High resolution neodymium characterization along the Mediterranean margins and modeling of εNd distribution in the Mediterranean basins.

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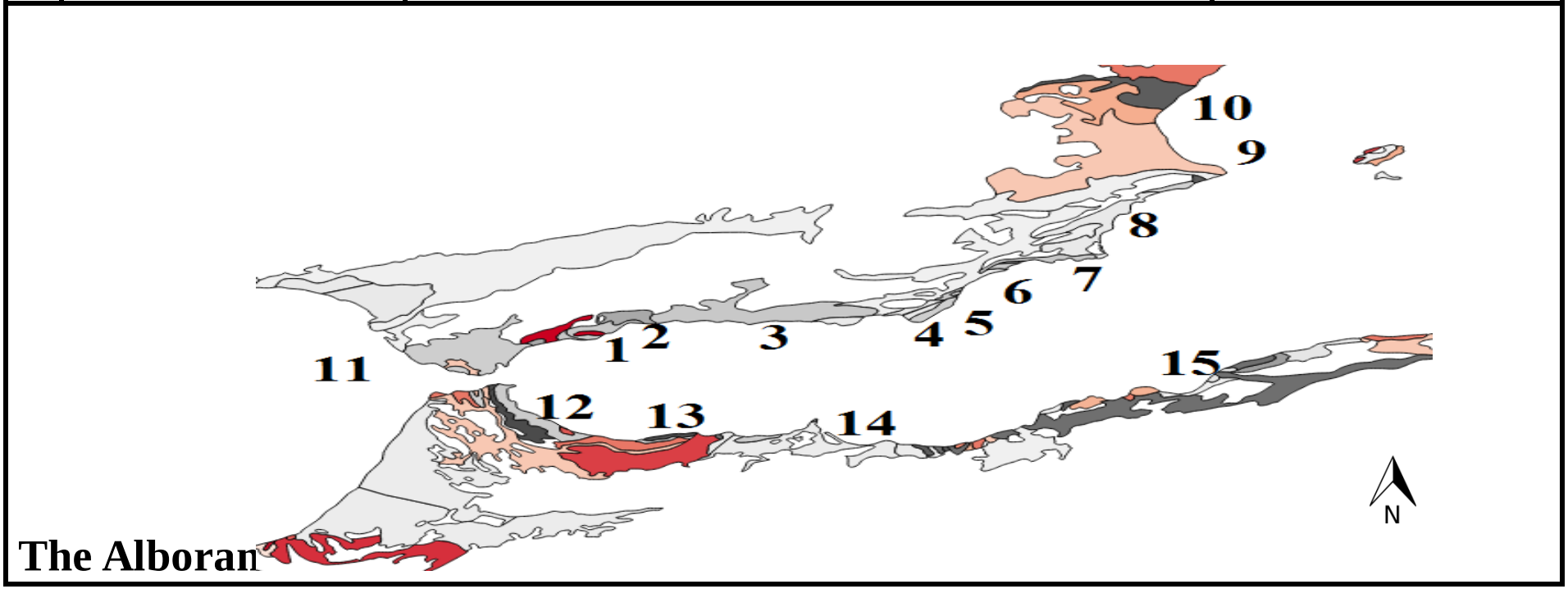
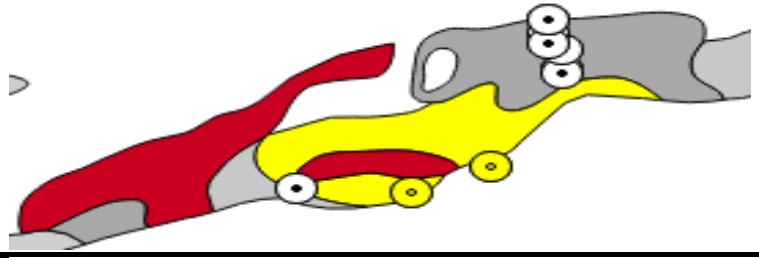
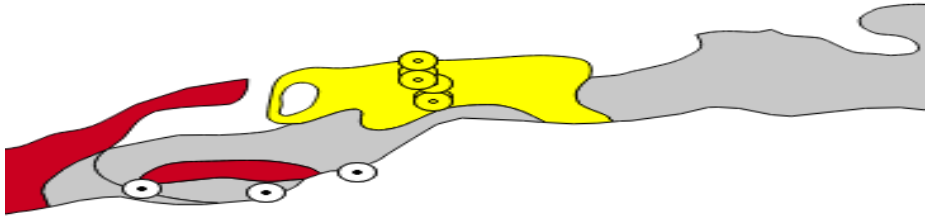
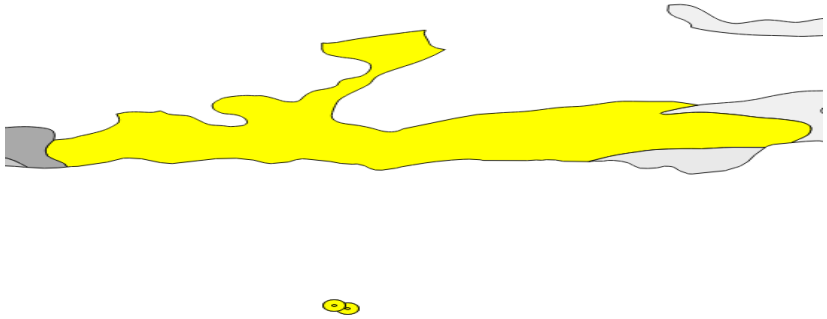
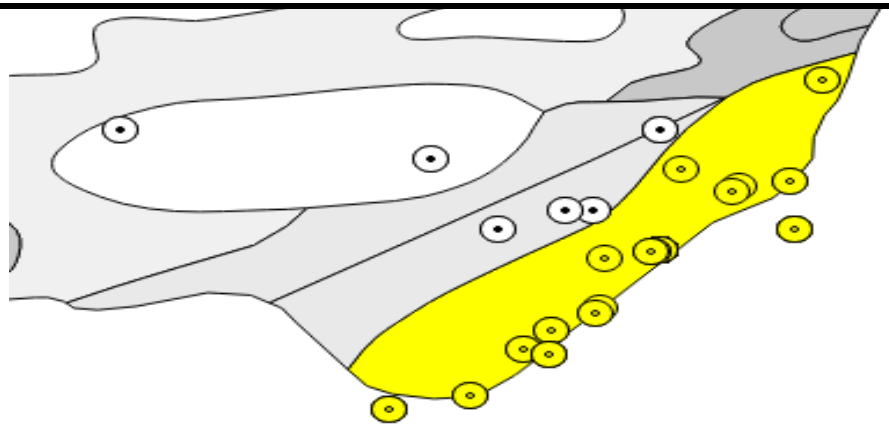
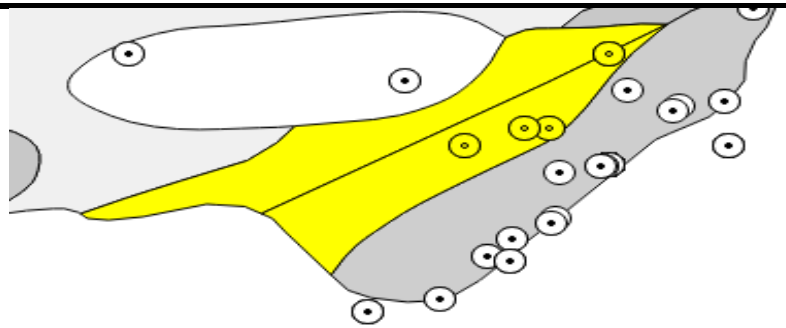
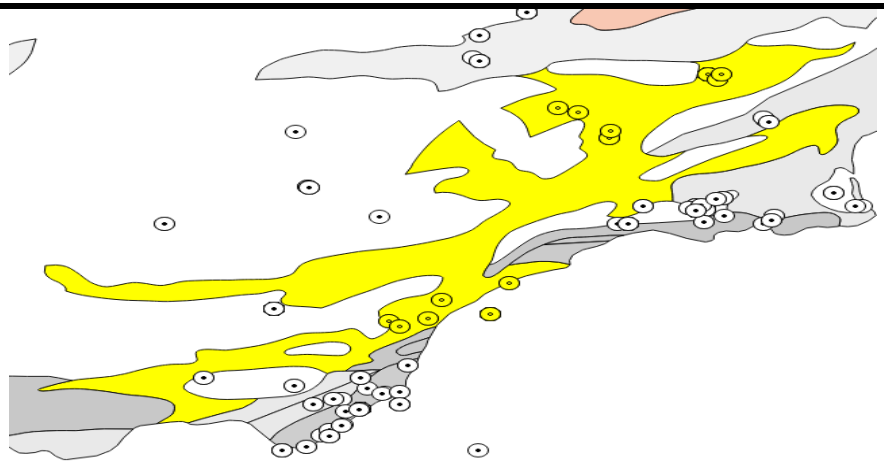
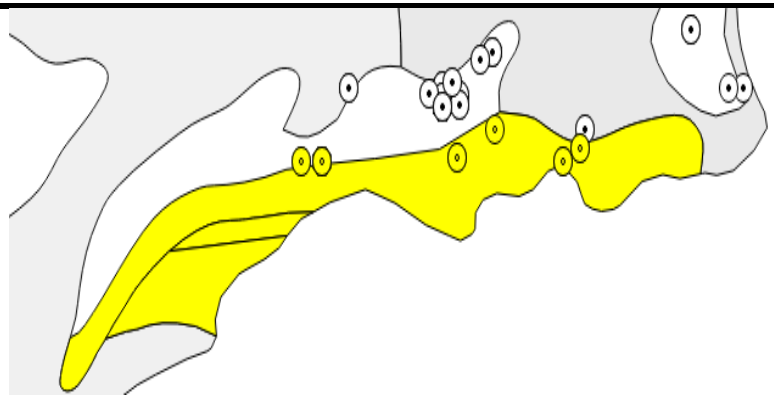
Appendix

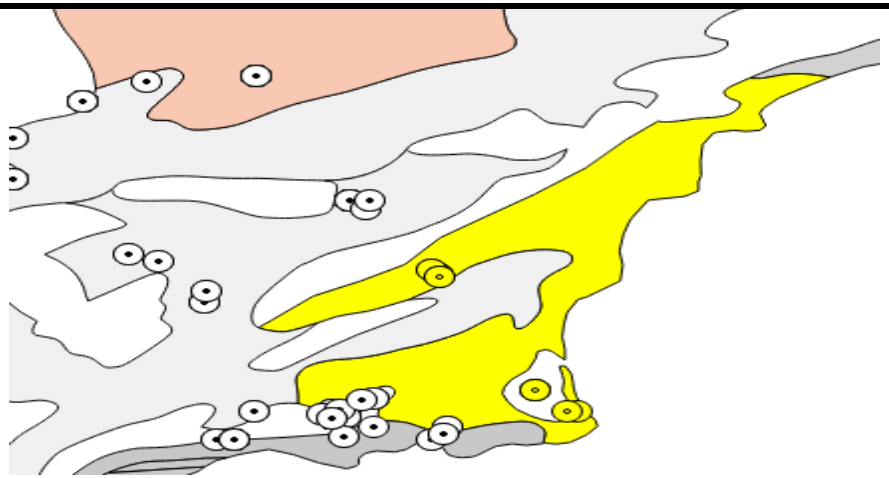
Appendix 1: Nd isotopic composition and concentration (in µg/g) of solid material used to build the map proposed in Fig. 1b. In yellow the selected data for each areas (from 1 to 67). λ for longitudes, φ for latitudes and SD for standard deviation

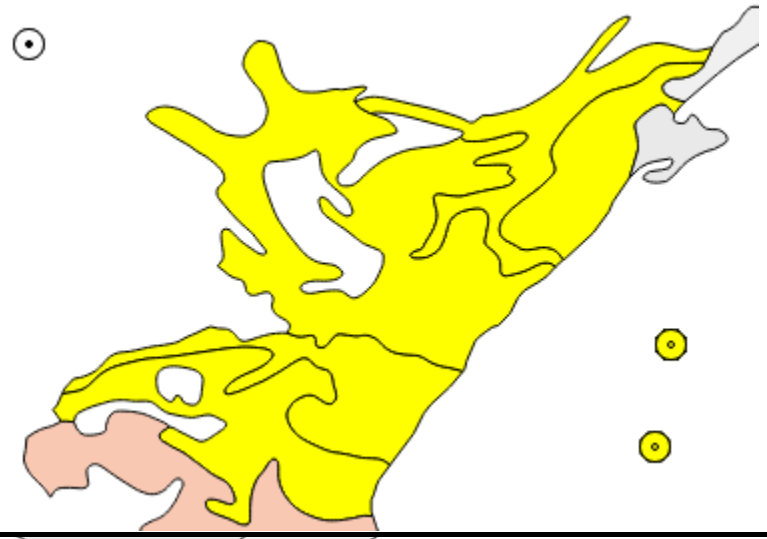
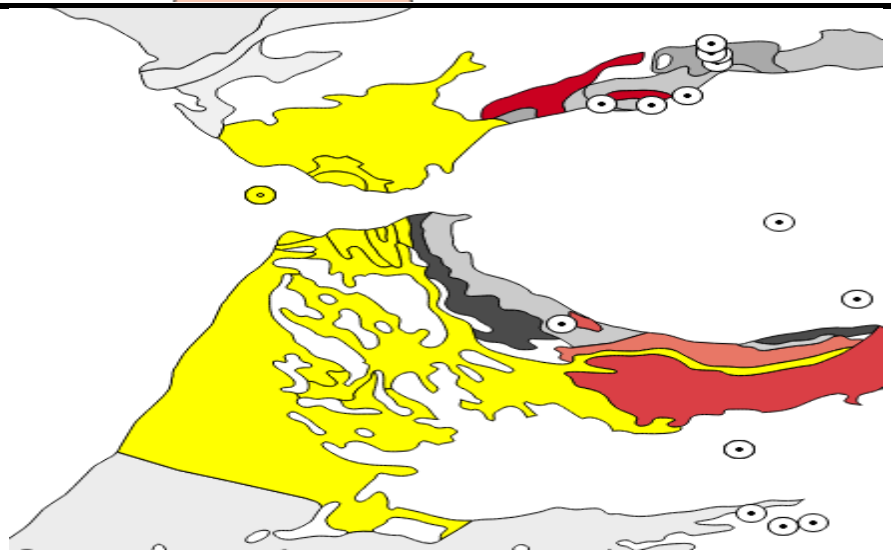
N°	References	Localisation	Finale value
			

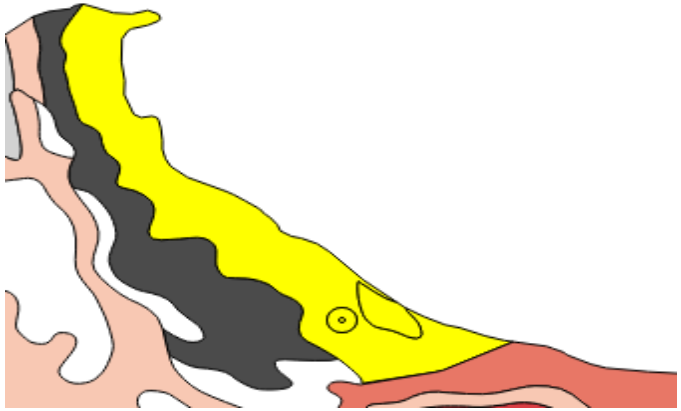
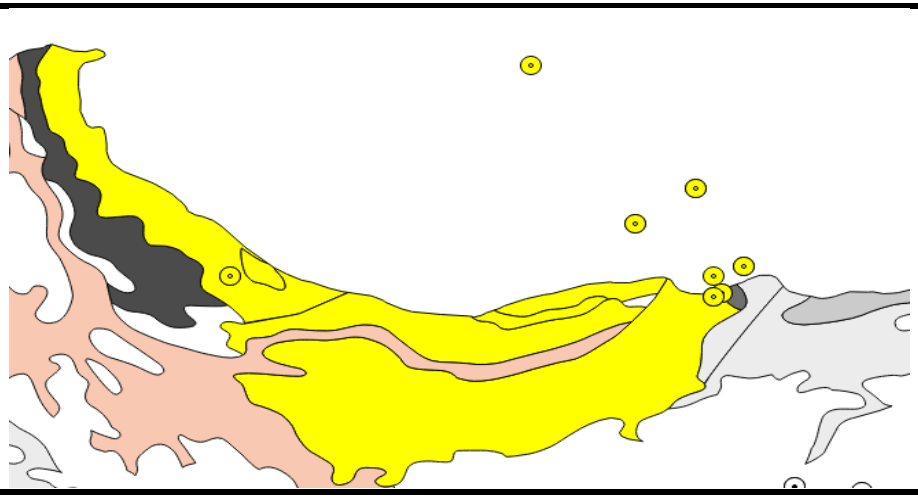
01	Duggen *et al.*,2004		1 Data εNd = -8.1 [Nd] = 36 φ λ 36,52 -4,65 36,58 -4,53
02	Turner *et al.*, 1999 Duggen *et al.*, 2004		Average of 7 Data εNd = +3.9 SD = 0.7 [Nd] = 6.2 SD = 1.2 φ λ 36.78 -4.43 36.82 -4.43 36.85 -4.45 36.83 -4.45 36.87 -4.45
03	Values from sediment Duggen *et al.*, 2008		Average of 2 Data εNd = -9.3 SD = 0.1 [Nd] = 47.3 SD = 5.2 φ λ 36.08 -3.540 36.09 -3.570

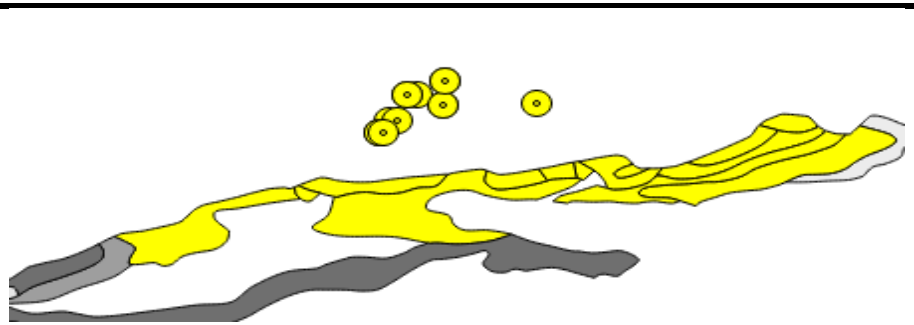
04	Zeck *et al.* 1999 Conticelli *et al.* 2009		Average of 13 Data εNd = -7.1 SD = 1.7 [Nd] = 13.3 SD = 6.2 φ λ 36,72 -2,2 36,7333 -2,14 36,78 -2,1 36,88 -2 36,96 -1,98 37,05 -1,88 36,93 -1,94 36,94 -1,94 36,9 -1,9 36,87 -2,04 36,87 -2,00 36,77 -2,08 36,94 -1,90
05	Turner *et al.*, 1999 Conticelli *et al.*, 2009		Average of 4 Data εNd = -7.5 SD = 1.2 [Nd] = 18 SD = 7 φ λ 36.92 -2.05 36.92 -2.07 37 -2 36.9 -2.12

06	Values from sediment Prelevic *et al.*, 2008 Conticelli *et al.*, 2009		Average of 12 Data εNd = -12.2 SD = 0.3 [Nd] = 116 SD = 2.3 φ λ 34.05 -1.12 11 -1.93 12.8 -1.67 32.75 -1.12 12.8 -1.12 12.8 -1.45 34.05 -1.5 11 -1.83 12.8 -1.62 7.5 -1.67 12.8 -1.08 12.8 -1.9
07	Prelevic *et al.*, 2008 We don't represented data from : CEBRIA *et al*, 2009 DUGGEN *et al.* 2005		Average of 6 Data εNd = -11.3 SD = 0.2 [Nd] = 94 SD = 28 φ λ 34.05 -1.32 11 -1.35 3.95 -1.32 12.8 -1.0772 12.8 -0.9567 12.8 -1.13

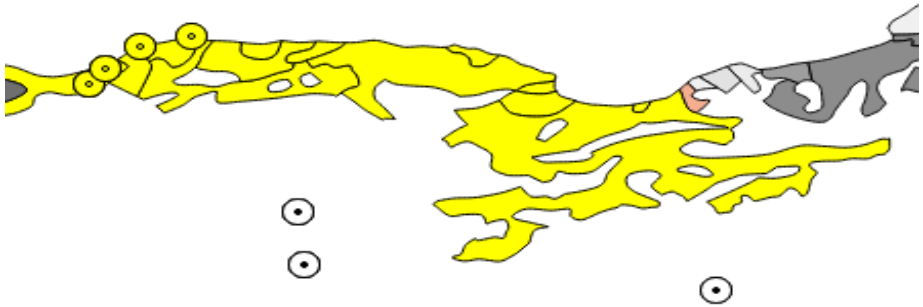
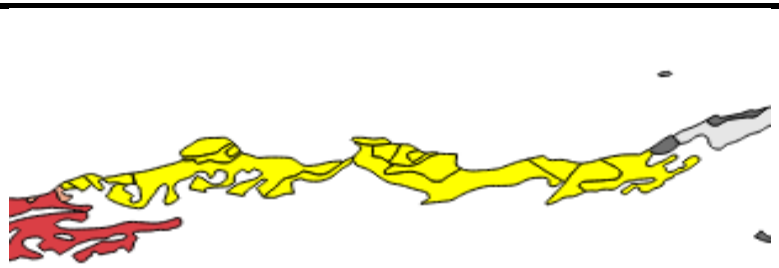
08	Conticelli *et al.*, 2009 Duggen *et al.*, 2005		Average of 3 Data εNd = -10.6 SD = 1 [Nd] = 52 SD = 33 φ λ 12.8 -0.97 11 -0.8 12.8 -0.9637
09	Prelevic *et al.*, 2008 Conticelli *et al.*, 2009 Benito garcia *et al.*, 1999 Duggen *et al.*, 2005 We don't represented data from : Nelson *et al.*, 1986		Average of 15 Data εNd = -11.2 SD = 1.3 [Nd] = 17 SD = 16 φ λ 34.05 -1.58 11 -1.58 34.05 -1.7 12.8 -1.28 7.5 -1.28 7.5 -1.7

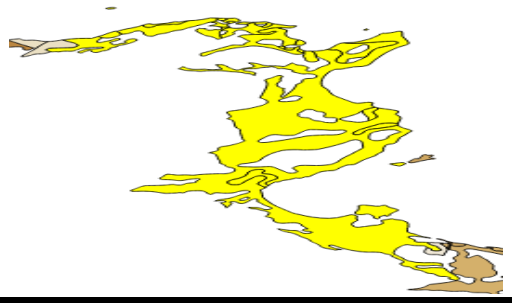
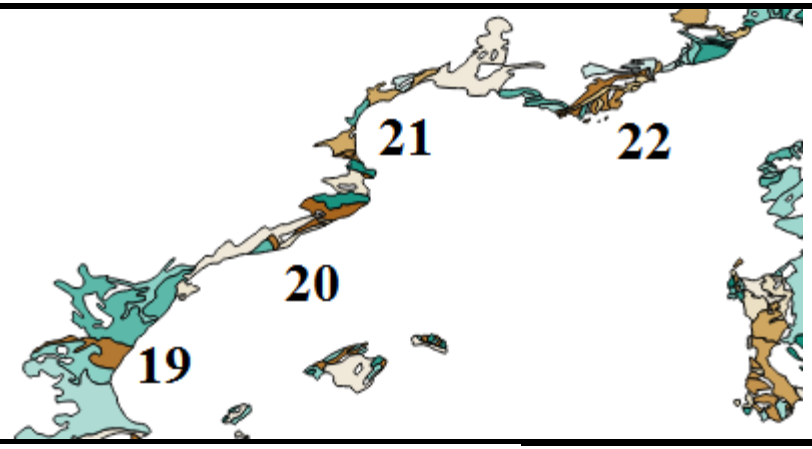
10	Values from sediment Gilbert *et al.*, 1994		Average of 14 Data εNd = -9.9 SD = 1.4 [Nd] = 30.5 SD = 8.2 φ λ 40 0.7 39.65 0.65
11	Lopez-guijarro *et al.*, 2008		1 Data εNd = -7.9 [Nd] = 94.2 φ λ 36 -6

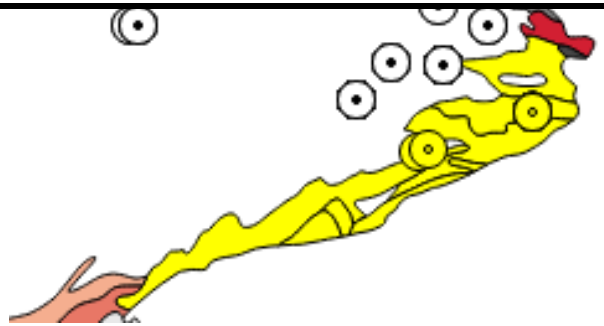
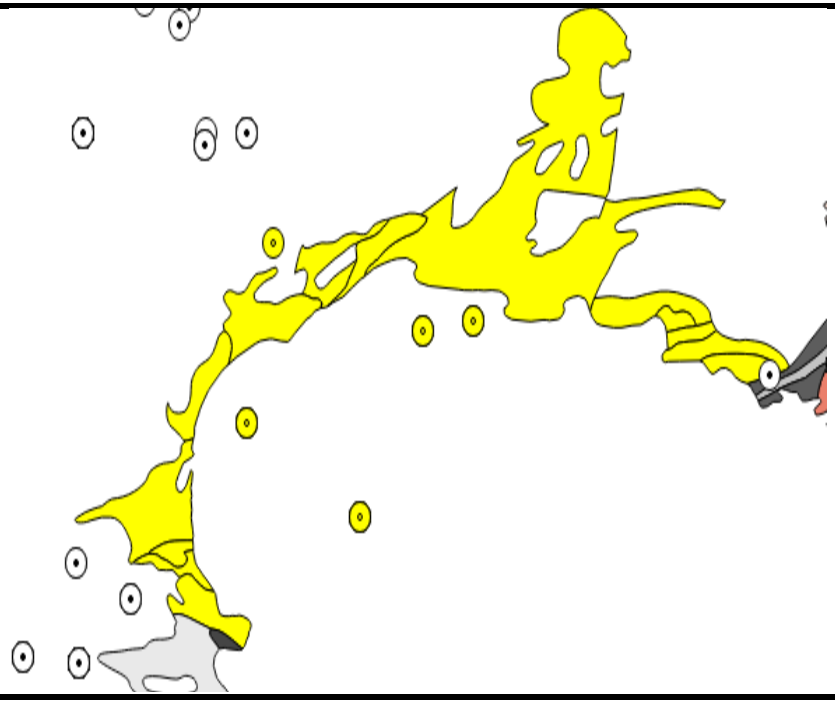
12	Gill *et al.*, 2004		1 Data εNd = -8.9 [Nd] = 30 φ λ 35.25 -4.96
13	Elazzouzi *et al.*, 1999 Duggen *et al.*, 2005 Gill *et al.*, 2004		Average of 5 Data εNd = -4.8 SD = 0.7 [Nd] = 32.3 SD = 10 φ λ 12.8 -3.7545 12.8 -3.95 12.8 -3.8 12.8 -3.68 12.8 -3.7557 12.8 -3.7338 14.15 -4.2133

14	Duggen *et al.*, 2005		1 data εNd = -7.8 [Nd] = 38.6 SD = 12 φ λ 35.47 -0.4 35.3 -1.47 35.5 -1.2
15	Values from sediment Toscani *et al.*, 1990		Average of 5 Data εNd = -11 SD = 0.5 [Nd] = 15.3 SD = 5 φ λ 36.78 1.59 36.73 1.55 36.84 1.78 36.88 1.68 36.88 1.65 36.88 1.65 36.85 2.1 36.93 1.78

The Algerian sub-basin

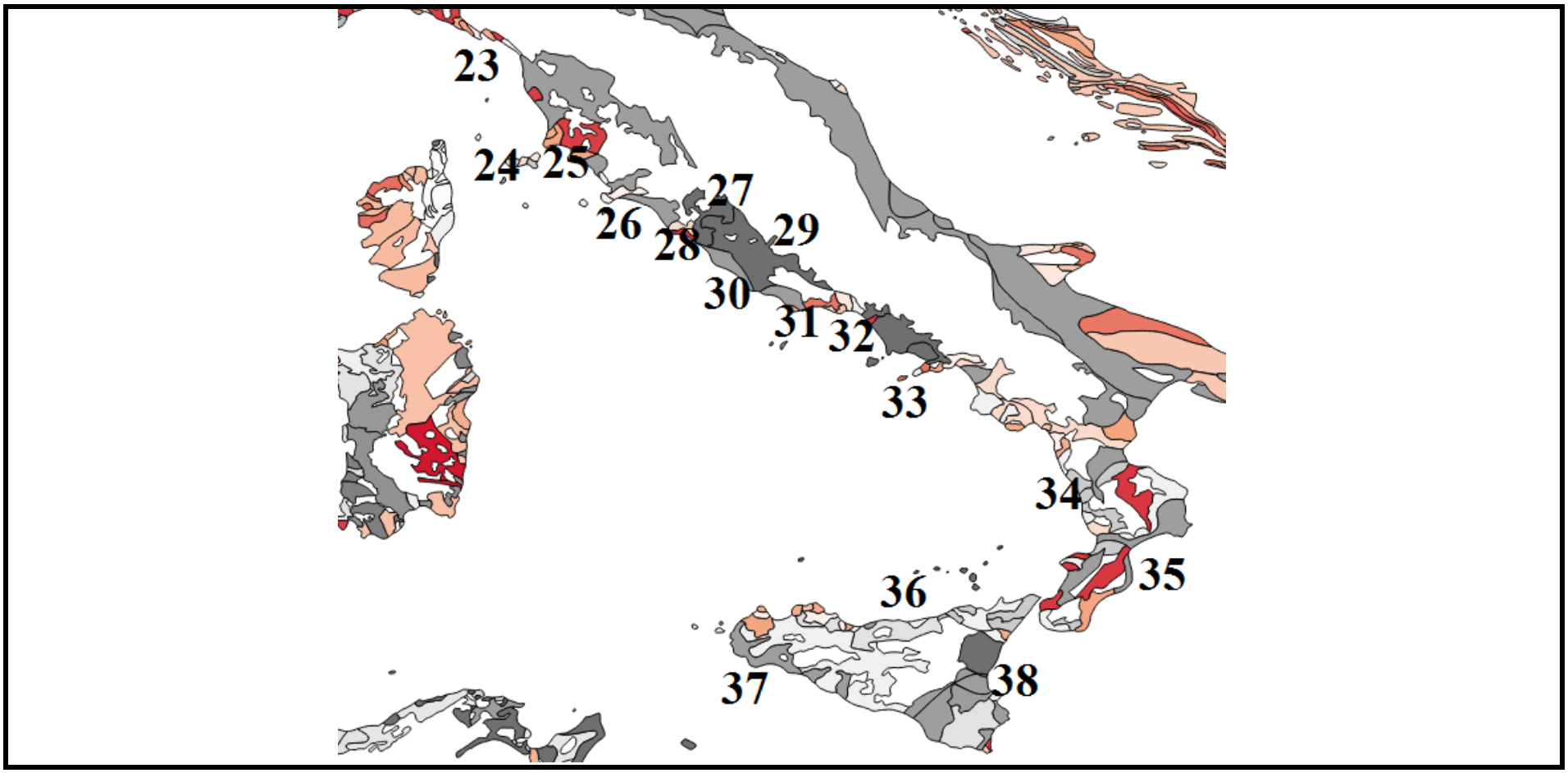
16	Belanteur *et al.*, 1995		Average of 2 Data εNd = -10.5 SD = 0.3 [Nd] = 15.3 SD = 5 φ λ 3.89 14.15 3.72 14.15 3.55 14.15 3.6 14.15
17	Juteau *et al* ,1986		Average of 3 Data εNd = -10.3 SD = 0.6 [Nd] = 14.8 SD = 3.3

18	Juteau *et al* ,1986		Same values as in the Algerian sub-basin. εNd = -10.3 SD = 0.6 [Nd] = 14.8 SD = 3.3
The Liguro-Provençal sub basin			
19	Values from sediment Gilbert *et al.*, 1994		Average of 14 Data εNd = -9.9 SD = 1.3 [Nd] = 30.2 SD = 8.5 φ λ 40 0.7 39.65 0.65

20	Navidad *et al.*, 2010		Average of 3 Data εNd = -8.3 SD = 0.2 [Nd] = 28 SD = 12 φ λ 41.7 2.35 41.72 2.4 41.92 2.98
21	Values from sediment Revillon *et al.*, 2011		Average of 24 Data εNd = -10.9 SD = 0.4 [Nd] = 12.8 SD = 9.2 φ λ 43,62 3,43 43,35 4,41 43,32 4,17 42,68 3,86 43,01 3,30

22	Rhone river: Peccerillo *et al*„ 2006 We don't represented data from : Lustrino *et al*„ 2007		Average of 3 Data εNd = -10.8 SD = 0.6 [Nd] = 85.9 SD = 57.1 φ λ 44.75 6.91 43.2 6.2 43.17 5.87 44.85 6.82 45 7

The Tyrrhenian sub-basin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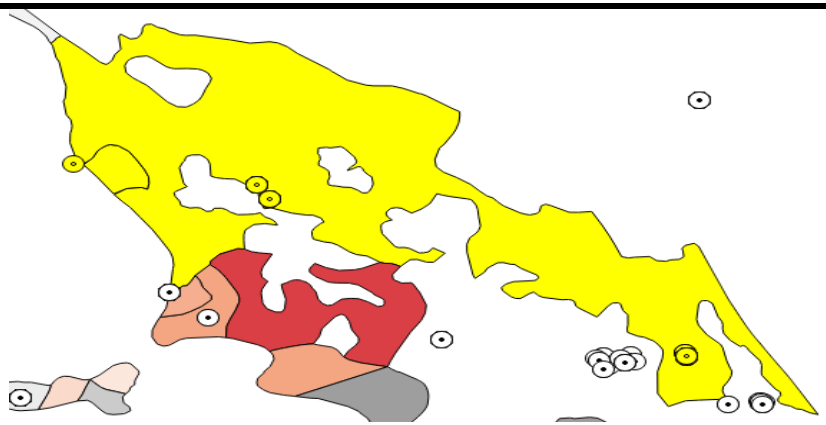
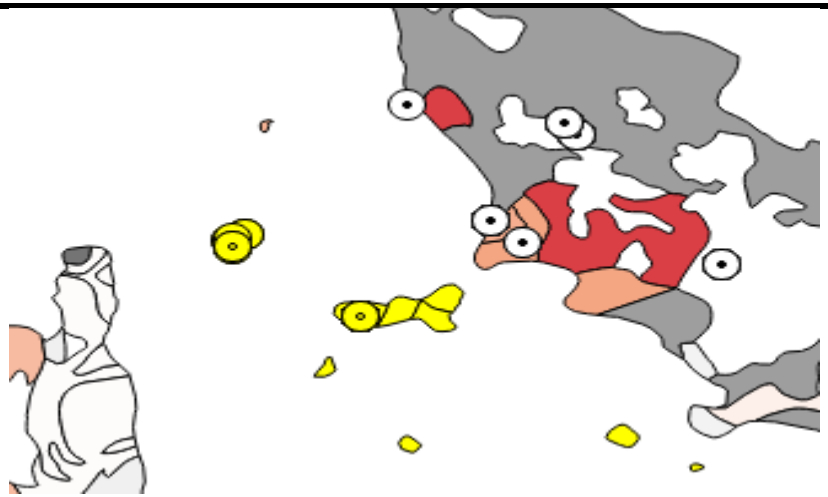
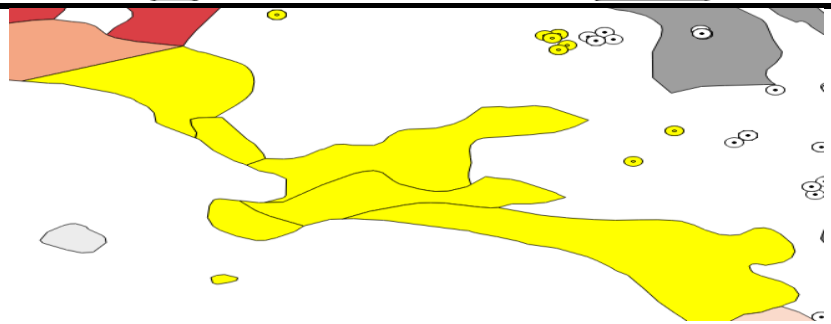
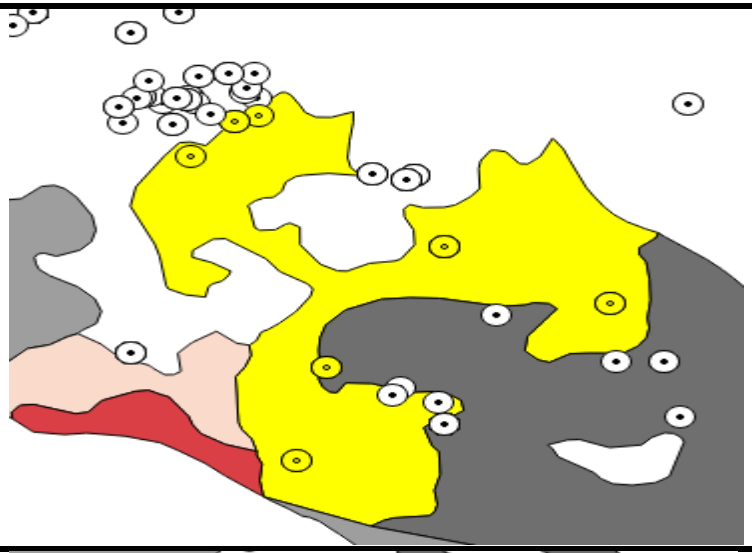
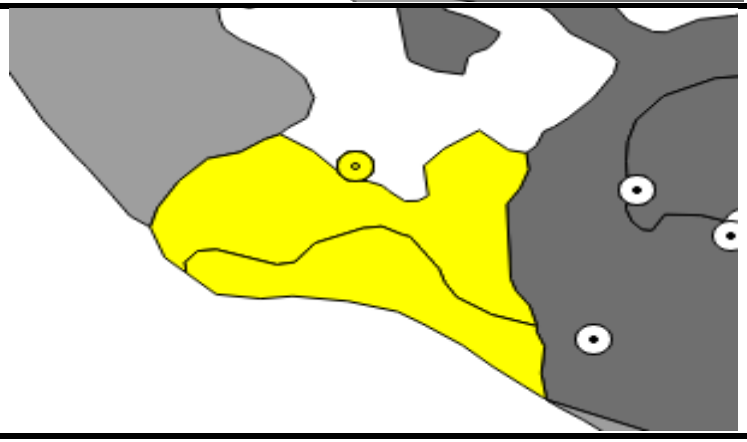
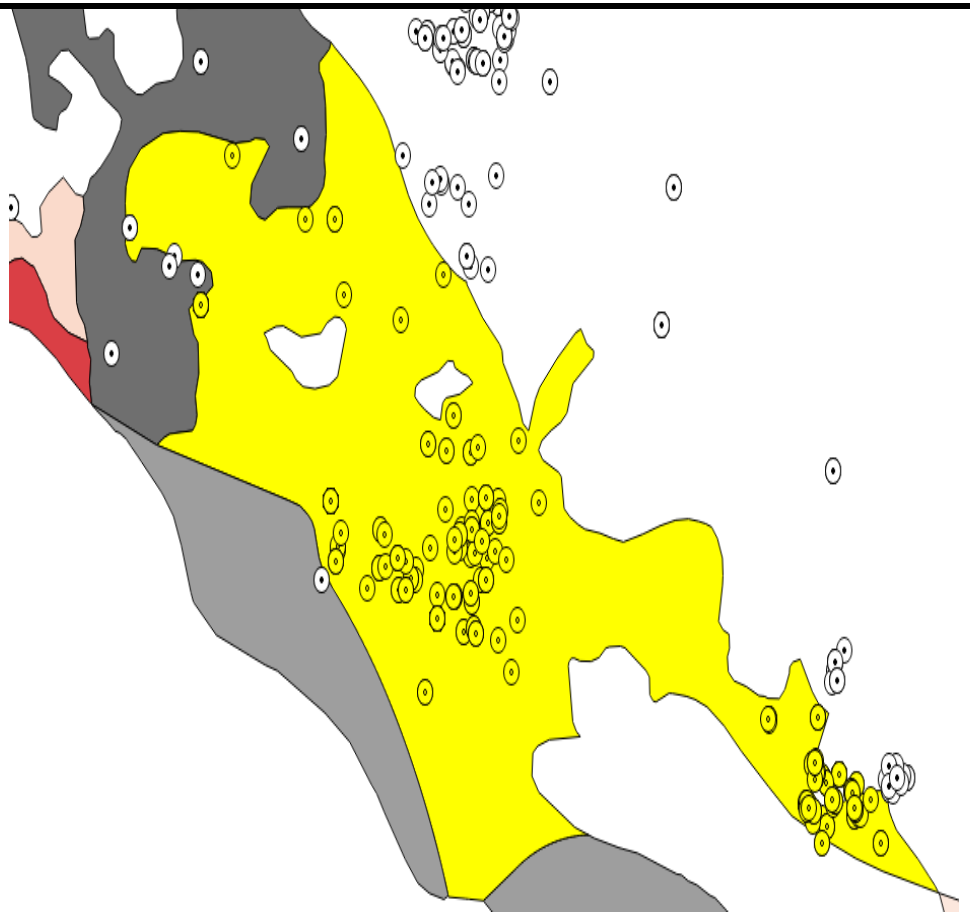
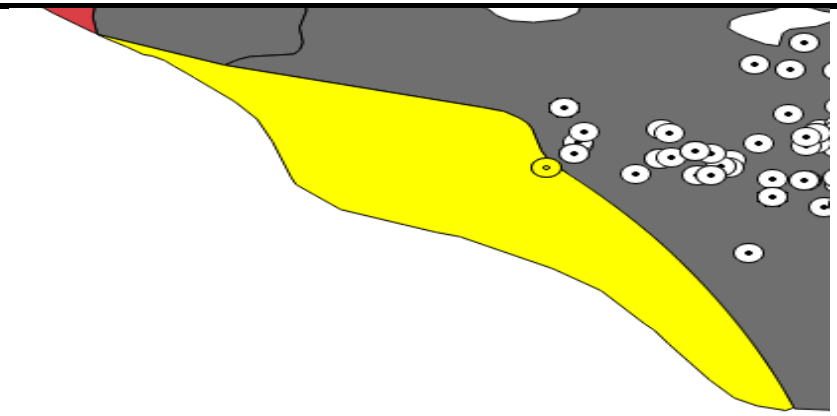
23	Conticelli *et al.*, 1992 Conticelli *et al.*, 2002 Conticelli *et al.*, 2009 Deastis *et al.*, 2000 Peccerillo *et al.*, 1987		Average of 15 Data εNd = -10.5 SD = 0.5 [Nd] = 148 SD = 30 φ λ 43,44 10,74 43,39 10,77 42,91 11,76 42,90 11,77 43,39 10,77 43,44 10,74 42,90 11,77 43,50 10,30
24	Conticelli *et al.*, 2002 Conticelli *et al.*, 2009 Gagnevin *et al.*, 2004		Average of 17 Data εNd = -8.3 SD = 1.2 [Nd] = 30 SD = 16.9 φ λ 10.17 2.65 9.84 7.15 9.80 7.55 9.81 4.63 10.17 7.4 10.17 5.8 9.81 4.63

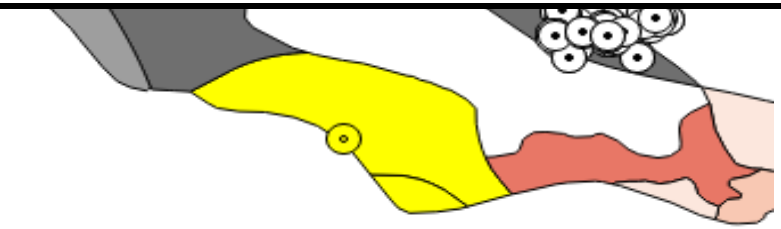
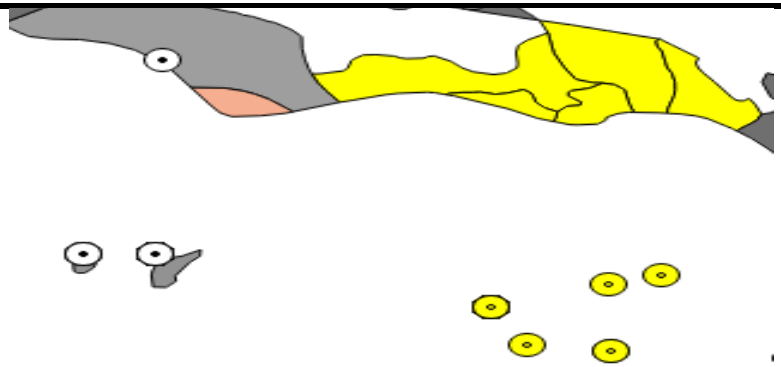
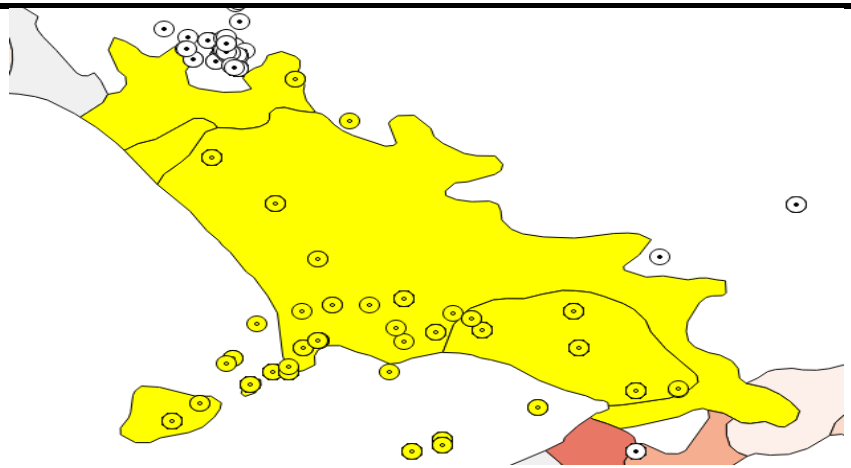
25	Hawkesworth *et al.*1979 Ferrara *et al.*, 1989		Average of 10 Data εNd = -8.3 SD = 0.8 [Nd] = 31 SD = 8.2 φ λ 43.1 10.53 43.02 10.62
26	Dibattistini *et al.*, 1998 Conticelli *et al.*, 2002 Avanzinelli *et al.*, 2008 Rogers *et al.*, 1985 Rogers *et al.*, 1985 Varekamp *et al.*, 1989 We don't represented data from : Hawkesworth *et al.*, 1979		Average of 40 Data εNd = -10.3 SD = 0.6 [Nd] = 80 SD = 77 φ λ 42.95 11.18 42.85 11.56 42.86 11.58 42.89 11.55 42.56 11.67 42.95 11.18 42.64 11.72 42.89 11.56

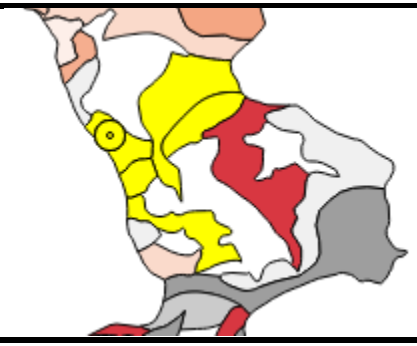
27	Conticelli *et al.*, 2009		Average of 4 Data εNd = -10.3 SD = 0.3 [Nd] = 60 SD = 17 φ λ 42.4267 11.9903 42.4833 12.0608 42.4761 12.0369 42.3 12.25 42 12.1 42.13 12.13 42.22 12.42
28	Conticelli *et al.*, 2002		Average of 2 Data εNd = -11 SD = 0.2 [Nd] = 69 SD = 15 φ λ 42.15 11.93

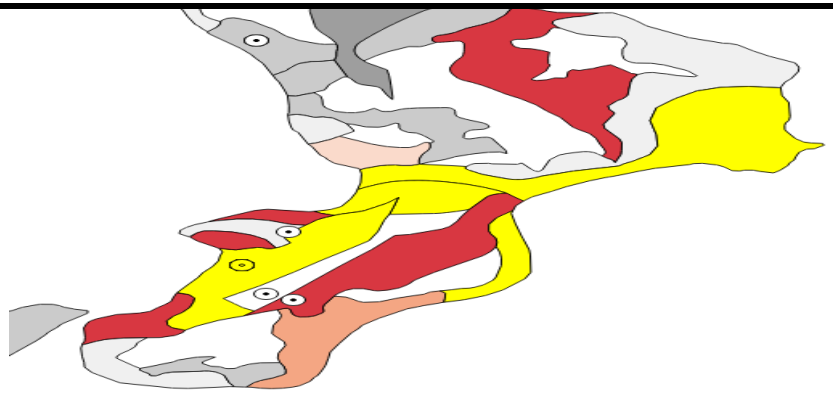
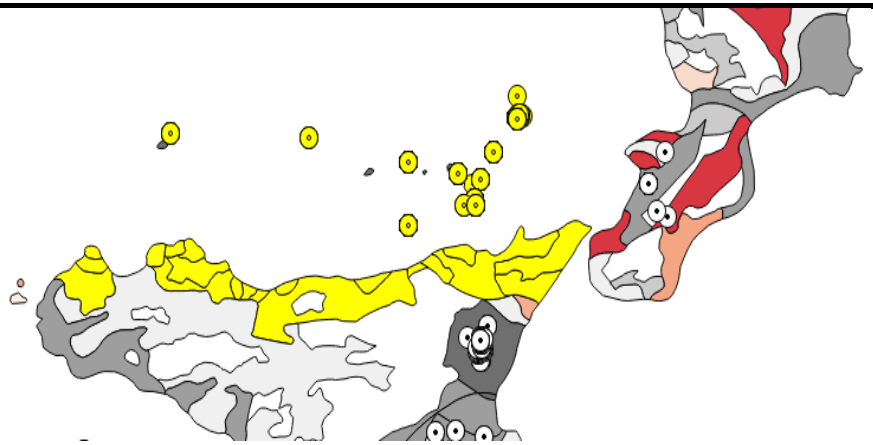
29	Marra *et al.*, 2011 Federico *et al.*, 1994 Peccerillo *et al.*, 2010 Federico *et al.*, 1994 Hawkesworth *et al.*, 1979 Avanzinelli *et al.*, 2008 Boari *et al.*, 2009 Boari *et al.*, 2009		Average of 72 Data εNd = -10.4 SD = 0.9 [Nd] = 112 SD = 40

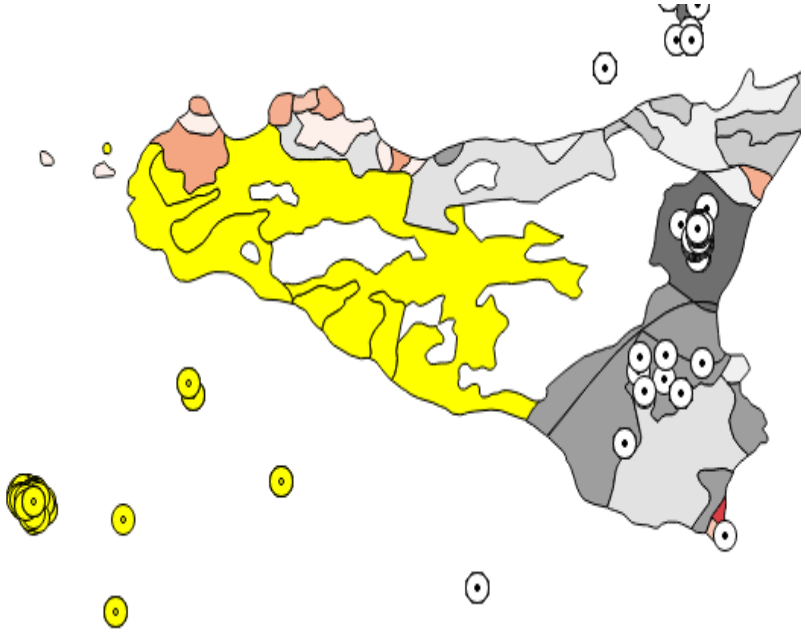
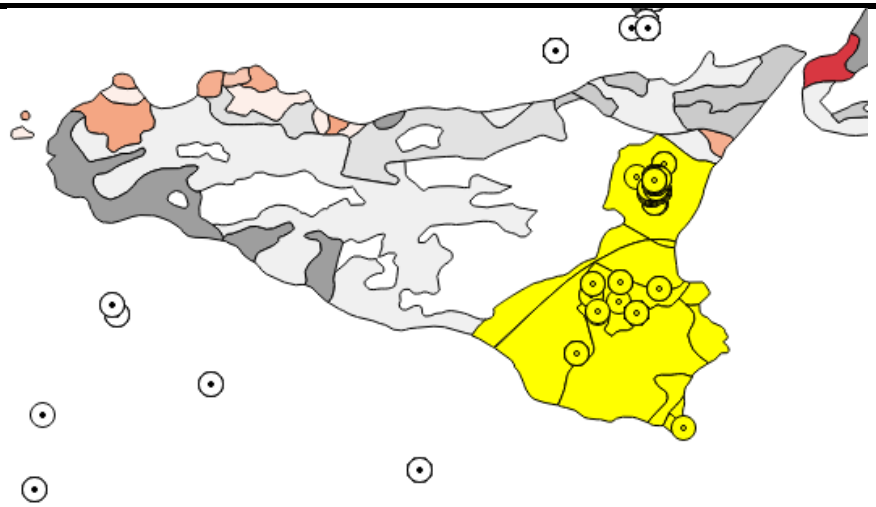
φ	λ
41,65	12,63
41,67	12,77
41,71	12,75
41,72	12,72
41,72	12,69
41,72	12,71
41,73	12,79
41,73	12,65
41,75	12,71
41,75	12,68
41,75	12,68
41,75	12,65
41,76	12,71
41,76	12,58
41,76	12,53
41,77	12,61
41,77	12,73
41,77	12,72
41,77	12,61
41,78	12,55
41,78	12,56
41,79	12,60
41,79	12,48
41,79	12,77
41,79	12,58

			41,79 12,73 41,79 12,71 41,80 12,71 41,80 12,48 41,80 12,69 41,82 12,69 41,82 12,56 41,82 12,49 41,82 12,71 41,82 12,69 41,84 12,66 41,85 12,82 41,85 12,47 41,85 12,47 41,85 12,75 41,90 12,71 41,90 12,67 42,08 12,66 42,14 12,48
30	Boari *et al.*, 2009		1 data εNd = -10.3 [Nd] = 144 φ 41.76 λ 12.45

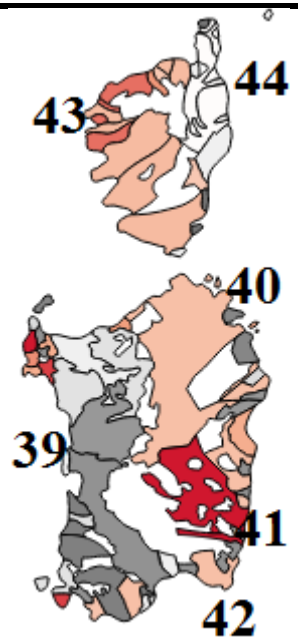
31	Conticelli *et al.*, 2002 Boari *et al.*, 2009		Average of 2 Data εNd = -7.6 SD = 1.4 [Nd] = 68 SD = 36 φ λ 41.35 12.95
32	Values from sediment Direnzo *et al.*, 2011 Dantonio *et al.*, 1999 We don't represented data from : Pappalardo *et al.*, 2002		Average of 11 Data εNd = -5.3 SD = 1.8 [Nd] = 34 SD = 19 φ λ 40.7 13.6 40.8 13.43 40.84 13.59 40.87 13.67 40.715 13.48
33	Values from sediment Piochi *et al.*, 2006 Direnzo *et al.*, 2011 Somma *et al.*, 2001 Ayuso *et al.*, 1998 Caprarelli *et al.*, 1993 We don't represented data from : Paone *et al.*,2006 Somma *et al.*, 1999		Average of 20 Data εNd = -3.3 SD = 1.6 [Nd] = 55 SD = 29 φ λ 40,7 14,2 40,7 14,3 40,7 14,3 40,7 13,9 40,7 14,4 40,8 14,5 40,8 14,0

			40,8 14,1 40,8 14,2 40,8 14,0 40,8 14,1 40,8 14,4 40,8 14,2 40,8 14,1 40,9 14,3 40,9 14,2 40,9 14,4 40,9 14,2 41,0 14,1 41,2 14,1 41,3 14,1
34	Bianchini *et al* 2008		1 Data εNd = +3.7 [Nd] = 73 SD = 29.9 φ λ 39.5 16

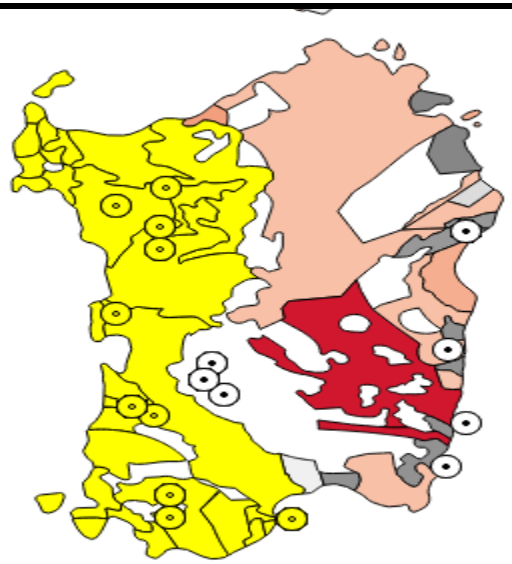
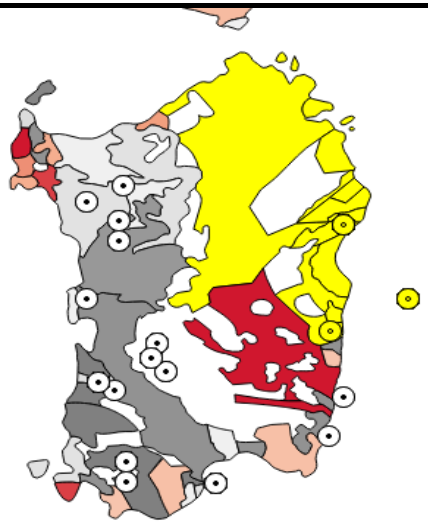
35	Rottura *et al*,. 1991		1 Data εNd = -9.5 [Nd] = 30 φ 38.48 λ 15.97
36	Values from sediment Deastis *et al.*, 1997 Delmoro *et al.*, 1998 Esperanca *et al.*, 1992 Gioncada *et al.*, 2003 Tommasini *et al.*, 2007		Average of 18 Data εNd = -0.6 SD = 1.2 [Nd] = 38.7 SD = 30 φ λ 38,28 14,58 38,38 14,97 38,40 14,96 38,50 15,00 38,53 14,87 38,58 14,58 38,63 15,07 38,70 14,00 38,79 15,21 38,79 15,20 38,80 15,22 38,80 15,23 38,81 15,22

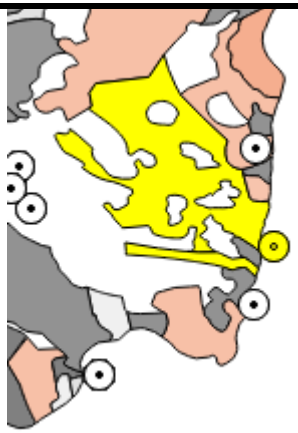
37	Rotolo *et al.*, 2006		Average of 9 Data εNd = +7.9 SD = 0.3 [Nd] = 46.4 SD = 5.3 φ λ 36,42 12,37 36,74 12,41 36,74 12,00 36,75 11,98 36,76 12,00 36,78 11,99 36,79 12,02 36,79 11,96 36,84 11,95 36,87 13,12 37,16 12,72 37,21 12,70
38	Tonarini *et al.*, 1996 Bianchini *et al.*, 1999 Sapienza *et al.*, 2009 Trua *et al.*, 1998 Beccaluva *et al.*, 1998 Tonarini *et al.*, 1996		Average of 15 Data εNd = +7.2 SD = 1.8 [Nd] = 40.4 SD = 30 φ λ 37,00 14,67 37,25 14,73 37,22 14,85 37,30 14,85 37,17 14,92 37,74 14,92 37,64 15,00

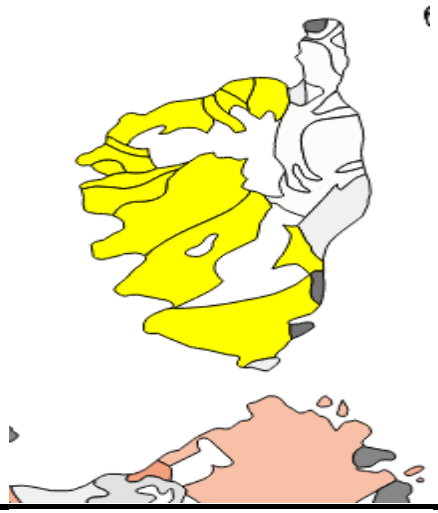
			37,73	15,00
			37,73	15,00
			37,64	15,00
			37,74	15,01
			37,72	15,01
			36,68	15,12

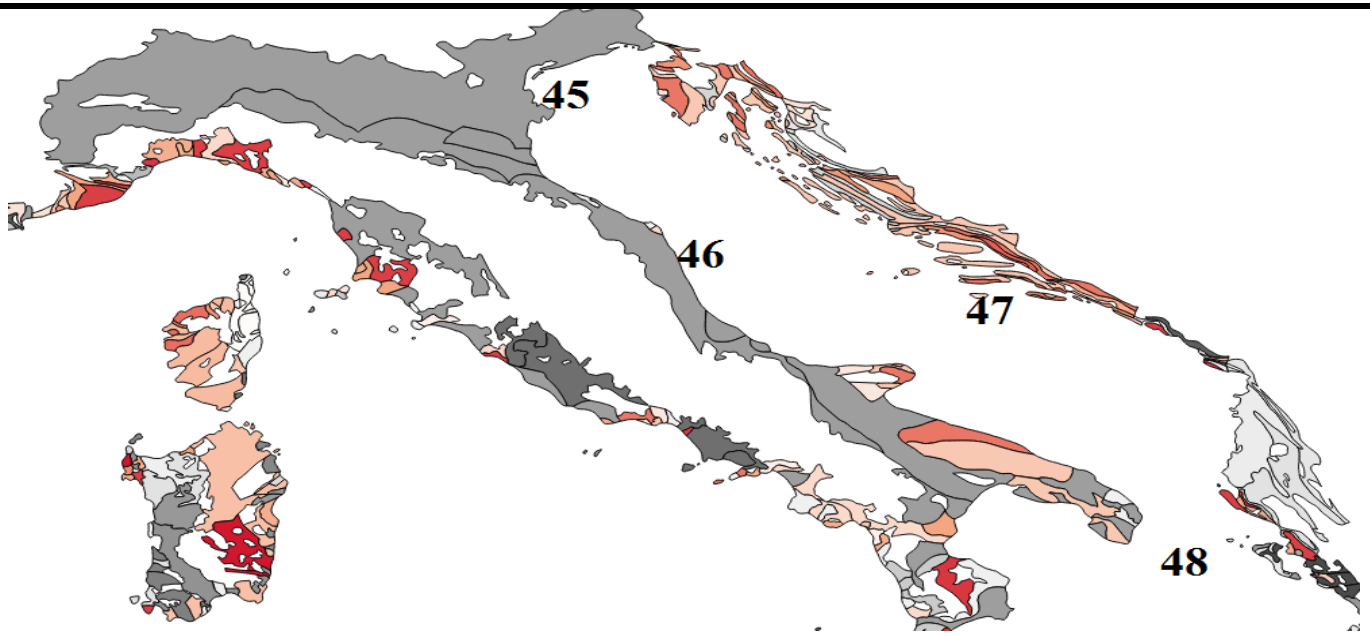


Corsica- Sardinia

39	Lustrino *et al.*, 2000 Downes *et al.*, 2001 Montanini *et al.*, 1994 We don't represented data from : Lustrino *et al.*, 2000		Average of 26 Data εNd = -5.8 SD = 2.3 [Nd] = 20.1 SD = 11.6 φ λ 39.78 8.83 40 8.5 40.5 8.5 40.5 8.5 39.54 8.63 39.58 8.55 39.7 8.8
40	Lustrino *et al.*, 2002		Average of 13 Data εNd = -2.2 SD = 0.8 [Nd] = 25.2 SD = 8.9 φ λ 39,84 9,64 40,38 9,7 40,38 9,7

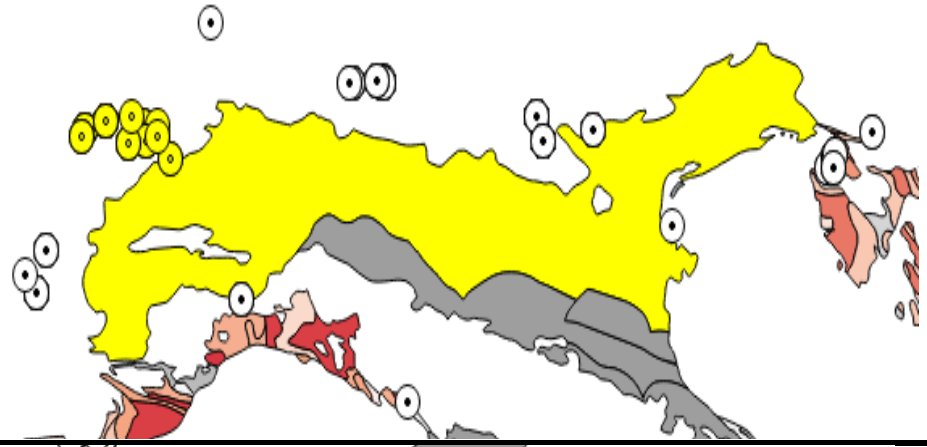
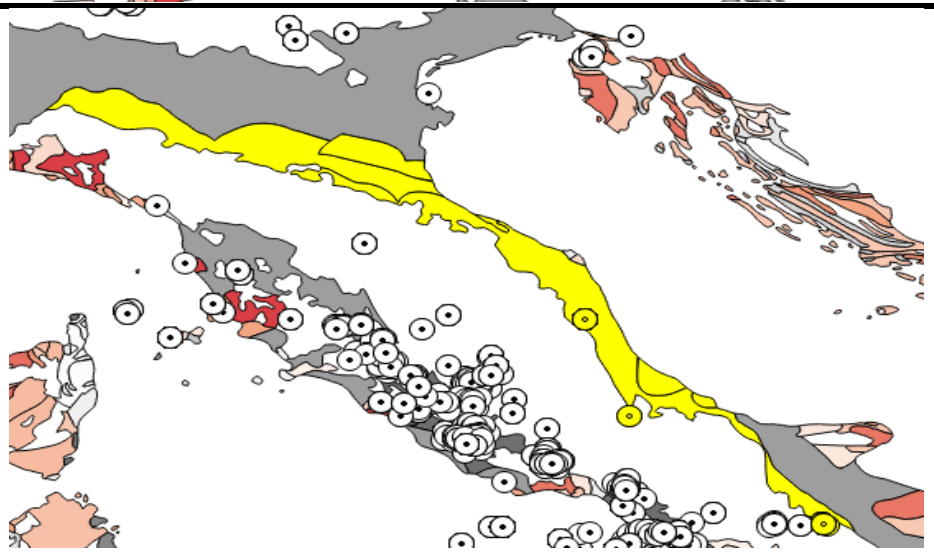
41	Lustrino *et al.*, 2000		1 data εNd = +4.4 [Nd] = 46.6 φ λ 39.5 9.7
42	Lustrino *et al.*, 2000		1 data εNd = +4.4 [Nd] = 46.6 φ λ 39.3 9.63

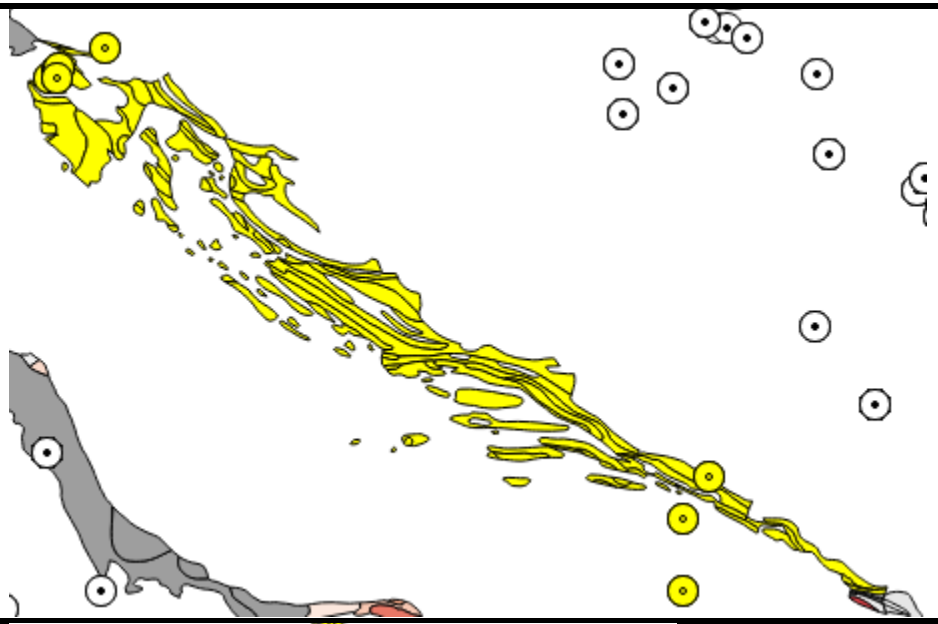
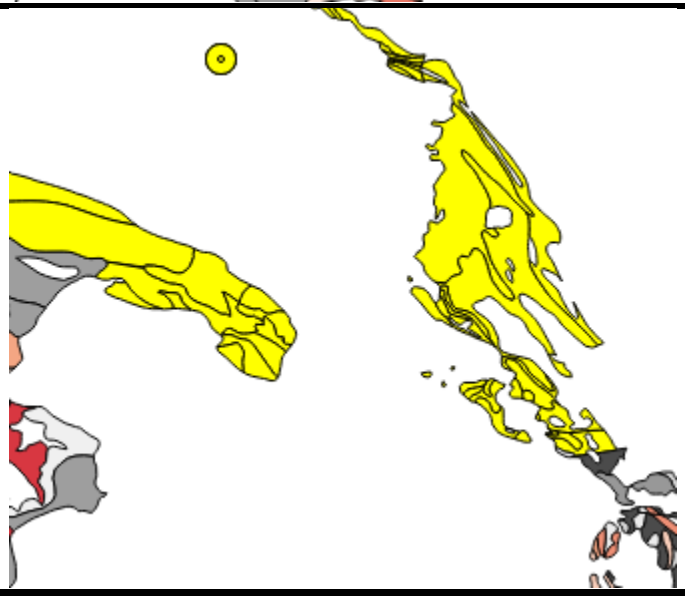
43			Same values as in 40 εNd = -7.4 [Nd] = 51
44	Values from sediment : Conticelli *et al.*, 2009 Conticelli *et al.*, 2002		Average of 8 Data εNd = -6.9 SD = 0.8 [Nd] = 60.1 SD = 30 φ λ 43,03 9,81 43,01 9,81 43,05 9,84 43,04 9,81



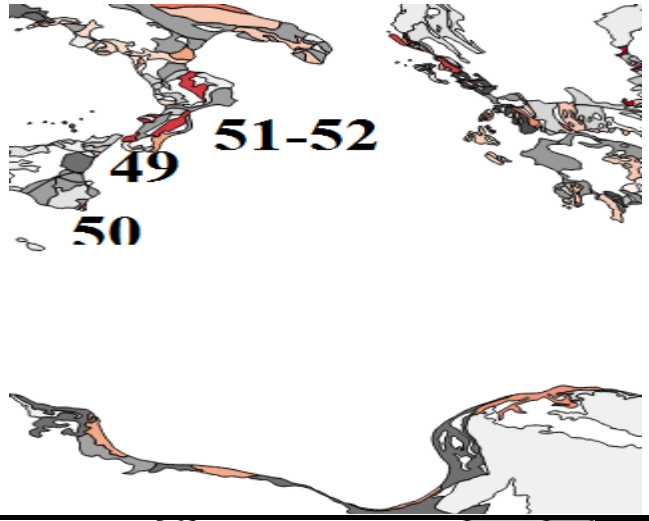
The Adriatic sub-basin

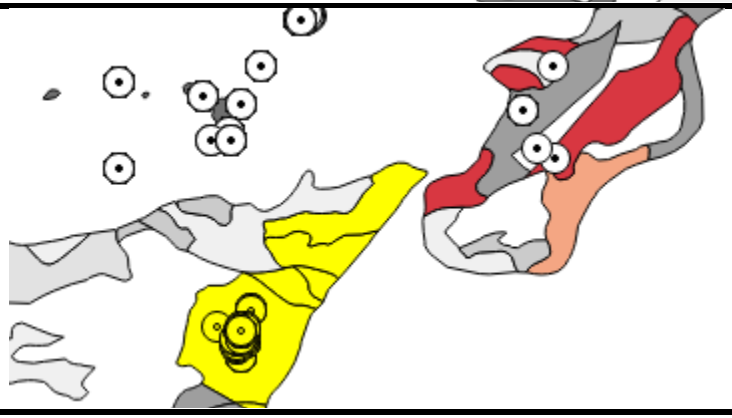
45	Conticelli *et al.*, 2009 Prelevic *et al.*, 2008 Owen *et al.*, 2008 Prelevic *et al.*, 2008 We don't represented data from : Beccaluva *et al.*, 2007 Gasperini *et al.*, 2006		Average of 19 Data εNd = -10.4 SD = 1.6 [Nd] = 90.5 SD = 35.3 φ λ 7.7 34.05 7.82 34.05 7.33 34.05 7.33 28.45

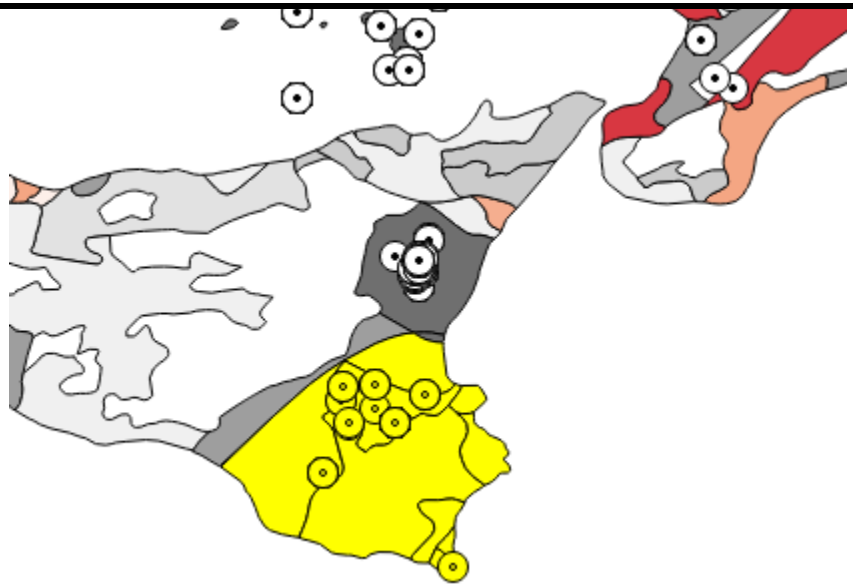
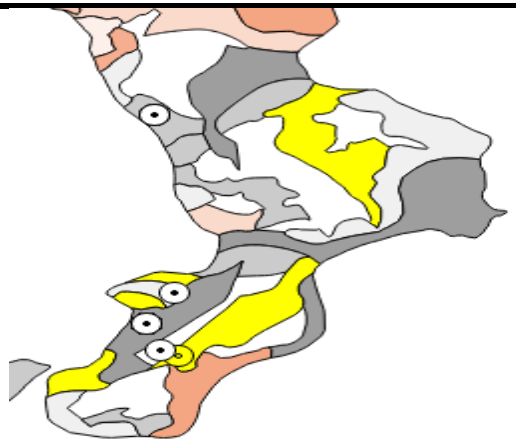
			7.95 28.45 7.85 28.45 7.33 28.45 7.7 31 7.33 31 8.05 31 7.95 28.45 7.85 28.45 7.73 28.45
46	Stoppa *et al.*, 2003 Dibattistini *et al.*, 2001 Castorina *et al.*, 2000		Average of 22 Data εNd = -11.1 SD = 0.4 [Nd] = 123 SD = 83 φ λ 42.95 13.63 40.95 15.62 42.95 13.63 42.95 13.63 40.95 15.62 40.95 15.62 42.95 13.63 40.96 15.61 40.93 15.64

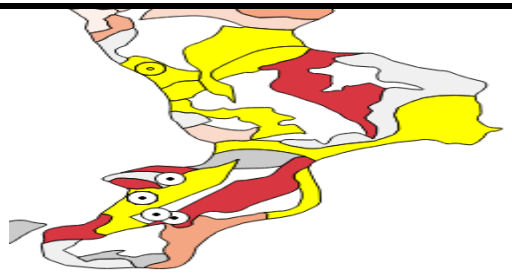
47	Values from sediment Prelevic *et al.*, 2008		Average of 4 Data εNd = -9.1 SD = 0.9 [Nd] = 91.7 SD = 26.3 φ λ 42.79 18.17 42.5 18 45.52 13.69 45.59 13.71 45.52 13.69 45.73 14.02 45.59 13.71
48	values from sediment Prelevic *et al.*, 2008		Average of 2 Data εNd = -9.7 SD = 0.6 [Nd] = 96.3 SD = 21.7 φ λ 18 34.05

The Ionian sub-basin

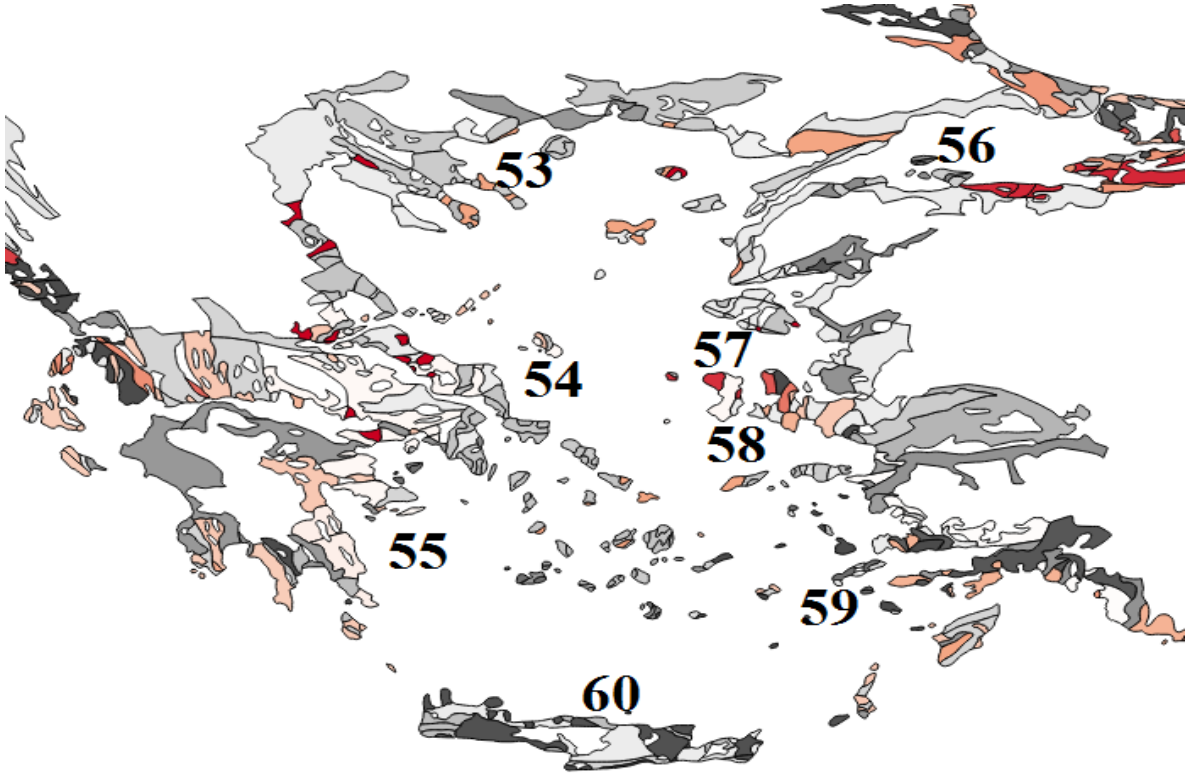


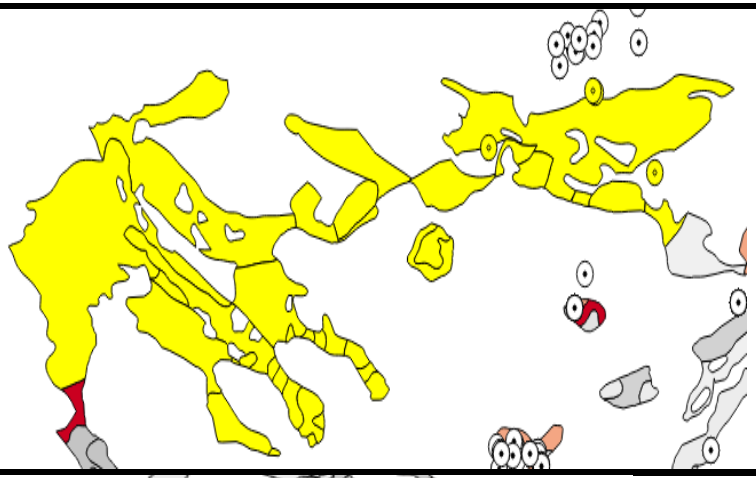
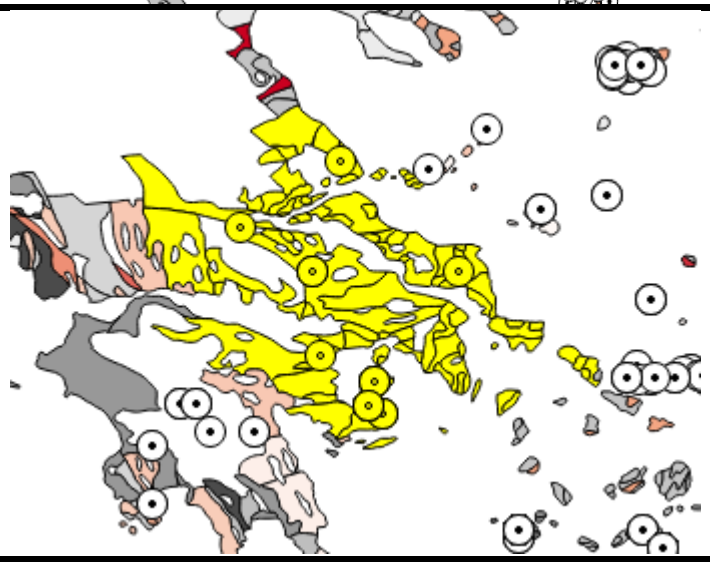
49	Bianchini *et al.*, 1999 Scribano *et al.*, 2006 Trua *et al.*, 1998 Beccaluva *et al.*, 1998		Average of 13 Data εNd = +4.8 SD = 1.1 [Nd] = 50.7 SD = 22 φ λ 37,6 15,0 37,8 15,0 37,7 15,0

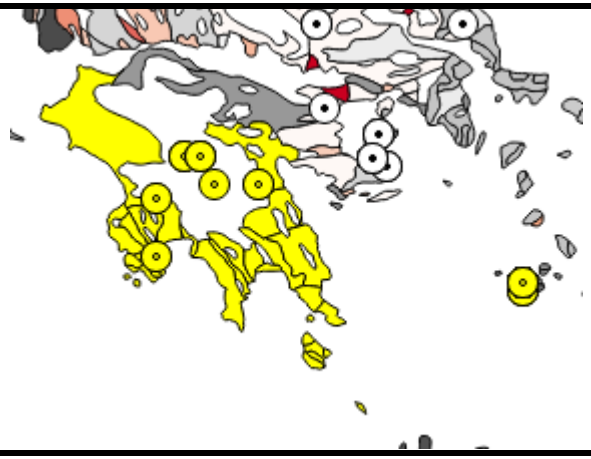
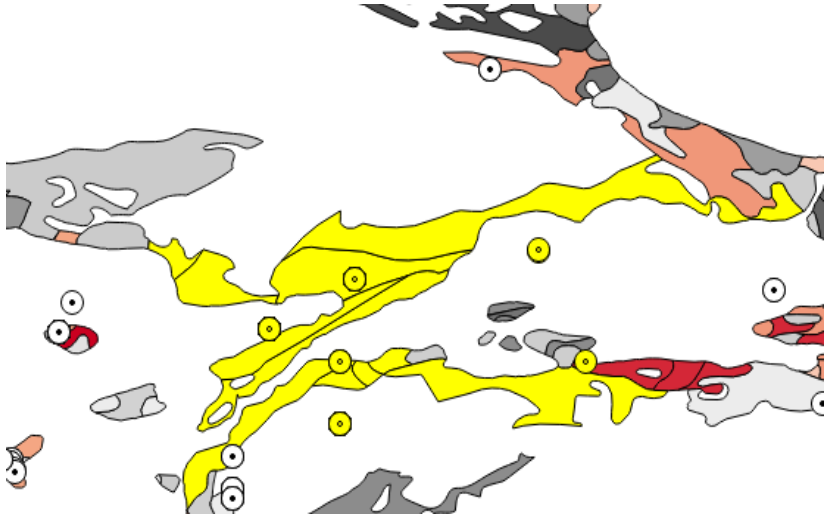
50	Marty *et al.*, 1994 Tonarini *et al.*, 1995 Dorazio *et al.*, 1997 Viccaro *et al.*, 2008 Carter *et al.*, 1978 Armienti *et al.*, 2004		Average of 17 Data εNd = +7.2 SD = 1.3 [Nd] = 40.7 SD = 20 φ λ 37,3 14,85 37,27 15,02 37,17 14,92 37 14,67 37,3 14,85 36,7 15,1 37,2 14,7 37,2 14,8 37,2 14,9 37,2 14,7 37,2 14,9
51	Hawkesworth *et al.*, 1979		εNd = +3.8 [Nd] = 117 φ λ 38.32 16.08

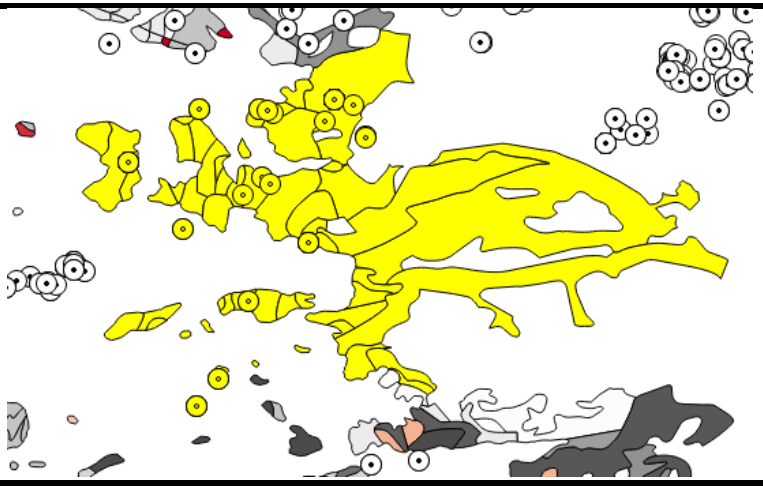
52	Rottura *et al.*, 1991		Average of 7 Data εNd = -9.8 SD = 1.2 [Nd] = 33.2 SD = 11.6 φ λ 39.5 16,0

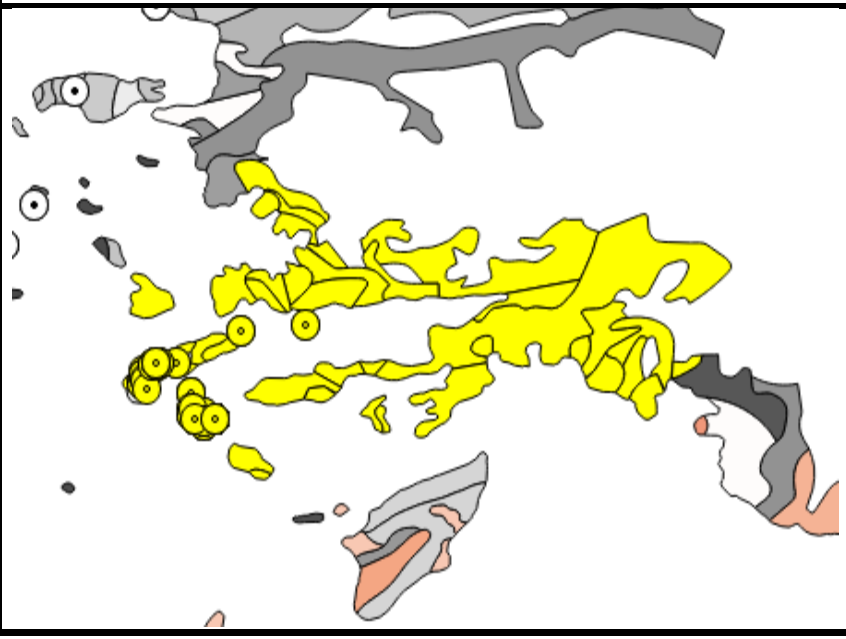
Aegean sub-basin

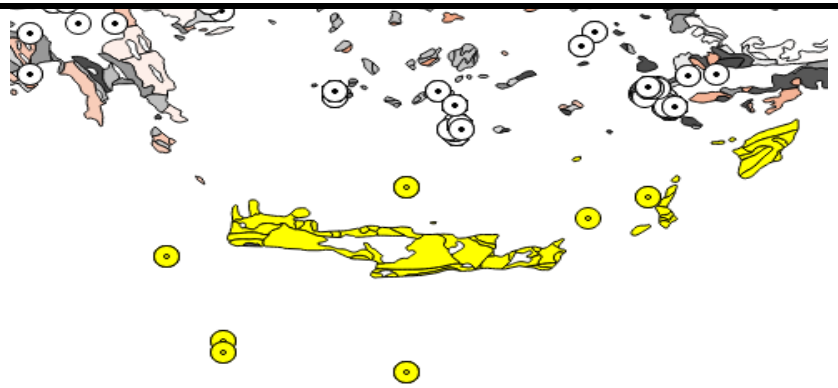


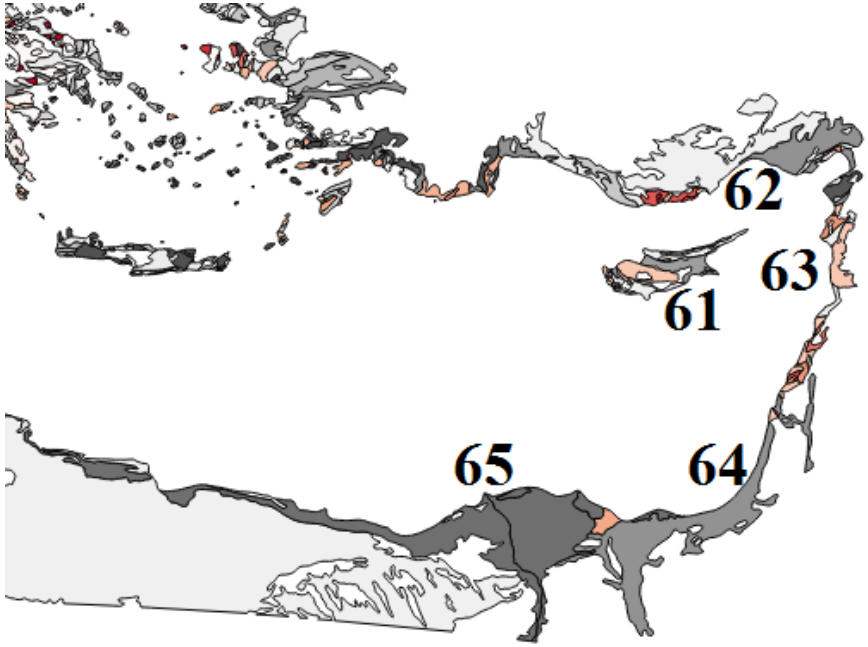
53	Kirchenbaur *et al* ,.2012		Average of 7 Data εNd = -3.1 SD = 0.4 [Nd] = 28.7 SD = 2 φ λ 41 26,0 41.1 25,0 41.3 25.6
54	Mitropoulos *et al.*, 1987 Innocenti *et al.*, 1979 Clift *et al.*, 1999 Innocenti *et al.*, 1981		Average of 9 Data εNd = -3.8 SD = 0.5 [Nd] = 29.7 SD = 7 φ λ 37,8 23,4 37,6 23,4 37,5 23,5 38,5 23,0 38,5 24,0 38,8 22,5 37,9 23,1

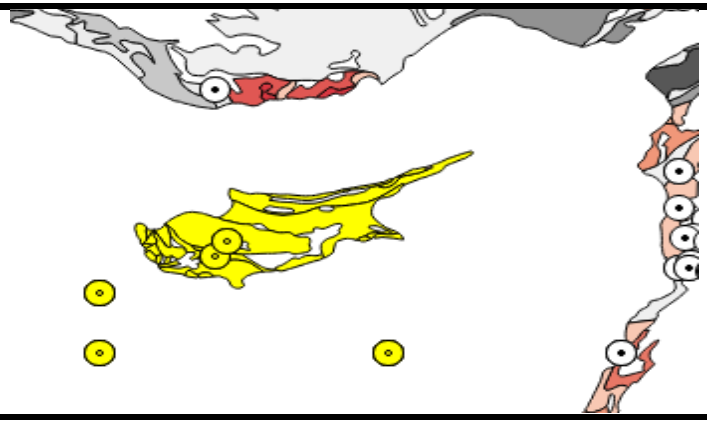
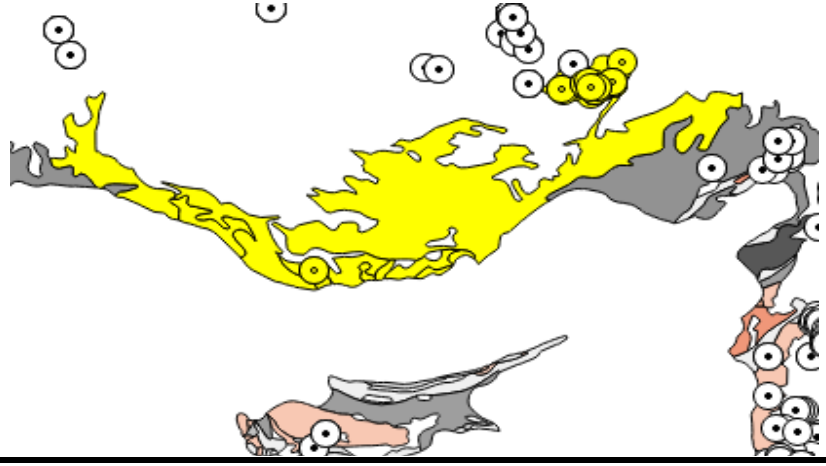
55	Pepiper *et al.*, 1998		εNd = -4.4 [Nd] = 54.1 φ λ 36.7 24.4
56	Exchange with the black sea Genc *et al* 1998 Aldanmaz *et al.*, 2000 We don't represented data from : Genc *et al.*, 1998		Average of 2 Data εNd = -6.3 SD = 0.2 [Nd] = 60 SD = 7 φ λ 40,71 26,9 40,72 26,9

57	Aldanmaz *et al.*, 2000 Innocenti *et al.*, 2005		Average of 13 Data εNd = -4.9 SD = 0.8 [Nd] = 38 SD = 9 φ λ 38,95 26,43 39 27 39,12 27,18 39,12 26,33 39,21 26,94 39,32 26,70 39,40 26,07 39,46 26,24 39,47 25,86 39,48 26,09 39,50 26,00 39,60 26,40 39,75 26,33
58	Innocenti *et al.*, 2005 Bachmann *et al.*, 2007		Average of 31 Data εNd = -2.7 SD = 0.9 [Nd] = 30 SD = 1.2 φ λ 38,69 27,23 38,67 26,76 38,67 26,45 38,67 26,80 38,53 27,29 38,40 26,10 38,33 26,77

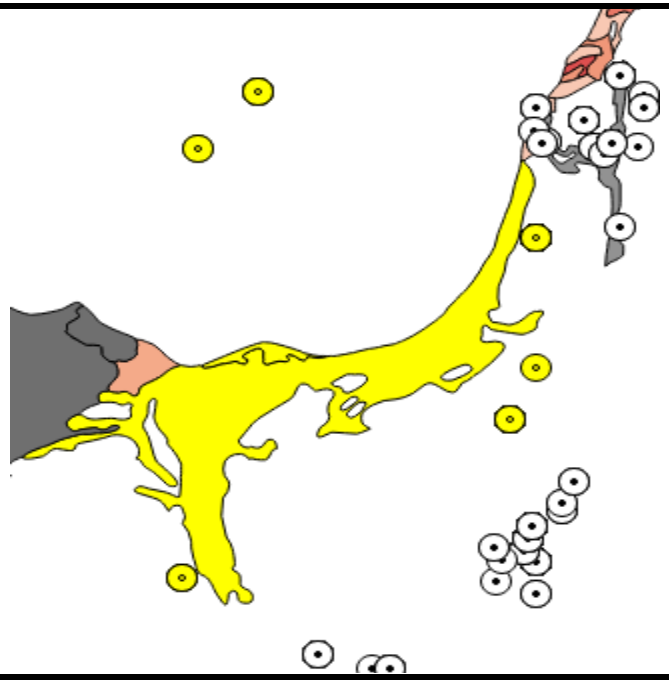
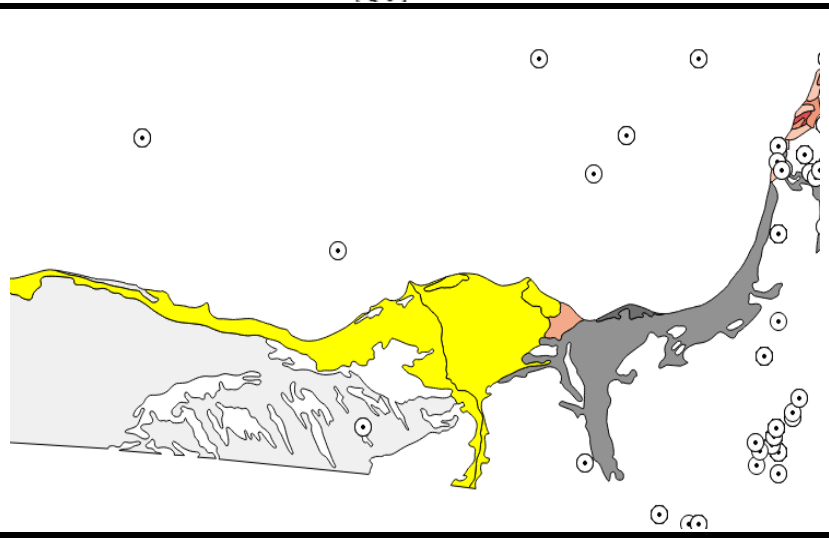
			38,29 26,81 38,07 26,37 38,00 27,00 37,31 26,55 37,17 26,44
59	Buettner *et al.*, 2005 Zellmer *et al.*, 2007 Pepiper *et al.*, 2008 Bachmann *et al.*, 2007		Average of 38 Data εNd = 0.6 SD = 1.7 [Nd] = 22 SD = 13 φ λ 36,58 27,22 36,58 27,15 36,59 27,17 36,72 26,96 36,77 27,00 36,77 27,08 36,88 27,32 36,90 27,56

60	Weldeab *et al* 2002 We use the mean values proposed by Weldeab *et al* 2002 for all the Aegean sea		1 Data εNd = -3.2 [Nd] = 2

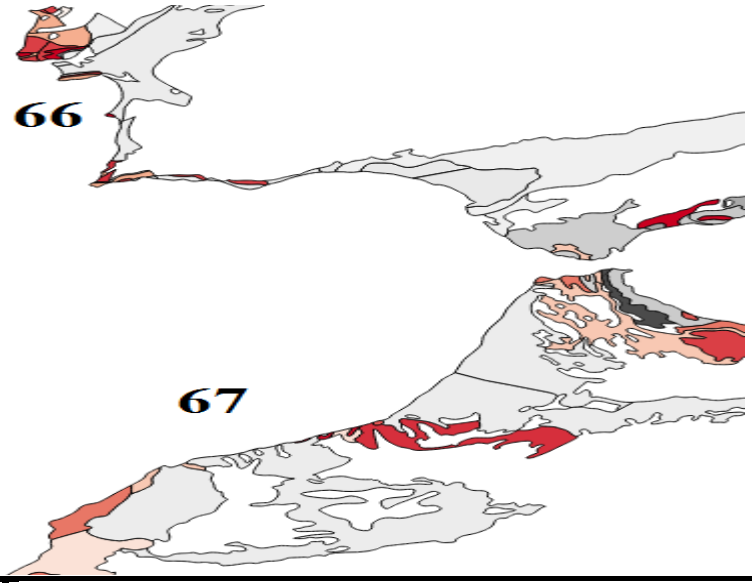


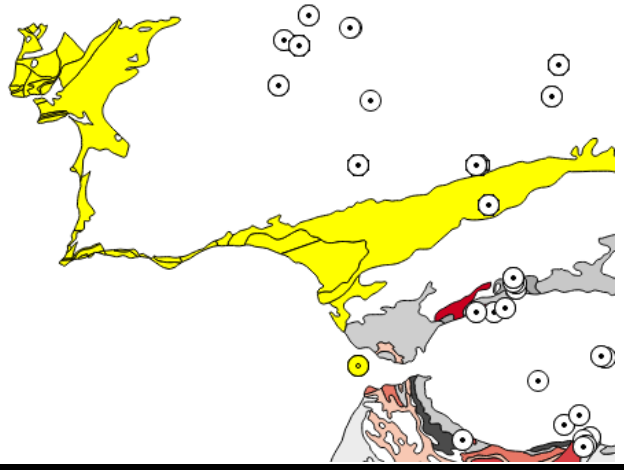
61	Cameron *et al.*, 1983		Average of 3 Data εNd = -10 SD = 1.9 [Nd] = 2 SD = 13 φ λ 34.92 32.88 34.8 32.8 34.92 32.88
62	Alpaslan *et al.*, 2006		Average of 4 Data εNd = -6.8 SD = 1.8 [Nd] = 70.3 SD = 23 φ λ 37.55 34.53 37.56 34.73 37.57 34.61 37.59 34.71
63	Abdelrahman *et al.*, 2002 Stein *et al.*, 1992		Average of 6 Data εNd = +4.3 SD = 1.5 [Nd] = 30.3 SD = 12

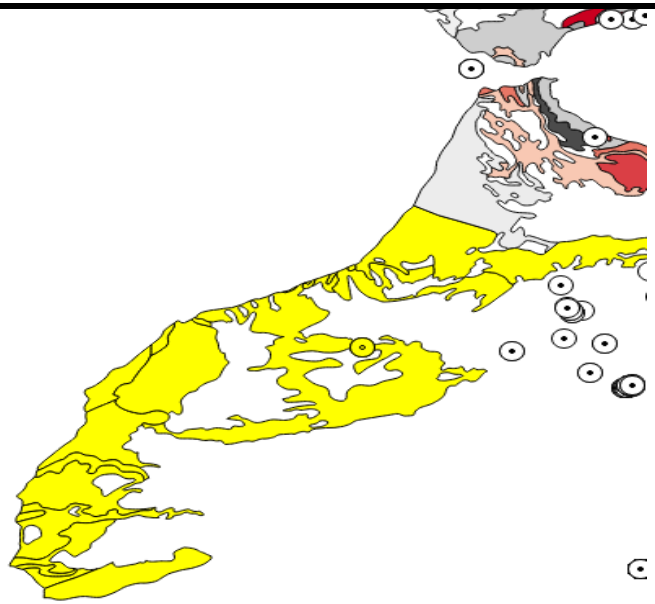
			φ λ 35.5 36 34 35.6 34.9 36.2 34.93 36.17 34.73 36.08 34.70 36.07

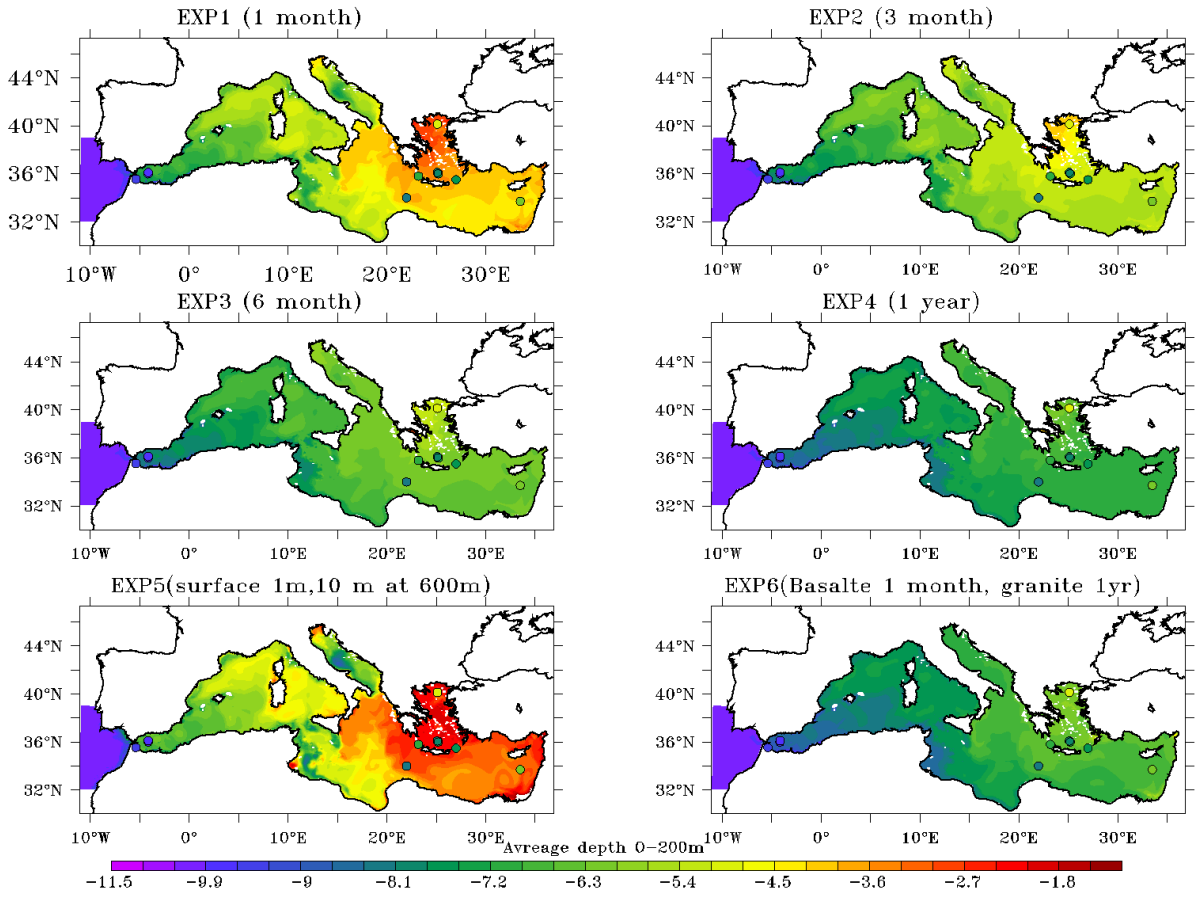
64	Weinstein *et al.*, 2006 Krienitz *et al.*, 2007 Stein *et al.*, 1992 Tachikawa *et al.*, 2004		Average of 21 Data εNd = +4.3 SD = 1.5 [Nd] = 30.3 SD = 12 φ λ 32 35 32,6 32,68 30,6 34,82 30,6 34,82 30,6 34,82
65	Tachikawa, *et al* 2004		Average of 2 Data εNd = -4 SD =1.9 [Nd] =60

Atlantic

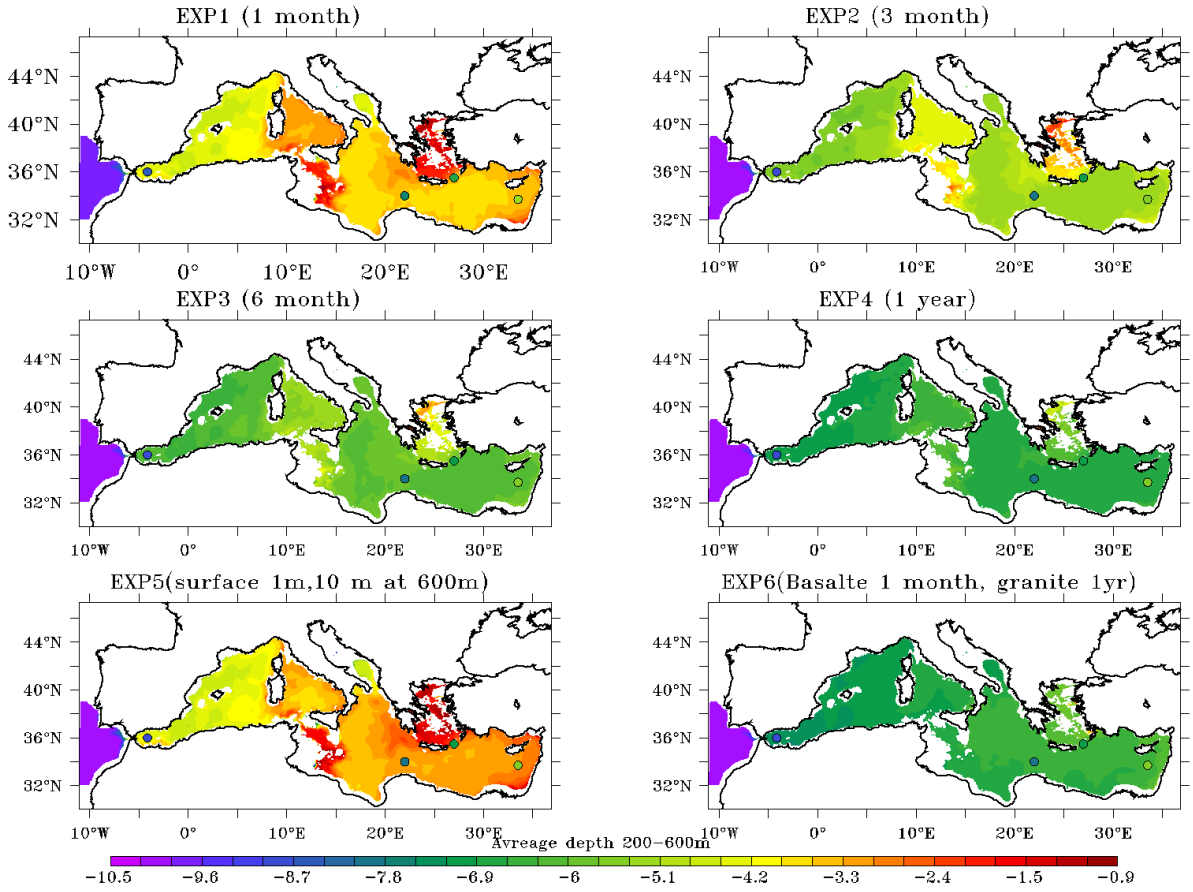


66	Jeandel *et al*,. 2007 Sanchez-Garcia *et al.*, 2010		εNd = -9 [Nd] =49.7 SD = 24.3 φ λ 36 -6

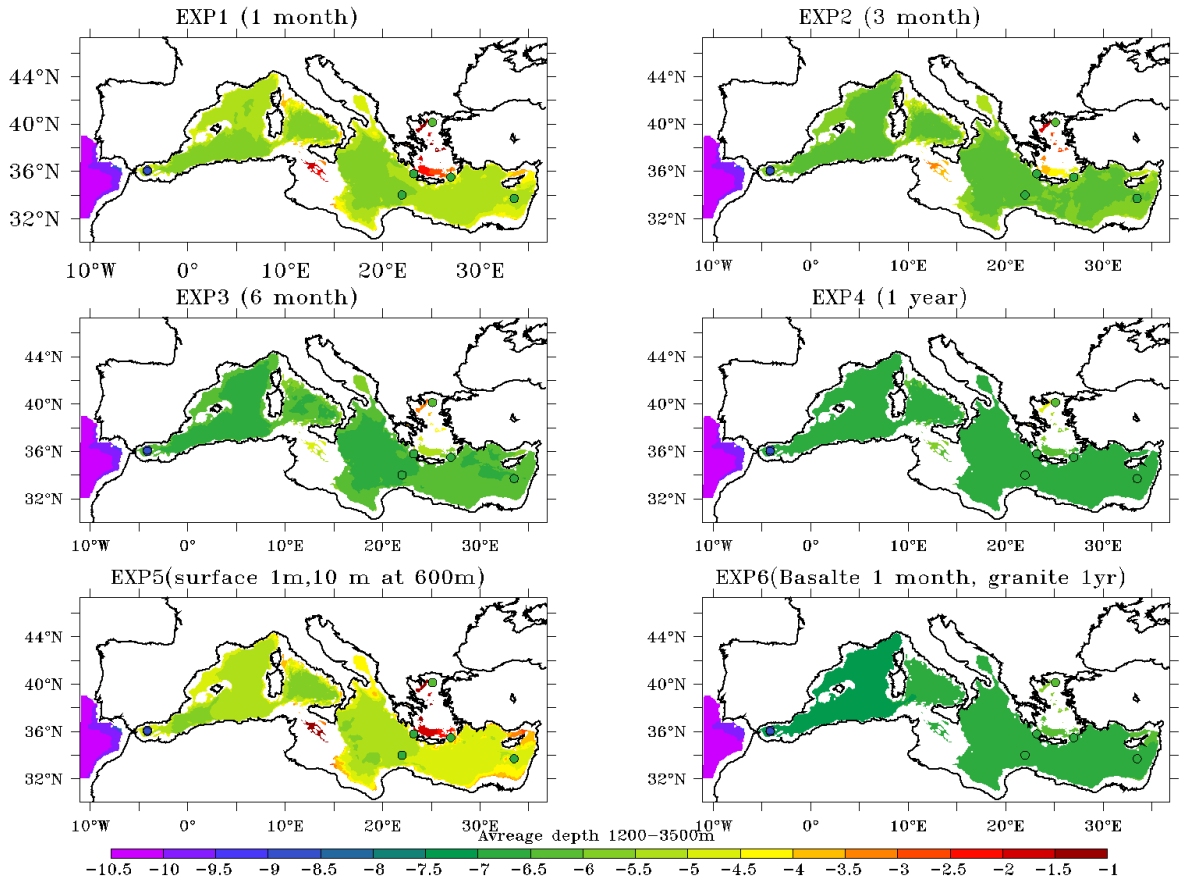
67	Jeandel *et al*,. 2007 Duggen *et al*,. 2009		εNd = -12 [Nd] =60 SD = 14 φ 32.97 λ -6.93



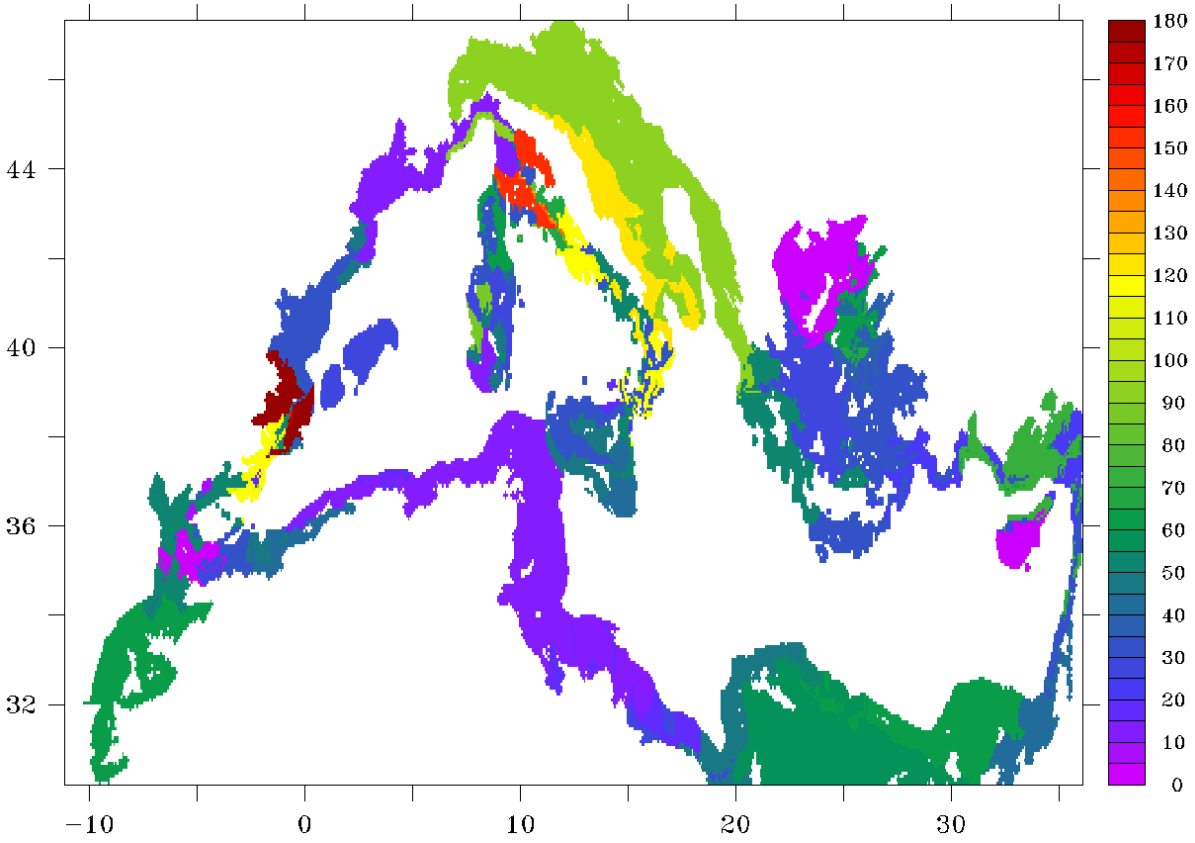
Appendix 2: Horizontal εNd map averaged between 0 and 200 m for simuλons EXP1, EXP2, EXP3, EXP4, EXP5 and EXP6, i.e. for τ=1 month, 3 months, 6 months, 1 year , τ varying vertically, and τ =1 month (max εNd mar) to 1 year (min εNd_{margin}). Superimposed to these maps are filled circles with the same color scheme for the εNd data from the compiλon done by Tachikawa et al., 2004 averaged between the same depths.



Appendix 3: Same as Appendix A1, but between 200 and 600 m depth.



Appendix 4: Same as Appendix A1, but between 600 and 3500 m depth.



Appendix 5: Map of Nd concentration of margins (in µg/g), of all the margins surrounding the Mediterranean Sea