

VITA Operations Team

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on behalf of the team

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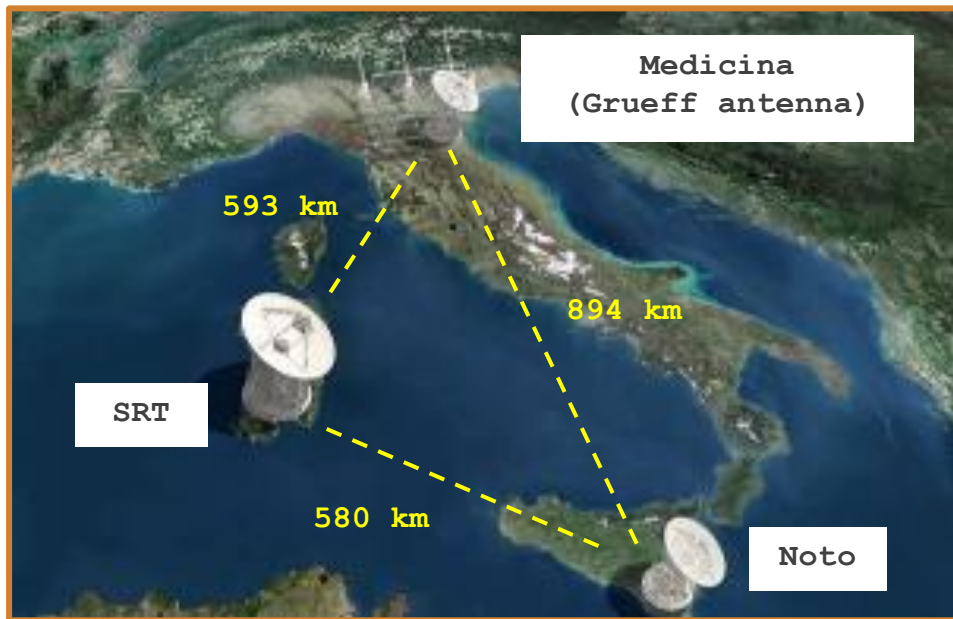
What is VITA?

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VLBI Italian Array



LIFE

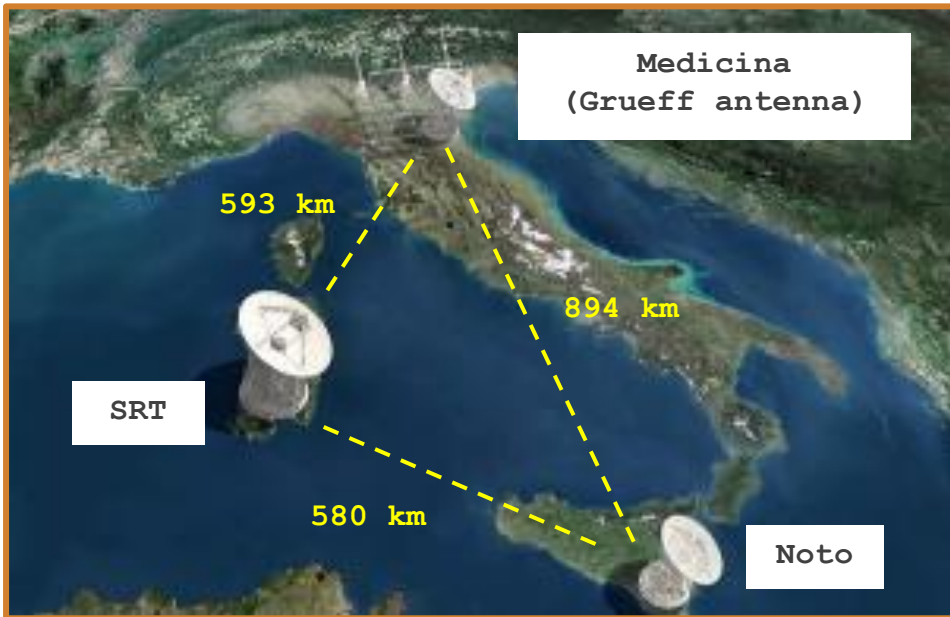


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«Una nuova **VITA** per le antenne italiane.»

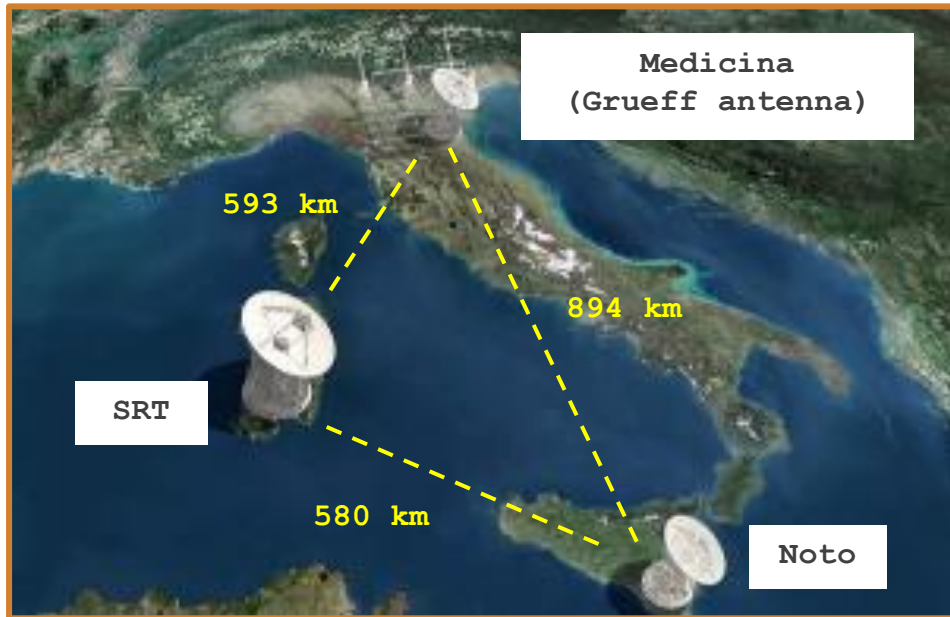
«A new **LIFE** for the Italian antennas.»

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«Una nuova **VITA** per le antenne italiane.»

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Compact Triple-Band Receivers installation and upgrades of the three antennas

What is the VITA Operations Team?

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The first seed was sown during the meeting *‘Towards high-performance mm-VLBI science operations with multi-band receivers’* (Bologna, October 28th-31st, 2025).

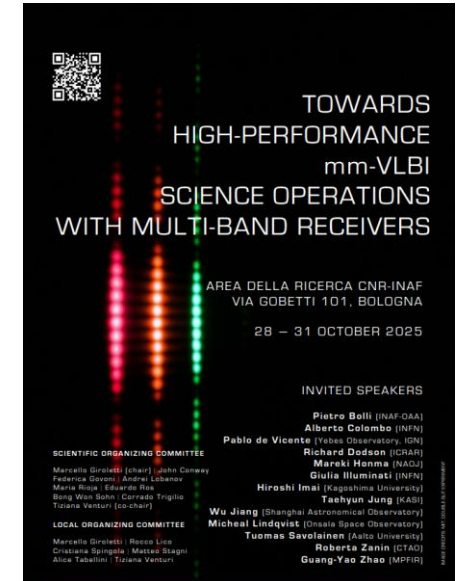


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The **kick-off meeting** was on November 28th, 2025.

- **27 INAF members** across 5 institutes: Arcetri, Bologna, Cagliari, Catania, and Rome.
- **Multidisciplinary expertise:** hardware/software engineers, VLBI & correlator experts, site operators, IT operators & network administrators, and radio astronomers.
- **Regular montly meetings** (9 so far).



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Short-term: Establish the operational baseline and solve critical technical bottlenecks to execute the first multi-band/CTR VLBI tests between Italian antennas (SRT, Medicina, Noto) and international partners (KASI, Yebes, etc.).

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pySched (creation of the .vex file for DBBC3)



Drudg (creation of Field System observing file)



Data Recording and Correlation



Data Calibration

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Long-term: Provide end-to-end operational support for all TAC-approved VLBI observations using the VITA network (from scheduling to correlation and data delivery) at any frequency band.

The critical technical bottlenecks

VEX file creation for DBBC3:

- **Sched/pySched does not support the DBBC3** and its multi-band modes (6 IFs: 3 freqs x 2 pols).

(Setting DAR=DBBC3 in the stations file is not functional in *pySched v12*)

- DAR=DBBC2 only support DBBCVER = ASTRO/ASTRO2 (max 4 IFs), GEO (2 IFs), or HYBRID (3 IFs).

- **Workaround:** set *DAR=NONE* and *DBBCVER=NONE* in station file, generate two separates .vex file for different band pairs, and manually merge them in a single 3-band .vex file for the DBBC3.

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Field System (FS):

- **Incomplete DBBC3 support:** DRUDG currently lacks full support for the VEX2 format (required to optimize bit mapping across >4 IFs), forcing the use of unoptimized legacy VEX1.5 files.
- **Forced fallback:** restricts initial observations to 2 frequencies (most realistically utilizing the DBBC2).
- **Workaround:** station-specific control files used by the FS must be manually edited for the specific obs.
- *first communication tests between FS and DISCOS were carried out and appeared to work properly.*

The critical technical bottlenecks

to be checked/done:

- LO frequencies: confirming the multi-band LO frequency setup.
- Polarization outputs: Verifying output (LCP/RCP) from the CTR receivers
- DBBC3 data recording (known amplitude issue)
- Antab files creation
- Bit Mapping: Correcting the \$TRACKS section within the .vex file.
- Data correlation

station.dat

```
STATION=SARDINIA   STCODE=Sr  CONTROL=VEX
!!RMC: patching info based on Feb'14 NMEs (L, K)
  DBNAME = SARDINIA
  MOUNT=ALTAZ AX1RATE=51 AX2RATE=30 AX1LIM=-90,450 AX2LIM=6,87
  AX1ACC=0.3 AX2ACC=0.18
!   TSETTLE=3 DAR=DBBC  DBBCVER=HYBRID ! RECORDER=MKIV  NDRIVES=1  NHEADS=2
  TSETTLE=3 DAR=NONE  DBBCVER=NONE ! RECORDER=MKIV  NDRIVES=1  NHEADS=2
  NBBC=16 DISK=MARK5C MEDIADEF=DISK  TSCAL=CONT
/
```

03-26.vex

```
def 4BBCs;
* kqwbands: Sr
    BBC_assign = &BBC01 : 1 : &IF_A1;
    BBC_assign = &BBC17 : 17 : &IF_C1;
    BBC_assign = &BBC09 : 9 : &IF_B1;
    BBC_assign = &BBC25 : 25 : &IF_D1;
    BBC_assign = &BBC33 : 33 : &IF_E1;
    BBC_assign = &BBC41 : 41 : &IF_F1;
enddef;
*-----
$PHASE_CAL_DETECT;
*
def NoDetect;
* kqwbands: Sr
    phase_cal_detect = &NoCal;
enddef;
*-----
$FREQ;
*
def 22242.54MHz4x2MHz;
* kqwbands: Sr
    chan_def = : 22242.54 MHz : L : 2.00 MHz : &CH01 : &BBC01 : &NoCal; * RCP
    chan_def = : 22242.54 MHz : U : 2.00 MHz : &CH02 : &BBC17 : &NoCal; * LCP
    chan_def = : 44485.08 MHz : L : 2.00 MHz : &CH03 : &BBC09 : &NoCal; * RCP
    chan_def = : 44485.08 MHz : U : 2.00 MHz : &CH04 : &BBC25 : &NoCal; * LCP
    chan_def = : 88970.16 MHz : L : 2.00 MHz : &CH05 : &BBC33 : &NoCal; * RCP
    chan_def = : 88970.16 MHz : U : 2.00 MHz : &CH06 : &BBC41 : &NoCal; * LCP
    sample_rate = 4.000 Ms/sec;
enddef;
*-----
$TRACKS;
*
```

Possible BBCs setting for DBBC3:

setting 1

Board	Pol.	BCCs #	Band
A	RCP	1-8	K
B	RCP	9-16	Q
C	RCP	17-24	W
D	LCP	25-32	K
E	LCP	33-40	Q
F	LCP	41-48	W

setting 2

Board	Pol.	BCCs #	Band
A	RCP	1-8	K
B	RCP	9-16	Q
C	LCP	17-24	K
D	LCP	25-32	Q
E	RCP	33-40	W
F	LCP	41-48	W