# IERS Working Group on Site Survey and Co-locations (IERS WG 2)

jointly with IAG Sub-Commission 1.2 – WG 2 (SC1.2-WG2)

## Charter

### Introduction

Nowadays the quality of the station coordinate results of the various space geodetic techniques is of the order of a few millimetres in the horizontal and about 1 cm in the vertical component, respectively. In view of this precision, one of the major limiting factors in the establishment of a unique, high-precision terrestrial reference frame is the quality and availability of accurate local tie information for all the co-located sites around the globe. In short the, ITRF existence and quality are highly dependent on the collocation sites. New satellite missions (e.g. altimetry missions for the detection of sea level change) ask for extremely accurate, stable and consistent reference frames and Earth orientation parameter series and thus require well-distributed, numerous co-location sites between all the different techniques.

Because of the many uncertainties in information about local ties, the individual space geodetic techniques tend to question the quality of local ties instead of considering systematic effects between the techniques that might be the reason for the discrepancies at a site. In order to identify such technique-specific systematic errors – a clear necessity for the success of a rigorous combination – the local ties have to be established with an accuracy of 1 mm.

Whereas already full variance-covariance matrices are exchanged for the combination of the global solutions of the space geodetic techniques, we are still faced with an archaic situation what the local ties are concerned (doubtful ties, few or no information on the quality, let alone variance-covariance matrices).

The work of the IERS WG “Site Survey and Co-location” (IERS WG 2) should also be seen in view of the developments within the IERS that aim at a rigorous combination of the space geodetic techniques in order to generate highly consistent and accurate products for station coordinates and velocities, Earth Orientation Parameters (EOP), and quasar coordinates. To achieve this ambitious goal the quality of the local ties is one of the crucial points. Therefore, a very close cooperation should be established between the WG “Site Survey and Co-location” and the WG “Combination”, that coordinates the IERS Combination Pilot Project.

### Goals and Objectives

The major goals and objectives of the WG are:

1. Site Survey and Standards
    - Develop, test, compare and set standards on site survey methods, including observational techniques, network design, classical adjustment, geometrical modelling and/or direct measurement techniques for invariant point determination, reference frame alignment, software implementation and SINEX generation. This will include the development of a standards document for undertaking site surveys.

- Preparation and coordination of a Pilot Project (PP) on site survey. The PP will include a test campaign(s) to be used for the comparison of different approaches to local tie surveys addressing each of the technical elements.
- Develop standards for the documentation of site surveys, including survey report content and format.
- Suggest a pool of expertise to provide advice to survey teams, as required, on standards for site surveys.

2. Coordination
   - Liaise with local and international survey teams undertaking site surveys at important co-location sites.
   - Liaise with the technique combination groups to ensure WG site survey products meet user requirements.
   - Coordinate as required and make recommendations to observatories as to survey scheduling and re-survey frequency.
   - Develop and distribute software tools to the community to assist in the generation of site survey products, including SINEX generation software.
   - Provide a forum to raise the profile of site survey as a critically important independent geodetic technique.
3. Site Survey Research
   - Investigate new site survey methodologies, including observational techniques, observational modelling, invariant point definition, geometrical modelling and/or direct measurement techniques for invariant point determination, reference frame alignment and structural deformation analysis.
4. Future Planning
   - The WG will make recommendations and prepare for the future in respect to the ongoing site survey needs of the community and how these needs will be met in the long term (to address issues outside of the scope of this WG).
   - Develop recommendations as to how the community can provide the IERS database with all information relevant to inter-technique combination issues and to the maintenance of the ITRF: collect and archive SINEX files of local surveys with correct variance-covariance information, survey reports, site documentation and log files, maps, types of co-located instruments, list of site events (technique-independent), etc.

## Schedule

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| March, 2004 | Call for participation in Pilot Project on Site Survey. |
| April 16, 2004 | Finalise draft definition of the minimum standards for IERS site surveys, including SINEX requirements. Finalise site survey priority schedule. Deadline for PP submissions. |
| April 25-30, 2004 | First meeting of the IERS WG 2 (EGU Nice, France). Report on research aspects of site survey. Review of draft Site Survey Document and draft Survey Report Template. Official planning of Pilot Project. |
| June, 2004 | Site survey and co-location web site established. |

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| July, 2004 | WG to release site survey and co-location software tools (including SINEX output tools) that may assist groups undertaking co-location surveys to IERS standards. |
| April 25-29, 2005 | Meeting of the IERS WG 2 (EGU Nice, France). Report on research aspects of site survey. Review status of the Site Survey Document and the Survey Report Template. Progress meeting of Pilot Project. |
| August 22-26, 2005 | Meeting of the IERS WG 2 (IAG General Assembly, Cairns, Australia). Progress meeting of Pilot Project. |
| December 2005 | Report on the future directions of the activities related to site survey and co-location WG. Final report of Pilot Project due. |

### Chair:

John Dawson

### Members:

Zuheir Altamimi (ITRF)
Detlef Angermann
Claude Boucher (ITRF)
Herve Fagard (IDS)
Bruno Garayt
Ruediger Haas
Gary Johnston
Jinling Li
Jim Long
Chopo Ma (IVS)
Shigeru Matsuzaka
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Angie Moore (IGS)
Axel Nothnagel (IVS)
Mike Pearlman (SLR)
Bernd Richter (IERS CB, database)
Markus Rothacher (IERS AC)
Pierguido Sarti
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