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Generation and Applications of Extra-Terrestrial Environments on Earth

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Description:

This book has been prepared under the auspice of the European Low Gravity Research Association (ELGRA) www.elgra.org. The main task of ELGRA is to foster the scientific community in Europe and beyond in conducting gravity and space-related research.

This publication is dedicated to the science community, and especially to the next generation of scientists and engineers interested in space research and in the means to use Earth to reproduce the space environment. ELGRA provides a comprehensive description of space conditions and the means that have been developed on Earth to perform space environmental and (micro-) gravity related research. .

The book covers ground-based research instruments and environments for both life and physical sciences research. It discusses the opportunities and limitations of protocols and instruments to compensate gravity or simulate microgravity, such as clinostats, random positioning machines, levitating magnets, electric fields, vibrations, tail suspension or head down tilt, as well as centrifuges for hyper-g studies. Other space environmental conditions are addressed too, like cosmic radiation or Mars atmospheric and soil properties to be replicated and simulated on Earth. Future long duration of manned missions, personal well-being and crew interaction are major issues dealt with.

Keywords: Astrobiology; atmosphere; bed rest; cell biology; centrifuge; clinostat; combustion; drop tower; Earth analogues; electric gravity; fluids; fundamental physics; ground-based research, human; human physiology; hyper-gravity; isolation; magnetic levitation; Mars; Moon; material; materials sciences; microbiology ; microgravity; parabolic flight; partial gravity, plant; plasma; Plateau method; psychology ; radiation; space environment; tail suspension; vibrations; near weightlessness, hypergravity