

Global Constellation of Stratospheric Scientific Platforms

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Global Aerospace Corporation (GAC) is developing a revolutionary and cross-cutting concept for a global constellation of hundreds of stratospheric super-pressure balloons which can address major scientific questions relating to NASA's Earth Science Mission by measuring stratospheric gases, collecting data on atmospheric circulation, observing the Earth's surface, and detecting and monitoring environmental hazards. Such a system could augment and complement satellite measurements and possibly replace satellites for making some environmental measurements.

The technical and programmatic keys to this new concept are:

- Achievable constellation geometry management,
- Significant and cost-effective scientific applications,
- Affordable, long-duration balloon systems,
- International agreements on overflight,
- Balloon trajectory control capability, and
- A global communications infrastructure.

In the satellite era, there has been a shift away from making conventional *in situ* measurements of the global environment to remote sensing from Earth orbiting spacecraft. After forty years, there may be some reason to challenge this remote sensing paradigm with a new *in situ* strategy. In combination, (a) the advance of electronics, (b) the inherent difficulty of making some remote measurements from satellites, and (c) the interest in simultaneous global measurements, argue for a reevaluation of the current reliance on satellites for many global environmental measurements.

Total system cost for balloon constellations may be competitive with or lower than comparable spacecraft systems due to the inherent high cost of spacecraft and launch vehicles. A network of balloons will be less costly than a comparable network of spacecraft if the individual balloons have lifetimes measured on the order of years, thereby reducing the cost of replacement or refurbishment.

GAC is developing sophisticated geometry management strategies for global balloon constellations, exploring additional science applications and benefits, identifying technology needs and generating estimates of the cost of implementing such a revolutionary system.

