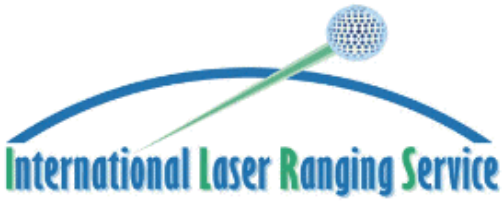
Session 7
Array and Corner Cube Manufacturers and Specifications and Space Debris

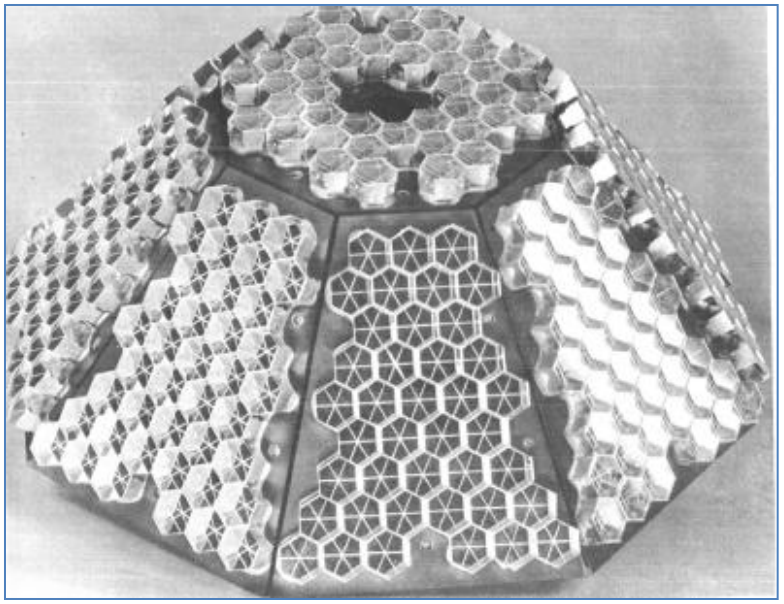
International Technical Laser Workshop 2012

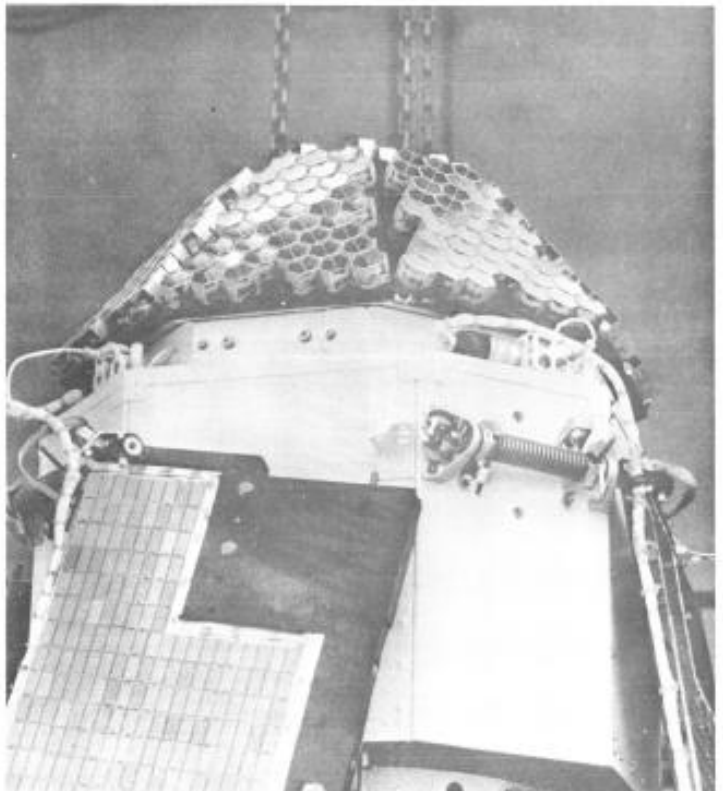
Scott Wetzel, Dominic Doyle



Historical Array Providers

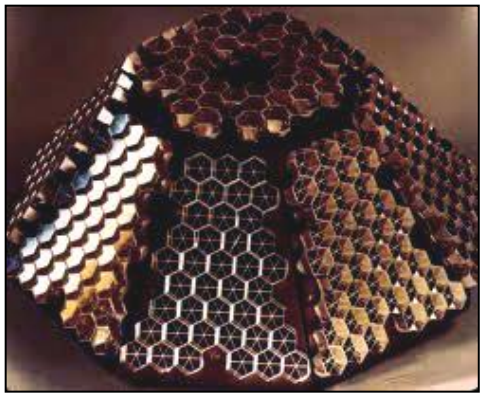
- First SLR returns occurred 10/31/64 from Beacon Explorer-B at the GSFC.



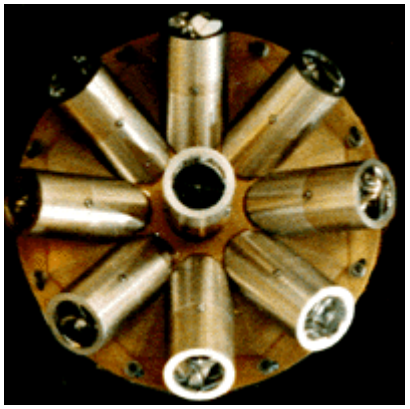


The array (Figure 4) consists of 360 cube corner prisms arranged over nine panels which form a truncated octagonal pyramid. At the base of the pyramid, the diameter of an inscribed circle is about 18 inches, and its height is about 10 inches. The individual prisms are of radiation-resistant fuzed quartz with aluminized reflecting surfaces, cut at the corners to yield hexagonal faces for optimum area usage. They are about one inch across flats.

LEO Array Examples



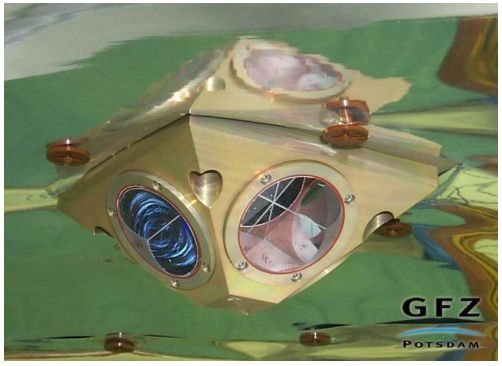
BEACON-B, -C



MSTI-II, VCL, GPB

GFO-1, ADEOS-II, Jason 1, 2, 3, ICESat

BLITS



CHAMP, GRACE, TerraSAR-X, TanDEM-X SWARM, KOMPSAT-5, etc.

HY-2A, STSat

Cryosat 1, 2, GOCE, PROBA-2, etc..

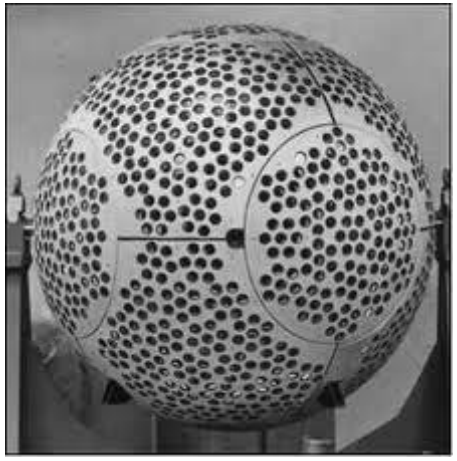
ERS-1, 2, EnviSat

Geodetic Satellites

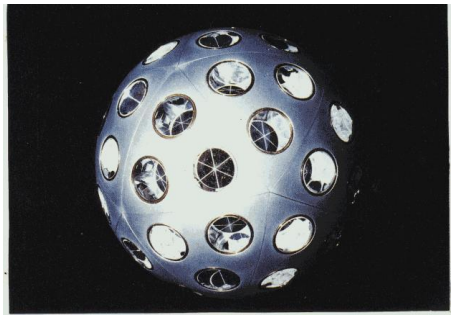
AJISAI

LAGEOS -1, -2

LARES



Etalon-1, -2

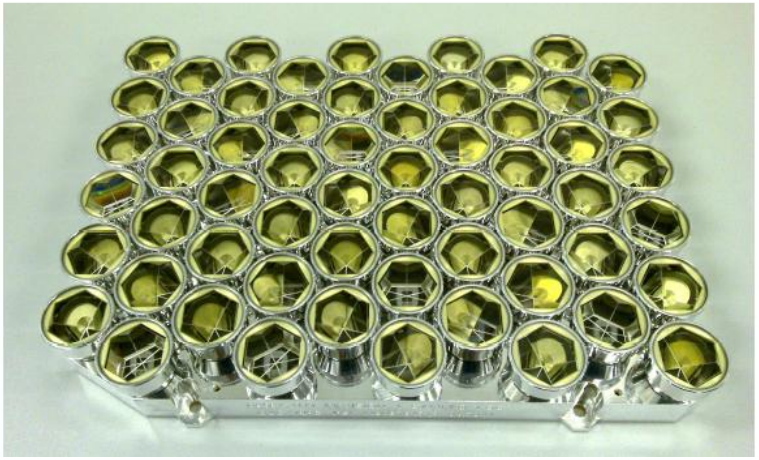


Starlette, Stella

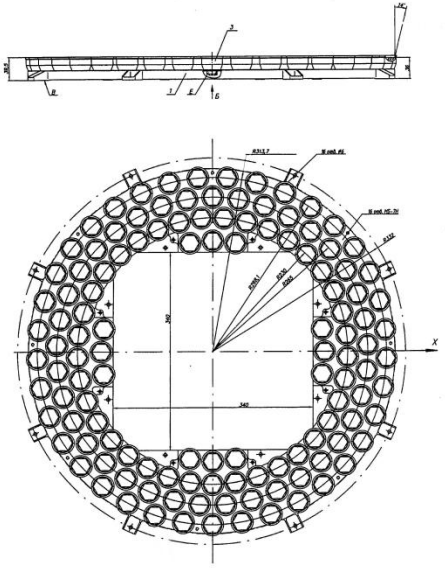
Larets

GEO Array Examples

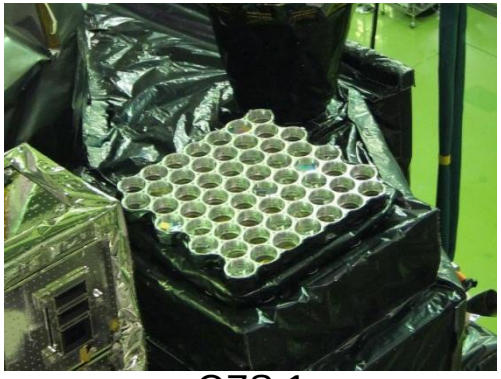
Compass M-1



Galileo

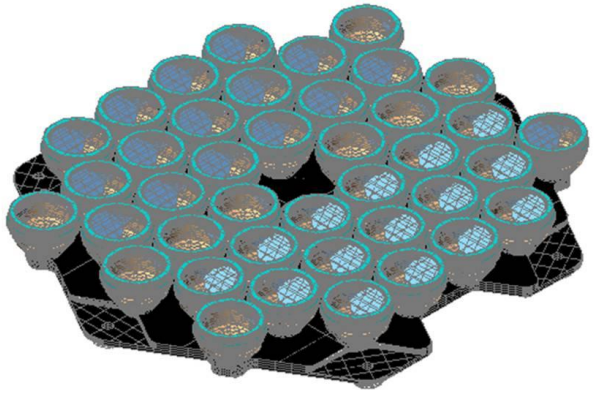


GLONASS 125



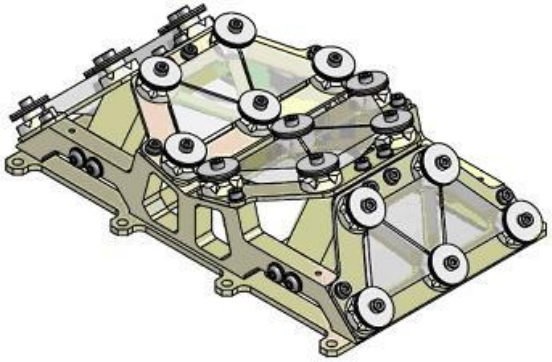
QZS-1

ETS-8

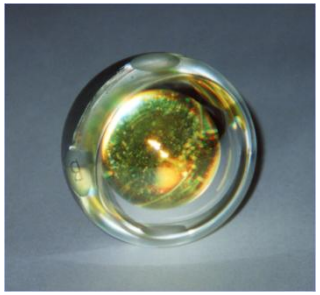


IRNSS

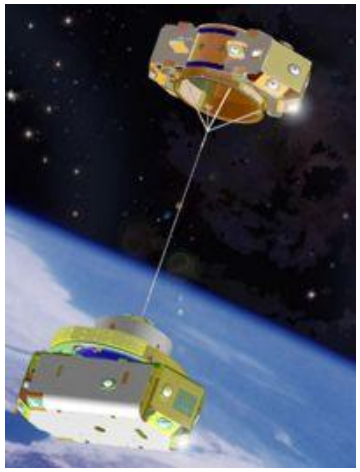
Some Other Interesting Types



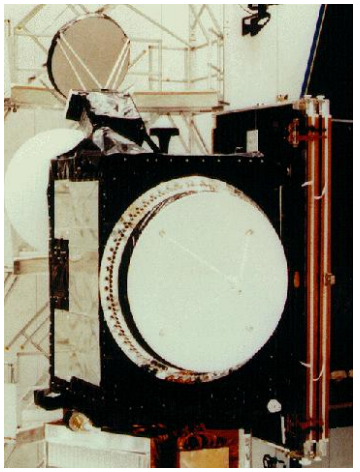
SOHLA-1



Meteor-3M

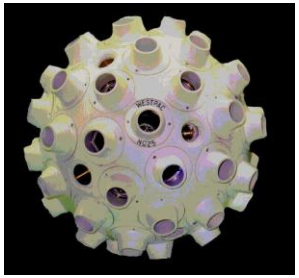


TiPS

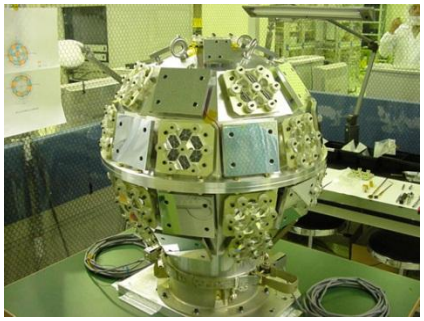


TOPEX/Poseidon

Starshine

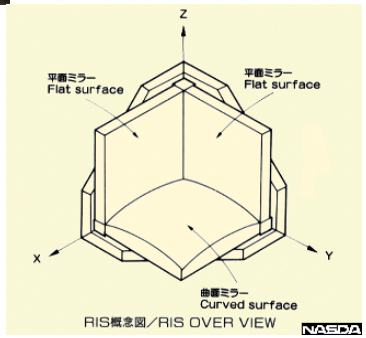


Westpac



LRE

Reflector



RIS

Array and Corner Cube Manufacturers and Specifications

- Many of missions have knowledge of SLR and Array requirements and specifications
- Some do not so… arrays may not always be optimal in value
- Manufacturers work closely with the missions to develop these requirements
- ILRS has been more involved in the specification or at least recommendations for retroreflector arrays
- More focus on design to meet accurate tracking requirements / cross section / polarization / others
- All is necessary to achieve latest goals for GGOS

What do we care about in an array?

- When considering a retroreflector array for an upcoming mission some important things to consider include:
  - Array cross-section
  - Velocity aberration
  - Polarization impacts
  - Thermal impacts
  - Mechanical interface
  - Clear field of view impacts
  - Other environmental impacts
- Something that should not be left out is considering who will be tracking it, where and when.
  - Who is tracking this – regional or global support
  - When can this be tracked
  - What is the impact on performance
  - How will it be tracked

Some Current LRA Providers

- Some current providers of LRA's include:
  - US (Honeywell/ITE)
  - Europe (GFZ)
  - China (Shanghai Observatory)
  - Russia (Scientific Research Institute for Precision Instruments)
- Agencies that build arrays include:
  - US – NASA, NRL
  - Europe – ASI, INFN
  - Asia – JAXA, ISRO
- Apologies if any are missed….to be added.