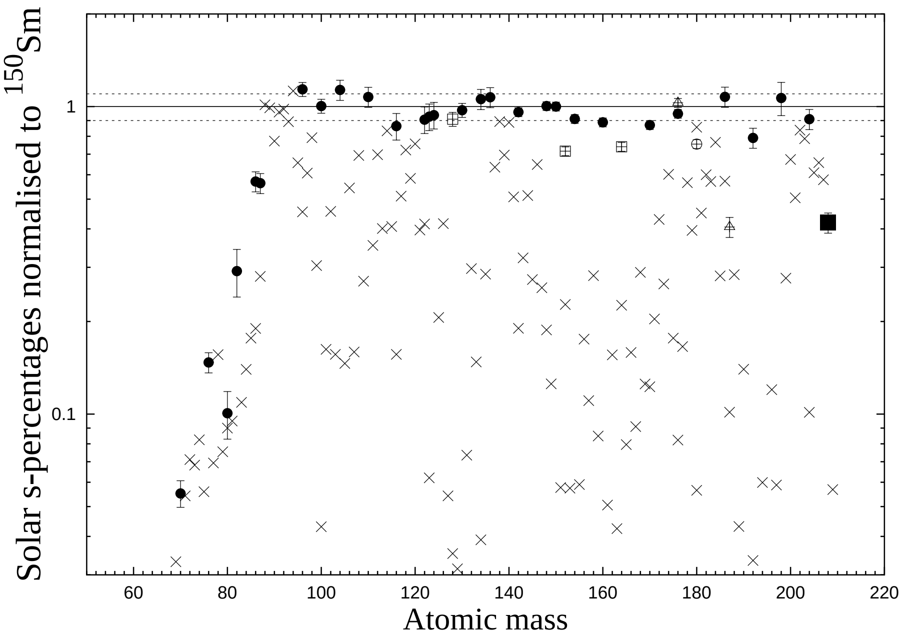

Figure A1. Solar s% normalized to ^{150}Sm versus atomic mass for the solar main component as in Arlandini et al. (1999), updated to 2009.

APPENDIX A: SOLAR *S*-PROCESS CONTRIBUTION

In Table A1, we show the best representation of the solar main component with theoretical predictions in percentage for elements from Sr to Bi for an average between $M = 1.5$ and $3\ M_{\odot}$ at half solar metallicity and a case ST. Here, the main-*s* percentages presented by Arlandini et al. (1999), stellar model (reported as comparison in Col. 3), are updated with new solar abundances and a network upgraded to 2009 (Col. 4). The results by Bisterzo et al. (2006a) have been further updated with the recent cross sections measurement of ^{62}Ni (Alpizar-Vicente et al. 2008), ^{90,91}Zr (Tagliente et al. 2008a,b), ^{186,187,188}Os isotopes (Mosconi et al. 2008), ^{204,206,207}Pb (Domingo-Pardo et al. 2006, 2007a,b), ^{209}Bi(n, γ)^{210}Bi^{g} (Bisterzo et al. 2007) (see also KADoNiS, Karlsruhe Astrophysical Database of Nucleosynthesis in Stars, web address http://nuclear-astrophysics.fzk.de/kadonis/.). The case ST at [Fe/H] $= -0.3$ gives a [hs/ls] $= -0.25$ (Col. 4, and Fig. 11, middle panel). In Col. 5 we report the normalization of the main-*s* percentages to europium in logarithmic scale, [El/Eu]. As shown in Col. 4, only $\sim 6\%$ of solar europium is produced by the *s*-process, and it is considered a typical *r*-process element. The normalization to europium highlights the amount of a pure *s*-process contribution to each element [El/Eu]$_{\rm s}$. This [El/Eu] ratio is useful to compare our theoretical predictions with spectroscopic observations, especially in CEMP-*s* (and CEMP-$s+r$) stars, to understand if there is competition between *r*- and *s*-process (see Table 1 and Paper II). A pure *s*-process contribution predicts [La/Eu]$_{\rm s} = 1.08$ at [Fe/H] $= -0.3$, and $0.8 \leqslant$ [La/Eu]$_{\rm s} \leqslant 1.1$ at [Fe/H] $= -2.6$ (see Table 1, Cols. 7 to 10). If lower [La/Eu]$_{\rm s}$ values are observed, this indicate stars that experienced an important *r*-process contribution in addition to the *s*-process enhancements.

The same model presented in Table A1, is shown in Fig. A1 for isotopes from Sr to Bi normalised to the *s*-only nucleus ^{150}Sm. The full circles are the *s*-only nuclei. We adopted different symbols for ^{128}Xe, ^{152}Gd, and ^{164}Er, which have a not negligible p contribution (10% for Xe), for ^{176}Lu, a long-lived isotope (3.8×10^{10} y) which decays into ^{176}Hf, for ^{187}Os, which is affected by the long-lived decay of ^{187}Re (5×10^{10} y), and for ^{180}Ta, which receives also contributions from the *p*-process and from ν-interactions in massive stars. The black full square corresponds to ^{208}Pb, which receives a contribution of about 50% by the strong-*s* component (Travaglio et al. 2001, 2004; Serminato et al. 2009).

Table A1. Theoretical predictions in percentage for elements from Sr to Bi, (the label 'El' stands for a generic elements) adopted to reproduce the main component obtained by an average of $M = 1.5$ and $3.0\ M_{\odot}$ models ($M_{\rm aver}$) at [Fe/H] = -0.3 (case ST as in Arlandini et al. 1999, stellar model, Col. 3), improved with cross section measurements and solar abundances upgraded to 2009 (Col. 4; see text of this Appendix). In Col. 5 we report the normalization of the updated main-s percentages to europium in logarithmic scale, [El/Eu].

		Arlandini ($M_{\rm aver}$) [Fe/H] = -0.3	Updated [Fe/H] = -0.3	Updated
El (1)	Z (2)	% ST (3)	% ST (4)	[El/Eu] ST (5)
Sr	38	85.0	93.1	1.21
Y	39	92.0	99.0	1.23
Zr	40	83.0	88.1	1.18
Nb	41	85.0	89.3	1.19
Mo	42	50.0	54.8	0.98
Ru	44	32.0	34.1	0.77
Rh	45	14.0	15.6	0.43
Pd	46	46.0	49.4	0.93
Ag	47	20.0	21.3	0.56
Cd	48	52.0	64.0	1.04
In	49	35.0	39.0	0.83
Sn	50	65.0	65.6	1.05
Sb	51	25.0	25.3	0.64
Te	52	17.0	18.2	0.50
I	53	5.3	5.4	-0.03
Xe	54	17.0	17.0	0.47
Cs	55	15.0	14.8	0.41
Ba	56	81.0	84.1	1.16
La	57	62.0	69.5	1.08
Ce	58	77.0	80.7	1.14
Pr	59	49.0	50.8	0.94
Nd	60	56.0	56.7	0.99
Sm	62	29.0	30.9	0.73
Eu	63	5.8	5.8	0.00
Gd	64	15.0	11.0	0.28
Tb	65	7.2	8.5	0.17
Dy	66	15.0	14.4	0.39
Ho	67	7.8	8.0	0.14
Er	68	17.0	18.2	0.50
Tm	69	13.0	12.5	0.33
Yb	70	33.0	39.4	0.83
Lu	71	20.0	19.9	0.54
Hf	72	56.0	58.9	1.01
Ta	73	41.0	45.0	0.89
W	74	56.0	63.8	1.04
Re	75	8.9	16.9	0.46
Os	76	9.4	11.9	0.31
Ir	77	1.4	1.5	-0.59
Pt	78	5.1	6.4	0.04
Au	79	5.8	5.9	0.01
Hg	80	61.0	63.2	1.04
Tl	81	76.0	66.1	1.06
Pb	82	46.0	49.9	0.93
Bi	83	4.9	5.7	-0.01
[hs/ls]		-0.27	-0.25	