



NASA SBIR 2011 Phase I Solicitation

X3.03 Environmental Monitoring and Fire Protection for Spacecraft Autonomy

Lead Center: JPL

Participating Center(s): ARC, GRC, JSC, KSC, MSFC

Environmental Monitoring

Monitoring technologies to ensure that the chemical and microbial content of the air and water environment of the crew habitat falls within acceptable limits, and life support system is functioning properly and efficiently, are sought. Required technology characteristics: 2-year shelf-life; functionality in microgravity, low pressure and elevated oxygen cabin environments. Significant improvements in miniaturization, operational reliability, life-time, self-calibration, and reduction of expendables should be demonstrated. Proposals should focus on one of the following areas:

- Process control monitors for life support. Improved reliability for closed-loop feedback control system.
- Trace toxic metals, trace organics in water.
- Monitoring trace contaminants in both air and water with one instrument.
- Microbial monitoring for water and surfaces using minimal consumables.
- Optimal system control methods. Operate the life support system with optimal efficiency and reliability, using a carefully chosen suite of feedback and health monitors, and the associated control system.
- Sensor suites. Determine, with robust technical analysis, the optimal number and location of sensors for the information that is needed, and efficient extraction of data from the suite of sensors.

Fire Protection

Spacecraft fire protection technologies to detect the overheating or combustion of spacecraft materials by their particulate and/or gaseous signatures are also sought. These must be of suitable size, mass, and volume for a distributed sensor array. Technologies that detect smoke particulates and identify characteristics (mean particulate sizes or distribution) would also be useful. Catalytic or sorbent technologies suitable for the rapid removal of gases, especially CO, and particulate during a contingency response are desired.

