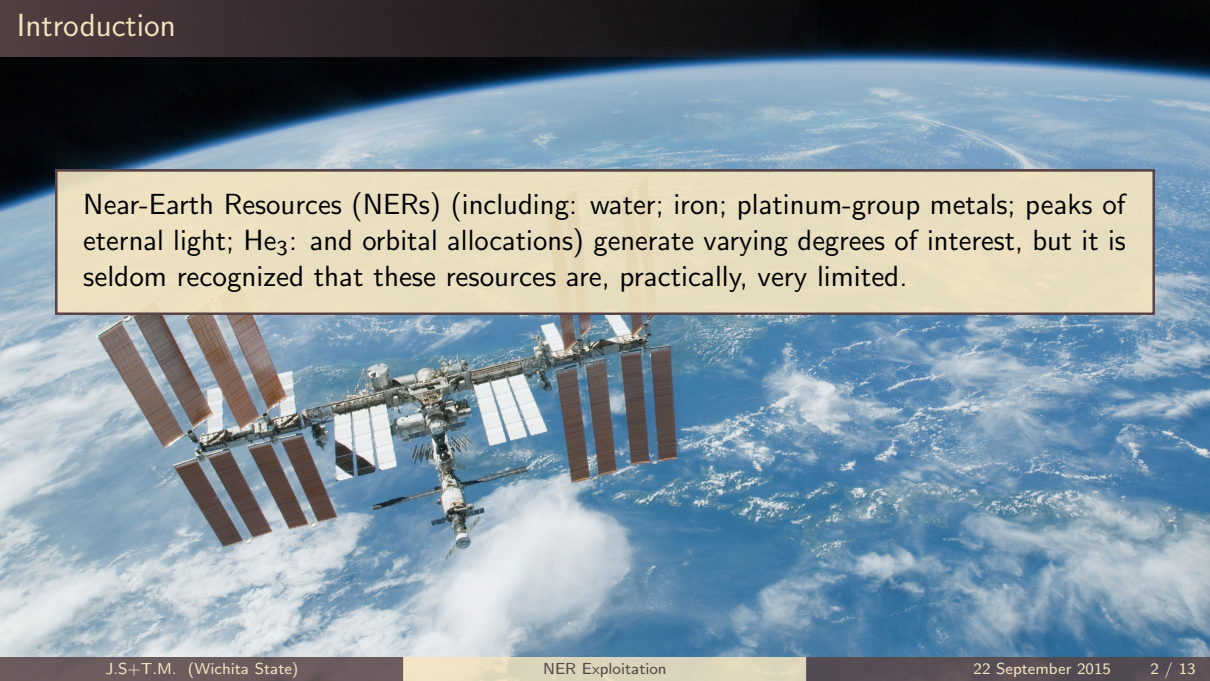
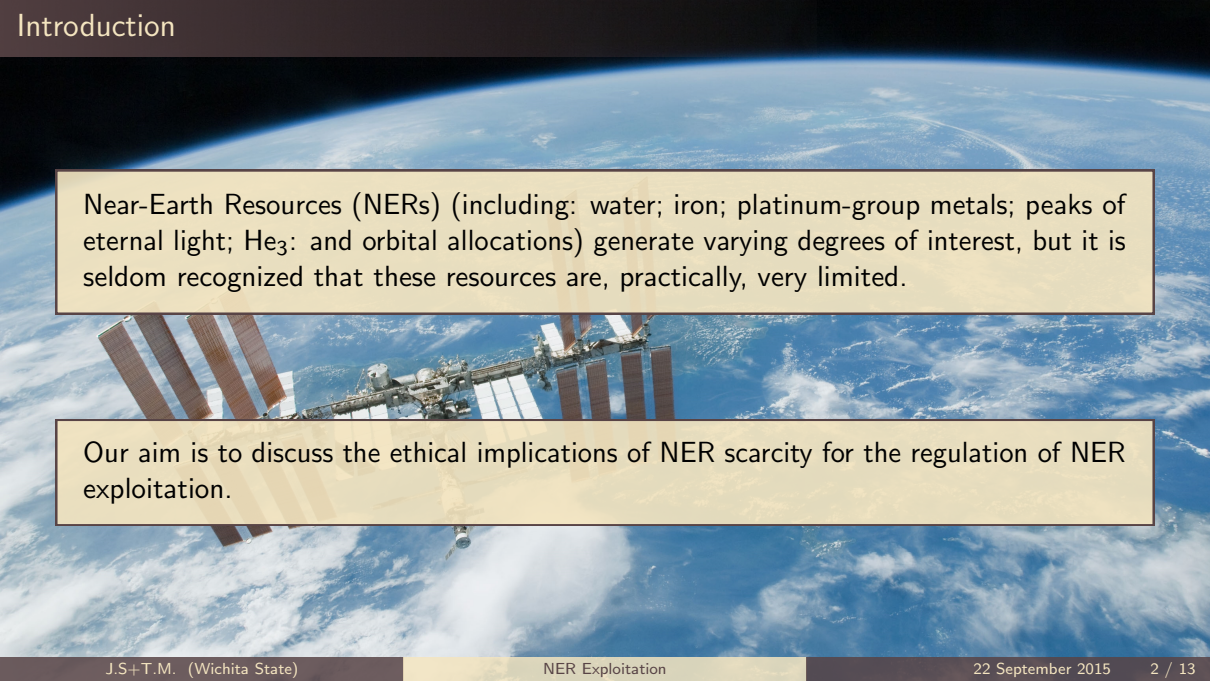
Book plug



The Ethics of Space Exploration, Tony Milligan and James S.J. Schwartz (eds), Springer (Spring 2016)

Near-Earth Resources (NERs) (including: water; iron; platinum-group metals; peaks of eternal light; He_3: and orbital allocations) generate varying degrees of interest, but it is seldom recognized that these resources are, practically, very limited.





Near-Earth Resources (NERs) (including: water; iron; platinum-group metals; peaks of eternal light; He_3: and orbital allocations) generate varying degrees of interest, but it is seldom recognized that these resources are, practically, very limited.

Our aim is to discuss the ethical implications of NER scarcity for the regulation of NER exploitation.

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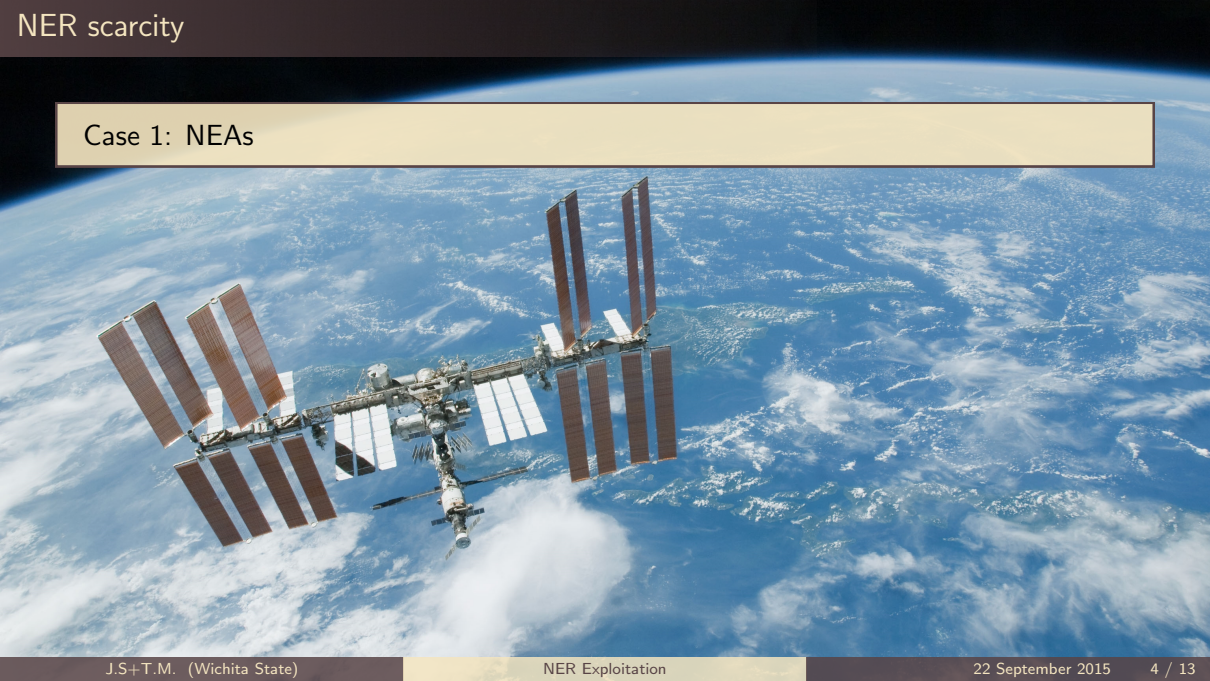
At least *ideally*, we believe that regulation of NER exploitation must also involve:

1. Decision-making bodies with the authority and expertise to appraise the overall *societal value* of exploitation proposals, and to accept or reject proposals accordingly.
2. Independent scientific and environmental oversight.

Case 1: NEAs



Case 1: NEAs

Not just NEA can be profitably accessed—mining candidates must:

- be of the appropriate type (M-type for platinum-group metals; C-type for water);
- be neither too large nor too small in mass;
- have an orbit that permits low-energy capture in cislunar space; and
- have an orbit that aligns with Earth's so as to facilitate timely capture.

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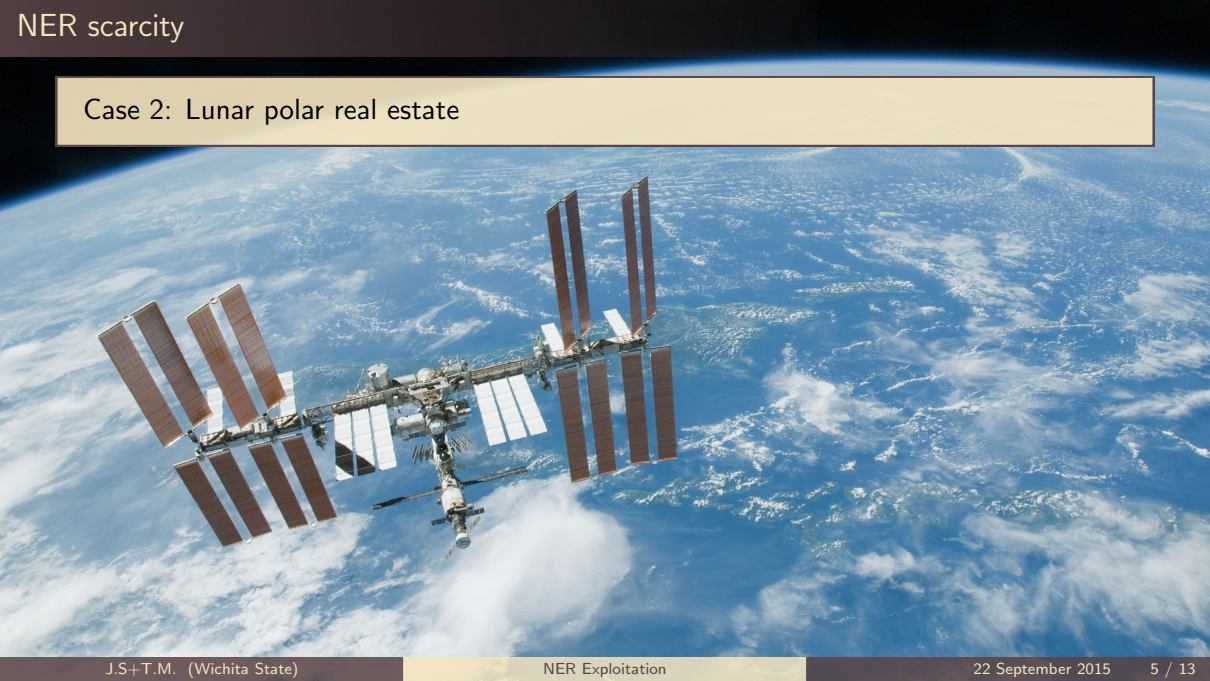
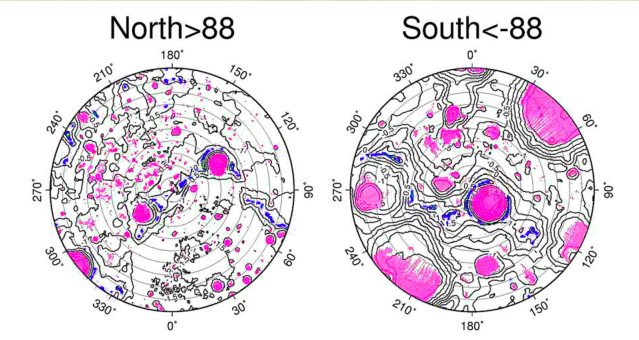
According to Martin Elvis' (2014) estimates of the probabilities, there are only on the order of 10 NEAs suitable for platinum-group metal extraction, and on the order of 9000 NEAs suitable for water extraction.

Case 2: Lunar polar real estate



Case 2: Lunar polar real estate

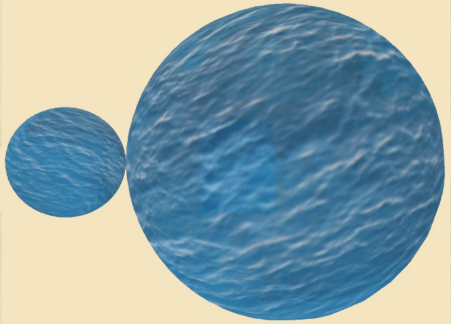
(A): Peaks of eternal light



Source: Noda, et. al (2008).

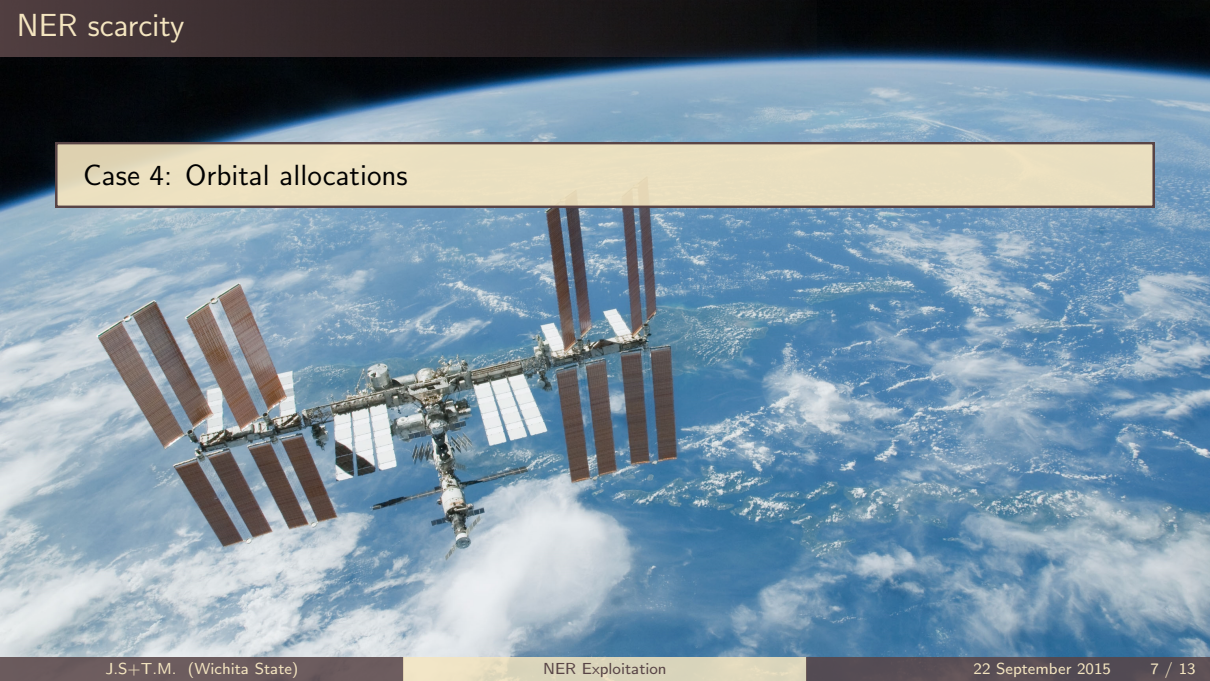
Case 2: Lunar polar real estate

(B): Water from permanently shadowed craters



Left: Lunar polar water (1.77 km diameter); Right: Lake Nicaragua. Source: Author.

Case 4: Orbital allocations



Case 4: Orbital allocations

"...Member States shall bear in mind that radio frequencies and any associated orbits, including the geostationary-satellite orbit, are limited natural resources and that they must be used rationally, efficiently and economically, in conformity with the provisions of the Radio Regulations, so that countries or groups of countries may have equitable access to those orbits and frequencies, taking into account the special needs of the developing countries and the geographical situation of particular countries." ITU Constitution, Article 44.

A moral premise

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Thus any regulatory regime that is truly rational and ethical should aim to minimize trivial and frivolous NER exploitation.

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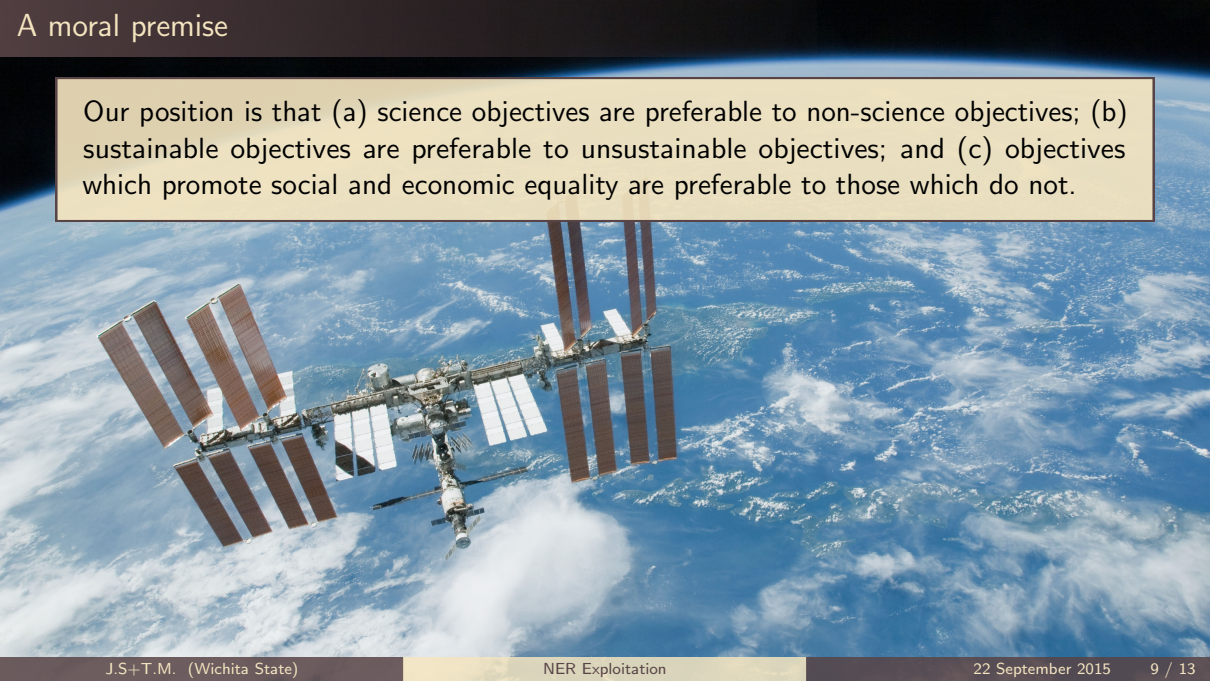
Thus any regulatory regime that is truly rational and ethical should aim to minimize trivial and frivolous NER exploitation.

In practice, this means that it is not sufficient, ethically speaking, merely to ensure *equitable access* to NERs. *It also matters for what purposes consumers intend to use NERs!*

A moral premise

Our position is that (a) science objectives are preferable to non-science objectives; (b) sustainable objectives are preferable to unsustainable objectives; and (c) objectives which promote social and economic equality are preferable to those which do not.



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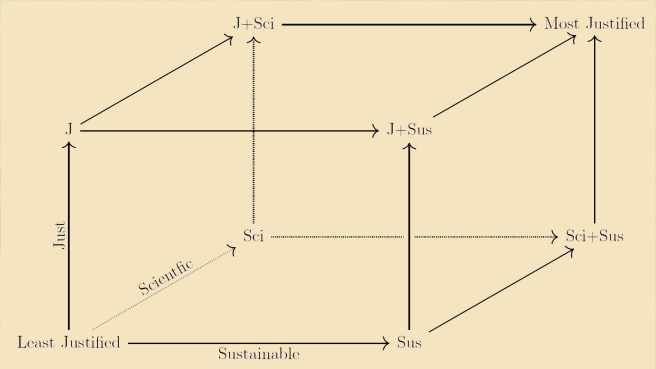

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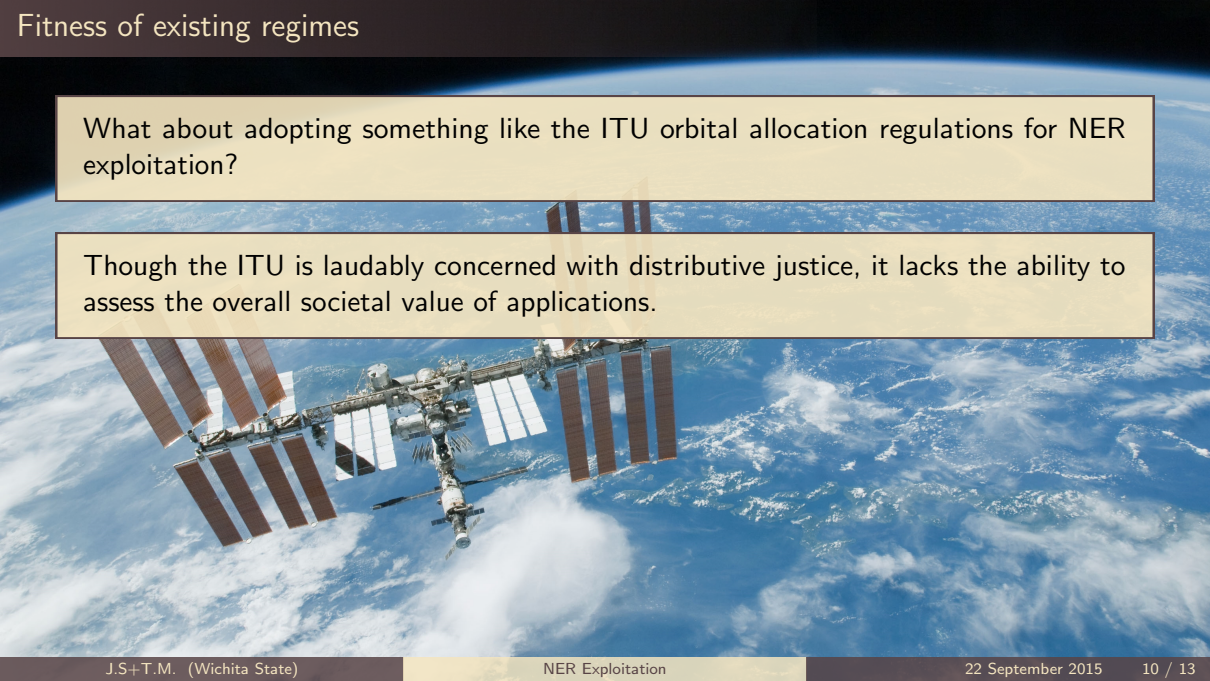

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By contrast, we think an ethically sound NER regime should have the authority and expertise to evaluate proposals at least partially on the basis of their anticipated societal value.

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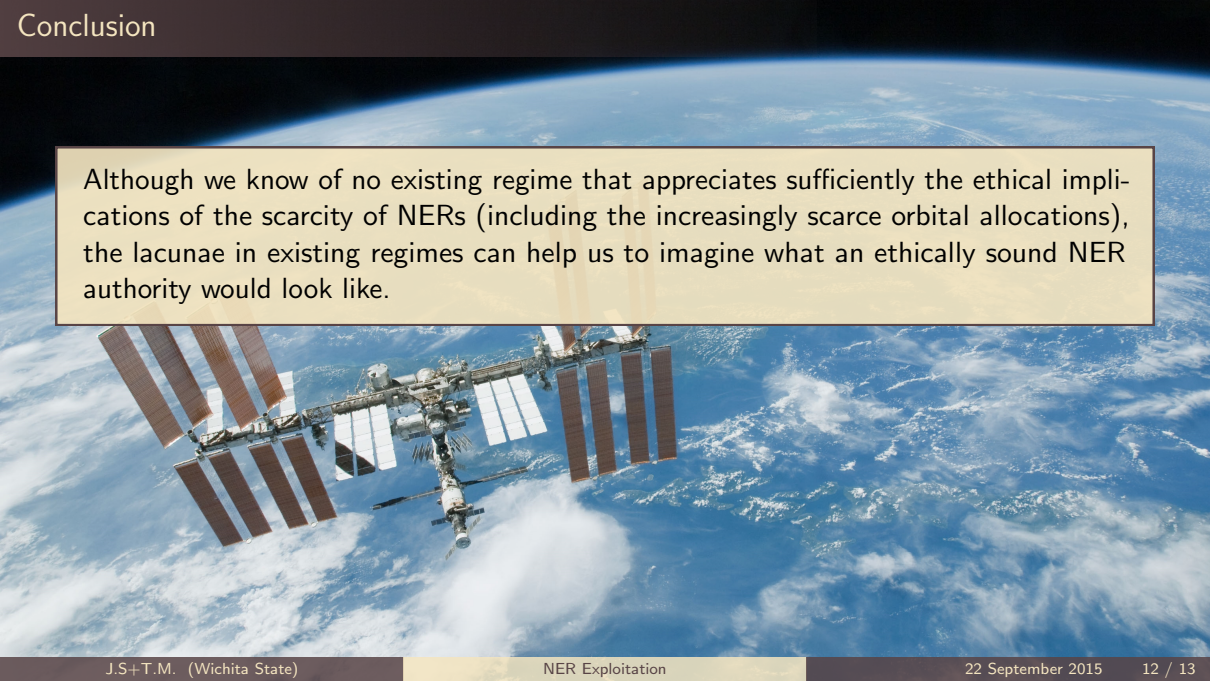
By contrast, we think exploitation—both of deep sea minerals and of NERs—requires *independent* scientific and environmental oversight.

Conclusion

Although we know of no existing regime that appreciates sufficiently the ethical implications of the scarcity of NERs (including the increasingly scarce orbital allocations), the lacunae in existing regimes can help us to imagine what an ethically sound NER authority would look like.



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Minimally, such a regime should be:

- Less tolerant of low-value proposals than the ITU.
- Less tolerant of risks to science and to the environment than the ISA.

Thank you!

- Elvis, Martin. 2014. How Many Ore-Bearing Asteroids? *Planetary and Space Science* 91: 20-26.
- Noda, H., *et al.* 2008. Illumination Conditions at the Lunar Polar Regions by KAGUYA(SELENE) Laser Altimeter. *Geophysical Research Letters* 35.