The 2017 Tracking Data Use Questionnaire Summary

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ILRS satellite applications

Satellite	Application
BE-C	Inter-comparison of space geodesy techniques; secular and long-period variations in gravity field; Earth rheology and post glacial rebound
CryoSat-2	Thickness of sea ice, surface elevation of ice; Ocean/Ice altimetry
GRACE-A, -B	Static and time-varying gravity field
HY-2A	Ocean altimetry; Dynamics of the ocean environment sea surface height and temperature
Jason-2, -3	Ocean altimetry; global circulation, air-sea interaction, monitor ocean events (El Nino); precision time transfer
KOMPSAT-5	SAR imaging; atmospheric sounding; radio occultation
PN-1A	Multi-technique Precision orbit determination; atmospheric density
SARAL	Ocean altimetry; ocean surface topography; Wave height; wind speed; ocean circualtion. model
Sentinel-3A	Ocean altimetry; SAR, sea surface topography; sea and land surface temperatures; ocean and land color; climate monitoring and forecasting
STSat-2C	Atmospheric monitoring; electronic temperature and electron density and plasma potential; measure and monitor near-space density
SWARM-A, -B, -C	Survey of Earth's geomagnetic field and its temporal evolution
TanDEM-X	SAR; high accuracy digital elevation models; tandem with TerraSAR-X
TerraSAR-X	SAR; X-band SAR data for scientific research and commercial applications

Satellite	Application
RadioAstron	Interometer measurements
TechnoSat	Technology experiments; demonstration of small COTS reflectors for the array
Ajisai	Gravity Field, Satellite spin studies, Force model, EOP
Etalon-1, -2	Satellite and refinement of the Earth gravity Field model; .support GLONASS
LAGEOS-1, -2	Geodynamics/Reference Frame
LARES	Gravito-magnetic field, Lense-Thirring Effect, Reference Frame
Larets	Geodesy and Geodynamics; test of array design
Starlette/Stella	Static and Time varying gravity field, tides,long period perturbations
Compass/Beidou	Navigation/Time Transfer
Galileo	Navigation/Time Transfer
GLONASS	Navigation/Time Transfer
IRNSS	Navigation
QZSS	Navigation

Introduction

- **The scope of the survey:**

  Many stations in the ILRS network are nearly saturated in their tracking schedule. The ILRS is presently assessing its tracking needs to try to maximize its utility. If you want your needs to be considered, please fill in this questionnaire. We plan to make revisions to our tracking list based on users needs, so your input is critical.

  The survey should not take you more than 5-10 minutes to complete, depending on your level of involvement with SLR data.

  Thank you for supporting the ILRS!

- **We received 66 replies, of which eight (8) were on behalf of specific missions/entities (other than individuals):**
  - ***GRACE, TerraSAR-X, TanDEM-X, KOMPSAT, LARES, ILRS for ITRF, Sentinel-3A and GLONASS***

Groups of Missions Used

- Geodetic spheres
  - AJISAI, Etalon, LAGEOS, LARES, Starlette, Stella, Larets
- Altimetry Missions
  - Cryosat, HY-2A, Jason, SARAL, Sentinel-3
- GNSS Constellations
  - GPS, GLONASS, Galileo, BeiDou, IRNSS, QZ
- Remote Sensing Missions (LEOs)
  - GRACE, Beacon-C, KOMPSAT-5, PN-1A, STSAT-2C, Swarm
- Lunar reflectors, RadioAstron/Spektr-R, LRO/LR

Applications

- Science Product
- Precision Orbit Determination
- Calibration and Instrument Validation
- Engineering Applications or Demonstration
- Other applications

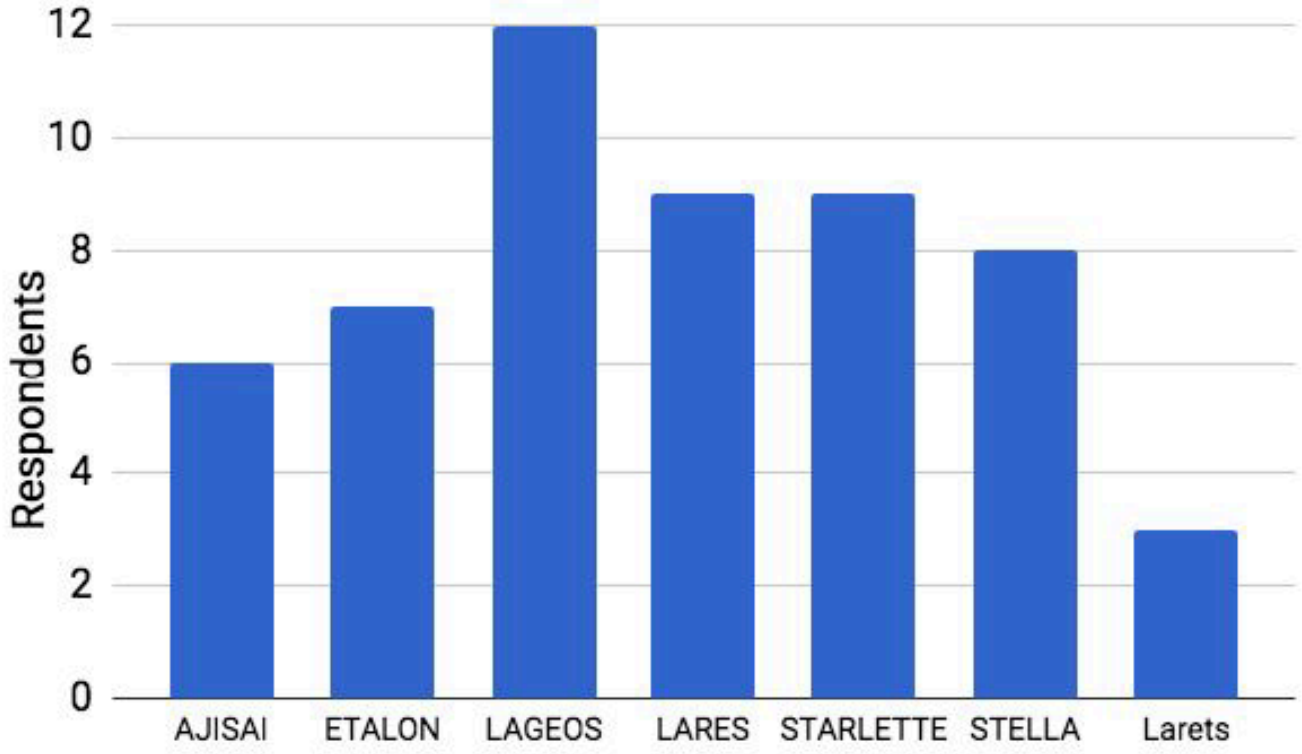
Questions Asked:

- Do you use ILRS data from any of the targets in each group?
- How many passes on each satellite do you require per week?
- Any special characteristics/conditions for the data that you need?
- What data accuracy do you require?
- Can your work be done with periodic campaigns instead of continuous tracking?
- What products do you generate with the data?
- Are those data products made public?
- General comments

Summary of the Answers (1)

- **Geodetic spheres**
  - Do you use ILRS data from any of these targets?

46 YES **20 NO**



Summary of the Answers (2)

- **Altimetry Missions**
  - Do you use ILRS data from any of these targets?

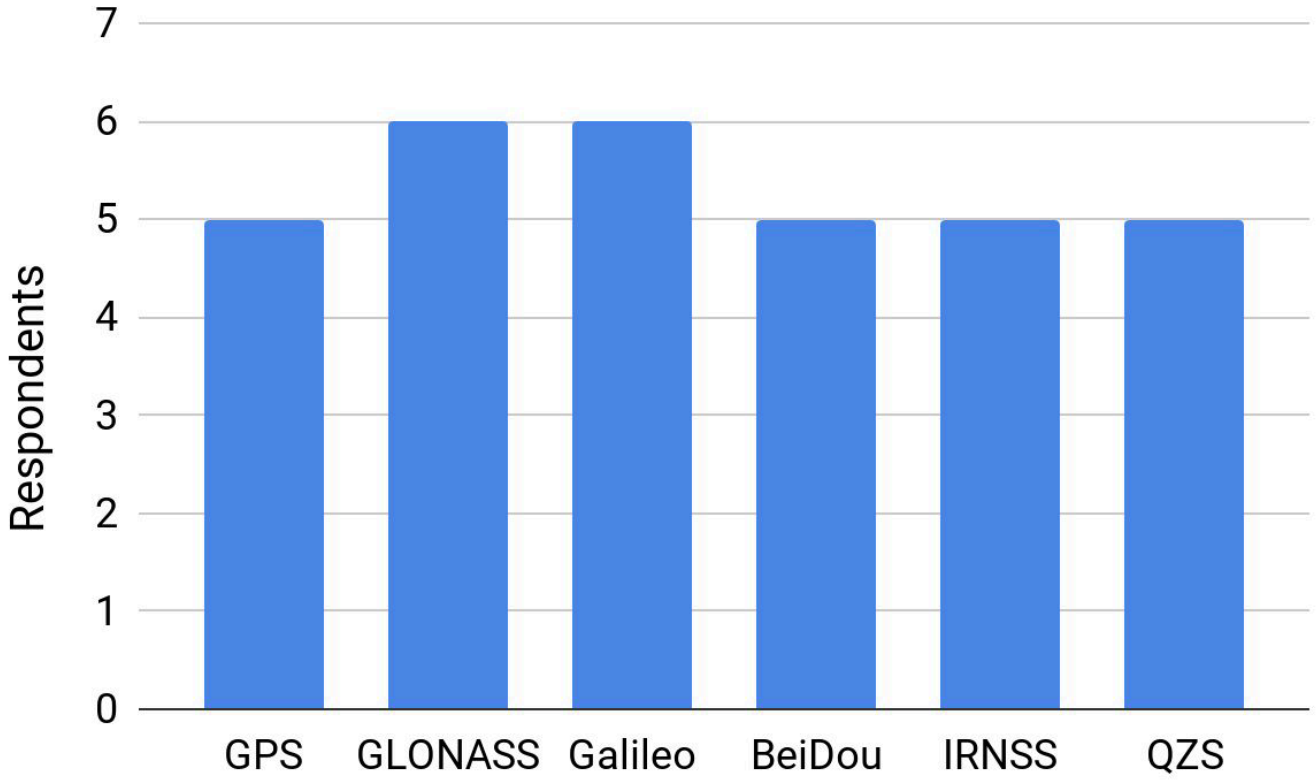
    27 YES 38 NO
  - 27 respondents answered that they use all data from all missions
  - 38 respondents don't use any of this data

- Two respondents included the following preferences:
  - low to high altitude coverage
  - Sentinel-3A, Cryosat

Summary of the Answers (3)

- **GNSS Constellations**
  - Do you use ILRS data from any of these targets?

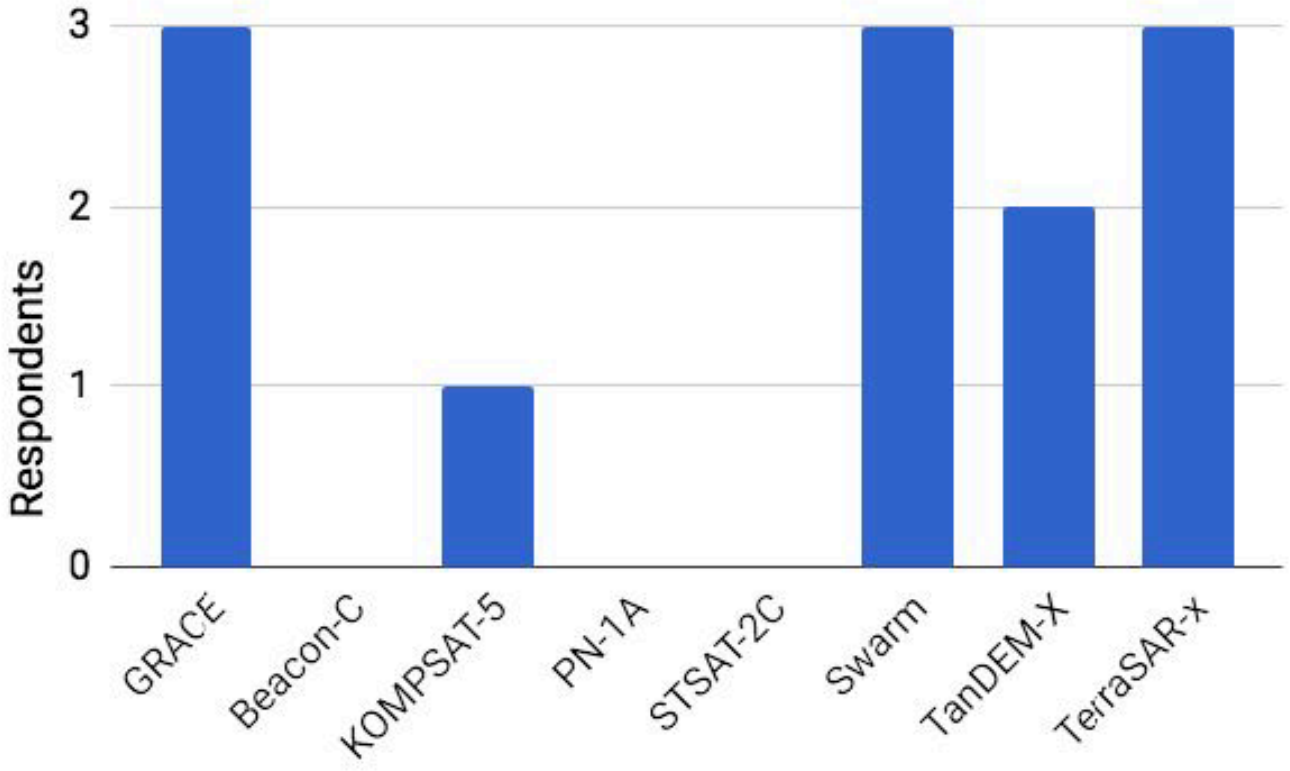
38 YES **28 NO**



Summary of the Answers (4)

- **Remote Sensing Missions (LEOs)**
  - Do you use ILRS data from any of these targets?

24 YES 40 NO



Summary of the Answers (5)

- **Lunar reflectors, RadioAstron/Spektr-R, LRO/LR**
  - Do you use ILRS data from any of these targets?

8 YES 57 NO

- Lunar reflectors, RadioAstron/Spektr-R, LRO/LR Missions Summary:
  - 8 respondents answered that they use all data from all missions
  - 57 respondents don't use any of this data.

- None of the respondents indicated any preferences.

Summary of the Answers (6)

- **No. of passes per satellite required each week?**
  - Geodetic spheres: **2/3** need **> 100**, **1/3** up to **50**
  - Altimeter missions: **2/3** need **> 100**, for HY-2A **40%** up to **50**
  - GNSS : **45%** need **> 100**, the rest split evenly: **1-20 & 21-50**
  - LEO:
    - **50%** asked for **> 100** for GRACE, Beacon-C, KOMPSAT-5, Swarm, TanDEM-X, TerraSAR-x
    - **75%** asked for for **1-20** for PN-1A, STSAT-2C and **25%** for **21-50**
  - Lunar targets:
    - Lunar reflectors: **60%** **6-10** **30%** **1-5**
    - RadioAstron/Spektr-R: **100%** **1-5**
    - LRO/LR: **2/3** **1-5** **1/3** **6-10**
    - Phasing of moon: **All responses evenly split**

Summary of the Answers (7)

- Required data accuracy:
  - **60%** asked for **millimeter or better**
  - **30%** were satisfied with **centimeter**
- Any special characteristics or conditions for the data that you need?
  - Similar percentage of respondents asked for NP, Day & Night data, Low and High elevation data
  - A much smaller percentage asked for FR data as well
  - There was no interest at all for only Day or only Night data
- Periodic campaigns vs. continuous tracking:
  - Except for GNSS and Lunar, only **~15%** answered **yes**
  - For GNSS and Lunar the answers were split **50-50**

Summary of the Answers (8)

- What products do you generate with the data?
  - **Scientific Products, POD and Calibration/validation** were the top choices with nearly equal percentages for all groups of targets
  - Very few reported **engineering and special products**

- Are the data products that you generate publicly available?
  - the **majority** answered **yes**;
  - a **few** said **limited access,** and
  - **1-2** per group answered **no**

Detailed Results

- Those interested in the results of the survey can visit the associated poster in this session:

  "ILRS Tracking Data Requirements Survey 2017", Magdalena Kuzmicz-Cieslak and Erricos C. Pavlis

- The results will be placed online, accessible from the ILRS portal.