

SUBCOMMISSION ON NEOGENE STRATIGRAPHY

ANNUAL REPORT 2011

1. TITLE OF CONSTITUENT BODY and NAME OF REPORTER

Subcommission on Neogene Stratigraphy (SNS)

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2. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

The SNS is the primary body responsible for providing optimum clarity and stability in the Neogene Chronostratigraphic Scale by selecting and defining Global Stratotype Sections and Points (GSSPs) for Series and Stages.

3. ORGANIZATION

The SNS is a subcommission of the ICS, founded in 1971. Reference is made to the annual report of 1995 for a brief historical resume of the SNS. The subcommission has four regional committees (Mediterranean, Pacific, Atlantic and Nordic) and keeps close contacts with the Russian Neogene Commission chaired by Prof. Yuri B. Gladenkov. Apart from the executive bureau, the SNS has 21 voting members and 35 corresponding members (*see Appendix for full list of officers and voting members*). The SNS has presently one active working group for defining the GSSP remaining for the Langhian and Burdigalian chaired by Isabella Raffi. The SNS web site (www.geo.uu.nl/SNS) is used for news release and contains the following sections: Home, News, Board, Members, Newsletters, GSSP's, and Links.

3a. Officers for 2008-2012:

Chair:	Frits Hilgen, Utrecht, The Netherlands
Vice-Chairs:	Francisco Javier Sierro, Salamanca, Spain David Hodell, Cambridge, UK
Secretary:	Elena Turco, Parma, Italy

Support for the SNS comes from the Chairman's Institute in the Netherlands (Faculty of Geosciences, Utrecht University). This institute also hosts the SNS web-site.

4. INTERFACES WITH OTHER INTERNATIONAL PROJECTS

There is a close link with (IODP) because of its important role in the development of integrated time scales for the Neogene, in testing the global correlation potential of bio-events, and in a better understanding of climate and ocean history during this time span.

5. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2011

Towards defining the Langhian GSSP

The base of the Langhian and thus the Lower-Middle Miocene boundary is widely accepted to be approximated by the *Praeorbulina* datum and a position close to Chron C5Cn, in agreement with common and consolidated practise. However, the historical stratotype at Cessolo with terrigenous and turbiditic sediments in its lower part is less suitable for defining the GSSP. For that reason, two potentially suitable sections for defining the Langhian GSSP were selected in the Mediterranean, namely the downward extension of the La Vedova beach section in northern Italy and St. Peter's Pool on Malta. These sections were studied as part of the Italian research project (PRIN 2006 - prot. 2006047534 - "In search of the Global Stratotype Sections and Points of the Burdigalian and Langhian Stages and paleoceanographic implications"), directed at defining the remaining GSSPs (Langhian and Burdigalian) in the Neogene.

Research papers directed at selecting the most suitable section and guiding criterion for defining the Langhian GSSP will be published in a special volume of Stratigraphy and are in press. These include papers presenting results of integrated high-resolution magnetostratigraphic and calcareous plankton biostratigraphic studies of the La Vedova and St. Peter's Pool sections (Foresi *et al.*, 2011; Turco *et al.*, 2011). At La Vedova, the reversal boundary that corresponds to the top of C5Cn.1n is found in the interval marked by the so-called megabeds of Montanari *et al.* (1997). However, the *Praeorbulina* datum, marked by the FO of *P. glomerosa curva* according to Turco *et al.* (2011), is located much higher in the section, close to the C5Bn.2n/C5Br reversal boundary. The reason for this is that Turco *et al.* (2011) follow the taxonomic concept of Blow (1956, 1969) and included *P. sicanius* under the genus *Globigerinoides*. Turco *et al.* (2011) therefore conclude that the *Praeorbulina* datum is insufficient to define the base of a chronostratigraphic unit, not only because of the controversial taxonomic concepts, but also because of its rarity and diachroneity, and its discontinuous distribution. At this stage, the best criterium to identify the base of the Langhian thus seems to be the top of Chron C5Cn. The bioevent that approximates the magnetic reversal is the LCO of the nannofossil *H. ampliapertura*, which is a reliable event in the Mediterranean, but defies exportation to open ocean sites at low-latitudes (Turco *et al.*, 2011).

St. Peter's Pool offers an alternative section for defining the Langhian GSSP (Foresi *et al.*, 2011). This cyclic deep marine section provides an excellent calcareous plankton biostratigraphy which allows a straightforward correlation to the La Vedova section (Iaccarino *et al.*, 2011). The section is easily accessible and contains the Burdigalian/ Langhian boundary on the basis of (1) the historical criterion that *P. glomerosa sicana* FO (= *G. sicanus* FO of Foresi *et al.*, 2011) occurs at the base of the Langhian Stratotype (Rio *et al.*, 1997) and (2) that it is close to the top of the C5Cn.1n (Lourens *et al.*, 2004), but the magnetostratigraphy is unfortunately of a rather poor quality (Mazzei *et al.*, 2009; Foresi *et al.*, 2011; Iaccarino *et al.*, 2011).

Ongoing studies focus on the cyclostratigraphy and the astronomical tuning of these sections, which is considered an important criterion for defining GSSPs in the Neogene. The younger La Vedova beach section has been studied in detail and an astronomical tuning established (Hüsing *et al.*, 2009). Also the downward extension covering the interval for defining the GSSP looks promising from an orbital tuning perspective (Iaccarino *et al.*, 2009). A preliminary astronomical tuning and astrobiochronology have been established for the alternative St. Peter's Pool section on Malta (Lirer *et al.*, 2009). Following these studies a decision will be made which section and criterion are most suitable for defining the Langhian GSSP. Evidently, both sections have their strong and weak points and are complementary to each other, with La Vedova having a higher quality magnetostratigraphy and St. Peter's Pool a better preservation of the calcareous plankton. The latter is important for biostratigraphy and stable isotopes.

6. CHIEF PROBLEMS ENCOUNTERED IN 2011

A problem that remains is the possible lack of suitable sections in the Mediterranean for defining the Burdigalian GSSP. This is certainly the case if we prefer to have the Burdigalian GSSP defined in an astronomically tuned deep marine section in the Mediterranean that directly underlies the geologic time scale. The alternative option to have this boundary defined in (I)ODP cores is being seriously considered by the Working Group on the Langhian and Burdigalian GSSPs, and a decision about this issue will probably be made the coming year.

The other problem that remains is the outcome of the ICS vote on the Quaternary issue and the formal ratification by IUGS which is unacceptable for many SNS members, including the chair.

7. SUMMARY OF EXPENDITURES IN 2011:

Credit on Nov 2010	Euro	2965,35
ICS	Euro	+ 1010,00
Transfer costs	Euro	-7,00
Credit on Nov 2011	Euro	3968,35

8. WORK PLAN, CRITICAL MILESTONES, ANTICIPATED RESULTS AND COMMUNICATIONS TO BE ACHIEVED NEXT YEAR (2011):

Publication of the Neogene ATNTS2012 chapter in GTS2012.

The study of the two potential boundary stratotype sections of La Vedova and St. Peter's Pool for defining the Langhian GSSP will be continued and focus on the astronomical tuning of the sections and the construction of a stable isotope record for St. Peter's Pool. It is anticipated that a workshop will be held in the second half of next year about the definition of the Langhian and Burdigalian GSSPs. The search for suitable sections and/or cores for defining the Burdigalian GSSP will continue. In absence of suitable Mediterranean sections for defining the Burdigalian GSSP, the option to formally designate this boundary in an ODP core will be seriously considered.

9. BUDGET AND ICS COMPONENT FOR 2012

Organization workshop on Langhian and Burdigalian GSSPs, Italy	Euro 2500
Optional: Fieldtrip to the La Vedova section (base-Langhian)	Euro 1500

10. SUMMARY OF MAIN ACCOMPLISHMENTS OVER PAST FIVE YEARS (2007-2011)

2007

Ratification of the Serravallian GSSP proposal by IUGS. Pilot study of the La Vedova section, a candidate section for the Langhian GSSP. Revision and update of SNS website.

2008

Integrated stratigraphic studies of the La Vedova section and its downward extension by Italian and Dutch research teams, the latter section being candidate for defining the Langhian GSSP. Revision and update of SNS website. Preparation of several papers on the definition and status of the Quaternary and Neogene. Preparation of a "Neogene" proposal for the formal ICS voting procedure on the Quaternary-Neogene issue.

2009

Publication of several papers by members of SNS on the issue of the Quaternary issue (Aubry et al., 2009; McGowran et al., 2009; Van Couvering et al., 2009). Publication in Episodes about the formal definition of the Serravallian GSSP (Hilgen et al., 2009). Ongoing research on the La Vedova and St. Peter's sections.

2010

Preparation of several papers on the two candidate sections for defining the Langhian GSSP for publication in a special volume of Stratigraphy, on the historical stratotype of the Langhian, and on the taxonomic concept of *Praeorbulina*.

2011

Publication of several papers about potential Langhian GSSP sections in a special volume of Stratigraphy (in press). Preparation of the Neogene chapter (ATNTS2012) of the GTS2012 (Hilgen et al., 2011, in press).

11. OBJECTIVES AND WORK PLAN FOR NEXT 2 YEARS (2011-2012)

Organization of a workshop on the selection of boundary criteria and sections for defining the 2 remaining stage boundaries in the Miocene, namely the base-Langhian and the base-Burdigalian. Potentially suitable sections in the Mediterranean region that may serve as Langhian GSSP have been identified (La Vedova; St. Peter's Pool). Crucial questions to be addressed during the workshop are: 1) which section is most suitable to be proposed as Langhian GSSP, 2) which prime guiding criterion should be selected, and 3) should we abandon the ambition of having the Burdigalian GSSP directly tied within an astrochronologic framework in order to have the GSSP defined in a Mediterranean land-based section, or should we define this GSSP in drilled ODP sequences at Ceara Rise or any other tuned sequence drilled by (I)ODP.

Selection of most suitable section/ODP core and guiding criteria for defining the Langhian and Burdigalian GSSPs before 2013. Writing of proposals for the Langhian and Burdigalian GSSPs in 2012-2013.

APPENDIX [Names and Full Addresses of Current Officers and Voting Members]

Subcommission officers

Chairman: Frederik J. Hilgen, Faculty of Geosciences, Utrecht University, P.O. Box 80021, 3508 TA Utrecht, The Netherlands, e-mail: fhilgen@geo.uu.nl

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