

Consolidated Laser Prediction Format: The Lunar Connection



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The ability for all laser stations to easily
access lunar predictions opens a wide
range of opportunities for increased LLR
activity

Introduction

- ❑ Consolidated Prediction Format provides method of ranging to disparate targets using one format
- ❑ Allows cross-technique ranging attempts
- ❑ Tabular format contains state vectors at appropriate intervals
- ❑ Typically in true body fixed system of date

Advantages for LLR

- New LLR stations do not need to develop LLR prediction software
- Single station could use predictions from multiple suppliers
- Non-LLR stations have opportunity to at least check feasibility to range the moon

Caveats

- ❑ On-site code should not use SLR-type short-cuts that ignore return vector or assume Euclidean space
- ❑ Current LLR ephemerides (e.g. DE-403) are not on ITRF, so station coordinates matched to ephemeris may be off by meters

Implementation

- ❑ One multi-day file for each reflector and for the center of the moon
- ❑ Center of moon file also contains Euler libration angles from which point angles to any arbitrary lunar feature can be constructed
- ❑ On-site software (based on sample code) creates daily files from moon rise to moon set

What's next

- MLRS field tests
 - SLR already tested with new format
 - LLR software ready; awaits testing
- Make sample code available
- Set up lunar prediction server (Apollo)

Conclusion

- The LLR community stands to reap many benefits from the introduction of a unified prediction format
- Use of the new format is undergoing tests which should prove the concept for multiple target types
- There is already a “market” for centrally produced LLR predictions