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Microgravity Research: A Retrospective of Accomplishments

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During the early days of human spaceflight U.S. National Aeronautics and Space Administration (NASA) began giving researchers the ability to perform experiments under extremely low gravity conditions (microgravity). Early microgravity experiments were rudimentary and discovery driven. The limitations of such an approach were clear and in the early 1990s, NASA broadened its program significantly beyond those experiments that were destined to be flown to include a ground-based program that contained both experimental and theoretical investigations. The ground-based program provided a source of carefully designed microgravity experiments. This led to the program in the Physical Sciences Division that involved research in, for example, fluids, materials and low temperature physics. The impact of the microgravity research program has been the focus of a recent National Research Council report titled Assessment of Directions in Microgravity and Physical Sciences Research at NASA. We found that there have been numerous high impact ground-based and flight investigations. For example, NASA funding has been instrumental in elucidating the nature of surface-tension-driven fluid flows, dendritic crystal growth and the thermodynamics of phase transitions near critical points. Using this report as a basis, a discussion of the impact of microgravity research on the fields in which it is a part will be given.