I. INTRODUCTION

- In the next ten years NASA plans to launch several spacecraft into Low Earth Orbit (LEO) for remote sensing of the Earth with instruments that will accumulate several hundred gigabits of data per orbit.
- The ability to handle such a large volume of science data per orbit far exceeds the capabilities of NASA's current space and ground assets.
- The paper proposes two solutions: first, a high data rate link between the LEO spacecraft and ground via relay satellite in geostationary orbit (GEO). Second, a high data rate direct to ground link from LEO.

II. K-BAND SPACE-TO-SPACE LEO-TO-GEO LINK

The relay satellites are located in GEO. The LEO-to-GEO link is designated as the return link (RL) to the relay satellite and operates at Ka-band frequencies (20.2 to 21.2 GHz) and 25.5 to 23.55 GHz frequencies. The GEO-to-LEO forward link (FL) operates at K-band frequencies (20.2 to 21.2 GHz). The LEO spacecraft to a ground station down link operates at Ka-band frequencies (25.5-27.0 GHz) and 13.7 GHz frequencies.

III. V-BAND GEO-TO-GEO INTERSATELITE LINKS

The forward (FL) and return (RL) links operate at V-band frequencies (59 to 64 GHz), but with opposite sense of polarization to minimize interference.

GEO-TO-GEO INTERSATELITE LINKS

- GEO
- FL
- RL
- FL

IV. K-BAND GEO-TO-GROUND LINK

The relay satellite to ground station down link operates at K-band frequencies (20.2 to 21.2 GHz).

V. KA-BAND LEO-TO-GROUND LINK

The LEO spacecraft to a ground station down link operates at Ka-band frequencies (25.5-27.0 GHz).

VI. CONCLUSIONS

Results from computer simulations carried out for high-data-rate LEO-to-GEO, GEO-to-GEO, GEO-to-ground, and LEO-to-ground links to down load large volume of science data are presented.