SECTION 8 - ILRS INFORMATION

8.1 ILRS TERMS OF REFERENCE

1.0 INTRODUCTION

1.1 Charter and Affiliations

The International Laser Ranging Service (ILRS) is an established Service within Section II, Advanced Space Technology, of the International Association of Geodesy (IAG). The primary objective of the ILRS is to provide a service to support, through Satellite and Lunar Laser Ranging data and related products, geodetic and geophysical research activities as well as International Earth Rotation Service (IERS) products important to the maintenance of an accurate International Terrestrial Reference Frame (ITRF). The service also develops the necessary standards/specifications and encourages international adherence to its conventions.

1.2 Services

The ILRS collects, merges, archives and distributes Satellite Laser Ranging (SLR) and Lunar Laser Ranging (LLR) observation datasets of sufficient accuracy to satisfy the objectives of a wide range of scientific, engineering, and operational applications and experimentation. These data sets are used by the ILRS to generate a number of scientific and operational data products including but not limited to:

- Earth orientation parameters (polar motion and length of day)
- Three-dimensional coordinates and velocities of the ILRS tracking stations
- Time-varying geocenter coordinates

- Static and time-varying coefficients of the Earth's gravity field
- Centimeter accuracy satellite ephemerides
- Fundamental physical constants
- Lunar ephemerides and librations
- Lunar orientation parameters

The accuracy of SLR/LLR data products is sufficient to support a variety of scientific and operational applications including:

- Co-determination, with other space geodetic techniques, of the International Terrestrial Reference Frame (ITRF), especially as it relates to center-of-mass and scale
- Realization of global accessibility to and the improvement of the International Terrestrial Reference Frame (ITRF)
- Monitoring three dimensional deformations of the solid Earth
- Monitoring Earth rotation and polar motion
- Support the monitoring of variations in the topography and volume of the liquid Earth (ocean circulation, mean sea level, ice sheet thickness, wave heights, etc.)
- Tidally generated variations in atmospheric mass distribution
- Calibration of microwave tracking techniques
- Picosecond global time transfer experiments
- Astrometric observations including determination of the dynamic equinox, obliquity of the ecliptic, and the precession constant
- Gravitational and general relativistic studies including Einstein's Equivalence Principle, the Robertson-Walker b parameter, and time rate of change of the gravitational constant, G
- Lunar physics including the dissipation of rotational energy, shape of the core-mantle boundary (Love Number k2), and free librations and stimulating mechanisms
- Solar System ties to the International Celestial Reference Frame (ICRF)

1.3 Amendments to the ILRS Terms of Reference

A proposal to amend the ILRS Terms of Reference can be made in writing to the Chairperson of the Governing Board (see Section 3.0) by any ILRS Associate Member (see Section 4.1). Proposed amendments will be forwarded by email to all ILRS Associate Members of record for comment and amended as necessary by the Chairperson prior to a Governing Board vote. Associate Members will be given two weeks to comment. Final approval of any such amendment requires a 2/3 affirmative vote of the Governing Board. Proposed amendments to the Terms and subsequent Board actions will be summarized and presented to the Associate Members by the Chairperson at the next General Assembly.

2. PERMANENT COMPONENTS OF THE ILRS

The ILRS accomplishes its mission through the following permanent components:

- Tracking Stations and Subnetworks
- Operations Centers
- Global and Regional Data Centers
- Analysis, Lunar Analysis, and Associate Analysis Centers
- Central Bureau

The characteristics and responsibilities of these entities is described in the following subsections.

2.1 Tracking Stations and Subnetworks

ILRS Tracking Stations range to a constellation of approved satellites (including the Moon), contained in a list of satellites compiled and approved by the ILRS Governing Board, through the use of state of the art laser tracking equipment and data transmission facilities which allow for a rapid (at least daily) data transmission to one or more Operations and/or Data Centers (see below). The stations must meet data accuracy, quantity, and timeliness requirements which are specified in separate documents. The tracking data produced by the ILRS stations are regularly and continuously analyzed by at least one ILRS Analysis Center or one mission-specific Associate Analysis Center. Tracking Stations may be organized into regional or institutional subnetworks.

2.2 Operations Centers

The Operational Centers are in direct contact with tracking sites organized in a subnetwork. Their tasks typically include the collection and merging of data from the subnetwork, initial data quality checks, data reformatting into a uniform format, compression of data files if requested, maintenance of a local archive of the tracking data, and the electronic transmission of data to a designated ILRS Data Center. Operational Centers may also provide the tracking sites with sustaining engineering, communications links, and other technical support. In addition, Operational Centers can perform limited services for the entire network. Individual tracking stations can also perform part or all of the tasks of an Operational Center themselves.

2.3 Data Centers

2.3.1 Regional Data Centers

The Regional Data Centers reduce traffic on electronic networks. They collect reformatted tracking data from Operational Data Centers and/or individual tracking stations, maintain a local archive of the data received and, in some cases, transmit these data to the Global Data Centers. Regional Data Centers may also meet the requirements for Operational Centers and Global Data Centers (as defined in the previous and following paragraphs) of strictly regional network operations and duplicate activities of Global Data Centers to facilitate easy access to the information and products.

2.3.2 Global Data Centers

The Global Data Centers are the primary interfaces to the Analysis Centers and the outside user community. Their primary tasks include the following:

- Receive/retrieve, archive and provide on-line access to tracking data received from the Operational/Regional Data Centers
- Provide on-line access to ancillary information such as site information, occupation histories, meteorological data, site specific engineering data, etc.
- Receive/retrieve, archive and provide on-line access to ILRS scientific data products received from the Analysis Centers
- Backup and secure ILRS data and products

2.4 Analysis Centers

The analysis centers fall into three categories: Analysis Centers, Lunar Analysis Centers, and Associate Analysis Centers.

2.4.1 Analysis Centers

The Analysis Centers receive and process tracking data from one or more data centers for the purpose of producing ILRS products. The Analysis Centers are committed to produce the products, without interruption, at an interval and with a time lag specified by the Governing Board to meet ILRS requirements. The products are delivered to the Global Data Centers, to the IERS (as per bilateral agreements), and to other bodies, using

designated standards. At a minimum, the Analysis Centers must process the global LAGEOS-1 and LAGEOS-2 data sets and are encouraged to include other geodetic satellites in their solutions.

The Analysis Centers provide, as a minimum, Earth orientation parameters on a weekly or sub-weekly basis, as well as other products, such as station coordinates, on a yearly basis or as otherwise required by the IERS. The Analysis Centers also provide a second level of quality assurance on the global data set by monitoring individual station range and time biases via the fitted orbits (primarily the LAGEOS 1 and 2 satellites) used in generating the quick-look science results.

2.4.2 Associate Analysis Centers

Associate Analysis Centers are organizations that produce special products, such as satellite predictions, time bias information, precise orbits for special-purpose satellites, station coordinates and velocities within a certain geographic region, or scientific data products of a mission-specific nature. Associate Analysis Centers are encouraged to perform additional quality control functions through the direct comparison of individual Analysis Center products and/or the creation of "combined" solutions, perhaps in combination with data from other space geodetic techniques (e.g. VLBI, GPS, GLONASS, DORIS, PRARE, etc.), in support of the IERS International Terrestrial Reference Frame (ITRF) or precise orbit determination. Organizations with the desire of eventually becoming Analysis Centers may also be designated as Associate Analysis Centers by the Governing Board until they are ready for full scale operation.

2.4.3 Lunar Analysis Centers

Lunar Analysis Centers process normal point data from the Lunar Laser Ranging (LLR) stations and generate a variety of scientific products including precise lunar ephemerides, librations, and orientation parameters which provide insights into the composition and internal makeup of the Moon, its interaction with the Earth, tests of General Relativity, and Solar System ties to the International Celestial Reference Frame.

2.5 Central Bureau

The Central Bureau (CB) is responsible for the daily coordination and management of the ILRS in a manner consistent with the directives and policies established by the Governing Board. The primary functions of the CB are to facilitate communications and information transfer within the ILRS and between the ILRS and the external scientific community, coordinate ILRS activities, maintain a list of satellites approved for tracking support and their priorities, promote compliance to ILRS network standards, monitor network operations and quality assurance of data, maintain ILRS documentation and databases, produce reports as required, and organize meetings and workshops.

Although the Chairperson of the Governing Board is the official representative of the ILRS to external organizations, the CB, consonant with the directives established by the Governing Board, is responsible for the day-to-day liaison with such organizations.

The CB coordinates and publishes all documents required for the satisfactory planning and operation of the Service, including standards/specifications regarding the performance, functionality and configuration requirements of all elements of the Service including user interface functions.

The CB operates the communication center for the ILRS. It produces and/or maintains a hierarchy of documents and reports, in both hard copy and electronic form, including network information, standards, newsletters, electronic bulletin board, directories, summaries of ILRS performance and products, and an Annual Report.

The Central Bureau may propose to the Governing Board names of individuals to be considered by the ILRS Associates for election as members at large to help ensure the proper representation of important contributing organizations.

The responsibilities and activities of the Central Bureau may be distributed between different groups and organizations according to written agreements and charters.

In summary, the Central Bureau performs a long term coordination and communication role to ensure that ILRS participants contribute to the Service in a consistent and continuous manner and that they adhere to ILRS standards.

The Central Bureau is headed by a Central Bureau Director, who is an ex-officio member of the ILRS Governing Board. The Secretary of the GB is also provided by the Central Bureau.

3.0 GOVERNING BOARD

3.1 Roles and Responsibilities

The Governing Board is responsible for the general directions in which the ILRS is providing its services. It defines the official ILRS products, decides upon the satellites to be included in the ILRS tracking list, accepts standards and procedures prepared and proposed by the individual bodies of the ILRS and ensures, through its chairperson, the contact to other services and organizations.

The GB exercises general control over the activities of the Service including modifications to the organization that would be appropriate to maintain efficiency and reliability, while taking full advantage of the advances in technology and theory.

Most GB decisions are to be made by consensus or by a simple majority vote of the members, provided that there is a quorum consisting of at least ten members of the GB. In case of lack of a quorum the voting is by mail or email. Changes in Terms of References and the Chairperson of the GB can be made by a 2/3 majority of the members of the GB, i.e., by twelve or more votes.

3.2 Membership

The Governing Board consists of both appointed and elected members. The appointed members include:

Director of the Central Bureau	1
Secretary of the Central Bureau	1
President of IAG Sect. II or Com.VIII (CSTG)	1

Members elected by their peers within the ILRS Associates include:

NASA SLR Network representatives	2
EUROLAS Network representatives	2
WPLTN Network representatives	2
Analysis and Associate Analysis Centers' representatives	2
Data centers' representative	1
LLR Representative	1
At-Large Members	2
IERS Representative	1
Total	16

The appointed members are considered ex-officio and are not subject to institutional restrictions. The elected board positions are nominated and elected by members of the ILRS components they represent for a two-year term. The At-Large members are intended to compensate for under-representation among the various components

of the ILRS or to provide additional skills or knowledge of use to the Board in carrying out its duties. At-Large members are elected by the entire body of ILRS Associates. The total GB membership should be properly balanced in all respects with regard to supporting organizations, skill mix, geography, etc.

3.3 Nomination and Election of Members

ILRS Associate Members (see Section 4.1), together with the GB, may nominate and vote for the elected members of the GB. The Call for Nominations and GB Elections will be conducted by the Central Bureau via official email lists and will be held approximately every two years prior to the International Workshop on Laser Ranging. Newly elected GB members will be installed at the next semiannual meeting. With the exception of At-Large members, GB nominees must be associated with the relevant ILRS component (e.g. Analysis, Data Centers, Lunar, etc.), and only ILRS Associate Members officially associated with that component, as determined by the official email lists maintained by the CB, may participate in the election of their representative. The full ILRS membership can vote for At-Large members. The GB will be final arbiter on an individual's qualifications for a particular elected post on the Board. Election is by a simple majority of votes received. In the unlikely event of a tie vote, the GB will make the final selection in Executive Session.

3.4 Election and Role of Chairperson

The GB Chairperson is elected by the Board from among its members for a term of two years, renewable for three terms. Nomination and selection of the Chairperson is carried out in GB Executive Session during the biannual Workshop Meeting. The Chairperson does not vote, except in case of a tie. He/she is the official representative of the ILRS to external organizations.

3.5 Frequency of Meetings

The Board shall endeavor to meet semiannually and at such other times as shall be considered appropriate or opportune by the Chairperson or at the request of at least eight Governing Board members. Whenever possible and appropriate, the GB and CB will jointly sponsor a General Assembly twice per year for the benefit of the ILRS Associates. The logistics (schedule, location, advertising, etc.) for the General Assembly are the responsibility of the CB.

3.6 Rights and Privileges of GB Members

Members of the GB shall become IAG Fellows with the appropriate rights and privileges following two years of recognized service.

3.7 Analysis and Lunar Coordinators

The laser ranging technique is a broad based one. As an observational technique, the division between lunar laser ranging and artificial satellite laser ranging has become largely a historical one. However, present differences in many areas related to observations (e.g., predictions and data formats) are still being reconciled. It must also be recognized that the major data analysis packages that are presently used for artificial satellite analysis are not yet equipped to deal with lunar laser ranging observations and most of the LLR analysis packages are equally not yet compatible with SLR observations. Thus, it is prudent to maintain separate LLR and SLR coordinators for an, as yet, undefined time into the future. The SLR and LLR coordinators must work within their own disciplines to maintain observational and data integrities. However, they must also work together in an effort to unify both techniques, bringing together the best of both, and, when possible, learning from the other.

The Analysis and Lunar Coordinators are elected by the GB from its own membership and serve as the two voting ILRS representatives on the IERS Directing Board. The IERS in turn designates a representative to serve as an ex-officio voting member of the ILRS Governing Board.

The Analysis Coordinator is a voting member of the ILRS Governing Board and is elected by the Governing Board as the ILRS representative to the IERS Directing Board. Under a reciprocal arrangement, the IERS designates a representative to serve as a voting member on the ILRS Governing Board. The Lunar Coordinator may represent the ILRS as a deputy voting member on the IERS Directing Board in the Analysis Coordinator's absence and may otherwise attend IERS Board meetings at their discretion in a non-voting advisory capacity.

The Analysis Coordinator chairs the Analysis Working Group which includes, at a minimum, the Lunar Coordinator, one representative from each of the Global Analysis Centers and may contain representatives of Associate Analysis Centers as well.

The responsibility of the Analysis Coordinator is to monitor the Analysis Centers' activities to ensure that the ILRS objectives are carried out. Specific expectations include global data quality control, station performance evaluation and reporting, and continued development of appropriate analysis standards and formats for the final science products. The Analysis Coordinator is also responsible for the appropriate combination of designated Analysis Centers products into a single and coherent set of products.

The Analysis Coordinator ensures that the ILRS products produced by the ILRS Analysis and Associate Analysis Centers conform with IERS requirements and standards.

3.8 Working Groups

The Governing Board, at its discretion, can create or disband Working Groups. A Working Group (WG) may be either permanent (Standing) or temporary (Ad-Hoc) in nature. Standing Working Groups are created by the GB to carry out continuously evolving business of the ILRS. Occasionally, Ad-Hoc Working Groups are appointed to carry out special investigations or tasks of a temporary or interdisciplinary nature.

The valid activities for the various Working Groups are defined by their Charters. Modifications to the charters of existing WG's can be submitted by the corresponding Coordinator for approval by the Governing Board. In order to create a new WG, the sponsor must submit a proposed charter, which clearly states the goals and responsibilities of the new group, for approval by the GB.

The Coordinator of each Standing WG is selected by the GB from amongst its members to ensure close coupling of the WG with the GB and its goals. The WG Coordinator can independently appoint additional members to the WG from among the other GB members, ILRS Associate Members or ILRS Correspondents (see below). The WG Coordinator may also designate a Deputy to act on his/her behalf in his/her absence. All GB members, with the exception of the ex-officio members and the Chairperson, are required to serve on at least one of the Standing Working Groups.

The Coordinator for Ad-Hoc Working Groups may be chosen, at the discretion of the Board, from outside its membership in order to best fulfill the goals of that WG.

Currently, the Standing Working Groups are:

- Missions
- Data Formats and Procedures
- Networks and Engineering
- Analysis

4.0 DEFINITIONS

4.1 ILRS Associate Members

Persons affiliated with recognized ILRS institutions and who routinely participate in any of the ILRS activities (management, missions, tracking, engineering, operations, data analysis, archiving, etc.) are eligible to be ILRS Associate Members. To gain official membership in the ILRS, an approved ILRS institution must submit the person's name, email, and primary ILRS function in the organization to the Central Bureau. ILRS Associate Members do not have to be employed by their institution sponsor; they merely need to provide a recognized ILRS-related service to the sponsoring institution under a contractual or cooperative arrangement. The Associate's stated function will determine his/her eligibility to nominate and/or vote for specific GB representatives as described in Section 3.3.

Associate Members may attend open (non-executive) ILRS meetings which are announced to the general community by the CB, place nominations for elected GB posts, vote in ILRS elections, and serve on the Governing Board if appointed or elected. A directory, electronic and/or hard copy, of ILRS Associate Members, and their approved association with a particular component of the ILRS, is maintained by the CB.

ILRS Associate Members are considered IAG Affiliates with the corresponding rights and privileges.

4.2 ILRS Correspondents

ILRS Correspondents are persons on a mailing list maintained by the Central Bureau, who do not actively participate in the ILRS but who either express interest in receiving ILRS publications, wish to participate in workshops or scientific meetings organized by the ILRS, or generally are interested in ILRS activities. Ex-officio ILRS Correspondents are the following persons:

- IAG General Secretary
- President of IAG Section V

8.2 ILRS WEBSITE MAP

ILRS Home Page at NASA in the USA
mirrored sites at EDC in Germany and CRL in Japan

About the ILRS
- Terms of Reference
- ILRS Bibliography
- Central Bureau
- Governing Board
- History
- Join the ILRS
- Meetings
- Network Map
- Organization Chart
- Acronyms

Mail Services
- SLRMail
- SLReport
- URGENT
- ILRSPred
- ILRS Exploders

Contact the ILRS
- Directory of Associates
- Associate Locator

Working Groups (WG)
- **Analysis**
  - Activities and Meetings
  - Pilot Projects
  - Actions
  - Charter
  - Members & Exploder
- **Networks and Engineering**
  - Activities and Meetings
  - Actions
  - Charter
  - Members & Exploder
- DF&P WG Charter
- DF&P WG Members
- DF&P WG Activities
- LEO Rapid Predictions
- Missions WG Charter
- Missions WG Members
- Misisons WG Activities
- SP (Tiger) WG Charter
- SP (Tiger) WG Members
- SP (Tiger) WG Activities
- Refraction Study Group Activities

Satellite Missions
- Campaign/Mission News
- Campaign Reports
- List of Missions
- Mission Analysis Reports
- Mission Parameters
- Mission Support History
- Priorities
- Request Tracking Support
- Link Budget Calculations

Stations
- Configurations
- Contacts
- Coordinates
- Data Anomalies
- DOMES Procedure
- Eccentricity Database
- Network Map
- News
- Site Pressure Profiles
- Site Identifiers
- Site Log Database
- Site Log Procedure
- Site Log Search Feature
- SOD Procedure
- Status Reporting
- System Performance

Products/Formats/Procedures
- **Normal Points (NP)**
  - NP Availability
  - NP Transmission Procedures
  - NP Data Flow (table)
  - NP Format Overview
  - NP Format
  - NP Algorithm
  - NP Format/Data Integrity QC
- **Predictions**
  - Prediction Availability
  - Prediction Centers
  - Prediction Types
  - TIRV Format
  - TIRV Force Models
  - Maneuver Notification
  - Drag Function
  - Time Bias Function
- **Fullrate (FR)**
  - FR Availability
  - FR Format
- **Site Positions and Velocities**
  - SLR Coordinates(ITRF2000)
  - SLR Coordinates(text file)
  - ILRS Sinex Description
- **Data Flow** (NP and Predictions)

Science/Analysis
- ILRS Bibliography
- IERS Conventions (1996 and 2000)
- Analysis Centers
  - Analysis Data Products
  - Mission Analysis Reports
  - ITRF Yearly Solutions
- SLR and Earth Science
- Science meetings

Engineering/Technology
- Collocation Results
- Performance Evaluation
- SLR Applications
  - SLR Animation
- Link Budget Calculations

Reports
- Analysis Reports
  - Bulletins
  - Campaign Reports
- ILRS Bibliography
  - ILRS Meetings Reports
- Laser Workshop Reports
- Performance Report Cards
  - SLR/LLR CSTG Reports
- SLReport
  - Special Reports
  - Station Data Anomalies
- Station Status Reports

What's New
- Campaign/Missions News
- Meetings News
- Station News

Links
- Agencies
- Altimetry
- Analysis Centers
- Data Centers
- Earthquake/Tectonics
- Earth Rotation
- El Ni o and La Ni a
- Geodetic Services
- Gravity Models
- Laser Safety
- Missions
- Stations
- Useful
- Y2K

8.3 NETWORK PERFORMANCE REPORT CARD FOR 2001

	Data Volume									
Location	Station Number	LEO Pass Total	LAG Pass Total	High Pass Total	Pass Total	LEO NP Total	LAGEOS NP Total	High NP Total	Total NP	Minutes of Track
Baseline		1000	400	100	1500					
Golosiiv	1824	349	100	0	449	5153	627	0	5780	2855.83
Maidanak 1	1863	16	15	5	36	202	99	33	334	430.25
Maidanak 2	1864	12	13	18	43	142	108	60	310	570.75
Komsomolsk	1868	63	20	14	97	884	130	54	1068	829.25
Mendeleevo	1870	249	0	0	249	2261	0	0	2261	711
Simeiz	1873	435	92	1	528	5073	556	4	5633	2711.33
Riga	1884	769	135	0	904	15935	1524	0	17459	7347.08
Katsively	1893	230	90	13	333	3939	782	70	4791	3205.92
McDonald	7080	2149	714	671	3534	28731	6191	2576	37498	34384.4
Yarragadee	7090	3850	1172	1380	6402	65967	14406	10640	91013	103167
Greenbelt	7105	4407	961	432	5800	83402	10837	3206	97445	65595.5
Monument Peak	7110	4586	878	533	5997	74923	9218	4242	88383	64843.3
Tahiti	7124	207	34	0	241	2996	307	0	3303	1728
Haleakala	7210	946	280	280	1506	11889	2932	1706	16527	18301.3
Wuhan	7231	6	3	0	9	80	34	0	114	100.5
Changchun	7237	2532	509	323	3364	41783	4905	2348	49036	35265.6
Beijing	7249	1130	194	50	1374	15663	1700	300	17663	10218.9
Kashima	7335	73	12	6	91	982	130	30	1142	788.167
Tateyama	7339	460	79	27	566	5539	517	130	6186	3692.25
Urumqi	7355	31	44	2	77	466	606	15	1087	1409.25
Lhasa	7356	102	117	12	231	1503	1410	51	2964	3609.75
Arequipa	7403	1619	257	0	1876	24779	2553	0	27332	13607.8
Hartebeesthoek	7501	1679	559	329	2567	21756	7265	2783	31804	36433.8
Cagliari	7548	74	7	0	81	1205	48	0	1253	572.25
Metsahovi	7806	432	97	15	544	9072	1328	88	10488	5693.83
Zimmerwald	7810	2187	685	266	3138	35267	9091	2191	46549	41058.8
Borowiec	7811	443	247	19	709	7748	2868	71	10687	8432.33
Kunming	7820	671	258	124	1053	10153	2187	730	13070	11501
San Fernando	7824	1402	215	0	1617	22477	1341	0	23818	10105.2
Helwan	7831	140	0	0	140	1384	0	0	1384	457.25
Riyadh	7832	1067	501	178	1746	20380	6889	1511	28780	28317.5
Grasse	7835	3614	746	106	4466	79572	8505	845	88922	44938
Potsdam	7836	1276	252	31	1559	19065	2229	145	21439	10763.5
Shanghai	7837	1201	279	117	1597	17264	2498	750	20512	14622.8
Simosato	7838	1290	280	107	1677	26348	3243	670	30261	18795.4
Graz	7839	3640	722	636	4998	85763	10633	5538	101934	75351.6
Herstmonceux	7840	2795	985	454	4234	38818	12093	2556	53467	49519.9
Grasse (LLR)	7845	15	387	574	976	290	6698	3134	10122	29138.5
Mt. Stromlo	7849	3148	870	397	4415	37892	7589	2419	47900	41743.4
Matera (MLRO)	7941	112	107	27	246	2048	1235	172	3455	4078.5
Wettzell	8834	896	382	138	1416	14822	3853	760	19435	16633.3
totals		50303	13298	7285	70886	843616	149165	49828	1042609	823530

		Data Quality					Operational Compliance		
Location	Station Number	SS RMS	NP RMS	Short Term	Long Term	% of good LAGEOS NP	Data Latency (hours)	Format Revision	Site logs
Baseline			10	20	20	95	12	1	yes
Golosiiv	1824	78	14	88		32	19	1	yes
Maidanak 1	1863					0	120	1	no
Maidanak 2	1864	91	12	29		36	60	1	no
Komsomolsk	1868	142	32	27		58	156	1	no
Mendeleevo	1870						40	1	no
Simeiz	1873	71	21	42		33	15	0	yes
Riga	1884	14	5	20	15	91	2	1	yes
Katsively	1893	65	13	23		93	17	0	yes
McDonald	7080	12	3	13	2	99	1	1	yes
Yarragadee	7090	10	2	10	2	98	1	1	yes
Greenbelt	7105	10	2	11	3	98	2	1	yes
Monument Peak	7110	9	2	12	4	97	3	1	yes
Tahiti	7124	8	4	15		94		1	yes
Haleakala	7210	10	5	13	7	97	1	1	yes
Wuhan	7231								yes
Changchun	7237	15	6	21	8	98	1	1	yes
Beijing	7249	12	21	37	36	55	8	1	yes
Kashima	7335								yes
Tateyama	7339	13	3	19	15	91	2	1	yes
Urumqi	7355								yes
Lhasa	7356	31	8	24		85	13	1	yes
Arequipa	7403	7	3	17	5	99	3	1	yes
Hartebeesthoek	7501	10	2	13	7	99	3	1	yes
Cagliari	7548						23	0	yes
Metsahovi	7806	21	8	23	12	93	2	1	yes
Zimmerwald	7810	19	3	11	5	99	2	1	yes
Borowiec	7811	28	8	18	13	94	3	1	yes
Kunming	7820	36	6	37	29	65	2	0	yes
San Fernando	7824	18	4	38	80	24	2	1	yes
Helwan	7831						11	0	yes
Riyadh	7832	17	3	18	3	96	5	0	yes
Grasse	7835	17	2	10	2	99	3	1	yes
Potsdam	7836	17	6	17	8	96	7	1	yes
Shanghai	7837	16	6	29	14	89	2	1	yes
Simosato	7838	33	6	21	13	95	0	0	yes
Graz	7839	8	2	11	2	99	5	1	yes
Herstmonceux	7840	18	2	11	1	99	1	1	yes
Grasse (LLR)	7845	22	3	11	8	97	1	1	yes
Mt. Stromlo	7849	11	3	13	5	99	6	1	yes
Matera (MLRO)	7941	6	2	14		99	207	1	yes
Wettzell	8834	21	3	22	7	100	3	1	yes
totals									

8.4 ILRS NETWORK STATISTICS

Table 8.4-1. Low Orbiting Satellites

Site Name	Stat n	LRE	STR-3	CHMP	SNST	ERS-2	STAR.	STEL.	WEST.	GFO-1	BE-C	REFL.	MET-3M	Jason	TPX	Ajisai	Total
Arequipa	7403	0	0	24	0	148	250	195	18	132	228	0	0	0	282	344	1,621
Beijing	7249	0	0	18	0	73	172	97	15	61	175	0	0	0	243	276	1,130
Borowiec	7811	0	0	23	0	76	52	28	24	38	24	0	0	0	111	67	443
Cagliari	7548	0	0	0	0	7	7	2	0	8	3	0	0	0	13	34	74
Changchun	7237	0	1	53	0	169	401	195	52	178	347	0	0	0	601	536	2,533
Grasse	7835	0	0	201	0	466	477	383	228	346	404	0	0	0	684	421	3,610
Grasse	7845	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
Graz	7839	0	1	134	0	393	539	421	209	316	434	0	0	0	662	531	3,640
Greenbelt (MOB-7)	7105	0	1	81	0	287	820	395	95	367	744	0	1	3	717	900	4,411
Haleakala	7210	0	1	15	0	91	120	121	41	90	158	0	0	0	140	169	946
Hartebeesthoek	7501	0	0	7	0	121	297	217	32	131	120	0	0	0	302	450	1,677
Helwan	7831	0	0	0	0	2	6	12	0	0	25	0	0	0	52	43	140
Herstmonceux	7840	0	0	127	0	292	422	327	174	260	176	0	0	0	548	471	2,797
Kashima	7335	0	0	2	0	7	8	7	2	8	4	0	0	0	7	28	73
Katzively	1893	0	0	1	0	42	27	18	2	26	22	0	0	0	37	55	230
Kiev	1824	0	0	2	0	48	40	19	17	54	29	0	0	0	86	54	349
Koganei	7328	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Komsomolsk	1868	0	0	0	0	0	14	1	0	1	12	0	0	0	19	16	63
Kunming	7820	0	0	0	0	8	76	57	0	20	147	0	0	0	158	205	671
Lhasa (TROS)	7356	0	0	0	0	2	7	14	0	5	10	0	0	0	28	36	102
Maidanak	1863	0	0	0	0	0	1	0	0	0	0	0	0	0	8	7	16
Maidanak	1864	0	0	0	0	1	1	0	0	0	0	0	0	0	5	5	12
Matera (MLRO)	7941	0	0	0	0	10	29	8	0	11	14	0	0	0	23	16	111
McDonald	7080	0	0	8	0	149	311	204	26	212	533	0	0	0	330	378	2,151
Mendeleevo	1870	0	0	0	0	48	11	35	16	45	0	0	0	0	54	40	249
Metsahovi	7806	0	0	42	0	80	27	58	5	75	3	0	0	0	79	63	432
Monument Peak	7110	0	2	56	0	298	719	398	128	318	941	0	2	1	655	1,069	4,587
Mount Stromlo	7849	0	0	115	0	191	760	352	65	131	2	0	0	0	610	923	3,149
Potsdam	7836	0	0	133	1	166	148	174	32	133	28	0	0	0	292	170	1,277
Riga	1884	0	0	95	0	164	61	67	0	125	0	0	0	0	163	94	769
Riyadh	7832	0	0	0	0	31	183	125	36	49	202	0	0	0	207	234	1,067
San Fernando	7824	0	0	54	0	103	239	151	2	69	226	0	0	0	243	317	1,404
Shanghai	7837	0	0	9	0	45	191	125	23	55	272	0	0	0	186	288	1,194
Simeiz	1873	0	0	10	0	45	45	17	0	54	49	0	0	0	110	106	436
Simosato	7838	0	0	1	0	88	220	101	15	85	250	0	0	0	223	307	1,290
Tahiti	7124	0	0	0	0	7	31	36	2	10	0	0	0	0	32	47	165
Tateyama	7339	0	0	4	0	16	76	42	9	12	103	0	0	0	62	136	460
Urumqi	7355	0	0	0	0	15	0	3	2	3	2	0	0	0	6	0	31
Wettzell	8834	0	0	0	0	30	147	68	1	37	98	0	0	0	268	247	896
Wuhan	7231	0	0	0	0	0	2	1	0	0	0	0	0	0	2	1	6
Yarragadee	7090	3	3	306	0	328	635	369	249	386	131	11	0	0	586	844	3,851
Zimmerwald	7810	0	0	46	0	172	359	249	85	148	265	0	0	0	442	421	2,187
Totals: 42 stations		18	9	1,567	1	4,219	7,931	5,092	1,605	3,999	6,181	11	3	4	9,276	10,350	50,266

Table 8.4-2. High Orbiting Satellites

Site Name	Statn	LAG1	LAG2	ETA-1	ETA-2	GPS35	GPS36	Moon	GL-75	GL-76	GL-77	GL-78	GL-80	GL-81	GL-82	GL-84	Total	Grand
	7403	149	154	0	0	0	0	0	0	0	0	0	0	0	0	0	303	1,924
Beijing	7249	112	85	13	11	0	0	0	0	0	0	15	0	0	0	10	246	1,376
Borowiec	7811	165	82	2	3	0	0	0	0	0	0	6	7	0	0	2	267	710
Cagliari	7548	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	8	82
Changchun	7237	262	248	43	60	0	0	0	4	5	6	56	65	10	8	66	833	3,366
Grasse	7835	429	317	12	19	6	2	0	0	0	0	18	28	0	0	21	852	4,462
Grasse	7845	225	162	132	119	123	100	298	0	0	0	20	87	0	0	60	1,326	1,341
Graz	7839	408	314	91	91	48	55	0	9	5	9	94	116	14	11	93	1,358	4,998
Greenbelt (MOB-7)	7105	645	553	105	114	14	15	0	0	0	0	187	230	0	0	103	1,966	6,377
Haleakala	7210	160	190	36	71	6	1	0	0	0	0	117	137	0	0	30	748	1,694
Hartebeesthoek	7501	352	436	129	132	2	1	0	0	0	0	219	146	0	0	81	1,498	3,175
Helwan	7831	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	140
Herstmonceux	7840	576	410	70	83	44	35	0	0	0	0	71	93	0	0	63	1,445	4,242
Kashima	7335	6	6	1	1	0	0	0	0	0	0	0	2	0	2	0	18	91
Katzively	1893	49	41	0	3	0	1	0	0	0	0	2	1	0	0	6	103	333
Kiev	1824	63	38	0	0	0	0	0	0	0	0	0	0	0	0	0	101	450
Koganei	7328	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Komsomolsk	1868	14	6	3	1	0	0	0	0	0	0	2	7	0	0	1	34	97
Kunming	7820	120	138	39	22	11	15	0	0	0	0	25	9	0	0	3	382	1,053
Lhasa (TROS)	7356	64	53	1	5	0	0	0	0	0	0	6	0	0	0	0	129	231
Maidanak	1863	9	6	0	1	0	1	0	0	0	0	0	3	0	0	0	20	36
Maidanak	1864	5	8	4	6	0	3	0	0	0	0	2	4	0	0	0	32	44
Matera (MLRO)	7941	77	48	6	4	4	3	0	0	0	0	10	11	0	0	0	163	274
McDonald	7080	345	424	134	135	51	58	144	0	0	0	76	109	0	0	55	1,531	3,682
Mendeleevo	1870	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	249
Metsahovi	7806	74	23	3	1	0	0	0	0	0	0	5	5	0	0	1	112	544
Monument Peak	7110	482	427	151	152	43	30	0	0	0	0	166	189	0	0	86	1,726	6,313
Mount Stromlo	7849	467	410	45	50	6	4	0	0	0	0	152	117	0	0	26	1,277	4,426
Potsdam	7836	153	99	0	2	0	0	0	0	0	0	7	15	0	0	7	283	1,560
Riga	1884	89	47	0	0	0	0	0	0	0	0	0	0	0	0	0	136	905
Riyadh	7832	244	257	24	19	34	23	0	0	0	0	29	31	0	0	22	683	1,750
San Fernando	7824	115	101	0	0	0	0	0	0	0	0	0	0	0	0	0	216	1,620
Shanghai	7837	138	137	12	17	0	0	0	3	1	3	0	32	7	6	34	390	1,584
Simeiz	1873	45	47	0	0	0	0	0	0	0	0	1	0	0	0	0	93	529
Simosato	7838	135	145	25	20	0	0	0	0	0	0	17	25	0	0	20	387	1,677
Tahiti	7124	14	11	0	0	0	0	0	0	0	0	0	0	0	0	0	25	190
Tateyama	7339	45	34	4	5	1	0	0	0	0	0	8	6	0	3	0	106	566
Urumqi	7355	42	3	0	1	0	0	0	0	0	0	1	0	0	0	0	47	78
Wettzell	8834	203	191	26	28	5	0	0	0	0	0	32	31	0	0	17	533	1,429
Wuhan	7231	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	9
Yarragadee	7090	596	585	294	318	279	223	0	0	0	0	459	354	0	0	283	3,391	7,242
Zimmerwald	7810	390	296	44	38	23	19	0	0	0	0	6	72	0	0	63	951	3,138
Totals: 42 stations		7,473	6,537	1,449	1,532	700	589	442	16	11	18	1,809	1,932	31	30	1,153	23,722	73,988

8.5 ILRS NETWORK COLLOCATION

Site Name	Country	Lat.	E. Lon.	Laser SOD	Laser DOMES	GPS	GLONASS	VLBI	DORIS	PRARE	Gravi-meter
Arequipa	Peru	-16¡ 28'	-71¡ 38'	74031303	42202M003	AREQ			AREB		
Beijing	China	39¡ 55'	116¡ 25'	72496101	21601S004	BJFS					Absolute
Borowiec	Poland	52¡ 17'	17¡ 05'	78113802	12205S001	BOR1	BORG				Absolute
Cagliari	Italy	39¡ 08'	08¡ 58'	75486201	12725S013	CAGL					
Changchun	China	43¡ 50'	125¡ 20'	72371901	21611S001						
Grasse	France	43¡ 45'	06¡ 55'	78353102	10002S001	GRAS					Absolute
Grasse	France	43¡ 45'	06¡ 55'	78457801	10002S002	GRAS					Absolute
Graz	Austria	47¡ 04'	15¡ 30'	78393402	11001S002	GRAZ	GRAB				Absolute
Greenbelt	USA	39¡ 01'	-76¡ 50'	71050725	40451M105	GODE	GODZ	GGAO7108	GREB	Yes	
Haleakala	USA	20¡ 43'	-156¡ 16'	72102313	40445M001	MAUI					
Hartebeesthoek	South Africa	-25¡ 53'	27¡ 42'	75010602	30302M003	HARB, HRAO		HARTRAO	HBKB	Yes	
Helwan	Egypt	29¡ 52'	31¡ 21'	78314601	30101S001						
Herstmonceux	United Kingdom	50¡ 52'	00¡ 20'	78403501	13212S001	HERS	HERP				
Kashima	Japan	35¡ 57'	140¡ 40'	73357201	21701M002	KSMV		KASHIM11, KASHIM34			
Katzively	Ukraine	44¡ 23'	33¡ 58'	18931801	12337S006						
Kiev	Ukraine	50¡ 22'	30¡ 30'	18248101	12356S001	GLSV					
Koganei	Japan	35¡ 43'	139¡ 29'	73287101	21704M001	KGNO, KGNI		KOGANEI			
Komsomolsk	Russia	50¡ 52'	136¡ 59'	18685901	12341S001						
Kunming	China	25¡ 04'	102¡ 41'	78208201	21609S002	KUNM					Yes
Lhasa (TROS)	China	29¡ 25'	91¡ 07'	73568401	21613M003	LHAS	LHAZ				
Maidanak	Uzbekistan	38¡ 41'	66¡ 56'	18635101	12340S001						
Maidanak	Uzbekistan	38¡ 41'	66¡ 56'	18645401	12340S002						
Matera (MLRO)	Italy	40¡ 39'	16¡ 42'	79417701	12734S008	MATE	MAT1	MATERA		Yes	
McDonald	USA	30¡ 41'	-104¡ 01'	70802419	40442M006	MDO1		FD-VLBA			
Mendeleevo	Russia	56¡ 02'	37¡ 14'	18706301	12309S001	MDVO	MDVJ				
Metsahovi	Finland	60¡ 13'	24¡ 24'	78067601	10503S014	METS	METZ		METB		Supercon ducting
Monument Peak	USA	32¡ 53'	-116¡ 25'	71100411	40497M001	MONP					
Mount Stromlo	Australia	-35¡ 19'	149¡ 01'	78498001	50119S001	STR1	STR2		MSOB		Supercon ducting
Potsdam	Germany	52¡ 23'	13¡ 04'	78365801	14106S009	POTS					
Riga	Latvia	56¡ 53'	24¡ 08'	18844401	12302S002						Absolute
Riyadh	Saudi Arabia	24¡ 41'	46¡ 42'	78325501	20101S001						
San Fernando	Spain	36¡ 28'	-06¡ 12'	78244502	13402S007	SFER					
Shanghai	China	31¡ 11'	121¡ 26'	78372805	21605S001	SHAO		SESHAN25			
Simeiz	Ukraine	44¡ 16'	33¡ 36'	18734901	12337S003						
Simosato	Japan	33¡ 34'	135¡ 56'	78383602	21726S001						
Tahiti	French Polynesia	-17¡ 35'	-149¡ 37'	71240802	92201M007	THTI			PAQB	Yes	
Tateyama	Japan	35¡ 56'	139¡ 51'	73397401	21740M001			TATEYAMA			
Urumqi (TROS)	China	43¡ 43'	87¡ 38'	73558401	21612M002	URUM		URUMQI			
Wettzell	Germany	49¡ 09'	12¡ 53'	88341001	14201S018	WTZA, WTZR, WTZT	WTZJ, WTZZ	WETTZELL			Supercon ducting
Wuhan	China	30¡ 35'	114¡ 19'	72312901	21602S004	WUHN					Supercon. and Abs.
Yarragadee	Australia	-29¡ 03'	115¡ 21'	70900513	50107M001	YAR1, YAR2	YARR		YARB		
Zimmerwald	Switzerland	46¡ 53'	07¡ 28'	78106801	14001S007	ZIMM	ZIMJ, ZIMZ				Earth Tide
Totals:					42	31	12	10	7	4	12

Note: This table reflects current co-locations as of 31-Dec-2001

8.6 ILRS COMPONENTS

ILRS Central Bureau
NASA Goddard Space Flight Center (GSFC), USA
Global Data Centers
Crustal Dynamics Data Information System (CDDIS), NASA GSFC, USA
EUROLAS Data Center (EDC), Deutsches Geod tisches ForschungsInstitut (DGFI), Germany
Regional Data Centers
Shanghai Observatory, Academia Sinica, China
Operations Center
Russian Mission Control Center (MCC), Russia
University of Texas at Austin, Center for Space Research (CSR), USA
NASA Goddard Space Flight Center (NASA GSFC), USA
University of Texas at Austin, USA
Analysis Centers
Delft University of Technology (DUT), The Netherlands
Russian Mission Control Center (MCC), Russia
University of Texas at Austin, Center for Space Research (CSR), USA
Lunar Analysis Centers
Observatoire de Paris, France
Forschungseinrichting Satellitengeod sie (FESG), Germany
Jet Propulsion Laboratory (JPL), USA
University of Texas at Austin, USA
Associate Analysis Centers
Austrian Academy of Sciences, Austria
Australian Surveying and Land Information Group (AUSLIG), Australia
Academia Sinica, China
Observatoire de la C te d'Azur/Centre d'Etudes et de Recherches G odynamiques et Astrom trie (OCA/CERGA), France
Bundesamt f r Kartographie und Geod sie (BKG), Germany
Central Laboratory for Geodesy, Bulgarian Academy, Bulgaria
Communications Research Laboratory (CRL), Japan
Deutsches Geod tisches ForschungsInstitut (DGFI), Germany
European Space Agency/ESA Space Operations Center (ESA/ESOC), Germany
GeoForschungsZentrum, Germany
Agenzia Spaziale Italiana/Centro de Geodesia Spaziale (ASI/CGS), Italy
Forsvarets ForskningsInstitutt (FFI, sNorwegian Defence Research Establishment), Finland
Institute of Applied Astronomy, Russia
Institute of Astronomy of the Russian Academy of Sciences, Russia
Institute of Metrology for Time and Space, Russia
Astronomical Institute, University of Berne (AIUB), Switzerland
Main Astronomical Observatory of the National Academy of Sciences of the Ukraine (GAOUA), Ukraine
National Space Development Agency (NASDA), Japan
Natural Environment Research Council, United Kingdom
University of Newcastle, United Kingdom
NASA Goddard Space Flight Center (GSFC), USA

8.7 ILRS ORGANIZATIONS

Agency	Country
Geosciences Australia/National Mapping Division (GA/NMD)	Australia
Division of National Mapping/Geodesy Section	Australia
Austrian Academy of Sciences	Austria
Central Laboratory for Geodesy, Bulgarian Academy	Bulgaria
Academia Sinica	China
Chinese Academy of Surveying and Mapping	China
State Seismological Bureau	China
Yunnan Observatory	China
Technical University of Prague	Czech Republic
National Research Institute of Astronomy and Geophysic (NRIAG)	Egypt
Finnish Geodetic Institute	Finland
Observatoire de la C te d'Azur/Centre d'Etudes et de Recherches G odynamiques et Astrom trie (OCA/CERGA)	France
Observatoire de Paris	France
Tahiti Geodetic Observatory, University of French Polynesia (UFP)	French Polynesia
Bundesamt f r Kartographie und Geod sie (BKG)	Germany
Deutsches Geod tisches ForschungsInstitut (DGFI)	Germany
European Space Agency (ESA)	Germany
Forschungseinrichting Satellitengeod sie (FESG)	Germany
GeoForschungsZentrum (GFZ)	Germany
Technical University of Munich	Germany
University of Hannover/Institut fuer Erdmessung	Germany
Indian Space Research Organization (ISRO) Telemetry Tracking and Command Network (ISTRAC)	India
Astronomical Observatory of Cagliari	Italy
Italian Space Agency (ASI)	Italy
Communications Research Laboratory (CRL)	Japan
Hydrographic Department/Japan Coast Guard	Japan
National Space Development Agency (NASDA)	Japan
Astronomical Observatory, University of Latvia	Latvia
Division for Electronics, Forsvarets ForskningsInstitutt (FFI)	Norway
Universidad Nacional de San Augustin (UNSA)	Peru
Space Research Centre of the Polish Academy of Sciences (PAS)	Poland
Institute of Applied Astronomy (IAA)	Russia
Institute of Astronomy of the Russian Academy of Sciences (INASAN)	Russia
Institute of Metrology for Time and Space (IMVP)	Russia
Mission Control Centre (MCC)	Russia
Russian Space Agency (RSA)	Russia
Space Research Insitute (SRI) for Precision Instrument Engineering	Russia
King Abdulaziz City for Science and Technology (KACST)	Saudi Arabia

Agency	Country
Hartebeesthoek Radio Astronomy Observatory (HartRAO)	South Africa
Real Instituto y Observatorio de la Armada	Spain
Astronomical Institute, Unversity of Berne (AIUB)	Switzerland
Delft University of Technology (DUT)	The Netherlands
Crimean Astronomical Observatory	Ukraine
Lebedev Physical Institute in the Crimea	Ukraine
Main Astronomical Observatory (MAO) of the National Academy of Sciences of Ukraine	Ukraine
Natural Environment Research Council (NERC)	United Kingdom
University of Newcastle Upon Tyne	United Kingdom
Harvard-Smithsonian Center for Astrophysics	USA
Jet Propulsion Laboratory (JPL)	USA
National Aeronautics and Space Administration Goddard Space Flight Center (NASA GSFC)	USA
Naval Center for Space Technology (NCST)	USA
University of Hawaii	USA
University of Texas at Austin	USA
University of Texas, Center for Space Research (CSR)	USA

8.8 ILRS ASSOCIATES AND CORRESPONDENTS

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Maceo Blount	MOBLAS-7/c/o HTSI SLR	USA	maceo.blount@honeywell-tsi.com
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8.9 LIST OF ACRONYMS

AAC	Associate Analysis Center
AC	Air Conditioner
AC	Analysis Center
ACT	Australian Capital Territory
ADEOS	Advanced Earth Observing Satellite
AFSPC	Air Force Space Command (USA)
AGSO	Australian Geological Survey Organization
AGU	American Geophysical Union
AIUB	Astronomical Institute of Berne (Switzerland)
ALOS	Advanced Land Observing Satellite
AMU	Amplitude Measuring Unit
AO	Announcement of Opportunity
APD	Avalanche Photo Diode
APOLLO	Apache Point Observatory Lunar Laser Ranging Operation (USA)
APRGP	Asia-Pacific Regional Geodetic Project
APSG	Asia-Pacific Space Geodynamics Project
ASCII	American Standard Code for Information Interchange
ASI	Agenzia Spaziale Italiana (Italian Space Agency)
AUSLIG	Australian Surveying and Land Information Group
AVN	Allgemeine Vermessungs-Nachrichten (Germany)
AWG	Analysis Working Group
Az/El	Azimuth/Elevation
BE-C	Beacon Explorer C
BKG	Bundesamt f r Kartographie und Geod sie (Germany)
CAL/VAL	Calibration/Validation
CB	Central Bureau
CCD	Charged Coupled Device
CCR	Corner Cube Reflector
CDDIS	Crustal Dynamics Data Information System (USA)
CDP	Crustal Dynamics Project
CERGA	Centre d'Etudes et de Recherches G odynamiques et Astrom trie (France)
CF	Constant Fraction
CFA	Center for Astrophysics (USA)
CFD	Constant Fraction Discriminator
CGS	Centro de Geodesia Spaziale (Italy)
CHAMP	CHAllenging Mini-Satellite Payload
CIS	Conventional Inertial System
CLG	Central Laboratory for Geodesy (Bulgaria)
CMB	Core-Mantle Boundary
CNES	Centre National d'Etudes Spatiales (France)
CNS	Communication, Navigation, Surveillance (USA)
CODE	Center for Orbit Determination in Europe
COM	Center Of Mass
COSPAR	Committee on Space Research
CPU	Central Processing Unit
CRAO	Crimean Astrophysical Observatory (Ukraine)
CRDF	Civilian Research Development Foundation (USA)
CRL	Communications Research Laboratory (Japan)
C-SPAD	Compensated Single Photoelectron Avalanche Detector

CSR	Center for Space Research (USA)
CSRIFS	Combined Square Root Information Filter and Smoother
CSTG	International Coordination of Space Techniques for Geodesy and Geodynamics
DANOF	Department of Fundamental Astronomy of the Paris Observatory (France)
DEC	Digital Equipment Corporation
DEOS	Delft Institute for Earth-Oriented Space Research (The Netherlands)
DFPWG	Data Formats and Procedures Working Group
DGFI	Deutsches Geod tisches ForschungsInstitut (Germany)
DOD	Department of Defense (USA)
DOGS	DGFI Orbit and Geodetic Parameter Estimation System (Germany)
DOMES	Directory Of MERIT Sites
DORIS	Doppler Orbitography and Radiopositioning Integrated by Satellite
DTM	Digital Terrain Model
DUT	Delft University of Technology (The Netherlands)
DXO	Dual Crossover
EDC	EUROLAS Data Center (Germany)
EGS	European Geophysical Society
ELV	Expendable Launch Vehicle
ENVISAT	ENVIronmental SATellite
EOP	Earth Orientation Parameter
EOS	Electro Optical Systems (Australia)
ERS	European Remote Sensing Satellite
ESA	European Space Agency
ESE	Earth Science Enterprise (USA)
ESOC	ESA Space Operations Center (Germany)
ETS	Engineering Test Satellite
EU	European Union
EUROLAS	European Laser Consortium
FAA	Federal Aviation Administration (USA)
FAQ	Frequently Asked Question
FAO	Food and Agriculture Organization
FDR	Foundation for Research Development (South Africa)
FESG	Forschungseinrichting Satellitengeod sie (Research Facility for Space Geodesy, Germany)
FFI	Forsvarets ForskningsInstitutt (Norwegian Defense Research Establishment)
FGAN	Forschungsgesellschaft f r Angewandte Naturwissenschaften (Germany)
FR	Full Rate
FTLRS	French Transportable Laser Ranging System
FTP	File Transfer Protocol
G3OS	Three Global Observing Systems
GAOUA	Main Astronomical Observatory of the National Academy of Sciences of Ukraine
GAVDOS	GPS/Gravity Aided Vertical Determination and Oceanic Sea-level
GB	Gigabyte
GB	Governing Board
GCOS	Global Climate Observing System
GeoDAF	Geodetical Data Archive Facility (Italy)
GeodIS	Geodetic Information System (Germany)
GEOS	Geodetic and Earth Orbiting Satellite
GEOSAT	Geodesy Satellite
GFO	GEOSAT Follow-On (USA)

GFZ	GeoForschungsZentrum (Germany)
GGAO	Goddard Geophysical and Astronomical Observatory (USA)
GIS	Geographic Information System
GLAS	Geoscience Laser Altimeter System
GLI	Global Imager
GLONASS	Global Navigation Satellite System
GLONASS	Global'naya Navigatsionnay Sputnikovaya Sistema
GM	Gravity Model
GNP	Generic Normal Point Processing
GOCE	Gravity Field and Steady-state Ocean Circulation Explorer
GOOS	Global Ocean Observing System
GP-B	Gravity Probe B
GPS	Global Positioning System
GRACE	Gravity Recovery And Climate Experiment
GRGS	Groupe de Recherches de G od sie Spatiale (France)
GRL	Geophysical Research Letters
GSFC	Goddard Space Flight Center (USA)
GTOS	Global Terrestrial Observing System
GUTS	Global and High Accuracy Trajectory Determination System.
H2A/LRE	Laser Ranging Experiment
HARTRAO	Hartebeesthoek Radio Astronomy Observatory (South Africa)
HEO	High Earth Orbit
HOLLAS	Haleakala Laser Station (USA)
HP	Hewlett-Packard
HQ	Headquarters
HTSI	Honeywell Technology Solutions, Inc. (USA)
H/W	Hardware
IA/RAS	Institute of Astronomy/Russian Academy of Sciences
IAA	Institute of Applied Astronomy, Russia
IAG	International Association of Geodesy
IAPG	Institut f r Astronomische und Physikalische Geod sie (Germany)
IAU	International Astronomical Union
ICESat	Ice Cloud and Land Elevation Satellite
ICRF	International Celestial Reference Frame
ICRS	International Celestial Reference System
ICSU	International Council for Science
IERS	International Earth Rotation Service
IFE	Institut f r Erdmessung (Germany)
IGEX	International GLONASS Experiment
IGGOS	Integrated Global Geodetic Observing System
IGLOS-PP	International GLONASS Service Pilot Project
IGN	Institut Geographique National (France)
IGOS	Integrated Global Observing Strategy
IGS	International GPS Service for Geodynamics
ILP	International Lithosphere Programme
ILRS	International Laser Ranging Service
IMVP	Institute of Metrology for Time and Space (Russia)
INASAN	Institute of Astronomy of the Russian Academy of Sciences
INTAS	International Association for the promotion of co-operation with scientists from the New Independent States (NIS) of the former Soviet Union
IOC	Intergovernmental Oceanographic Commission

IRV	Inter-Range Vector
ISGN	Integrated Space Geodetic Network
ISRO	Indian Space Research Organization
ISTRAC	ISRO Telemetry Tracking and Command Network (India)
ITE	Institute of Terrestrial Ecology
ITRF	International Terrestrial Reference Frame
ITRS	International Terrestrial Reference System
ITSS	Raytheon Information Technology and Scientific Services (USA)
IUGG	International Union of Geodesy and Geophysics
IVS	International VLBI Service for Geodesy and Astrometry
JCET	Joint Center for Earth Systems Technology (USA)
JGM	Joint Gravity Model
JGR	Journal of Geophysical Research
JHD	Japanese Hydrographic Department
JPL	Jet Propulsion Laboratory (USA)
KACST	King Abdulaziz City for Science and Technology (Saudi Arabia)
LAGEOS	LAser GEOdynamics Satellite
LAN	Local Area Network
LAREG	Laboratoire de Recherches en G od sie (France)
LEO	Low Earth Orbit
LIDAR	Light Detection and Ranging
LLR	Lunar Laser Ranging
LOD	Length Of Day
LOSSAM	LAGEOS Spin Axis Model (The Netherlands)
LRA	Laser Retroreflector Array
LRE	Laser Retroreflector Experiment
LRR	Laser RetroReflector
L+T	Swiss Federal Office of Topography
LURE	LUnar Ranging Experiment
MAO	Main Astronomical Observatory (Ukraine)
MCC	Mission Control Center (Russia)
MCC-M	Mission Control Center-Moscow (Russia)
MCEP	Mean Celestial Ephemeris Pole
MCP	Micro Channel Plate
MEDLAS	Mediterranean Laser Campaign
MEO	Medium Earth Orbit
MERIT	Monitoring of Earth Rotation and Intercomparison of Techniques
MIT	Massachusetts Institute of Technology (USA)
MLRO	Matera Laser Ranging Observatory (Italy)
MLRS	McDonald Laser Ranging System (USA)
MOBLAS	MOBile LASer Ranging System
MOM	Mobile Optical Mount
MOTIC	Modular Time-Interval Counter
MTLRS	Modular Transportable Laser Ranging System
MWG	Missions Working Group
NAPEOS	Navigation Package for Earth Observation Satellites
NASA	National Aeronautics and Space Administration (USA)
NASDA	National Space Development Agency (Japan)

NCL	University of Newcastle Upon Tyne (United Kingdom)
NCST	Naval Center for Space Technology (NCST)
NERC	Natural Environment Research Council (United Kingdom)
NEWG	Networks and Engineering Working Group
Nd: YAG	Neodymium Yttrium Aluminum Garnet
NIMA	National Imagery and Mapping Agency (USA)
NMD	National Mapping Division (Australia)
NMF	Niell Mapping Function
NNG	Near Earth Navigation and Geodesy
NOAA	National Oceanic and Atmospheric Administration (USA)
NP	Normal Point
NRIAG	National Research Institute of Astronomy and Geophysics (Egypt)
NRL	Naval Research Laboratory (USA)
NW&E	Networks and Engineering Working Group
OCA	Observatoire de la C te d'Azur (France)
OD	Orbit Determination
OPR	Optical Plot Reading
OS	Operating System
PAS	Polish Academy of Sciences
PC	Personal Computer
PCGIAP	Permanent Committee for GIS Infrastructure for Asia and the Pacific
PDF	Portable Document Format
PM	Polar Motion
PMT	Photo Multiplier Tube
PM/UT	Polar Motion/Universal Time
POD	Precise Orbit Determination
POLAC	Paris Observatory Lunar Analysis Center (France)
PPET	Portable Pico-Second Event Timer
PPN	Parameterized Post Newtonian
PRARE	Precise Range and Range-rate Equipment
PRC	People s Republic of China
PRN	Pseudo Random Noise
QC	Quality Control
QL	Quick-Look
QLDAC	Quick-Look Data Analysis Center (The Netherlands)
QLNP	Quick-Look Normal Point
R&D	Research and Development
RAM	Random Access Memory
RGDR	Regional Gas Dose Ratio
RINEX	Receiver Independent Exchange Format
RISDE	Russian Scientific Research Institute for Space Device Engineering
RITSS	Raytheon Information Technology and Scientific Services (USA)
RMS	Root Mean Square
RRA	RetroReflector Array
RSA	Russian Space Agency
RSG	Refraction Study Group
SALRO	Saudi Arabian Laser Ranging Observatory (Saudi Arabia)
SAO	Smithsonian Astrophysical Observatory (USA)

SAR	Synthetic Aperture Radar
SC	Station Coordinates
SCAR	Scientific Committee on Antarctic Research
SCL	Scientific Committee on the Lithosphere
SENH	Solid Earth and Natural Hazards
SETIC	Selective Time-Interval Counter
SG	Study Group
SGAC	Space Geodesy Analysis Centre (Australia)
SINEX	Software Independent Exchange Format
SLR	Satellite Laser Ranging
SLRP	Satellite Laser Ranging Processor
SNR	Signal to Noise Ratio
SOD	Site Occupation Designator
SOPAC	Scripps Orbit and Permanent Array Center (USA)
SP	Signal Processing
SPAD	Single Photoelectron Avalanche Detector
SPIE	International Society for Optical Engineering
SPWG	Signal Processing Working Group
SRI	Space Research Institute (Russia)
SRIF	Square Root Information Array
SR	Stanford Research
SRS	Stanford Research Systems
SSC	Set of Station Coordinates
SSV	Set of Station Velocities
STARSHINE	Student Tracked Atmospheric Research Satellite for Heuristic International Networking Experiment
SUNSAT	Stellenbosch UNiversity SATellite (South Africa)
SV	Station Velocities
S/W	Software
SXO	Single Crossover
SYRTE	Syst me de Ref r nce Temps-Espace (France)
TAI	International Atomic Time
TB	TerraByte
TBF	Time Bias Function
TCP/IP	Transmission Control Protocol/INTERnet Protocol
TIGO	Transportable Integrated Geodetic Observatory
TIRV	Tuned Inter-Range Vector
TLRS	Transportable Laser Ranging System
TOPEX	Ocean TOPography Experiment
TP	Technical Publication
T/P	TOPEX/Poseidon
TRANET	TRAnsit NETwork
TRF	Terrestrial Reference Frame
TROS	TRansportable Observation Station
TROS	Transportable Range Observation System
TUM	Technical University of Munich (Germany)
UK	United Kingdom
UMBC	University of Maryland Baltimore County (USA)
UN	United Nations
UNEP	United Nations Environmental Programme
UNESCO	

UPF	Universit de la Polyn sie Fran aise (French Polynesia)
UPS	Uninterruptible Power Supply
URL	Uniform Resource Locator
US	United States
USA	United States of America
USNO	United States Naval Observatory
UT	Universal Time
UT	University of Texas (USA)
UTC	Universal Coordinated Time
UTOPIA	University of Texas Orbit Processor (USA)
UTX	University of Texas (USA)
UTXM	University of Texas McDonald Observatory Lunar Analysis Center (USA)
VCL	Vegetation Canopy LIDAR
VLBI	Very Long Baseline Interferometry
VNIIFTRI	All-Russian Scientific Research Institute for Physical-Technical and Radiotechnical Measurements (Russia)
VOL	Variation Of Latitude
WEGENER	Working Group of European Geoscientists for the Establishment of Networks for Earthquake Research
WESTPAC	Western Pacific Laser Tracking Network Satellite
WG	Working Group
WLRS	Wettzell Laser Ranging System (Germany)
WMO	World Meteorological Organization
WPLTN	Western Pacific Laser Tracking Network
WWW	World Wide Web
Y2K	Year 2000