UNAVCO Investigator's Manual

1 November 2001

This manual is intended as a resource for anyone planning the logistics and technical support that is necessary for successful GPS campaigns. It features general information, UNAVCO support procedures for both proposal preparation and field project data collection, and technical planning outlines for large scale GPS projects. Principal Investigators and field team leaders are encouraged to review this manual at the initial stages of project planning, and to refer back to it at the various stages of the GPS campaign planning process.

Table of Contents:

1. Introduction 4
1-1 Assisting with GPS in Geosciences Research 4
1-2 What is GPS? 4
1-3 Why UNAVCO? 4
1-4 UNAVCO Today 4
1-5 Who Guides UNAVCO? 5
1-6 Member Institutions 5
2. Guidelines for Use of UNAVCO Resources 5
2-1 Proposal Preparation 6
2-2 After Receiving Funding Announcement 6
2-3 Project Scheduling 6
2-4 Project Planning 6
2-5 During Project 6
2-6 Data Archiving 7
2-7 Emergency Use of UNAVCO Equipment 7
2-8 UNAVCO Board of Directors Members 7
3. UNAVCO GPS Project Schedule 7
3-1 Scheduling Procedure 7
3-2 Questions Regarding Scheduling 7
4. UNAVCO Principal Investigator's Outline 8
4-1 Proposal Preparation 8
4-2 After Receiving Funding Announcement 8
4-3 Initial Planning Meeting with UNAVCO (“120 Day Meeting”) 8
4-4 90 Day Deadline 9
4-5 60 Day Deadline 9
4-6 30 Day Deadline 9
4-7 10 Days Before Shipping 9
4-8 Arrival at Field Staging Site 9
4-9 During GPS Tracking 10
4-10 End of Project 10
4-11 Post Project 10
5 Agent Projects 10
5-1 UNAVCO Equipment Loan Agreement 11
5-2 Key Agent Issues 11
5-3 Training 12
5-4 Project End 12
6 UNAVCO Project Checklist 12
6-1 Project Overview 13
6-2 Project Preparation Schedule 13
6-3 Costs 13
6-4 Equipment 13
6-5 Logistics 14
6-6 Shipping 14
6-7 Travel Preparations 15
6-8 Participants 15
6-9 Insurance 16
6-10 Operator's Notebook 16
6-11 Contacts 16
7 UNAVCO Project Engineer's Outline 16
7-1 Project Assignment – Initial Planning Meeting with Principal Investigator 16

7-2 90 Day Deadline ... 17
7-3 60 Day Deadline ... 17
7-4 30 Day Deadline ... 18
7-5 10 Days Before Shipping ... 18
7-6 Shipping Day ... 19
7-7 Arrival at Field Staging Site ... 19
7-8 During GPS Tracking ... 19
7-9 End of Project ... 20
7-10 Return to UNAVCO Facility ... 20
8. Field Training Outline ... 20
8-1 Overview ... 21
8-2 Equipment ... 21
8-3 Tripod and Tribrach ... 21
8-4 Antenna ... 21
8-5 Measure Height of Antenna ... 21
8-6 Power Setup ... 22
8-8 Documentation ... 22
8-9 Downloading ... 22
8-10 Packing up and Preparation for Next Day ... 22
8-11 Run your own survey ... 23
8-12 Troubleshooting ... 23
8-13 Suggestions ... 23
9 UNAVCO Emergency Contact Outline ... 23
9-1 Emergency Contact Lists ... 23
9-2 When an Accident or Theft Occurs ... 24
10 Shipping Outline ... 24
10-1 Clean, Pack and Inventory All Boxes ... 24
10-2 Return Boxes to Shipping Agent ... 24
10-3 Required Information ... 25
10-4 Instructions for Shipper ... 25
10-5 Shipping Agent Should Contact Denver Shipper ... 25
10-6 Contact UNAVCO Facility if You Have Any Problems ... 25
11 UNAVCO Data Management Guidelines ... 25
11-1 Introduction ... 25
11-2 Data Management Timeline ... 25
11-3 Media ... 26
11-4 Information to Provide UNAVCO Before Campaign Begins ... 26
11-5 Information to Send to UNAVCO After Campaign Ends ... 27
11-6 Extracting Data from the Archive ... 27
12 UNAVCO Facility Information ... 27
12-1 UNAVCO Facility Addresses ... 27
12-2 UNAVCO Facility Staff Phone & E-mail List ... 28
12-3 INTERNET Access - World Wide Web & FTP ... 28

1. Introduction

1-1 Assisting with GPS in Geosciences Research

This manual contains information prepared by the University NAVSTAR Consortium (UNAVCO) to assist principal investigators in the successful preparation and execution of research projects utilizing the Global Positioning System (GPS). UNAVCO is sponsored by the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA) to make GPS resources available for geoscience research.

The University NAVSTAR Consortium (UNAVCO) is a national program, governed by universities and funded by the National Science Foundation and NASA, to assist university researchers using Global Positioning System (GPS) technology in Earth sciences applications. UNAVCO provides information, support, and scientific infrastructure to principal investigators making use of GPS satellites for Earth science and related research. The aim of UNAVCO is to extend the capabilities of the university community, nationally and internationally, to better understand the behavior of the Earth and the global environment, and to foster the transfer of knowledge and technology for the betterment of life on Earth.

1-2 What is GPS?

The Global Positioning System (GPS) is a constellation of 24+ satellites designed for navigation and positioning. GPS satellites are to the space age as lighthouses were to the sailing age. Although GPS was developed mainly for military use, valuable civilian and scientific applications have been developed.

1-3 Why UNAVCO?

In the early 1980s:

a. GPS was being established as a powerful space-based system for military navigation.
b. The earth sciences research community recognized that GPS has a wide variety of valuable geosciences applications.
c. University researchers lacked the equipment and expertise to use GPS effectively.

To address this opportunity, university researchers formed a consortium to establish a pool of GPS equipment and provide technical assistance to investigators working in high-accuracy differential GPS surveying. The earth sciences community built the UNAVCO program on the concept of shared responsibility between universities and the UNAVCO Facility, with encouragement and funding from the National Science Foundation.

UNAVCO began establishing a GPS equipment pool and providing technical and field support to university investigators in 1986. Since that time, UNAVCO has assisted scores of researchers in hundreds of field projects employing state-of-the-art GPS equipment and methods.

1-4 UNAVCO Today

UNAVCO's primary mission is to provide GPS equipment and technical support to university-based investigators. Applications include the study of plate tectonics, earthquakes, crustal motion, volcanoes, sea level, ocean currents, ice dynamics, and atmospheric sensing. More than 100 universities and research

institutions participate as members of UNAVCO. Investigators and students at these institutions have access to a variety of equipment and support services.

Continuous GPS Station Support. UNAVCO provides complete support and turnkey solutions for investigators using continuously tracking GPS stations and networks for the highest accuracy applications of GPS. This support includes standardized power and communication solutions, discounted GPS equipment prices, network monitoring and maintenance, daily data retrieval, data management software, and archiving services.

GPS Equipment for Campaign Support. High accuracy GPS receivers and auxiliary equipment are available to the community through the UNAVCO equipment pool. Although GPS equipment is complex and a variety of user options are available, UNAVCO equipment is standardized. This ensures simplified training, operations, and data analysis, as well as higher scientific productivity and quality. Participating investigators who are applying GPS to their research interests can obtain assistance in planning, training, logistics, field operations, as well as data analysis and archiving.

Technical Assistance. Investigators can also obtain assistance in troubleshooting, accuracy improvement, new applications, software development, equipment testing, data analysis and other technical areas.

Archiving Services. The scientific value of high-accuracy geophysical positioning data tends to increase with the passage of time. UNAVCO maintains a map-oriented relational database to archive GPS data and make it readily available to investigators.

Rapid Deployment. Unique research opportunities often precede and follow major geophysical events such as earthquakes and volcanic eruptions. Equipment and technical support is often provided to investigators on short notice following major events. Serving the rapid deployment needs of the community is a continuing priority of UNAVCO.

1-5 Who Guides UNAVCO?

Program guidance for UNAVCO is provided by a board of directors elected by member institutions to represent the university community. The UNAVCO Facility is managed by the University Corporation for Atmospheric Research (UCAR) in Boulder, Colorado. UCAR is a consortium of universities in the United States and Canada. UCAR oversees a wide range of programs and facilities that serve its members and the world scientific community. UCAR also manages and operates the National Center for Atmospheric Research (NCAR).

The UNAVCO program is funded under a peer-review grant from the National Science Foundation and under contract from the National Aeronautics and Space Administration.

1-6 Member Institutions

www.unavco.org

2. Guidelines for Use of UNAVCO Resources

Principal Investigators (PIs) are encouraged to follow these guidelines in order to facilitate the smooth planning and execution of projects. Note that failure to comply with the 30 day Purchase Order (PO) deadline (see Section 4-6, 30 Day Deadline, Chapter 4) may lead to downgrading in priority, postponement, or cancellation of UNAVCO support for your field project.

2-1 Proposal Preparation

a. Contact UNAVCO for budget and logistics advice at least one month before proposal submittal.
b. In the proposal, specify which UNAVCO resources are being requested. Include the location of the project, the number of receivers required, the type of receivers required, and the start and end dates of the project.
c. c. Have the proposal budget reviewed by UNAVCO before submitting the proposal to the funding agency. UNAVCO can provide a letter of support to accompany the proposal, stating that UNAVCO has reviewed the GPS objectives of the proposal and is prepared to provide GPS support consistent with that requested in the proposal.
d. Send a copy of the proposal to UNAVCO.

e. Submit an on-line request for support to UNAVCO for the proposed GPS project. This will allows the project to be tentatively scheduled prior to a funding announcement.

2-2 After Receiving Funding Announcement

a. Inform UNAVCO of proposal status and award number.
b. Solicit UNAVCO's input if preparing a revised budget.

2-3 Project Scheduling

The project will be scheduled by UNAVCO when both (1) the support request has been received by UNAVCO, and (2) the project is funded by a source (normally NSF or NASA) that UNAVCO is mandated to support.

2-4 Project Planning

a. Follow UNAVCO Scheduling Procedure (see also Section 3-1, Scheduling Procedure).
b. Ensure the purchase order (PO) for UNAVCO services reaches the UNAVCO Administrator at least 30 days before the start of the project.
c. Contact the UNAVCO Facility with questions.

2-5 During Project

a. A UNAVCO engineer will accompany the project. The UNAVCO engineer is responsible for the security and proper use of UNAVCO equipment. In the case of disputes that impinge on the welfare of the personnel or equipment, the UNAVCO engineer has the final authority.

or

b. A designated research organization representative (Agent) will assume responsibility for the security and proper use UNAVCO equipment. The Agent will also be responsible for training others on the proper use of the equipment in accordance with UNAVCO procedures.

c. Apart from this, the PI (or other appointed leader of the field team) has responsibility for the daily operation of the project.
d. The PI is responsible for cost overruns.

2-6 Data Archiving

a. All data from projects wholly or partly funded by NSF-EAR or NASA must be archived at the UNAVCO Facility. Archive accessibility is based on the PI's arrangements (see also Section 7-2, Timing and Data Management Logistics). Data include, but are not limited to all raw field data (zip disks, floppies, or other storage media) and legible copies of all field logs. Policies for deposit and release of data into/from the archive are described in Chapter 7.
b. Deposit of other data sets into the archive is encouraged. The PI is responsible for making the necessary arrangements for archiving of data with the project field engineer.

2-7 Emergency Use of UNAVCO Equipment

One of UNAVCO's principal objectives is to provide GPS equipment for the detection of post-seismic strain associated with major earthquakes. Deployment of UNAVCO equipment within a day or so of the event is important. Following a major earthquake, any researcher who believes that crucial strain measurements are likely to be obtained if GPS equipment were immediately deployed should contact UNAVCO immediately.

Users of UNAVCO equipment are advised that re-allocation of scheduled equipment may occur in the event of a major earthquake. Rescheduling of equipment will be given top priority for investigators who suffer delay of scheduled use of UNAVCO equipment.

2-8 UNAVCO Board of Directors Members

www.unavco.org

3. UNAVCO GPS Project Schedule

3-1 Scheduling Procedure

These procedures must be followed to ensure UNAVCO support:

a. An on-line (www.unavco.ucar.edu/) request for support from the Principal Investigator (PI) should be received by the UNAVCO Facility 120 days before the start of a project. Information required includes the proposal name, proposal number, funding source, program manager, purpose of the project, the location of the project, the number of receivers required, the type of receivers required, and the start and end date of the project and field dates. Preliminary requests may be submitted to UNAVCO before notification of funding award.
b. UNAVCO will provide the PI with prompt written confirmation or denial of support upon receipt of the on-line support request.
c. Depending on the magnitude of the project, PIs who receive approval to use UNAVCO resources may be required to schedule a planning meeting with the UNAVCO staff 120 days before observations are to begin. UNAVCO may waive this requirement under special circumstances. Additional reviews should occur 90, 60 and 30 days before the campaign. Purchase orders for UNAVCO services must be received 30 days before the campaign.
d. Schedule conflicts and allocation of UNAVCO resources will be handled by UNAVCO with advice from the appropriate program sponsor.

3-2 Questions Regarding Scheduling

Please contact Wayne Shiver, (303) 497-8042, shiver@unavco.ucar.edu, for questions regarding project scheduling.

4. UNAVCO Principal Investigator's Outline

The following outline is to aid Principal Investigators (PIs) in preparing domestic and international GPS projects that utilize services provided by the UNAVCO Facility. This is a guideline for international and domestic campaigns and permanent station installations, and all items will not be relevant for every project. UNAVCO is primarily responsible for providing equipment and training, permanent station installation, data acquisition, GPS operator safety, and logistic support. Further services provided by UNAVCO include permanent station network monitoring, data archiving, advice in GPS network design and post-processing of GPS data.

4-1 Proposal Preparation

a. Contact UNAVCO for budget and logistic advice at least one month before proposal preparation.
b. In the proposal please specify:
   Location of project.
   Number and type of receivers required .
   Start and end date of project.
c. Have the proposal budget reviewed by UNAVCO before submitting the proposal to the funding agency.
d. Send a copy of the proposal to UNAVCO.
e. Submit an on-line support request to UNAVCO.
f. Notify UNAVCO of proposal status.

4-2 After Receiving Funding Announcement

a. Inform UNAVCO of proposal status.
b. Solicit input from UNAVCO if preparing a revised budget.
c. Complete (as appropriate) the UNAVCO Project Checklist (Chapter 5) and send to UNAVCO before the initial planning meeting.

4-3 Initial Planning Meeting with UNAVCO ("120 Day Meeting")

a. Specify number and type of receivers or alternatives.
b. Specify shipping date, shipping contacts (in-country contacts for foreign projects), and exact shipping address.
c. Review field budget, including:
   Project engineer and operators per diem and expenses.
   Shipping.
   Field gear.
   Equipment replacement.
   Receiver power: e.g. AC, DC, batteries, solar, wind, generators, chargers.
   Rental cars and project travel.
   Excess baggage.
d. Prepare draft budget
e. Specify project responsibilities and assignments.
f. If there are multiple PI's, assign one to represent all PIs to UNAVCO.
g. Discuss completed Project Checklist (see Chapter 5).
h. Discuss training session and operator notebooks.
i. Develop preliminary equipment request list.

j. Establish e-mail aliases.
k. Discuss political situation in host country.
l. List local contacts.
m. State requirements regarding data archive issues.

4-4 90 Day Deadline

a. Coordinate with project engineer and prepare field budget for 60 day deadline.
b. Discuss any unaddressed items on the Project Checklist with project engineer.
c. Prepare tentative receiver and operator schedule.
d. For foreign projects:
   Acquire copies of all U.S. operator passports and send to UNAVCO.
   Notify operators of necessary shots or travel documents.

4-5 60 Day Deadline

a. Finalize field budget. (Purchase Order (PO) to be received at UNAVCO by 30 day deadline).
b. Confirm host country customs policy.
c. Prepare a list of stations, including:
   Names.
   Four letter and four number station IDs.
   Latitude, longitude in decimal degrees or degrees-minutes-seconds and height in meters.
   Magnetic declination.
   Descriptions.
d. Determine observation schedule from local logistics.

4-6 30 Day Deadline

a. Ensure PI's purchasing department has sent a PO to the UNAVCO Administrator.
b. Mail the UNAVCO project engineer all station information.
c. Mail the UNAVCO project engineer a complete receiver and operator project schedule.
   Shipping dates and observation windows will be finalized at this time.
d. Mail the UNAVCO project engineer the operator introduction letters explaining the scientific objective of the project (in English and local language) to be included in notebooks.

4-7 10 Days Before Shipping

a. Check with UNAVCO on equipment status.
b. Three days prior to travel reconfirm international flights.

4-8 Arrival at Field Staging Site

a. Assist with customs clearance if necessary.
b. Meet with local contacts and make sure they understand the role of the UNAVCO project engineer on the GPS project.
c. Assist project engineer with on site GPS training, logistics, and customs clearance.

4-8.1 Training

a. Give discussion on local tectonics and project scope.
b. Monitor status of operators and their progress with the GPS equipment. The UNAVCO project engineer will evaluate each project operator for system competence, safety in handling the equipment, data integrity, and paper work. The project PI should work closely with the UNAVCO project engineer in resolving problems with care of the equipment and attitude or motivational problems of operators. However, if the project engineer deems an operator is not competent to handle project equipment safely, that operator will not be allowed to operate equipment under UNAVCO's care.
c. Brief each operator on the stations that they will occupy.
d. Help UNAVCO project engineer clean, inventory, and re-pack equipment for deployment.

4-8.2 Operators

a. Check each operator for complete knowledge of proper use of equipment.
b. Check each operator's station information.
c. Check that all logistic problems for each operator have been addressed.
d. Distribute money for all logistics expenses including rental car, guards, and excess baggage.
e. Arrange a time and place to have all field operators call to give updates or describe any problems.
f. Deploy operators and equipment.

4-9 During GPS Tracking

a. Monitor status of all operators and equipment.
b. Prepare alternative plans in case of receiver failure or logistic problems.
c. Help transport equipment and people between observation sessions.
d. Schedule two days and a facility to store and clean equipment prior to return shipment.
e. Reconfirm return flights for operators.

4-10 End of Project

a. Ensure each operator delivers original and backup disks with the data.
b. Ensure each operator provides measurement log forms and station description forms.
c. Discuss with project engineer the best way to get data back safely.
d. Purchase receipts for additional project expenses from operators.
e. Help clean, inventory, and pack equipment for shipment.
f. Meet with UNAVCO project engineer to inventory broken or damaged equipment.

4-11 Post Project

a. Work with field project engineer to archive all project data within guidelines agreed to at the Initial Planning Meeting.
b. Work with project engineer to ensure that all expenditures have been charged to the project PO and to close project PO.

5 Agent Projects

In many cases the PI receives equipment and training from UNAVCO, but no direct project support from a field engineer. Such projects are called “Agent Projects”, and a designated research organization representative (Agent) assumes responsibility for equipment security and damage, operator training, data acquisition, GPS operator safety, and logistic support. A signed “UNAVCO Equipment Loan Agreement”

is required for all Agent projects. Agent projects differ from those supported by a UNAVCO field engineer in several ways:

a. There is usually no need to set up a Purchase Order with UNAVCO.
b. UNAVCO is not directly involved in field logistics issues, although consultation may be provided.

This chapter contains issues specific to Agents managing UNAVCO supported GPS field projects. The Agent should also review the rest of the UNAVCO Investigator's manual.

5-1 UNAVCO Equipment Loan Agreement

The Equipment Loan Agreement spells out the responsibilities of the PIs research organization when borrowing UNAVCO equipment The primary responsibilities of the agreement are:

a. The research organization is responsible for the full cost of repair or replacement of any of the equipment that is damaged, lost, confiscated, or stolen from the time it assumes custody until it is returned to UNAVCO. It is the research organization representative's responsibility, before departing the place or country of use, to ensure that the equipment has cleared customs and is in shipment to UNAVCO.
b. The Agent shall be responsible for the proper use and deployment of the equipment loaned by UNAVCO. The Agent shall be responsible for training others participating in the research project on the proper use of the equipment in accordance with UNAVCO procedures.
c. The Agent shall be responsible for the safe packaging, proper import and export procedures, shipping and receiving, and proper operation and use of the equipment loaned by UNAVCO.
d. Delivery and return transportation expenses shall be paid by the research organization being loaned the equipment. These expenses shall include the cost of shipment of the equipment to the research location, the return of the equipment to UNAVCO, and equipment insurance during the shipping.
e. In the event UNAVCO has to make arrangements for the return of the equipment, the research organization shall be responsible for all costs incurred by UNAVCO, including labor costs, to obtain the return of the equipment.
f. All maintenance, except as prescribed in the UNAVCO operating procedures, shall be performed by authorized UNAVCO personnel. Any unauthorized maintenance voids all original equipment warranties. The research organization shall be liable for the cost of purchasing a new warranty for the equipment if unauthorized maintenance is performed on the equipment.
g. It shall be the research organizations duty at its expense to comply with all country, federal, state, county, and municipal laws, ordinances, and regulations, if any, applicable to the work being performed with this equipment and to secure all local and/or state/country licenses or permits required to use this equipment. The research organization shall hold NAVCO/UCAR harmless from all damages of any nature whatsoever that they may suffer as a result of the research organization's failure to do so.

5-2 Key Agent Issues

5-2.1 Operator safety is the Agent's first priority.

The Agent should be aware of all possible safety issues, both political and natural. The Agent should maintain a daily contact schedule where operators can contact them if necessary.

5-2.2 Equipment safety is the Agent's second priority.

a. Packing and repacking of equipment is important and should be explained in detail. In the past equipment has returned from Agent projects packed incorrectly resulting in damage (i.e. bent antenna plane or crimped antenna cables). Be sure that all operators know how to pack equipment prior to deployment.

b. Use of UNAVCO equipment should follow these guidelines.

The Agent:

1. Will not release equipment to an operator until they are fully trained.
2. Will keep track of the equipment inventory (i.e. have a complete copy of the manifest).
3. Will not jeopardize the agreed return schedule of the equipment.
4. Will assure proper cleaning, checking the inventory and repacking of all equipment.
5. Will report all lost or broken equipment at the end of the project. Contact the UNAVCO Facility immediately if a receiver appears broken. UNAVCO may be able to troubleshoot the problem and get the receiver working again. Clearly mark all broken equipment (flagging is good to use for this). Make a list of equipment and FAX to the UNAVCO Facility along with return shipping information.
6. Will check that equipment is correctly packed and inventoried for return customs clearance. This is particularly important for returning import back into the U.S.

5-2.3 Meeting project goals is the Agent's third priority.

Although this goal is listed third it is an important goal. The UNAVCO Facility will provide any preplanning assistance necessary to successfully meet the proposed goals of the project. In addition, the other chapters of this manual will provide helpful information.

5-3 Training

5-3.1 Operator Training

The Agent agrees to train others who will be using UNAVCO equipment. This includes confirming the ability, competence, and commitment of all of the operators. The Agent should understand all points in the training outline and be able to relay these points to the observers.

5-3.2 Optional Training

a. QC the data.
b. Specialized or minor repairs to the equipment excluding opening the receiver or the antenna.
c. Calibrate tribrachs.

5-4 Project End

A list of the data including disks, log sheets and site descriptions must be forwarded to the UNAVCO archive immediately following the project. Copies of the data must arrive at the UNAVCO archive within one year of the project, in accordance with the UNAVCO data policy (www.unavco.ucar.edu).

6 UNAVCO Project Checklist

The following is a list of items to aid Principal Investigators (PIs) in preparing for domestic and international GPS projects that utilize services provided by the UNAVCO Facility. This document lists the items that need to be addressed in outline form for the Initial Planning Meeting and subsequent meetings with UNAVCO. Although some of these items will be handled by the UNAVCO project engineer, all items should be discussed at the Initial Planning Meeting. Agent project PIs will also find this list useful for managing their own projects.

6-1 Project Overview

Present an informative summary of the proposed project. Many of these subjects will be covered in depth later in the checklist.

a. Scientific objectives.
b. Logistics.
   Area (countries, cities).
   Host(s) organization(s).
   Start and end date of project.
   Type of receivers requested.
   Number of receivers requested.
   Other support equipment requested.
   Operators.
   Engineer or Agent request.
   Reconnaissance plans or report.

6-2 Project Preparation Schedule

a. Initial Planning, 90, 60, 30 day meetings with UNAVCO.
   Where.
   When (dates).
b. Key preparation issues:
   Budget preparation, PO generation and funding schedule.
   Reconnaissance and station information.
   Shipping (Chapter 10).
   PI's preparation schedule (Chapter 4).
   Project engineer's preparation schedule (Chapter 7).

6-3 Costs

Prepare a budget including estimated costs related to project (see budget template):

a. Materials and supplies:
   Notebooks.
   Data disks or other backup media.
   Field gear: batteries, first-aid kits, camping equipment.
   New equipment.
   Lost or broken equipment expense.
b. Purchased Services
   Communication
   Express Mail
   Medical Services.
   Visas.
c. Shipping cost estimate.
d. Personnel travel expenses, including:
   Air fare.
   Per diem (food & lodging).
   Rental Vehicles and ground transportation.
   Excess baggage.

6-4 Equipment

a. Field:
   Complete list of equipment requested.(consider local conditions)

b. Personal:
Informative list of equipment, clothing, medicine, etc. that operators need for the field environment.

6-5 Logistics

a. Cultural report.
b. Political status:
Local or civil conflicts (check consular information sheet for travel warnings).
c. Area information:
Local time zone (GMT ±?, remember daylight savings here and overseas).
Climate.
d. Power:
Availability of local power.
110v or 220v.
Quality and dependability of power.
Plug type.
e. Communication access:
Phones, faxes, telex, radio.
f. Local hazards.
g. Emergency contacts.
h. Facility locations:
Project staging.
Central point of communication.
Training.
Information about sites and locations:
Station reports.
Declination.
i. In-country transportation.

6-6 Shipping

a. Schedule:
Departure/return dates and information.
Port(s) of entry.
Airline schedules, airplane size (ability to carry cargo), etc.
b. Shipping of equipment within project's local area.
c. Parties involved in shipping.
d. Address of consignee: Exact instructions for labeling shipping cases.
e. Address(es) of paying parties.
f. Customs:
Arrangements made by host(s) at port of entry.
Recommendations for expedient customs clearance.
Estimate of time frame and possible complications expected during customs process.
Estimate of costs to be incurred during customs clearance.
Customs.
Broker fees.
Contacts.
Brokers (local).
Special preparations to be made for shipping.
g. Documents:
Carnets.
Bonds.

Other.

h. Time frame for faxing or mailing manifests to host country contact.
` Special considerations for unusual equipment.
i. Batteries, generators, etc.

6-7 Travel Preparations

a. Government documents:
Passport.
Travel permits, visas (tourist, work, government).
b. State Department Consular Sheets and other information if available.
c. Other documents:
Letters of introduction.
Permissions/invitations from host organization or government.
Special permissions.
International driver's license.
Passport photos.
Immunization records.
Institutional IDs.
d. Health considerations:
Diseases.
Climate.
Water quality.
Food quality.
Animals.
Medication, shots, medical prophylaxis, first aid kits (Take medical shots record card in the field).
Other health hazards.
e. Financial considerations:
Credit cards.
Phone cards.
Cash.
Traveler's checks.

6-8 Participants

a. Generate a list of US participants. Include information that will be used to determine abilities and effective placement in the project.
Identification:
Full name.
Male/ female.
Position (Professor, student, professional, etc.).
Birth date.
Social security number.
Passport information.
Emergency/Family contacts.
Definition of role in project.
Abilities pertaining to project:
Field experience.
Experience/knowledge of project location.
Experience/ability in foreign culture.
Experience with GPS, survey, and equipment.
Language abilities (English, foreign).
b. Limitations to be considered:
Host organization(s).
U.S. participants.

Non-U.S. participants.

6-9 Insurance

a. Equipment:
   Insurance for field project. Contact UNAVCO for special considerations.
b. UNAVCO Personnel (see UCAR policies and procedures for UNAVCO employees):
   Workman's Compensation.
   Release for projects in countries with US State Department Travel Warnings.
   Response to injury or death of a participant.
c. Emergency procedures.

6-10 Operator's Notebook

a. Determine which items to include such as:
   Statement of scientific purpose.
   Procedures programming.
   Map of area.
   Calendar of project schedule.
   Observation schedule.
   Satellite azimuth elevation or visibility plots.
   Field logs.
   Site descriptions.
   Other, calculators, rulers, gum

6-11 Contacts

a. Include names and role, phone, fax, email address and telex numbers of:
   Local contacts.
   If they speak English.
   U.S. Embassy.
   Customs.
   Other interest groups or organizations (ex: IAGS, DMA, etc.).

7 UNAVCO Project Engineer's Outline

The primary role of the UNAVCO engineer or agent is to organize and prepare all GPS and conventional survey equipment for international and domestic projects, assume responsibility for shipping to and from a project, provide shipping and customs documentation, inventory and safeguard equipment while it is in the field, repair (engineers only) equipment when necessary, and ensure operators and equipment are deployed safely into and out of the field during GPS measurements. The following checklist is the assigned engineers or agents responsibility; however, the engineer or agent may delegate responsibility as needed to ensure a successful project.

7-1 Project Assignment – Initial Planning Meeting with Principal Investigator

a. Determine number and type of receivers or alternatives.
b. Shipping date, shipping contacts (in-country contacts for international projects), and exact shipping address.
c. Review:
   Location of project.
   Start and end date of project.
   Field budget including (see budget template):
      Field gear.

Batteries, generators, solar panels and chargers.
Equipment replacement.
Communications.
Shipping.
Ground and air transportation.
Engineer per diem (food & lodging) and expenses.
Excess baggage.

d. Develop draft budget with the PI to determine PO amount.
e. Submit draft budge and completed budget information sheet to UNAVCO Field Project Coordinator (FPC) for review.
f. Determine project responsibilities and assignments.
g. Agent status determined.
h. Discuss completed Project Checklist (Chapter 6).
i. Discuss training session and operator notebooks.
j. Develop preliminary equipment request list.
k. Establish electronic or computer mail aliases for all PIs.
l. Initiate contacts list for in-country liaison and write letter of introduction.
m. Ensure permission has been granted to work in country.
n. Determine requirements regarding data management and archive issues.

7-2 90 Day Deadline

a. Budget and purchasing:
Contact PI and prepare field budget for 60-day deadline.
b. PI interactions:
Project update due from PI outlining unaddressed issues from the Project Checklist.
All conflicts between UNAVCO and project PI resolved.
c. Shipping and equipment:
Final receiver schedule in place
Confirm UNAVCO equipment is available and scheduled for project.
d. Archiving & Computing schedule:
Schedule software training for engineer, if necessary.

7-3 60 Day Deadline

a. Budget and purchasing:
Submit final budget to Field Project Coordinator (FPC). (FPC will work with Administrator to open PO.)
Request letter of funding intention from PI for pre-assignment of account key.
Submit purchase request to FPC for field items, computer media, and other equipment.
b. PI interactions:
Request a list of stations and coordinates from the PI
Confirm host country customs policy with shipper and PI
c. Shipping and equipment:

Contact shipper to reconfirm shipping date, time, and space.
Give copy of final shipping quotes to FPC.
Coordinate incoming receivers from other PIs and purchase or borrow any needed equipment.
Confirm Equipment Services Group shipment schedule and the number of in-house and out-of-house receivers to be prepared.
Review equipment request list.
d. Archiving & Computing schedule:
Confirm field computer testing schedule.
Review in-field data management strategy.

e. Training and observation information:

Prepare or review scenarios and/or satellite visibility diagrams.

If training will be held at field staging site (in host country for international campaigns), secure storage and staging facilities.

7-4 30 Day Deadline

a. Budget and purchasing:

Confirm receipt of PO by UNAVCO with FPC.

Communicate travel plans and fill out travel authorization, including VISA payment form.

Make appointment with UCAR safety officer, if necessary.

b. PI interactions:

Confirm list of stations and coordinates from PI are in-house.

c. Shipping and equipment:

Contact shipper to reconfirm shipping date, time, space, and routing.

Reconfirm equipment shipment schedule and number of in-house receivers and out-of-house receivers in preparation.

Send preliminary manifests to host country in advance if necessary.

Equipment request list must be in by now.

Coordinate incoming receivers from other PIs and purchase or borrow any needed equipment.

Notify local contacts of shipping date and time. UNAVCO will make every attempt to meet deadlines set by customs officials in the host country. Typically, copies of equipment manifests, which list the type, origin and value of the project equipment, will be sent in advance of its arrival.

Supply FPC with equipment inventory and serial numbers for insurance purposes.

Test all receivers and QC data.

Calibrate tribrachs.

d. Archiving & Computing schedule:

Reconfirm computer testing schedule.

Arrange field data management methodology.

Obtain updates of QC programs and RINEX translators.

e. Training and observation information:

If training in Boulder, reserve training facilities and conference room.

Collect copies of passports and emergency contact information for all US operators.

Review scenarios and/or satellite visibility diagrams.

Make field logs, station description forms, and disk labels.

Prepare operator notebooks.

Review project with UNAVCO engineers to catch any mistakes.

7-5 10 Days Before Shipping

a. All items above should be completed and in-house by now.

b. Make final purchase request for any necessary equipment.

c. Closely monitor equipment status with the Equipment Technician.

d. Training preparations:

Confirm arrangements for training facilities.

Charge batteries if needed.

Prepare training field logs, overheads, and disk labels.

Prepare detailed hour-by-hour training outline.

Finalize field data management methodology.

Verify that you have copies of passports and emergency contact information for all operators.

e. Shipping day count down:

Five days before shipping: check first iteration of inventory.

Two days before shipping: recheck equipment inventory.
Contact shipper and arrange pick up of equipment.
Prepare office notebook.
24 hours before shipping: all equipment should be cleaned, tested, inventoried, and packed.

7-6 Shipping Day

a. Meet shippers and send off equipment.
b. Get system weights, Air Way Bill #'s, equipment flight schedule, routing, and charges from the shipper.
c. Give copy of Air Way Bill to the UNAVCO FPC.
d. International campaigns: FAX Air Way Bill, equipment flight schedule, and equipment inventory to the project PI and any in-country contacts.
e. Have someone from UNAVCO track shipment.
f. Prepare office notebook.

7-7 Arrival at Field Staging Site

a. Meet with local contacts and make sure they understand the role of the UNAVCO engineer on the GPS project.
b. Call UNAVCO to establish lines of communication.
c. Arrange for delivery of the equipment and/or go to customs and liberate the equipment.
d. Arrange for and conduct training session.
Arrange interpreter if necessary
e. Equipment:
Repeat QC testing if possible.
Check tribrachs.
f. Operators:
Recheck each operator for proper use of equipment.
Check each operator's station information.
Check that the project PI has taken care of all logistic problems for each operator.
Ensure that each operator has money for a rental car, guard, excess baggage, and other logistic expenses.
Arrange communications to have all field operators call to give updates or in case of problems.
g. Deploy operators and equipment.
h. Preliminary check on return routing of equipment and customs policy.

7-8 During GPS Tracking

a. Monitor status of all operators and equipment. The project engineer or agent should occupy a base station with adequate communication facilities for contacting remote stations. The engineer/agent may operate a GPS receiver at this site but their primary responsibility is to maintain the integrity and safety of all UNAVCO equipment. Therefore, this station will be abandoned if retrieval or repair of equipment is necessary during the campaign. (Possibly have an assistant remain at site in case the engineer is needed elsewhere.)
b. Travel to specific sites if problems occur, fix broken equipment, replace parts if necessary, or ship equipment back to base station.
c. Ten days prior to completion, reconfirm return shipment.
d. Set cleaning schedule:
Schedule two days and a facility to store and clean equipment prior to shipment.
Purchase cleaning supplies.

7-9 End of Project

a. Reconfirm shipping reservations and return flights for operators.
b. Inventory data and logsheets.
c. Supervise cleaning, inventorying, and re-packing of all equipment.
d. Make a preliminary list of all broken and missing equipment and fax ESG. Give a copy to the project PI.
e. Clearly mark all broken equipment.
f. Mark boxes and install shipping labels.
g. Contact shippers in USA (for international projects - do not rely on in-country agents) for equipment pick-up.
h. Monitor status of equipment until it is airborne for UNAVCO (or the US in case of international travel).
i. Contact Shipping Company or UNAVCO with the AWB #, number of pieces sent, flight #, carrier, and flight schedule.
j. Ensure equipment is to clear customs in Denver.

7-10 Return to UNAVCO Facility

a. Archive data immediately upon return.
b. Debrief engineers on the project and how to improve future projects, immediately upon return.
c. Submit travel expense report to FPC within two weeks of return.
d. Equipment:

Review broken equipment with Equipment Technician.
Monitor status of in-coming equipment.

e. Prepare a detailed project report within one month of return, to include:

Project dates, places, number and type of receivers.
Project PI and names of all operators.
Any conflicts with PI or operators.
Copies of all station descriptions.
Names, phone and FAX numbers of all in-country contacts.
List any problems encountered during the Initial Planning, 90, 60, 30, and 10-day deadlines.
Organize final notebook.

f. Review expenses within one month of return.
Confirm with all departments that all expenses have been charged to project.
Review expense spread sheet and compare with cost summaries and receipts.
When all expenses have been received, request closure of project via email with FPC. This should occur about two months after return from the field (to allow for receipt of all bills) and at least two months before the expiration of the PO, in normal circumstances.

8. Field Training Outline

This outline is a supplement to the instructions received from the UNAVCO engineer on GPS data collection procedures. Verbal, visual, and, most importantly, hands-on instruction are necessary for an

operator to learn proper field techniques. These skills need to be attained during the training period - not out in the field. Upon completion, operators must demonstrate the ability to operate and care for field equipment responsibly.

8-1 Overview

a. Introduction to training class:
   Review schedule of training class.
   Introduction of Principal Investigators (PIs), instructors, and participants.
   PI explains scientific objectives of the project and items of interest.
   Project Engineer explains his/her role and responsibilities.
   Receive notebooks, log sheets and handouts.

8-2 Equipment

a. Have a system already set up.
b. Assign receiver/system to the primary operator and explain the responsibilities of the operator:
   Review the following:
   Equipment checklist.
   Unpacking and packing equipment.
   Dropped or broken equipment. Report any problems to the engineer without hesitation.
   Transporting equipment.
   Care of computers and diskettes.
   Transporting data.

c. Explanation of all equipment on the manifests.

8-3 Tripod and Tribrach

a. Tripod Set Up Procedure Chapter.
   Operators learn to set up a tripod and tribrach.
   Operators are given potential problems. Example: set up on a hill or in rocks.

8-4 Antenna

a. Explain the parts of the antenna and how it works.
   Location of the patch and electric phase center.
   Magnetic declination and importance of setting true north.
   Ground plane, chokering, and multipath.
   Antenna cables:
      Coiling the cable.
      Dirt in the plugs.
      Don’t step on or pull on cables.
      Connect cable to the antenna first then to the receiver.
      Stay away from the antenna during observations.

8-5 Measure Height of Antenna

How to read height stick.
Measure height and document it on log sheet. All 3 readings should be within 1 mm. This confirms the antenna is level.

8-6 Power Setup

a. Explain power requirements of the receiver and length of time it takes a battery to lose all power.
   Portable batteries.
   Car batteries.
   Explain jumping batteries in parallel and series.
   Demonstrate power setup with solar panels.
   Explain short circuiting, checking fuses and checking voltage.
   Charging batteries.
   AC power showing on screen.
   Explain the use of OSM or power download cable as alternate power supply.
   Power problems.
b. Connect battery to receiver.

8-7 Start-up Receiver

a. Hand out receiver operation notes.
   Explain care of receiver.
      Keep out of rain and sun.
      Run survey in tent or kinetics box and B box.
      Fill out logbook after every observation session.
   Explain the receiver ports.
   Power up the receiver and watch self tests as they appear.
   Go through receiver operation notes.

8-8 Documentation

a. Explain all the boxes on the log sheets and have the operators fill it out legibly and correctly as they conduct the survey.
b. Emphasize the use of all handouts. When in doubt refer to the handouts.
c. Field log sheets, disk labels and receiver logbooks.
d. Updating station descriptions.
e. Collect all log sheets at the end of the day and correct them and return to the operators.
f. Emphasize the importance of filling out the logbooks for the receivers.

8-9 Downloading

a. Stop the survey or watch the programmed stop.
b. Demonstrate the configuration of the download equipment.
   Demonstrate the setup of the OSM as an alternative to the download cable.
   Re-iterate care of computers. Avoid heat, dust and magnets.
c. Documentation on diskettes and log sheets.
d. Re-check antenna height and if centered exactly over the mark

8-10 Packing up and Preparation for Next Day

a. Demonstrate exactly how equipment should be packed in the box.
b. Demonstrate tent setup and pack up.
c. Charging batteries.
d. Check manifests.
e. Transportation to the next site.
f. Communication with engineer if necessary.

g. Report any problems or tracking difficulties to the engineer.

8-11 Run your own survey

a. Make all primary operators run their own survey from start to finish. Supervise carefully.
   Check antenna height and plumb.
   Check general system setup.
   Check and correct parameters set during programming of survey.
   Documentation and download.

8-12 Troubleshooting

a. Things to check at the beginning of the survey.
   Start and end times of the survey.
   Parameters programmed into the receiver.
   SNR values and continuous and total L1 and L2 observations.
b. Things to check during the survey.
   SNR values and continuous and total L1 and L2 observations.
   Position.
   Watch for animals or people near the equipment.
   Discuss danger of electrical storms.
   What to do in case of low battery power.
   What to do in case of power failure.
   What to do in case the antenna is off level.
c. Things to check at the end of the survey.
   What to do in case the antenna is off level.
   What to do in case of power failure.

8-13 Suggestions

a. Remember to allow 1 & 1/2 --> 2 hours to set up all equipment and program the receiver for the first observation session.
b. Take care not to confuse UTC time and local time when programming the survey.
c. Use the correct parameters as defined by the PI when programming the survey.

9 UNAVCO Emergency Contact Outline

The following is the emergency procedure to be followed while on a field project. An emergency involves either the injury or death of personnel involved in the campaign, substantial damage or loss of equipment or both.

9-1 Emergency Contact Lists

a. A list of contacts should be included in every notebook distributed on the project (operator, agent, engineer, principal investigator (P.I.), and at the UNAVCO Facility). This list should include phone numbers (office, cellular, and home), addresses, and Email addresses, for the PI, UNAVCO engineer, agent, UNAVCO Facility, and in-country contacts.
b. A list of operators with emergency phone contacts, next of kin, and workman's compensations coverage or insurance should be distributed to responsible parties such as P.I., engineer, agent and the UNAVCO Facility project notebook. In addition, insurance forms should be in all personnel field notebooks. These forms should be provided by the P.I. and included in every personnel's field notebook.

c. A list of the UNAVCO Facility emergency numbers should accompany the agent, engineer, PI, and operators.

9-2 When an Accident or Theft Occurs

When personnel are injured or equipment is destroyed or stolen the UNAVCO Facility must be informed immediately. The order of information flow should go as follows:

9-2.1 Injury of Personnel

The immediate concern should be to see to the medical needs of the injured person. All necessary medical attention should be administered. Paperwork must be filled out to ensure compensation from the insurance company or workman's compensation. For example, UNAVCO employees are required to do the following:

All injuries no matter how trivial must be reported to your insurance company.
All injuries or occupational diseases which result in lost time from work in excess of three shifts or calendar days, or in permanent physical impairment, must be reported to your insurance carrier on the Colorado Department of Labor and Employment Division of Labor Workers' Compensation section Employer's First Report of Injury form within ten days after notice or knowledge of the injury or disease.

9-2.2 Death of Personnel

a. Required paperwork must be filled out to ensure compensation from the insurance company. UNAVCO is required to report to the insurance carrier immediately in this case.
b. A police report must be taken and all police or official reports from the host country must be given to the UNAVCO engineer in charge or to the UNAVCO field supervisor or manger.
c. The UNAVCO engineer or agent will make arrangements for returning the person home.

9-2.3 Severe Equipment Damage or Equipment Loss

A police report must be taken and a copy given to the UNAVCO Facility. Any other official statements documenting the loss must also be copied to the UNAVCO Facility.

10 Shipping Outline

Below is a checklist for returning equipment to UNAVCO. Please follow these steps and FAX the requested information to your UNAVCO Facility contact.

10-1 Clean, Pack and Inventory All Boxes

All boxes should be cleaned, packed and inventoried as per the manifest. Each manifest should agree exactly with the contents of the matching equipment box. Each box should be banded. Ensure that each case is clearly marked with the return address and UNAVCO contact and phone number.

10-2 Return Boxes to Shipping Agent

Return the boxes to the shipping agent to whom the UNAVCO Facility delivered the equipment. For international projects the shipping agent can help you with return customs clearance.

10-3 Required Information

The following information should be FAXed to the UNAVCO Facility. They will forward it to the local customs broker for international shipments.

a. Airline
b. Air waybill number
c. Flight routing (from point of departure to Denver or UNAVCO Facility).
    Departure / ETA's
    Flight numbers
    Point of entry for international projects
d. Agent or Contacts along route
e. Number of boxes and total weight
f. Billing used
    1st choice - Prepaid by agent; bill receiving shipper in Denver
    2nd choice - Collect by receiving shipper in Denver

10-4 Instructions for Shipper

a. Ship on a pallet, if applicable
b. Band each box
c. Band boxes to pallet, if applicable
d. Ship all boxes together

10-5 Shipping Agent Should Contact Denver Shipper

The shipping agent should contact the receiving shipper in Denver. Your UNAVCO contact should give you their address, phone and FAX number before departure. Be sure you have this.

10-6 Contact UNAVCO Facility if You Have Any Problems

The UNAVCO engineer or Agent should not leave the field area until the equipment is on its way back to the UNAVCO Facility.

11 UNAVCO Data Management Guidelines

11-1 Introduction

UNAVCO has developed a comprehensive data management strategy to safeguard the present and future scientific value of GPS project data. This strategy encompasses most aspects of a typical project. It includes pre-project planning, data acquisition, conversion and verification in the field and at the Facility, and long-term archiving and data retrieval. The process involves project investigators, field operators, and Facility field engineers and archiving staff who are most familiar with the data. UNAVCO's data management strategy supports new modes of operation including continuously operating networks and mixed mode occupation strategies for regional GPS Geodesy. UNAVCO's goal is to provide a flexible, reliable service that meets the needs of the expanding users of the UNAVCO Facility.

11-2 Data Management Timeline

UNAVCO deadlines for data management are designed to meet NSF and NASA guidelines on data accessibility. At present, NSF requires that data be made available to the public one year after the project ends. NASA requires that data be made available six months after the project ends. To preserve the data integrity and to meet these deadlines, the data should be archived immediately after return from the field. Data are made public at the specified deadlines, not at the time of archiving. Exceptions can be made (section b.) at the request of the PI. UNAVCO will represent PI's needs in these matters to the Board of Directors and the sponsor whenever necessary.

a. The Initial Planning Meeting and subsequent meetings will be used to establish the PI's requirements regarding data security in the archive (see section 11-4) and conditions for accessing the data from the archive. The PI will consult with the field engineer and if necessary, the UNAVCO archivist, to determine current standards for submitting the data to UNAVCO.
b. Unless otherwise arranged by the PI, the project data will be archived upon the completion of the field operations (the PI may request alternative arrangements subject to approval by UNAVCO). The UNAVCO Board of Directors and NSF and NASA guidelines will be used to determine data availability. Data include raw data, RINEX data, meta-data (descriptions of and information about data and sites such as file names, antenna heights, and general locations and dates, and processed results. Generally this means that a web table containing information about the project will be readily accessible to the community. Requests for the data prior to the deadline noted above are met based on the PI's written statements (see section 7-4). After the specified deadline passes the data will be released without further PI notification. Requests for data are met as quickly as possible based on resources.

11-3 Media

The UNAVCO engineer will recommend a media source and will acquire media, labels and forms used in the campaign. Typical options include CD-RW, optical disks, zip disks, and floppy disks.

11-4 Information to Provide UNAVCO Before Campaign Begins

a. Campaign name: (a few words, e.g. "South Pacific, 1990").
b. Principal Investigators: (Names, Addresses, e-mail, etc.).
c. Other Investigators: (Students who will be heavily involved, etc.).
d. Primary contact: (chosen from above lists, preferably one name).
e. Security level of the data: (levels 1-3 require prior approval by the funding agency and the UNAVCO Board of Directors).

    1) May not be archived.
    2) May be archived but no information other than the campaigns existence will be disclosed to the community without the PI's written approval.
    3) May be archived and the general nature of the campaign (map area, number of sites, site names, low precision site coordinates) can be browsed by the community but no data files or site descriptions distributed.
    4) May be archived and released to any who request it, in accordance with the UNAVCO data policy.

f. List of sites to be occupied in the form: site abbreviation (four character ID) and brief site description including mark stamps and description.

    Example: *BOLD = 826m W/SW of intersection of Baseline Rd. and Broadway Boulder, Colorado, 39.97 N, 254.667E, mark stamp "Slater" on 1.5 inch diameter circular brass NGS monument.*

g. For each site give approximate dates and times of each session. Use UT for times by default; otherwise specify time zone and offset. Specify dates in an unambiguous format (do not use a number for the month).

   Example: *BOLD 0800 > 1200, 2000 > 2400 10-NOV-92 > 17-NOV-92*

11-5 Information to Send to UNAVCO After Campaign Ends

a. Media: Most media are supported by UNAVCO. Current support includes zip, optical, CD, and floppy disks, PCMCIA cards, hard drives, tapes, and optical platters. Media must be clearly labeled with the contents, and in the case of multiple site media storage, accompanied by a list of what is contained on the media and the directory structure. Additionally, for multiple site media storage, UNAVCO provides tools that will store the verified data (RINEXed) along with the raw data.
b. Each disk or cassette should be clearly labeled with a unique name incorporating the campaign name, site abbreviation and the date of the session. Use the same system for the entire campaign. In addition, please send separately a list of cassettes/floppy disks, etc. using the same identification system. The UNAVCO field engineer will supply the labels, media and forms, or work with the PI to handle special request.
c. Session Logs: The standard forms should be used for the session logs and should be filled out completely. Please label these forms with the same system that is used for the media, if possible. Ensure that the copies submitted to UNAVCO are legible and complete. Also, ensure that the identification information is consistent between the log sheets and the cassette or disk media.
d. Input and Output Format: For each type of receiver in the project, provide the version of the recording firmware that was used. Note that translation cannot begin until this information is provided and that the log sheets often do not arrive until months after the cassettes or floppies. Please specify output format desired. Note that some formats may not be available for some receivers. You are encouraged to request data in RINEX format, though other formats will be considered.
e. Storage of materials: All the materials will be stored at the UNAVCO archive by default. If this is not desired, please specify an alternate arrangement.

11-6 Extracting Data from the Archive

A catalogue of archived data is available on the UNAVCO web site. The directory, or browse file, is a listing of campaigns and general information about the region of the campaign and the data accessibility (security level). The data are accessible based on the previous arrangements of the original PI at the time of the Initial Planning Meeting.

To request data, send email to archive@unavco.ucar.edu. Include the name of the campaign, site name, date and times of interest, and any other details. UNAVCO archive personnel will respond with information concerning data availability. Data may also be requested by regular letter mail to the UNAVCO Archive.

12 UNAVCO Facility Information

12-1 UNAVCO Facility Addresses

UNAVCO
3340 Mitchell Lane
Boulder, CO 80301, USA

12-2 UNAVCO Facility Staff Phone & E-mail List

www.unavco.ucar.edu

12-3 INTERNET Access - World Wide Web & FTP

a. UNAVCO Facility web site: www.unavco.ucar.edu
b. UNAVCO Inc. web site: www.unavco.org