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# LEO POD REQUIREMENTS

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# Present and Future



- IGS contributions to ICESat and GRACE are gratefully acknowledged
  - Both missions have demonstrated 1-2 cm radial and 2-3 cm horizontal ( $1-\sigma$ ) using BlackJack GPS receiver for POD; validation based on satellite laser ranging (SLR) residuals, where SLR is withheld from POD
- Expectations that future missions will use accomplishments of today as the starting point for future mission requirements (we have demonstrated that today we have 1-2 cm radial ( $1-\sigma$ ), future expectations will probably require  $< 1$  cm radial)



# Can LEO Contribute to IGS Products?



- Long standing question
- I (Schutz) thinks the answer is “yes”, but the important question seems to be: if the contribution to IGS products is, say, 1% or 10%, is the required additional effort justified?
- Ideal situation would be a constellation of satellites specifically designed to optimally meet the IGS requirements
  - In today’s environment, agencies and institutions that provide mission funding are only concerned with meeting the mission requirements and they will ask what it costs to fulfill nonmission requirements such as those from IGS
  - IGS use will rely on LEOs launched by others for non-IGS purposes
  - Mission specific satellites have a limited life, e.g., 3 to 5 years; in some cases there are no firm plans for follow-on satellites (contrary to ground receiver network where a failed ground receiver will usually be quickly replaced); without continuity in LEO satellites, can IGS place an emphasis on LEO?
  - It seems unlikely that a constellation or even a single satellite would be designed to meet IGS requirements



# Open Issues



- We (CSR) performed simulations to assess the impact of LEO on IGS a few years ago; we will try to invigorate those investigations
- The specific contribution of LEO to Earth center of mass variations is of interest, especially the z-component
- An improvement of 1 cm in the GPS orbits does not translate into 1 cm improvement in LEO orbit, so more definitive assessment of GPS improvements (including receiver improvements) and the impact on LEO needs to be performed



# Final



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- My apologies for being unable to attend because of unexpected circumstances
  - Best wishes for successful meeting:  
Bob Schutz