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NOMADIC SETTLEMENTS: FUTURE MARS EXPLORATION WITH ANT-INSPIRED SWARM  
ROBOTS

**Abstract**

Characterized by their temporary colonies, the army ants known as “Eciton Burchelli”, exhibit a unique behaviour. They differentiate from the most of the other ants subfamilies because their colonies are not permanent, but temporary. Spread between Central and South America, the life of the colony is characterised by an alternation of sedentary and nomadic phases: during the first phase, the ants do not excavate the ground or manufacture structures to create a shelter or settlement, as other species do, but they create a temporary nest, called “bivouac”, which is made by the worker ants themselves, that hook and hold tight their bodies, in order to create a protection for their larvae, pupae and queen. They can also manipulate their configuration, in order to adapt to environmental conditions. Once this phase is over, the bivouac is dismantled and the nomadic phase begins, along with the search for another ideal nesting site. Inspired by the behaviour of these army ants, this research proposes a system in which the relative of the worker ants are swarm of specialised rovers which can aggregate, in order to create temporary settlements in which the humans would be protected. Each of these rovers would function as “intelligent bricks”, and they would be able to replicate and provide an essential duty on its own, such as ISRU, airlock, solar power, etc... more rovers would also be able to aggregate and form more complex and bigger rovers. In this sense, this paper aims to evidence the advantages of such innovative approach might have in future lunar and Martian missions. In particular, the implementation of such sedentary and nomadic approach would allow new possibilities in space exploration, as it would make possible to explore more and different regions and beyond the initial landing site.