PELASSES PROJECT REPORT OF THE

2001 ANCHOVY OTOLITH EXCHANGE PROGRAMME FROM SUBAREA VIII AND DIVISION IXa.

(First Draft -11 January 2002- to be reviewed in the 2002 Workshop)

Coordinated by A. Uriarte (AZTI) from July to September 2001

1- INTRODUCTION:

Exchange and checking of the procedures for age determination of the anchovy otoliths have been made in the past for several reasons; For the Bay of Biscay a previous exercises took place in 1990 (Astudillo et al 1990) and in 1996 (Villamor & Uriarte, 1996); For the Bay of Cadiz area (Division IXa) a previous exchange programme took place in 1997 (Garcia 1998). However no proper workshop on the reading procedures of these otoliths has taken place before.

Within PELASSES project, in subtask 2.3 it was established that at least one workshop will be organized to standardize the age readings of sardine and anchovy. However it was considered that before the workshop an exchange programme of anchovy otoliths should be carried out in order to ascertain the current level of precision among institutes and the difficulties that the age reading of anchovy otoliths present. The results of the workshop should serve as starting input to the Workshop on anchovy age reading.

This paper presents the results of the exchange programme on anchovy otoliths coordinated by AZTI from July to September 2001 for PELASSES Project.

2- OBJECTIVES:

The exchange programme had the following common objectives for the Subarea VIII (Bay of Biscay) as for division IXa:

1- Evaluate current precision in otolith age reading of anchovy among readers from fishery samples throughout the year and from spring Pelasses surveys in 2000 and 2001.
2- Identify major difficulties in anchovy otolith interpretation for age determinations concerning observed disagreements (otolith edge recognition and/or identification of true rings or checks).
3- Report results to the Workshop on anchovy age determination that will take place in October 2001 to facilitate the discussions and progress of work.

3- MATERIAL AND METHODS

PARTICIPANTS AND QUALIFICATION OF READERS

There were 7 readers participating in the exchange of otoliths, who had different levels of experience reading anchovy otoliths from the two areas concerned. These differences may account for part of the reasons behind the different degrees of agreement among readers

The participant complete identifications are detailed in Annex 1 to this report.
The list follows and a summary of their experience follows:

Uriarte, A. (Coordinator, AZTI): For the Monitoring of the Bay of Biscay anchovy, he reads their otoliths since 1984. For the current otolith exchange he read the otoliths without looking at the lengths of the anchovies.
Rico, I. (AZTI): Reading Bay of Biscay anchovy otoliths since about 1990 with the former reader. For the current otolith exchange he read the otoliths without looking at the lengths of the anchovies.
Cendrero, O. (IEO): Reading Bay of Biscay anchovy otoliths since late seventies, but not in a continuous manner. In the Lab of Santander takes care of the biological monitoring of the anchovy landings in this area. For the current otolith exchange he read the otoliths without looking at the lengths of the anchovies.
Blanco M. (IEO): No previous experience reading anchovy otoliths. She works at Santander with Orestes Cendrero and she will take care of reading the anchovy otoliths in near future. For the current otolith exchange she read the otoliths without looking at the lengths of the anchovies.
Millán M. (IEO)_Ixa: Reading the otoliths from the Spanish landings of anchovy in Ixa since 1988. For the current otolith exchange she read the otoliths without looking at the lengths of the anchovies.
Morais, A. (IPIMAR) : No previous experience reading anchovy otoliths. Now working in otoliths from surveys in IXa, central-north, central and south. For the current otolith exchange he read the otoliths looking at the lengths of the anchovies.
Grellier P. (IFREMER): He has only read the otoliths from the Bay of Biscay sets. No previous experience reading anchovy otoliths. The former person in charge (P. Prouzet) has recently left the work with anchovy, but has trained to this reader and age determination of the anchovy otoliths). For the current otolith exchange he read the otoliths looking at the lengths of the anchovies.

SETS OF OTOLITHS: The definitive adopted sets of otoliths were the following ones:

SET A) 200 OTOLITHS FROM THE BAY OF BISCAY, assuring all range of lengths (and hence ages).
- 100 otoliths from the first half of the year:
  IEO supply 60 from Surveys in 2000+01 and AZTI 40 from fishery 99/00.
- 100 otoliths from the summer autumn fisheries (99/00)

IEO supply 30 , AZTI 30 and IFREMER 40 (in the latter case only from 1999)

SET B) 240 OTOLITHS FROM AREA IXa:

- 110 otoliths from West Portuguese coasts (IXa central) arising from surveys in 2000 and 2001, prepared by IPIMAR: modifying Alexander's proposal:
  WEST COAST (PELASSES Mars2001) – **60** (length range: 8-17.5)
  WEST COAST (NOVEMBER 2000) – **50** (length range: 10-19)
- 130 otoliths from IXa south arising:
  IPIMAR: ALGARVE (PELASSES 2001Mars) – **30** (length range: 11.9-14.5).
  IEO fishery in Bay of Cadiz (IXa south). –**100**:
  (50 from the first half of the year and 50 from the second half).

PREPARATION OF THE SETS OF OTOLITHS:
As agreed in previous exchanges and directly among readers of anchovy otoliths, these otoliths are mounted entire within Eukit on black slides of 10 pairs of otoliths each. Otoliths are mounted with the sulkus facing down.

For each subset of otoliths selected above a general description of the set in terms of geographic origin, months and length range has to be provided.

Each black slide with otoliths was labelled by a unique code to which all otoliths were referred. Additional code for the exchange programme at the back of the each slide containing a slide identification + Institute of origin + month of captures was inserted.

And for each selected otolith the information available was:

- Slide identification code where it is contained
- Month of capture
- Length, weight and sex.

AGE DETERMINATION PROCEDURES

Each reader received forms to be fulfilled in excel files in two ways: with and without length or sex data. We recommended reading the otoliths without regarding the length, but if the reader usually does take into account the length or is unfamiliar with the sets of otoliths and/or the otoliths is particularly difficult, then the reader may want to have a look to the size of the individual. Two reader made use of the length information: Morais, A. (IPIMAR) and P. Grellier (IFREMER).

Each reader indicated:

- the age assigned to each otolith
- otolith edge (hyaline –H- or opaque –O-),
- reliability of age determination: 0-sure, 1- doubtful and 2-very doubtful or difficult.
- measures of the radius to the true annual rings on the posterior edge of the otolith.
- Presence of checks in a last column labelling them according to their relative position to the previous true annual rings. For instance a 08 indicates a check placed at about 80 % of the 0 group suspected growth. For instance 15 will indicate the

presence of a check placed at about 50% of the 1 year old suspected growth. Etc. (This is the way of naming checks in AZTI).
- Remarks such as: if the length was used to help age determination (by putting the word "Length"); Any other comments as Reason for difficulties etc.

The idea was to clearly understand how the otolith rings were interpreted by the readers in order to facilitate understanding agreements and discrepancies.

Minimum knowledge for age determination is:

a) Conventional birth dates for increasing in one year the age of an anchovy, when trespassing that date, is 1st of January.
b) Spawning time is usually in spring and maximum growth in spring and summer.
c) True Annual rings will be those formed in winter each year. Other rings may be present or appear throughout the year and cause problems in age determination (checks).

DATA ANALYSIS:
All data were analysed using the Workbook Age Reading comparisons of Eltink (2000) and following the recommendations of the Guidelines and tools for age reading comparisons (Eltink et al 2000)

So far and concerning the interpretations of agreements and disagreements, the radius measurements have not been compared among readers for individual otolith examples particularly suitable for discussions.

4- RESULTS

The preparation of the sets of otoliths and submission to the coordinator was completed during June 2001 and the exchange programme was completed by the End of September.

4.1 Results on the Otoliths from the Bay of Biscay:

Table 4.1.1 details the length, sex and month of landing of the set of otoliths selected for the exchange programme from the Bay of Biscay region (set A) along with the ageing produced by each reader. The last two columns give the Modal age, the percent of agreement relative to Modal age and the Precision of reading as the Coefficient of Variation in relation to the average age. The Average percentage of agreement across all ages and readers is 83 % and the average CV equals 30%.

Table 4.1.2 (A) shows that almost all otoliths were read by the participants (first sub-table of Table 4.1.2). CV is minimum at age 1 (see also **Figure 4.1.1**) and slightly increases with age and the percentage of agreement clearly diminishes with age. The sub-table of relative bias indicates that older ages tend to be underestimated (see also **Figure 4.1.2 & 3**). This phenomena is particularly relevant for the readers 3, 4 and 5 (from IEO) as shown as well

in **Figure 4.1.4**). This feature implies production of younger age composition by these readers in comparison with the others (**Table 4.1.3**). Best readers in relation to Modal age appear to be AZTI readers who have the longest experience in reading this otoliths. As two reader from this institute have read the otoliths they may bias the mode towards their reading, hence Table 4.1.2 has been repeated by omitting alternatively one or the other of AZTI readers in order to check how this may affect the former perception. This is shown in **Tables 4.1.2(B)** and **4.1.2(C)** resulting in no change of the former perception.

Tables 4.1.4 and **5** show that the degree of agreements do not change markedly between months but mainly among ages. However it seems that the difficulty of reading correctly age 1 increases during the second half of the year (Semestre 2 strata).

In **Table 4.1.3** as in **Figure 4.1.6** it is shown that except for age 3 of readers 3 and 4 mean length at age increases with age. The best ranked readers show the most smooth progression in length.

4.2 Results on the Otoliths from Division IXa:

Table 4.2.1 details the length, sex and month of landing of the set of otoliths selected for the exchange programme from the Division IXa (set B) along with the ageing produced by each reader. The Average percentage of agreement across all ages and readers is 84 % and the average CV equals 40.8%. This average percentage of agreement is similar to the one achieved for the Bay of Biscay anchovy.

Table 4.2.2 shows the amount of otoliths read by the participants (first sub-table of Table 4.1.2). There is no determination of age 3 so total ages ranges from 0 to 2. CV is minimum at age 1 (see also **Figure 4.2.1**), slightly increases at age 2 and is maximum at age 0. However the percentage of agreement for age 0 and 1 are similarly (about 88 %) and it clearly diminishes at age 2 (to about 68%). The sub-table of relative bias indicates that age 2 tend to be underestimated (see also **Figure 4.2.2 & 3**). This phenomena is particularly relevant for the readers 3 and 5 (from IEO) as shown as well in **Figure 4.2.4**). This feature implies production of younger age composition by these readers in comparison with the others (**Table 4.2.3**). Since the reader A.U. has not read the otoliths the results commented so far can be compared with those of the Bay of Biscay shown in **Table 4.1.2(C).**

Tables 4.2.4 shows that the degree of agreements do not change markedly among months but mainly among ages. However it seems that the difficulty of reading correctly age 1 may increase during spring.
Tables 4.2.5 shows the subset of otoliths from the Gulf of Cadiz (strata Cadiz) seem to be a bit more difficult for age determination than from other strata.

In **Table 4.2.3** and **Figure 4.2.6** show a natural progression in length at age for all readers.

4- DISCUSSION

Discussion on Set A Bay of Biscay:
The Average percentage of agreement across all ages and readers (83 %) and the average CV (30%) are rather low for a three year living fish. The major disagreements arise from the ageing of the oldest age groups (2 and 3). Ages 0 and 1 seem to be much better determined. Although the degree of agreements do not change markedly between months but mainly among ages, the difficulty of reading correctly age 1 increases during the second half of the year. These results stress the need of a workshop to improve the degree of precision and accuracy of readings.

The results certainly reveal that the Institutes more heavily involved in the estimations of the age composition of catches and surveys on anchovy have still some noticeable discrepancies. Table 4.1.3 shows that there are some problems in the age determination of the oldest age groups (2 and 3) particularly for the IEO and IFREMER readers which are relevant institutes for the monitoring of fishery on the Bay of Biscay anchovy.

The IEO of Santander according to modal age tend to underestimate the oldest age groups, implying younger age compositions than the ones produced by the rest of participants. This Institute monitors about 12% of the International landings of anchovy. IFREMER , that accounts for about 48% of the International landings has produced a bit more age 3 than expected. AZTI that monitors about 40% shows the highest agreement with the modal aging followed by the reader from Portugal (which is not implied in the monitoring of this fishery).

This results of percentage of agreement and the nature of increasing bias with (towards underestimating age) is similar to the problems in age determination detected previously for this population (Villamor & Uriarte 1996).

The reasons of these discrepancies were preliminary examined over individual otolith cases of disagreement. Here follow some general comments:
There is no evident reason to explain why the some of the Modal ages 2 have been determined as 1 in the case of the IEO readers. Although in some cases this was due to the assigning as checks (08 checks) what the others interpreted as true first annual ring. In general all these may be linked to difficulties in recognition of the expected general growth pattern of the otolith along the year, which has never been published before. Readers 4 and 5 had not read before otoliths from this area and hence they were not familiar at all with this species and in the former case with not anchovy otolith ageing procedure.
In the case of IFREMER, who was one inexperienced reader, several of the modal age 2 otoliths have been read as 3 years old and this seems to be due to interpreting some checks (recognized by the other readers as check 15) as true second winter annual rings.
Most of the difficulties encounter with the discrepancies between ages 1 and 2 for the second half of the year seems to be due to the discrimination between second year annual ring and 15 check appearing in the second year of growth of the 1 year old anchovies.

Modal age seems to be the best estimate of the actual age in most of the cases and while reviewing the current agreements and disagreements in AZTI some cases of AZTI reader's disagreements versus the modal age might have been reviewed in favour of the modal age.

Discussion on Set B Division IXa:
The Average percentage of agreement across all ages and readers (84 %) and the average CV (40.8%) are rather low for a two year living fish and similar to the levels achieved for age determinations on the Bay of Biscay anchovy. The major disagreements arise from the ageing of the oldest age groups (age 2). Ages 0 and 1 seem to be better determined. Although the degree of agreements do not change markedly between months but mainly among ages, the difficulty of reading correctly age 1 may increase during spring. The subset of otoliths from the Gulf of Cadiz (strata Cadiz) seem to be a bit more difficult for age determination than from other strata. These results stress the need of a workshop to improve the degree of precision and accuracy of readings.

The reasons of these discrepancies were preliminary checked according over the individual otolith cases of disagreement: First it must be stressed that the otoliths originating from Portuguese coasts, in IXa central and central-north, were rather different from those of the Algarbe and Bay of Cadiz. The former had less annuli and smaller growth bands than the latters.
Second: In spring otoliths from Portuguese coasts, in IXa central and central-north, often shown for rather small individuals no inner annuli what implies no winter ring. They might appear from an autumn spawning. Other had a clear winter ring and seemed a more typical 1 year old anchovies. The very few which showed two rings (the second in or almost at the edge of the otolith) did not have a relevant growth band between them: This may correspond with first annual ring being deposed in summer followed by a short growth till next winter causing such a small growth increase between the two first rings. In fact in November there several otoliths showing a single ring followed by a short growth which may correspond to that pattern of otolith development. The 0 group is clearly seen in November as entirely white otoliths.
Major disagreements originated from rather common otoliths which did not showed almost any ring or too vaguely marked as to admit their presence (and not as checks). And having to spawning times may produce a no unique pattern of growth of otoliths what makes the adoption of rules of age determination almost impossible.

Third: Algarbe and Bay of Cadiz otoliths were rather similar, with more or less pronounced annual rings a bit less intense than in the Bay of Biscay but with a general growth band pattern more similar to the latter area than those from IXa central-north and central-south. Those who posed the major amount of problems were mainly due to poorly marked annuli or almost no clear annuli till the edge. In those cases the nature of the edge was determinant to undertake a decision for the age determination, and since no clear rules are established for this area the amount of discrepancy among readers increased in those cases.

FINAL GENERAL REMARK:
The sets of otoliths examined in the exercise were otoliths arising from the most recent monitoring of the fishery landings and from recent surveys mostly during 2000 and 2001. Therefore they are indicative of the common troubles encountered in these years during the

life of PELASSES Project. Previous collections of agreed or Validated otolith do not exist, but some other sets of selected well featured otoliths could might result in better agreement among readers.
The moderate level of agreement and the changing of readers happening in several of the Institutes involved in the monitoring of this species strongly suggest that a workshop should take place to present and discuss the current methodologies of age determination in otoliths followed by the Institutes and increase the level of precision.

REFERENCES:

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Annex. LIST OF PARTICIPANTS:

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TABLES AND FIGURES :

Set of Tables and Figures 4.1 are obtained just by pressing the icon of printing of the Workbook ANCHOVY AGE COMPARISONS SET A.xls

Set of Tables and Figures 4.2 are obtained just by pressing the icon of printing of the Workbook ANCHOVY AGE COMPARISONS SET B.xls

Table 4.1.2 B and C follow in the next pages below:

Table 4.1.2B The number of age readings, the coefficient of variation (CV), the percent agreement and the RELATIVE bias are presented by MODAL age for each age reader and for all readers combined. A weighted mean CV and a weighted mean percent agreement are given by reader and all readers combined. The CV's by MODAL age for each individual age reader and all readers combined indicate the precision in age reading by MODAL age. The weighted mean CV's over all MODAL age groups combined indicate the precision in age reading by reader and for all age readers combined.

ANCHOVY exchange (July-Sept. 2001) SET A: BAY OF BISCAY

NUMBER OF AGE READINGS — This is NOT the Age composition

	MODAL age	AZTI-IR Reader 1	AZTI-AU Reader 2	IEO-OC Reader 3	IEO-MB Reader 4	IEOIX-MM Reader 5	IPIMAR-AL Reader 6	REMER-PG Reader 7	TOTAL
	0	34	-	34	34	34	33	34	**203**
	1	107	-	106	107	107	79	103	**609**
	2	39	-	39	39	39	38	38	**232**
	3	20	-	20	20	20	18	20	**118**
	4	-	-	-	-	-	-	-	**-**
	5	-	-	-	-	-	-	-	**-**
Total	**0-15**	**200**	**0**	**199**	**200**	**200**	**168**	**195**	**1162**

COEFFICIENT OF VARIATION (CV) — VS. Modal age

	MODAL age	AZTI-IR Reader 1	AZTI-AU Reader 2	IEO-OC Reader 3	IEO-MB Reader 4	IEOIX-MM Reader 5	IPIMAR-AL Reader 6	REMER-P Reader 7	ALL Readers
	0	0%	-	278%	0%	406%	0%	583%	**40.6%**
	1	25%	-	24%	66%	16%	33%	50%	**26.2%**
	2	11%	-	39%	51%	38%	18%	18%	**32.9%**
	3	0%	-	41%	44%	34%	25%	11%	**40.4%**
	4	-	-	-	-	-	-	-	**-**
	5	-	-	-	-	-	-	-	**-**
Weighted mean	**0-15**	**15.3%**		**72.0%**	**49.5%**	**88.4%**	**22.2%**	**132.5%**	**31.4%**
	RANKING	**1**		**4**	**3**	**5**	**2**	**6**	

PERCENTAGE AGREEMENT — VS. Modal age

	MODAL age	AZTI-IR Reader 1	AZTI-AU Reader 2	IEO-OC Reader 3	IEO-MB Reader 4	IEOIX-MM Reader 5	IPIMAR-AL Reader 6	REMER-PG Reader 7	ALL
	0	100%	-	88%	100%	94%	100%	97%	**97%**
	1	93%	-	94%	70%	97%	85%	81%	**87%**
	2	95%	-	41%	51%	41%	87%	87%	**67%**
	3	100%	-	10%	5%	15%	83%	90%	**50%**
	4	-	-	-	-	-	-	-	**-**
	5	-	-	-	-	-	-	-	**-**
Weighted mean	**0-15**	**95.0%**		**74.4%**	**65.0%**	**77.5%**	**88.1%**	**85.6%**	**80.7%**
	RANKING	**1**		**5**	**6**	**4**	**2**	**3**	

RELATIVE BIAS — BIAS RELATIVE TO MODAL AGE

	MODAL age	AZTI-IR Reader 1	AZTI-AU Reader 2	IEO-OC Reader 3	IEO-MB Reader 4	IEOIX-MM Reader 5	IPIMAR-AL Reader 6	REMER-PG Reader 7	ALL
	0	0.00	-	0.12	0.00	0.06	0.00	0.03	**0.03**
	1	0.07	-	0.00	-0.28	0.03	0.13	0.26	**0.03**
	2	0.05	-	-0.62	-0.62	-0.54	0.03	0.03	**-0.28**
	3	0.00	-	-1.35	-1.70	-1.10	-0.28	-0.10	**-0.76**
	4	-	-	-	-	-	-	-	**-**
	5	-	-	-	-	-	-	-	**-**
Weighted mean	**0-15**	**0.05**		**-0.24**	**-0.44**	**-0.19**	**0.04**	**0.14**	**-0.11**
	RANKING	**2**		**5**	**6**	**4**	**1**	**3**	

Overall ranking

	AZTI-IR Reader 1	AZTI-AU Reader 2	IEO-OC Reader 3	IEO-MB Reader 4	IEOIX-MM Reader 5	IPIMAR-AL Reader 6	REMER-PG Reader 7
Ranking Coefficient of Variation	1		4	3	5	2	6
Ranking Percentage Agreement	1		5	6	4	2	3
Ranking Relative bias	2		5	6	4	1	3
OVERALL RANKING	**1**		**5**	**6**	**4**	**2**	**3**

Table 4.1.2C The number of age readings, the coefficient of variation (CV), the percent agreement and the RELATIVE bias are presented by MODAL age for each age reader and for all readers combined. A weighted mean CV and a weighted mean percent agreement are given by reader and all readers combined. The CV's by MODAL age for each individual age reader and all readers combined indicate the precision in age reading by MODAL age. The weighted mean CV's over all MODAL age groups combined indicate the precision in age reading by reader and for all age readers combined.

ANCHOVY exchange (July-Sept. 2001) SET A: BAY OF BISCAY

NUMBER OF AGE READINGS — **This is NOT the Age composition**

	MODAL age	AZTI-AU Reader 1	AZTI-IR Reader 2	IEO-OC Reader 3	IEO-MB Reader 4	IEOIX-MM Reader 5	IPIMAR-AL Reader 6	REMER-PG Reader 7	TOTAL
	0	34	-	34	34	34	33	34	**203**
	1	109	-	108	109	109	81	105	**621**
	2	38	-	38	38	38	37	37	**226**
	3	19	-	19	19	19	17	19	**112**
	4	-	-	-	-	-	-	-	**-**
	5	-	-	-	-	-	-	-	**-**
Total	**0-15**	**200**	**0**	**199**	**200**	**200**	**168**	**195**	**1162**

COEFFICIENT OF VARIATION (CV) — **VS. Modal age**

	MODAL age	AZTI-AU Reader 1	AZTI-IR Reader 2	IEO-OC Reader 3	IEO-MB Reader 4	IEOIX-MM Reader 5	IPIMAR-AL Reader 6	REMER-P Reader 7	ALL Readers
	0	0%	-	278%	0%	406%	0%	583%	**40.6%**
	1	24%	-	24%	67%	16%	34%	49%	**26.7%**
	2	11%	-	39%	49%	37%	20%	17%	**32.4%**
	3	0%	-	40%	44%	35%	25%	11%	**40.1%**
	4	-	-	-	-	-	-	-	**-**
	5	-	-	-	-	-	-	-	**-**
Weighted mean	**0-15**	**15.4%**		**71.6%**	**50.2%**	**88.1%**	**23.3%**	**132.6%**	**31.4%**
	RANKING	**1**		**4**	**3**	**5**	**2**	**6**	

PERCENTAGE AGREEMENT — **VS. Modal age**

	MODAL age	AZTI-AU Reader 1	AZTI-IR Reader 2	IEO-OC Reader 3	IEO-MB Reader 4	IEOIX-MM Reader 5	IPIMAR-AL Reader 6	REMER-PG Reader 7	ALL
	0	100%	-	88%	100%	94%	100%	97%	**97%**
	1	93%	-	94%	69%	97%	83%	80%	**86%**
	2	95%	-	42%	50%	45%	84%	86%	**67%**
	3	100%	-	11%	5%	16%	82%	89%	**50%**
	4	-	-	-	-	-	-	-	**-**
	5	-	-	-	-	-	-	-	**-**
Weighted mean	**0-15**	**95.0%**		**75.4%**	**64.5%**	**79.0%**	**86.3%**	**85.1%**	**80.7%**
	RANKING	**1**		**5**	**6**	**4**	**2**	**3**	

RELATIVE BIAS — **BIAS RELATIVE TO MODAL AGE**

	MODAL age	AZTI-AU Reader 1	AZTI-IR Reader 2	IEO-OC Reader 3	IEO-MB Reader 4	IEOIX-MM Reader 5	IPIMAR-AL Reader 6	REMER-PG Reader 7	ALL
	0	0.00	-	0.12	0.00	0.06	0.00	0.03	**0.03**
	1	0.07	-	0.00	-0.28	0.03	0.15	0.27	**0.03**
	2	0.05	-	-0.61	-0.61	-0.50	0.05	0.08	**-0.26**
	3	0.00	-	-1.32	-1.68	-1.11	-0.29	-0.11	**-0.76**
	4	-	-	-	-	-	-	-	**-**
	5	-	-	-	-	-	-	-	**-**
Weighted mean	**0-15**	**0.05**		**-0.22**	**-0.43**	**-0.18**	**0.05**	**0.15**	**-0.10**
	RANKING	**1**		**5**	**6**	**4**	**2**	**3**	

Overall ranking

	AZTI-AU Reader 1	AZTI-IR Reader 2	IEO-OC Reader 3	IEO-MB Reader 4	IEOIX-MM Reader 5	IPIMAR-AL Reader 6	REMER-PG Reader 7
Ranking Coefficient of Variation	1		4	3	5	2	6
Ranking Percentage Agreement	1		5	6	4	2	3
Ranking Relative bias	1		5	6	4	2	3
OVERALL RANKING	**1**		**5**	**6**	**4**	**2**	**3**