

Questionnaire on Neogene chronostratigraphy (general framework and concepts)

SUMMARY OF MAIN RESULTS

As reported in the 1996 issue of our Newsletter, the GSSP of the Gelasian Stage has been formally ratified by IUGS in 1996. In addition, the GSSP of the Piacenzian Stage, whose proposal was also reported in the last newsletter (together with the positive results of the ballot within SNS), has been approved by ICS (and ratified by IUGS) last January. They constitute, together with the already ratified GSSPs of the Pliocene/Pleistocene and Oligocene/Miocene boundaries, the valuable contribution of SNS to the formulation of the Global Standard Chronostratigraphic Scale.

These achievements should stimulate us to make new steps in this direction, that is the submission of proposals for the GSSPs of the remaining boundaries.

To have a preliminary picture of different opinion and concepts of all our members in this respect, a questionnaire was circulated in February 1997. The questions to be answered were the following:

- 1) In the last years, virtually all published time scales subdivided the Miocene Series into three Subseries (Lower, Middle, Upper), each of them including two Stages (Aquitanian and Burdigalian; Langhian and Serravallian; Tortonian and Messinian). This is also the current guide-line of SNS, as reported in the cover of Neogene Newsletter n° 3. Do you *fully* agree with this chronostratigraphic framework?
- 2) Letting aside the GSSPs already ratified by IUGS, please explain your opinion concerning the primary marker event that should guide our research for the appropriate GSSP of the units listed in the next pages (bases of Pliocene, Messinian, Tortonian, Serravallian, Langhian, Burdigalian). Moreover, have you any knowledge of auxiliary markers that would help to correlate such a GSSP? Do you know any suitable stratigraphic section displaying a good exposure of the critical interval for the selection of the GSSP? If so, please provide complete information.
- 3) Would you like to participate in working group(s) on one or more GSSP(s) that maybe set up by SNS? If so, please specify which GSSP are you interested in, and what is your expertise.

4a) Would you agree with the establishment of an ad-hoc working group on the “pre-Messinian Miocene timescale”, similar to the one on the Pliocene, chaired by W.A. Berggren, that led to the formulation of the Late Neogene timescale (Berggren et al., 1995. Geol. Soc. Am. Bull., 107: 1272-1287)? 4b) If so, would you like to take part to it?

After two additional “call for reply” by the Secretary, a total of 34 replies were received (21 from voting members, that is 68%). The main results are summarized in the following pages. For each question, answers by voting members are reported separately and then combined with those by corresponding members.

Everybody can judge by himself what are the topics on which a fairly large agreement is consolidated and which are those more debated. Let us only highlight a couple of matters:

- first of all, a very large consensus is present on the general chronostratographic framework of the Miocene Series, that is its subdivision into three Subseries (Lower, Middle, and Upper), in turn subdivided into two Stages (Aquitania and Burdigalian, Langhian and Serravallian, Tortonian and Messinian). We hope that this result can definitely settle the matter (at least for the next years).

- a rather large agreement seems to exist on the primary marker to be used in the selection of a GSSP for the Pliocene Series and the Messinian Stage. Therefore, time seems ripe for further steps to be taken in the formal selection of those boundary stratotypes.

Acceptance of chronostratigraphic scheme

VOTING MEMBERS (21 REPLIES RECEIVED)

- 18 yes
- 3 questioning the utility of one or all Stages

VOTING + CORRESPONDING MEMBERS (34 REPLIES RECEIVED)

- 29 yes
- 3 questioning the utility of one or all Stages
- 2 no answer

Base of Pliocene

VOTING MEMBERS (21 REPLIES RECEIVED)

a) primary marker:

- 11 reestablishment of open marine conditions in the Mediterranean (either within the Mediterranean or at the correlative level outside the Mediterranean)
2 C3An/C3r boundary (base of Gilbert)
8 no answer

b) auxiliary markers (multiple answer):

- | | | | |
|---|--|---|-------------------------------|
| 2 | LO <i>D. quinqueramus</i> | 1 | LO <i>T. rugosus</i> |
| 1 | FO <i>G. tumida</i> | 1 | LO <i>G. dehiscens</i> |
| 1 | global paleoceanogr. changes associated with Mediterranean refilling | 1 | abundant <i>G. margaritae</i> |
| | | 1 | base Thvera |

c) sections (multiple answer):

- 7 Eraclea Minoa, Capo Rossello Apennines
1 Maccarone (Marche)
7 Bou Regreg or other Moroccan sections

VOTING + CORRESPONDING MEMBERS (34 REPLIES RECEIVED)

a) primary marker:

- 13 reestablishment of open marine conditions in the Mediterranean (either within the Mediterranean or at the correlative level outside the Mediterranean)
2 C3An/C3r boundary (base of Gilbert)
1 LO *G. plesiotumida*
18 no answer

b) auxiliary markers (multiple answer):

- | | | | |
|---|--|---|-------------------------------|
| 2 | FO <i>C. acutus</i> | 2 | LO <i>T. rugosus</i> |
| 4 | LO <i>D. quinqueramus</i> | 4 | base Thvera |
| 1 | global paleoceanogr. changes associated with Mediterranean refilling | 1 | abundant <i>G. margaritae</i> |
| 1 | below FO <i>G. puncticulata</i> | 1 | LO <i>G. dehiscens</i> |
| | | 1 | FO <i>G. tumida</i> |

c) sections (multiple answer):

- 10 Eraclea Minoa, Capo Rossello Apennines
1 Maccarone (Marche)
8 Moroccan sections

Base of Messinian

VOTING MEMBERS (21 REPLIES RECEIVED)

a) primary marker:

- 7 FCO/FRO *G. conomiozea* (and *G. mediterranea*)
- 2 C3Br. 1r/n
- 1 FO *Amaurolithus* spp.
- 1 Late Miocene Carbon Shift
- 10 no answer

b) auxiliary markers (multiple answer):

- | | | | |
|---------------------------|---------------------------------|---|--------------------------------|
| 2 | FO/FCO <i>Amaurolithus</i> spp. | 1 | FAD <i>D. quinqueringamus</i> |
| 1 | LO small <i>Helicosphaera</i> | 1 | FO <i>G. miotumida</i> |
| 1 | FO <i>G. multiloba</i> | 1 | last short influx of <i>G.</i> |
| <i>menardii</i> 4 (within | | | |
| 1 | FAD <i>G. conomiozea</i> | | range of <i>G. menardii</i> 5) |

c) sections (multiple answer):

- | | | | |
|---|---|---|-----------------------|
| 4 | Cretean sections (usually Faneromeni preferred) | 3 | Monte del Casino |
| | Apennines) | 1 | Monte Tondo (Romagna) |
| 1 | Metochia | 1 | La Sardella (Monte |
| | Conero) | | |
| 2 | Moroccan sections | 1 | Falconara |

VOTING + CORRESPONDING MEMBERS (34 REPLIES RECEIVED)

a) primary marker:

- 11 FCO/FRO *G. conomiozea* (and *G. mediterranea*)
- 2 C3Br. 1r/n
- 2 FO *Amaurolithus* spp.
- 1 Late Miocene Carbon Shift
- 18 no answer

b) auxiliary markers (multiple answer):

- | | | | |
|---------------------------|---------------------------------------|---|--------------------------------|
| 5 | FO/FCO <i>Amaurolithus</i> spp. | 1 | FAD <i>D. quinqueringamus</i> |
| 1 | LO small <i>Helicosphaera</i> | 1 | FO <i>G. miotumida</i> |
| 1 | FO <i>G. multiloba</i> | 1 | last short influx of <i>G.</i> |
| <i>menardii</i> 4 (within | | | |
| 1 | <i>G. menardii</i> D/S coiling change | | range of <i>G. menardii</i> 5) |
| 1 | FAD <i>G. conomiozea</i> | | |

c) sections (multiple answer):

6 Cretean sections (usually Faneromeni preferred)

Apennines)

2 Metochia Conero)

4 Moroccan sections

4 Monte del Casino

1 Monte Tondo (Romagna

1 La Sardella (Monte

1 Falconara

Base of Serravallian

VOTING MEMBERS (21 REPLIES RECEIVED)

a) primary marker:

2	LO <i>S. heteromorphus</i>	1	FO <i>O. universa</i>
2	FO <i>G. peripheroacuta</i>	2	top Chron C5Bn
14	no answer		

b) auxiliary markers (multiple answer):

2	LO <i>S. heteromorphus</i>	1	Mi3 oxygen isotope event
1	FAD <i>G. peripheroacuta</i>		

c) sections (multiple answer):

1	Conero Riviera	1	Tamioka area (Japan)
1	Malta and Gozo (Blue clays)	1	Jamaica and other Caribbean sections

VOTING + CORRESPONDING MEMBERS (34 REPLIES RECEIVED)

a) primary marker:

4	LO <i>S. heteromorphus</i>	2	FO <i>O. universa</i>
2	FO <i>G. peripheroacuta</i>	2	top Chron C5Bn
24	no answer		

b) auxiliary markers (multiple answer):

2	LO <i>S. heteromorphus</i>	1	Mi3 oxygen isotope event
1	FO <i>Nomurocythereis seminulum</i>	1	FAD <i>G. peripheroacuta</i>

c) sections (multiple answer):

1	Conero Riviera	1	Tamioka area (Japan)
1	Malta and Gozo (Blue clays) (Portugal)	1	Costa da Caparica
1	Jamaica and other Caribbean sections		

Base of Langhian

VOTING MEMBERS (21 REPLIES RECEIVED)

a) primary marker:

6	FO <i>P. sicana/Praeorbulina</i> lineage	1	base NN5
2	C5Cn.2n (mid-point)	12	no answer

b) auxiliary markers (multiple answer):

1	FO <i>P. glomerosa</i>	1	FAD <i>P. sicana</i>
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c) sections (multiple answer):

1	Moria (Marche)
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VOTING + CORRESPONDING MEMBERS (34 REPLIES RECEIVED)

a) primary marker:

10	FO <i>P. sicana/Praeorbulina</i> lineage	1	base NN5
1	Hispanotherium fauna	2	C5Cn.2n (mid-point)
20	no answer		

b) auxiliary markers (multiple answer):

1	LCO <i>H. ampliapertura</i>	1	LO <i>Megacricetodon</i>
	<i>primitivum</i>		
1	FO <i>Megacricetodon collongensis</i>	1	FO <i>P. glomerosa</i>
1	FAD <i>P. sicana</i>		

c) sections (multiple answer):

1	Moria (Marche)
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Base of Burdigalian

VOTING MEMBERS (21 REPLIES RECEIVED)

a) primary marker:

1	base N5 (Blow, 1969)	1	FO <i>G. trilobus</i>
1	FO <i>G. altiapertura</i>	1	FO <i>S. belemnos</i>
2	top Chron C6An	14	no answer

b) auxiliary markers (multiple answer):

1	FO <i>G. bisphericus</i>	1	FO <i>S. belemnos</i>
1	FAD <i>G. altiapertura</i>		

c) sections (multiple answer):

1	Santa Croce di Arcevia (Marche)
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VOTING + CORRESPONDING MEMBERS (34 REPLIES RECEIVED)

a) primary marker:

1	base N5 (Blow, 1969)	2	FO <i>G. trilobus</i>
4	FO <i>G. altiapertura</i>	1	FO <i>S. belemnos</i>
2	top Chron C6An	23	no answer

b) auxiliary markers (multiple answer):

1	FO <i>G. bisphericus</i>	1	FO <i>S. belemnos</i>
1	FO <i>G. trilobus</i> s.s. <i>globulina</i>	1	FO <i>Miogypsina</i>
1	FO <i>Pokorniella lusitanica</i> <i>helvetica</i>	1	LO <i>Hemicyprideis</i> gr.
1	FAD <i>G. altiapertura</i>		

c) sections (multiple answer):

1	Santa Croce di Arcevia (Marche)
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Participation in ad-hoc working groups on GSSPs

VOTING MEMBERS (21 REPLIES RECEIVED)

a) participation:

11 yes
2 no
8 no answer

b) which GSSPs (multiple answer)?

5	Pliocene	3	Messinian
3	Tortonian	2	Serravallian
2	Langhian	2	Burdigalian

VOTING + CORRESPONDING MEMBERS (34 REPLIES RECEIVED)

a) participation:

18 yes
5 no
11 no answer

b) which GSSPs (multiple answer)?

7	Pliocene	5	Messinian
7	Tortonian	4	Serravallian
5	Langhian	4	Burdigalian

Establishment of an ad-hoc working group on the “pre-Messinian Miocene timescale”

VOTING MEMBERS (21 REPLIES RECEIVED)

a) establishment:

13 yes
2 not now, still too soon
6 no answer

b) participation:

10 yes
3 possibly
2 no
6 no answer

VOTING + CORRESPONDING MEMBERS (34 REPLIES RECEIVED)

a) establishment:

23 yes
3 not now, still too soon
8 no answer

b) participation:

18 yes
4 possibly
3 no
9 no answer