

Introduction to Site Surveys for Co-location

Axel Nothnagel, Jim Long

Geodetic Institute of the University of Bonn
Honeywell TSI/NASA GSFC

1. Planning and Strategies

- Site situation
 - Space geodesy observing platforms
access / operation periods
 - Distance between observing platform
 - Availability of monumentation
- Personnel
- Equipment
 - Tripods, tribrachs
 - Theodolites/tachymeters and reflectors
 - Levelling instruments, levelling rods
 - GPS receivers and antennas
- Weather conditions

2. Site monumentation and local control network

- Control network and footprints
 - 2 levels of networks: close by and few kilometers distance
 - Stable permanent monumentation
 - * Self centering
 - * Height reference bolt
 - * Thermal insulation
 - * Height of pillar suitable for optical observations
 - * Network geometry with sufficient lines of sight between pillars
 - Sufficient number of pillars for each technique
 - Suitable for observing between networks
 - Provisional points using tripods

3. Methods

- Local ties / observing platform stability
Method of choice: conventional terrestrial surveying
 - Determination of ground network coordinates
 - * Height (control) of pillars with levelling instruments
 - * Establish scale of network using electronic tachymeters
 - * Triangulation
 - Determination of technique reference point
 - * Develop model for indirect representation
heavily depends on local situation
 - * 3D forward intersects for markers
- Transformation into geocentric system
 - GPS observations of sufficient duration on “identical” points
- Footprints
 - Method of choice: GPS observations
 - * Control of footprint points
 - * Permanent or campaign type observations
Permanent requires infrastructure and security of footprint points

4. Equipment

- Survey instruments
 - Tripods, tribrachs
 - Forced centering
 - Theodolites/tachymeters and reflectors
 - Levelling instruments, levelling rods
 - GPS receivers and antennas
- Calibration of survey instruments
 - Electronic distance meters and reflectors
 - Levelling instruments

5. Data Analysis

- Least squares adjustment
 - Raw analysis on site to detect blunders and missing elements
 - Final Adjustment
- Results
 - SINEX file
 - Report

6. General Comments

- Redundancy of measurements
- Repeated surveys for control of stability