

IRS2012-217
International Radiation Symposium 2012
Dahlem Cube, Berlin, Germany, 06 – 10 August 2012
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Earth Radiation Imbalance from a Constellation of 66 Iridium Satellites: Technological Aspects

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Iridium Communications Inc. is launching a new generation of polar orbiting communication satellites in 2015-2017. Iridium will provide a hosted payload bay on each of the 66 satellites (plus 6 in-space spares). This offers the potential for a paradigm shift in the way we measure Earth radiation imbalance from space, as well as massive cost savings. Because the constellation provides 24/7 global coverage, there is no need to account for diurnal cycle via extrapolations from uncalibrated narrowband geostationary imagers. And the spares can be rolled over to view the Sun and deep space, then transfer their calibration to the other members of the constellation during the frequent cross-overs.

In part using simulations of the constellation viewing realistic Earth scenes, this presentation will address the technological aspects of such a constellation: (1) the calibration strategy; (2) the highly-accurate and stable radiometers for measuring outgoing flux; and (3) the GRACE-inspired algorithms for representing the outgoing flux field in spherical harmonics and thus achieving ~ 500 -km spatial resolution and two-hour temporal resolution.