Pearlman, M.R., Appleby, G.M., Kirchner, G., McGarry, J., Murphy, T., Noll, C.E., Pavlis, E.C., Pierron, F. (2010), Current Trends in Satellite Laser Ranging, *Eos Trans. AGU*, *91*(26), Meet. Am. Suppl., Abstract G13C-07.

Abstract:

Satellite Laser Ranging (SLR) techniques are used to accurately measure the distance from ground stations to retroreflectors on satellites and the moon. SLR is one of the fundamental techniques that define the International Terrestrial Reference Frame (ITRF). which is the basis upon which we measure many aspects of global change over space, time, and evolving technology. It is one of the fundamental techniques that define at a level of precision of a few mm the origin and scale of the ITRF. Laser Ranging provides precision orbit determination and instrument calibration/validation for satellite-borne altimeters for the better understanding of sea level change, ocean dynamics, ice budget, and terrestrial topography. Laser ranging is also a tool to study the dynamics of the Moon and fundamental constants. Many of the GNSS satellites now carry retro-reflectors for improved orbit determination, harmonization of reference frames, and in-orbit colocation and system performance validation. The GNSS Constellations will be the means of making the reference frame available to worldwide users. Data and products from these measurements support key aspects of the GEOSS 10-Year Implementation Plan adopted on February 16, 2005. The ITRF has been identified as a key contribution of the IAG to GEOSS and the ILRS makes a major contribution for its development since its foundation. The ILRS delivers weekly additional realizations that are accumulated sequentially to extend the ITRF and the Earth Orientation Parameter (EOP) series with a daily resolution. Additional products are currently under development such as precise orbits of satellites, EOP with daily availability, low-degree gravitational harmonics for studies of Earth dynamics and kinematics, etc. SLR technology continues to evolve toward the next generation laser ranging systems as programmatic requirements become more stringent. Ranging accuracy is improving as higher repetition rate, narrower pulse lasers and faster detectors are implemented. Automation and pass interleaving at some stations is already expanding temporal coverage. Web-based safety keys are allowing the SLR network stations to range to optically vulnerable satellites. Some stations are experimenting with two-wavelength operation as a means of better understanding the atmospheric refraction and with very low power laser to improve eye-safety conditions. New retroreflector designs are improving the signal link and enable daylight ranging. Dramatic improvements have also been made with lunar ranging with the new APOLLO Site in New Mexico, USA and the upgraded lunar station "MEO" in Grasse,

