

## REPORT ON THE FIELD-WORKSHOP ON LOWER-MIDDLE PLESTOCENE TRANSITION IN ITALY

(Workshop in Bari, October 11<sup>th</sup>, 2014; Field-trip October 12<sup>th</sup>-13<sup>th</sup>, 2014)

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**ABSTRACT:** The report which presents the results of the Workshop Field-trip on "Lower-Middle Pleistocene transition in Italy" was organized by AIQUA and by ICS - Subcommittee on Quaternary Stratigraphy - and sponsored by the Earth and Environmental Sciences Department of University "A. Moro" of Bari. The workshop focuses on the presentation and discussion of the main results obtained from multidisciplinary scientific studies carried out on two Italian stratigraphic marine sections candidate to represent the GSSP of Lower-Middle Pleistocene transition (Montalbano Jonico in Basilicata and Valle di Manche in Calabria). A short presentation of a third GSSP candidate (Chiba section in Japan) was also planned. Therefore two significant Lower-Middle Pleistocene lacustrine intrapenninic successions (S.Lorenzo in Sant'Arcangelo Basin in south Italy and Sulmona paleolake basin in central Italy) have been illustrated. The field-trip was organized in a two-day excursion in order to visit the above-mentioned Sections.

Keywords: marine sections, lower-middle Pleistocene transition

### 1. INTRODUCING THE AIQUA-INQUA WORKSHOP

The organization of this scientific event was suggested by the Inqua International Commission on Stratigraphy - Subcommittee on Quaternary Stratigraphy - to the aim of having a complete picture on the multidisciplinary studies carried out on the two GSSP Italian sections candidate to represent the Early-Middle Pleistocene transition. The organization of the Field-Workshop was made possible through the precious help of Maria Marino, Angela Girone, Patrizia Maiorano, Adele Bertini and Salvatore Gallicchio and, for the Valle di Manche section, of Luca Capraro. Additional help in preparing field-trip was offered by the Mayor of Montalbano Jonico and his staff.

### 2. WORKSHOP PROGRAM

The workshop was held in Bari on October 10<sup>th</sup>, 2014: its main purpose was to present the state of the art of the two Italian GSSP sections candidate to represent the Early-Middle Pleistocene transition; during the Workshop the presentation of the studies on the third GSSP candidate (Chiba section in Japan) was also planned together with the illustration of the main features of the two Early-Middle Pleistocene sequences in the continental environment of San Lorenzo paleolake (Basilicata) and Sulmona paleolake

(Abruzzes). All the presentations took place at the Department of Earth and Environmental Sciences of "Aldo Moro" University in Bari. More than 30 scientists, mostly Quaternary stratigraphers and paleontologists attended the meeting.

2.1 - The workshop was opened by two introducing presentations whose main purpose was defining the



Fig. 1 - Location of the two Italian candidate Early-Middle Pleistocene GSSP sections in Basilicata (Montalbano Jonico) and in Calabria (Valle di Manche) and the lacustrine coeval succession in Sant'Arcangelo Basin.

primary requirements of Middle Pleistocene GSSP and summarizing the Early-Middle Pleistocene transition features during the Marine Isotope Stage 19. They are: **1** - Head M.J. - *Defining the Lower-Middle Pleistocene GSSP: procedures, practicalities, and pitfalls*; **2**- Head M.J., Gibbard P.L. - *The Early-Middle Pleistocene transition: latest developments and emphasis on Marine Isotope Stage 19*.

**2.2** - A second group of presentations, concerning the results of the more recent studies on the Montalbano Jonico section, includes: **3** - Ciaranfi N., Aiello G., Barra D., Bertini A., Gallicchio S., Girone A., Lirer F., Maiorano P., Marino M., Petrosino P., Toti F. - *The Montalbano Jonico section in the south Apennines foredeep (Italy): a reference for the Early-Middle Pleistocene transition*; **4** - Petrosino P., Jicha B.R., Mazzeo F.C., Ciaranfi N., Girone A., Maiorano P., Marino M. - *The Montalbano Jonico marine succession: an archive for distal tephra layers at the Early-Middle Pleistocene boundary in southern Italy*; **5** - Bertini A., Toti F., Ciaranfi N., Girone A., Maiorano P., Marino M. - *Climate stratigraphy across the Early-Middle Pleistocene boundary from palynological data of the Montalbano Jonico section (South Italy)*; **6** - Toti F., Bertini A. - *Vegetation and climate changes throughout the Montalbano Jonico section to MIS 18 up to MIS 16: new insights and preliminary results*. On the whole the presentations revealed a complete picture of the present-day knowledge about various interdisciplinary investigations especially carried out on MIS 18-21 time interval, with particular regard to paleoclimatic evolution of MIS 19 which includes the M/B paleomagnetic reversal.

**2.3** - A third group of presentations, concerning the results of the more recent studies on the Valle di Manche section, includes: **7** - Capraro L., Macri P., Scarponi D., Ferretti P., Bellini G., Dalan G. - *The Valle di Manche section (Calabria, southern Italy): state of the art, recent advances and future perspectives*; **8** - Scarponi D., Capraro L., Huntley J.W., Macri P., Raffi S. - *Stratigraphic variation of molluscan assemblages across the Lower to Middle Pleistocene transition in the Valle di Manche section (Calabria, southern Italy)*. The presentations mainly concerned new reconstructions of the high-resolution  $\delta^{18}\text{O}$  record and the pinning down of the B/M boundary in the section, in addition to the water depth variations between MIS 23 and MIS 19 put in evidence by changes in the composition of macrobenthic assemblages.

**2.4** - The last group of presentations includes: **9** - Suganuma Y., Kumai H. and other - *The Chiba section in Japan: a reference for Early-Middle Pleistocene transition*; **10** - Sabato L. - *The San Lorenzo lacustrine succession in the Sant'Arcangelo Basin (South Italy): a wonderful record of the Early to Middle Pleistocene in a continental environment*; **11** - Giaccio B., Nomade S., Sagnotti L., Zanchetta G., Renne P., Scardia G., Drysdale R.N., Tzedakis P.C., Sottili G., Sprain C., Sposato A., Scao V., Bassinot F., Messina P. - *The Low to Middle Pleistocene contribution for high resolution record of the Sulmona paleolake (Abruzzes, Italy)*.

### 3. FIELD - TRIP PROGRAM

The field-trip was developed in a two-day excursion



Fig. 2 - The field-trip participants

sion: the first day, which was totally spent in Basilicata, was devoted to the visit of the Montalbano Jonico section that is well exposed along the internal border of the southern Apennines Foredeep (Fig 2), with particular attention to the “Ideale Section”, and to a short visit to the continental succession in the S. Arcangelo basin.

The second day excursion was devoted to the visit to the Valle di Manche section, near the village of San Mauro Marchesato in Calabria.

### 3.1- October 12<sup>th</sup>

The Montalbano Jonico village is surrounded by a breathtaking badland landscape of both great panoramic and scientific value. Along the western steep slope of Montalbano Jonico a Lower-Middle Pleistocene composite section has been reconstructed, for a thickness of about 450 m; it extends from MIS 37 to MIS 16 (from 1240 ka to 645 ka) and consists in muds and muddy silts, from upper slope to shelf environment, which nine volcanoclastic layers (V1-V9) are interbedded to. One of the partial sections (Ideale Section) contains the transition between Early and Middle Pleistocene (Fig. 3). In its upper part  $\delta^{18}\text{O}$  and climatical-palynological data indicate the location of the MIS 19 isotopic stage and 19.1-19.2-19.3 substages, which

approximate the Brunhes/Matuyama boundary, just above V4 layer very close to MIS 19.2. This partial section represents a suitable interval for the definition of the GSSP (Global Boundary Stratotype Section and Point) for the Ionian Stage (Middle Pleistocene).

Not far from Montalbano Jonico the lacustrine succession of S.Lorenzo is well exposed in the eastern part of S. Arcangelo Basin, showing an Early-Middle Pleistocene transition in a continental environment.

### 3.2 - October 13<sup>th</sup>

Along the badland just below the cemetery of San Mauro Marchesato the Valle di Manche stratigraphic section (Fig. 4) is exposed for a thickness of about 50 m. It contains the transition between Early and Middle Pleistocene, which, according to new marine isotope stratigraphy, is marked by the M/B boundary located just before the peak of MIS 19. From a lithologic and environmental point of view the sediments around MIS 21 and 19 consist in outer-shelf muds, alternated with the shallowing-up silts and sandy silts. A tephra layer, called Pitagora ash, outcrops in correspondence with MIS 19: this tephra cannot be considered equivalent to V4.

The present state of the studies and some differences among the stratigraphic features of the two ma-



Fig. 3 - The participants at the base of the “Ideale Section” in Montalbano Jonico area: the white labels indicate the stratigraphic positions of V3 and V4 tephra layers and those of maximum flooding surface near the M/B boundary.

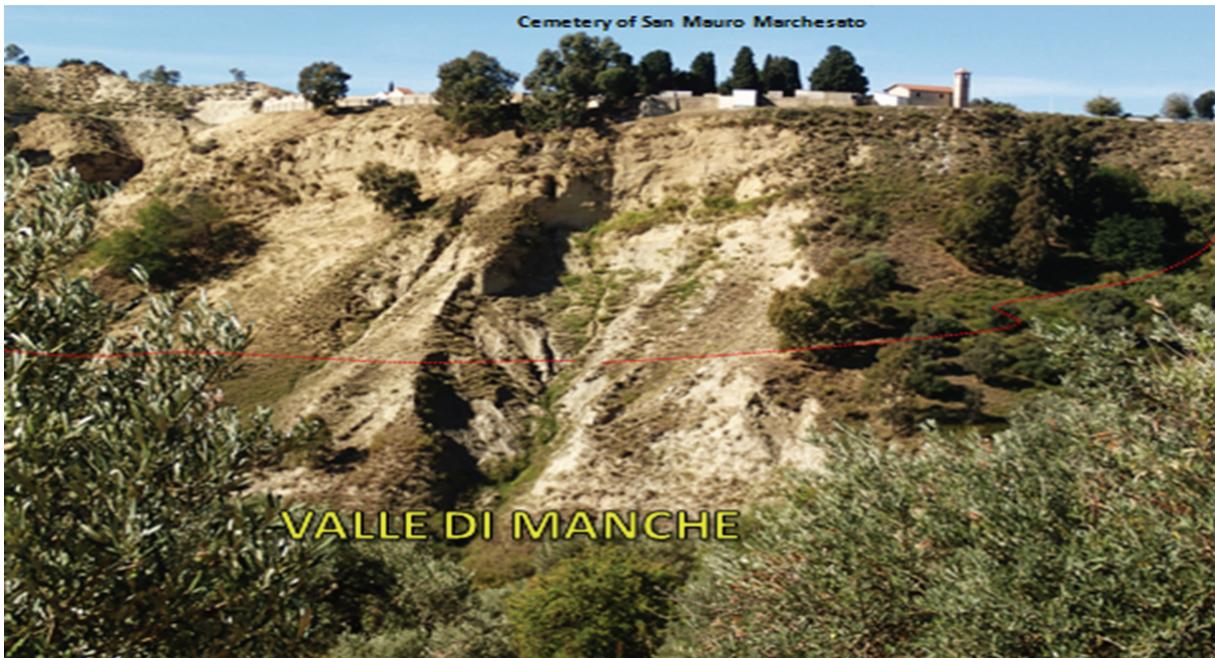


Fig. 2 - The Valle di Manche section. The red line indicate the transition between Early and Middle Pleistocene

rine sections of Montalbano Jonico and Valle di Manche do not allow to establish a robust correlation among these candidate sections.

#### 4. CONCLUDING REMARKS

After the end of this event some conclusive remarks have been summarized by the Chair of Subcommittee on Quaternary Stratigraphy of INQUA, about the state of the studies on the two Italian GSSP candidate sections.

In particular the Ideale section in Montalbano Jonico shows detailed foraminiferal and nannofossil biostratigraphy, robust pollen and ostracods paleoclimatic data,  $\delta^{18}\text{O}$  isotope stratigraphy with MIS 19 and its substages (19.1/19.3) well identified, astronomical calibration, nine tephra layers (V1-V9) - all geochemically well defined and two of them (V3-V4)  $^{39}\text{Ar}/^{40}\text{Ar}$  dated. The good preservation of the section and its easy access are guaranteed by the insertion of the section into a "Special Natural Reserve of Montalbano Jonico badlands" instituted with the Law 3/11 by the Basilicata Region. Furthermore the lower part of the Montalbano Jonico section together with the Vrica section in Calabria could represent a Unit Stratotype for the Calabrian Stage.

The Valle di Manche section shows the Matuyama-Brunhes reversal just before MIS 19, detailed foraminifer and nannofossil biostratigraphy, pollen assemblages, paleoclimatic data,  $\delta^{18}\text{O}$  stratigraphy, good chronology around M/B boundary and a good exposure.

#### REFERENCES

Capraro L., Asioli A., Backman J., Bertoldi R., Channell

J. E. T., & Massari F. et al. (2005) - Climatic patterns revealed by pollen and oxygen isotope records across Brunhes-Matuyama Boundary in the Central Mediterranean (Southern Italy). In M. J. Head & P. L. Gibbard (Eds.) - Early - Middle Pleistocene transitions: The land-ocean evidence. London Geological Society, special publication 247, 159-182.

Capraro L., Vai G.B., Backman J., Channel J.E.T., Massari F., Rio D., Scarponi D., Sgavetti M., Tateo F. (2014) - The Valle di Manche Section (Calabria, Southern Italy): a Candidate Section for the GSSP of the Ionian Stage (Middle Pleistocene Subseries). *Strati* 2013, 915-917, Springer Geology.

Ciaranfi N., D'Alessandro A., Girone A., Maiorano P., Marino M., Soldani D., Stefanelli S. (2001) - Pleistocene sections in the Montalbano Jonico area and the potential GSSP for Early-Middle Pleistocene in the Lucania Basin (Southern Italy). *Mem. Sc. Geol. dell' Univ. di Padova*, 53, 67-83.

Ciaranfi N., Lirer F., Lirer L., Lourens L.J., Maiorano P., Marino M., Petrosino P., Sprovieri M., Stefanelli S., Brill M., Girone A., Joannin S., Pelosi N., Vallefuoco M. (2009) - Integrated stratigraphy and astronomical tuning of the lower-middle Pleistocene Montalbano Jonico section (Southern Italy). *Quaternary Inter.*, 219, 109-120.

Ciaranfi N., Aiello G., Barra D., Bertini A., Girone A., Maiorano P., Marino M., Petrosino P. (2014) - The Montalbano Jonico Section (Southern Italy): a candidate for the GSSP of the Ionian Stage (Lower-Middle Pleistocene boundary). *Strati* 2013, 239-242, Springer Geology.

Maiorano P., Capotondi L., Ciaranfi N., Girone A., Lirer F., Marino M., Pelosi N., Piscitelli A. (2010) - Vrica-

- Crotone and Montalbano Jonico sections: a potential unit-stratotype for the Calabrian Stage. *Episodes*, 33, 218-233.
- Massari, F., Capraro, L., Rio, D. (2007) - Climatic Modulation of Timing of Systems-Tract Development with Respect to Sea - Level Changes (Middle Pleistocene of Crotone, Calabria, Southern Italy). *Journal of Sedimentary Research*, 77, 461-468.
- Sagnotti L., Cascella A., Ciaranfi N., Macrì P., Maiorano P., Marino M., Taddeucci J. (2010) - Rock magnetism and palaeomagnetism of the Montalbano Jonico section (Italy): evidence for late diagenetic growth of greigite and implications for magnetostratigraphy. *Geophys. Jour. Int.*, 180, 1049-1066.

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