

15th IAA SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FUTURE (D4)  
Contribution of Space Activities to Solving Global Societal Issues (2)

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## WHY SPACE COLONIES WILL NOT SOLVE TERRESTRIAL PROBLEMS

### Abstract

While the idea of colonising other worlds is as old as humankind itself and while with the advent of the space age this idea has fortified, in the last couple of years plans to build and maintain colonies on Moon or Mars have become more concrete. Recent decades have seen significant shifts in our awareness of Earth's systems and capacities, as well as human impacts on them (eg. rise of concepts and models like Gaia hypothesis, system science/ecology, or Anthropocene as human-triggered geological epoch). Population growth, intense resource-exploitation, and pollution have caused wide-scale ecosystem degradation and global climate change (Intergovernmental Panel on Climate Change 2014). In this time, the commercial space sector has also risen to prominence.

Particularly since 2004, when the Commercial Space Launch Amendments Act was signed, there has been increased emphasis on government-commercial partnerships in the US space sector, and increased visibility of commercial space exploration. Private companies with high ambitions advertise their plans to build colonies off-Earth and often rationalise/sell those plans not just through appeal to scientific exploration, but with the argument that building a second Earth and/or moving people to space colonies would be a solution for present-day problems on Earth, particularly resource-shortages (eg. agricultural land, rare metals, energy, water, clean air), pollution and overpopulation. In this paper we seek to evaluate such a claim and highlight realistic limitations and possibilities around the idea of large-scale space colonisation as solution to key global challenges.

We assume a healthy and ecologically sustainable population on Earth to be at 4-5 billion inhabitants at the current per capita consumption of food, water and resources. Therefore we aim to theoretically settle 2 billion people to off-planet colonies and try to estimate if settling them off would be feasible at all,

whether the emigration rate could compensate the birthrate, how many launches would be necessary and what they would require in terms of resources (both in terms of fuel for the space transfer and in terms of food for the survival of the passengers), and what the impacts for the remaining population would be, assuming the use of state-of-the-art propellants and technologies.