

MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)  
Microgravity Sciences Onboard the International Space Station and Beyond - Part 1 (6)

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MICROGRAVITY RESEARCH MISSIONS WITH SNC'S DREAM CHASER

**Abstract**

The reusable US spacecraft Dream Chaser is a lifting-body developed by Sierra Nevada Corporation (SNC) and intended to transport crew and cargo to the International Space Station (ISS). Co-funded by the Space Administration of the German Aerospace Center (DLR) and with SNC as project partner, OHB System explored applications for microgravity research using the Dream Chaser.

The Dream Chaser could offer possibilities for microgravity research supplemental to ISS research or as gap filler after decommissioning of the US Space Shuttle and possibly the ISS sometime in the 2020s. To make these flight opportunities available to the science community, an assessment of a payload infrastructure is performed. Unmanned microgravity mission are based on automated or ground controlled operation of payloads, which requires an infrastructure in the space vehicle and at ground similar to other unmanned platforms. The Dream Chaser offers the necessary capabilities for unmanned operations and landing. In case of an unmanned microgravity mission, the entire volume of the Dream Chaser cabin can be used for payload accommodation. The space vehicle can house up to 920 kg of gross payload mass, leading to about 600 kg payload mass available for scientific experiments. Duration of a microgravity mission strongly depends on the requirements of the scientific community. The number of payloads, the requested resources per payload and the operational time of a single payload or experiment determines the mission duration. Taking into account the limited power budget (1000 W) for an unmanned mission, the payloads will be operated according to a pre-determined time line depending on the scientific demands and the optimal use of the on-board resources.

A big advantage of SNC's Dream Chaser is the low landing shock of max 1.5 g and the early access after landing to experiments and payloads. Furthermore, the vehicle uses green propellants and can therefore land on any airport with a runway longer than 2500 m. This paper addresses relevant mission concepts and defines the payload to Dream Chaser interfaces (Payload Interface Definition Document -

PIDD). Involved costs are being compared in relation to other capsule mission concepts. Programmatic aspects of a US-German cooperation and an international microgravity mission with the Dream Chaser are being evaluated.