

IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)  
Behaviour, Performance and Psychosocial Issues in Space (1)

Author: Dr. Alina Lungeanu  
Northwestern University, United States, alina.lungeanu1@northwestern.edu

Prof. Leslie DeChurch  
Northwestern University, United States, dechurch@northwestern.edu  
Prof. Noshir Contractor  
Northwestern University, United States, NCONTRACTOR@GMAIL.COM  
Ms. Joy Caroline Liebman  
Northwestern University, United States, joy.liebman@northwestern.edu

A TALE OF THREE TEAMS: EFFECT OF LONG-TERM ISOLATION IN SIRIUS-21 ON CREW  
INTERPERSONAL NETWORKS

**Abstract**

Crews venturing into deep space need to develop and maintain positive working relationships, and avoid negative ones. Relations involve leadership, motivation, teamwork, expertise, and hindrance. Applying social network theory and methods, we explore three topological aspects of teams found to predict their capacity to perform effectively. These include (1) the level of interconnectedness among the crew, (2) the degree to which the crew shows hierarchy, and variation on status, position, or power, and (3) the extent to which the crew shows subgrouping among members. We observed three teams formed for 8 months in order to understand developmental patterns in crew relations, and how these patterns are affected by extended isolation. The first crew was SIRIUS-21, a 6-member crew in isolation in the NEK for 8 months. Once the SIRIUS crew was formed, we recruited two control teams, matched on diversity at the team level with SIRIUS-21 crew. During the 8-month mission, all three crews worked together on team tasks and completed regular surveys enabling us to track the development patterns of relations. The “twin teams” data serve as a comparison and example of crew relations outside of an isolated and confined environment. The SIRIUS-21 crew began with 6 members, but an off-nominal event occurred on mission day 32: a crew member was injured, and needed to leave the mission. The two control crews were reconfigured so our data includes three teams of 5 members each. We assessed 6 types of networks. Leadership was measured with the prompt “to whom did you provide leadership?” and followership with the prompt “who did you rely on for leadership?” Motivation was measured with the prompt “who kept your taskforce motivated?” and working effectively with the prompt “with whom did you work effectively?” Finally, positive working relationships were assessed with the prompt “with whom do you enjoy working?” while hindrance ties were measured using the prompt “who made the task difficult to complete?” We also measured informal social roles, using sociometric surveys developed for previous research on isolation in Antarctica. All social networks were assessed using sociometric surveys administered to SIRIUS-21 and the two twin crews twice a week over 8 months. Network metrics include density, centralization, components, and isolates. We present these metrics over time for SIRIUS-21 and the two “twin teams.” Implications for tracking crew relations and developing relation-based countermeasures are discussed.