

Harmonizing Collocation Information for InSAR Infrastructure in GNSS Sitelogs

Lennard Huisman (NSGI - Kadaster) and Hans van der Marel (Delft University of Technology)

Introduction

More and more InSAR **Corner Reflectors (CR)** and **Active Compact Transponders (ACTR)** are collocated with GNSS reference stations. Currently there are no clear guidelines on how to include these collocations in sitelogs. Such guidelines are important to harmonize the information on GNSS and InSAR collocations. The collocation information on InSAR in the GNSS sitelog is meant to identify the collocated instrumentation and installation type for a certain period. This contribution provides a proposed convention on how to include InSAR instrumentation and installation types in sitelogs in a standardized way.

Collocation section in GNSS sitelogs

Collocation information can be added to section 7 of the GNSS sitelogs. The structure of section 7 is as follows:

```
7.x Instrumentation Type : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
    Status                : (PERMANENT/MOBILE)
    Effective Dates       : (CCYY-MM-DD/CCYY-MM-DD)
    Notes                 : (multiple lines)
```

The next sections will suggest how to fill these four subsections.

Instrumentation type

The instrumentation type should describe the type of InSAR instrumentation (CR or ACTR). Next to that, the instrumentation can be set up to reflect signals in the **Ascending (A)** or **Descending (D)** track. If a pair of instruments is installed for both ascending and descending tracks, the instrumentation is **Coupled (C)**. In case the InSAR instrumentation is mechanically coupled and integrated with the GNSS monument and the GNSS station is continuously operating, the installation type is **Integrated (I)**. To describe the InSAR instrumentation type in the collocation section, we suggest the following convention:

INSAR <instrument type>/<installation type>.

This leaves us with the following table of possible instrumentation types:

InSAR instrument / installation type	Ascending (A)	Descending (D)	Coupled (C)	Integrated (I)
Corner reflector (CR)	INSAR CR/A	INSAR CR/D	INSAR CR/C	INSAR CR/I
Active compact transponder (ACTR)	INSAR ACTR/A	INSAR ACTR/D	INSAR ACTR/C	INSAR ACTR/I

Status

If the installation is not permanent the status is mobile.

Effective dates

InSAR instrumentation needs to be aligned relative to the satellite ground tracks. In some cases, instrumentation is installed but not aligned immediately. In this situation, it can happen that the instrument is already affecting the scatter in InSAR data but not usable. The effective dates are preferred to provide the period in which the instrument was orientated correctly.

Notes

If a transponder and corner reflector information file or other information is available, the notes section can be used to provide a hyperlink to this logfile or add the information. An example is given on the right for IJMU00NLD.

Surveyed local ties

If there is information on the relative position of the InSAR and GNSS instruments this information can be added to the existing section 5 on surveyed local ties.

Next steps

We recommend to share these proposed conventions with station operators and include them in guidelines into station guidelines. When successful the availability of information on InSAR and GNSS collocation will be improved and more consistent in GNSS sitelogs. If this action is successful, it might be followed up by an action to harmonize information on other collocated sensors, such as gravimetry sensors, as well.

Examples of instrumentation and installation types

Below some examples of instrumentation and installation types are shown for clarification.

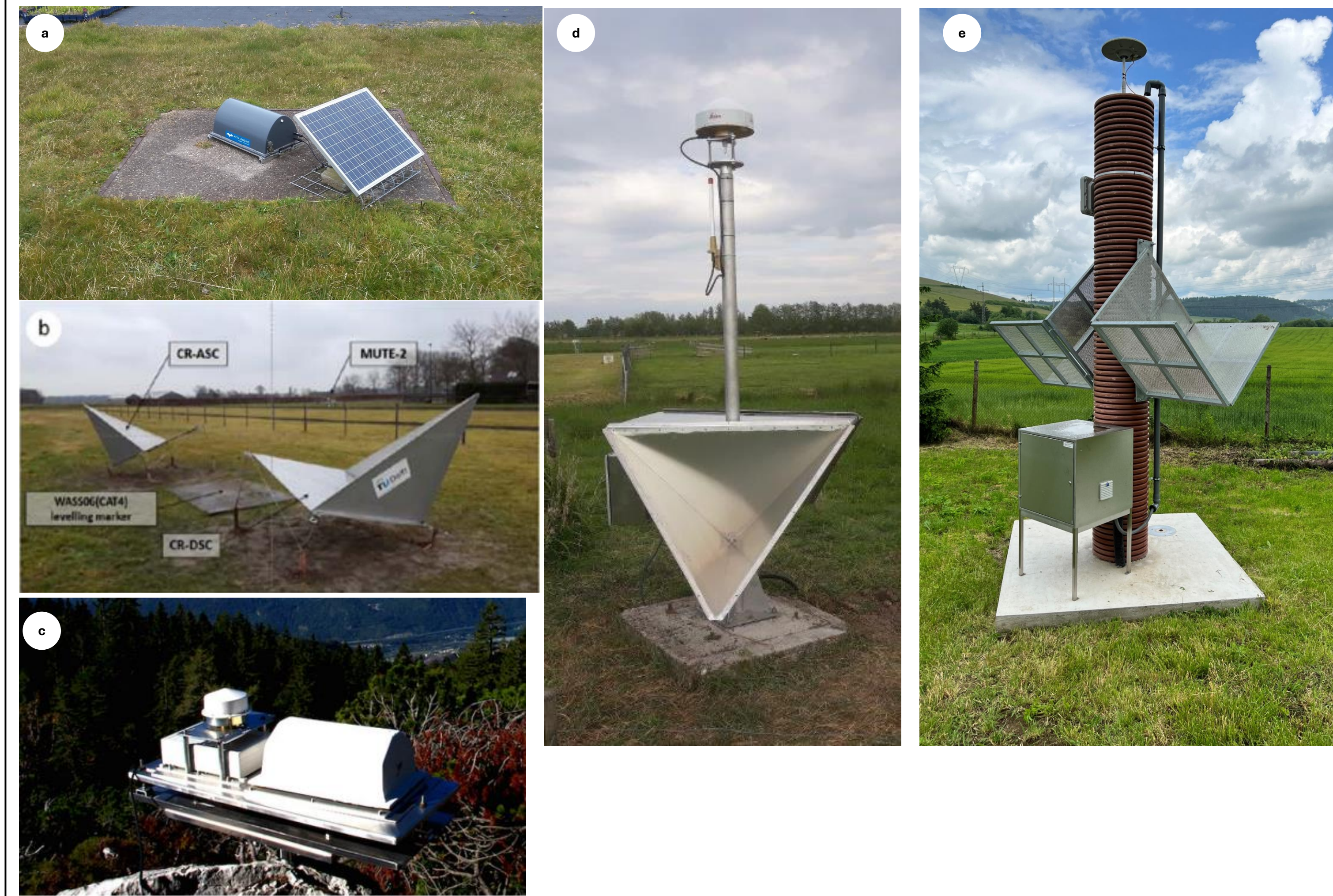


Figure: Different types of instruments:

- Coupled active transponder: ACTR/C,
- Two collocated, not coupled, corner reflectors: CR/A and CR/D,
- Active transponder integrated with GNSS: ACTR/I,
- Integrated Geodetic Reference Station (IGRS) CBW100NLD: CR/I,
- Integrated setup SPVL00SVK: CR/I

Sitelog example IJMU00NLD

```
7. Collocation Information
7.1 Instrumentation Type : TIDE-GAUGE STATION
    Status                : PERMANENT
    Effective Dates       : 1996-08-27/CCYY-MM-DD
    Notes                 : Tide gauge at Noordzee coast operated by RIKZ.
7.2 Instrumentation Type : UNDERGROUND LEVELING BENCHMARK
    Status                : PERMANENT
    Effective Dates       : 2004-12-30/CCYY-MM-DD
    Notes                 : Dutch height system NAP benchmark No. 024F0042
7.3 Instrumentation Type : INSAR ACTR/D
    Status                : PERMANENT
    Effective Dates       : 2012-05-14/2012-11-16
    Notes                 : InSAR transponder No. CAT1, occupancy code 01A0
    Systems: RS2
7.4 Instrumentation Type : INSAR ACTR/D
    Status                : PERMANENT
    Effective Dates       : 2012-11-16/2015-03-14
    Notes                 : InSAR transponder No. CAT1, occupancy code 01B0
    Systems: RS2
    CAT moved to other side of mast
7.5 Instrumentation Type : INSAR ACTR/D
    Status                : PERMANENT
    Effective Dates       : 2015-03-14/2015-12-27
    Notes                 : InSAR transponder No. CAT1, occupancy code 01B1
    Systems: RS2, S1
    Sentinel-1 (S1) observations added to program
7.6 Instrumentation Type : INSAR ACTR/C
    Status                : PERMANENT
    Effective Dates       : 2023-03-16/CCYY-MM-DD
    Notes                 : InSAR transponder No. E137, occupancy code 01C0
    Systems: S1
7.x Instrumentation Type : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
    Status                : (PERMANENT/MOBILE)
    Effective Dates       : (CCYY-MM-DD/CCYY-MM-DD)
    Notes                 : (multiple lines)
```

