Multimethodological approach to study the area of S. Giovanni in Laterano basilica (Rome, Italy)

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With the collaboration of D. Verrecchia ITABC CNR and Team of NewCastle University
The Project - This project is undertaking an intensive scientific survey of the entire structure to integrate information from standing buildings, excavated structures and sub-surface features through the collaboration of Newcastle University (UK), Florence University (Italy) and Institute for Technologies Applied to Cultural Heritage (ITABC-CNR, Italy). The earliest recorded excavations took place in 1730, the deepest lie 5.5 m below ground level. The general aim is to identify the remains of Roman Age and early Middle Ages to better understand the ancient topography and the urban evolution of this area.

Detailed aims

1. To locate the limits of Castra Nova Equitum Singularium, the barracks of the imperial horse guards established by the emperor Septimius Severus.

2. To locate the remains of the buildings of the Lateran Patriarchate. These are known from renaissance plans but up until now it has not proven possible to locate them on the ground.

3. To determine the full plan of the Santa Croce oratory; part of this building has been identified by Olof Brandt within the excavated area adjacent to the Baptistery.

4. To determine the full extent of the palatial housing found below the western part of the Basilica.
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*Archaeological map, after P. Liverani*
**Acquisition**: continuous profiling mode, within the 90 ns (400 MHz) and 195 ns (70 MHz) time window (twt); 16 bit data and 512 samples per radar scan.

**Basic Radargram Signal Processing**
- Post processing gain
- DC-drift removal
- Data resampling
- Background removal
- Migration

**Basic image Processing**
- Interpolation
- Staggering noise correction
- Transform/color application
- Time-slices
- Overlay analysis
- 3D image
Lateran Landscape

Paolo Liverani & Lateran Project
Scavi anni ‘60 nel «Giardino del Pallottini» (non più esistente)
400 MHz antenna – time slice at the estimated depth of 1.40 m
400 MHz antenna – time slice at the estimated depth of 2.30 m
400 MHz antenna – time slice at the estimated depth of 2.30 m
400 MHz antenna – time slice at the estimated depth of 3.00 m
St. John Lateran Basilica and Vicariate Palace (Rome): location of the area investigated with GPR
Topographical survey of the investigated area made with total station
Total GPR profiles: 777 profiles collected alternatively in forward and reversed directions (2012)
estimated depth 0.90 m

400 MHz antenna

estimated depth 1.40 m
estimated depth 2.00 m

400 MHz antenna

estimated depth 2.40 m
estimated depth 2.60 m

70 MHz antenna

estimated depth 3.80 m
estimated depth 4.00 m

70 MHz antenna

estimated depth 5.00 m
400 MHz antenna

estimated depth 0.90 m
400 MHz antenna

estimated depth 1.40 m
400 MHz antenna

estimated depth 2.00 m
400 MHz antenna

estimated depth 2.40 m
70 MHz antenna

estimated depth 4.70 m
Plan of the Patriachate prior to its demolition in the reign of Sixtus V. Lateran Archive.
400 MHz antenna

estimated depth 1.40 m
400 MHz antenna

estimated depth 1.40 m
400 MHz antenna

estimated depth 1.40 m
GPR survey 2016 January
Inside the Basilica
Possible reflection from the vault estimated distance 11.25 m at twt 75 ns
GPR survey 2016
Nave ND2
GPR survey 2016
estimated depth 0.50 m

a1: dim 4.8 x 1 m
a2: dim 4 x 3.5 m
a3: dim 3 x 3 m
GPR survey 2016
estimated depth 1.0 m

a3: dim 3 x 3 m
a4: semicircular anomalies
section 0.8 m
a5: 2 x 6.7 m
GPR survey 2016
estimated depth 1.50 m

a3: dim 3 x 3 m
a4: semicircular anomalies
    section 0.8 m
a5: 2 x 6.7 m
a6: square anomaly with
    dim 3.8 x 2.6 m
GPR survey 2016
estimated depth 2.0 m

a2: dim 4 x 3.5 m
a4: semicircular anomalies section 0.8 m
a6: square anomaly with dim 3.8 x 2.6 m
GPR survey 2016
estimated depth 3.0 m

a2: dim 4 x 3.5 m
a6: square anomaly with
dim 3.8 x 2.6 m
GPR survey 2016
estimated depth 3.5 m

a2: dim 4 x 3.5 m
a6: square anomaly with
dim 3.8 x 3.6 m
a7: dim 3 x 3 m; 4 x 3.5 m
A8: dim 1 x 5 m; 1 x 6 m
Acknowledgment

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