

Updated distribution and biogeography of amphibians and reptiles of Europe

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Supplementary Material – Table S1

Table S1. Example (species *Ablepharus kitaibelii*) of the series of GIS codes used in ArcGIS 9.3 to transform the original point distribution database into the UTM 50×50 km grid database. First, the species was selected in the attribute table of the database (in shapefile format). Second, a spatial query was performed between the selected species records and the grid file (also in shapefile format). Thus, those squares where the species is present were selected. Then, a new field was added to the attribute table of the grid. Finally, the selected squares of the grid received the value of 1; the remaining squares, the value of 0. This process was repeated for each species and for each database.

Steps	GIS codes
1	SelectLayerByAttribute database_shapefile NEW_SELECTION (CORRECT_NA = 'Ablepharus kitaibelii') database_shapefile
2	SelectLayerByLocation europe_grid_50_shapefile INTERSECT database_shapefile # NEW_SELECTION europe_grid_50_shapefile
3	AddField europe_grid_50_shapefile able_kit SHORT ##### NON_NULLABLE NON_REQUIRED # europe_grid_50_shapefile
4	CalculateField europe_grid_50_shapefile able_kit 1 VB # europe_grid_50_shapefile

Supplementary Material – Text S1

Text S1: Species list considered in this compilation following decisions by the SEH.

AMPHIBIANS

Order Caudata or Urodela (salamanders and newts)

Family Hynobiidae Cope, 1859 (asian or asiatic salamanders)

Salamandrella Dybowski, 1870

Salamandrella keyserlingii Dybowski, 1870 — Siberian Salamander

Family Salamandridae Goldfuss, 1820 (true salamanders and newts)

Calotriton Gray, 1858

arnoldi Carranza and Amat, 2005 — Montseny Brook Newt

asper (Dugès, 1852) — Pyrenean Brook Newt

Chioglossa Bocage, 1864

lusitanica Bocage, 1864 — Golden-striped Salamander

Euproctus Gené, 1839

montanus (Savi, 1838) — Corsican Brook Newt

platycephalus (Gravenhorst, 1829) — Sardinian Brook Newt

Ichthyosaura Sonnini and Latreille, 1801

alpestris (Laurenti, 1768) — Alpine Newt

Lissotriton Bell, 1839

boscai (Lataste in Blanchard, 1879) — Bosca's Newt

helveticus (Razoumowsky, 1789) — Palmate Newt

italicus (Peracca, 1898) — Italian Newt

montandoni (Boulenger, 1880) — Montandon's Newt

vulgaris (Linnaeus, 1758) — Smooth Newt

Lyciasalamandra Veith and Steinfartz, 2004

helverseni (Pieper, 1963) — Karpathos Salamander

Pleurodeles Michahelles, 1830

waltl Michahelles, 1830 — Sharp-ribbed Newt

Salamandra Garsault, 1764

atra (Laurenti, 1768) — Alpine Salamander

corsica (Savi, 1838) — Corsican Fire Salamander

lanzai (Nascetti, Andreone, Capula and Bullini, 1988) — Lanza's (Alpine) Salamander

salamandra (Linnaeus, 1758) — Fire Salamander

Salamandrina Fitzinger, 1826

perspicillata/terdigitata [composed by *S. perspicillata* (Savi, 1821) — Northern Spectacled Salamander and *S. terdigitata* (Bonnaterre, 1789) — Southern Spectacled Salamander]

Triturus Rafinesque, 1815

crystatus complex [composed by *T. arntzeni* Litvinchuk, Borkin, Dzuki and Kalezi, 1999 — Arntzen's Crested Newt, *T. carnifex* (Laurenti, 1768) — Italian Crested Newt, *T. cristatus* (Laurenti, 1768) — (Great or Northern) Crested Newt, *T. dobrogicus* (Kiritzescu, 1903) — Danube Crested Newt, *T. karelinii* (Strauch, 1870) — Southern Crested Newt, and *T. macedonicus* (Karaman, 1922) — Macedonian Crested Newt]

marmoratus/pygmaeus [composed by *T. marmoratus* (Latreille, 1800) — Marbled Newt and *T. pygmaeus* (Wolterstorff, 1905) — Southern Marbled Newt]

Ommatotriton Gray, 1850

vittatus (Gray, 1835) — Banded Newt

Family Plethodontidae Gray, 1850 (lungless salamanders)

Speleomantes Dubois, 1984

ambrosii (Lanza, 1955) — Ambrosi's Cave Salamander

flavus (Stefani, 1969) — Monte Albo Cave Salamander

genei (Temminck and Schlegel, 1838) — Gené's Cave Salamander

imperialis (Stefani, 1969) — Scented Cave Salamander

italicus (Dunn, 1923) — Italian Cave Salamander

sarrabusensis Lanza, Leo, Forti, Cimmaruta, Caputo and Nascetti 2001 — Sette Fratelli Cave Salamander

strinatii (Aellen, 1958) — Strinati's Cave Salamander

supramontis (Lanza, Nascetti and Bullini, 1986) — Sopramonte Cave Salamander

Family Proteidae Gray, 1825 (olms)

Proteus Laurenti, 1768
anguinus Laurenti, 1768 — Olm

Order Anura (frogs and toads)

Family Alytidae Fitzinger, 1843 (painted frogs and midwife toads)

Alytes Wagler, 1829

cisternasii Boscá, 1879 — Iberian Midwife Toad
dickhilleni Arntzen and García-Paris, 1995 — Southern Midwife Toad
muletensis (Sanchíz and Adrover, 1977) — Majorca Midwife Toad
obstetricans (Laurenti, 1768) — Common Midwife Toad

Discoglossus Otth, 1837

galganoi Capula, Nascetti, Lanza, Bullini and Crespo, 1985 — Iberian Painted Frog
montalentii Lanza, Nascetti, Capula and Bullini, 1984 — Corsican Painted Frog
pictus Otth, 1837 — Painted Frog
sardus Tschudi in: Otth, 1837 — Tyrrhenian Painted Frog

Family Bombinatoridae Gray, 1825 (fire-bellied toads)

Bombina Oken, 1816

bombina (Linnaeus, 1761) — Fire-bellied Toad
variegata (Linnaeus, 1758) — Yellow-bellied Toad

Family Pipidae Gray, 1825 (clawed toads and pipa toads)

Xenopus Wagler, 1827

laevis (Daudin, 1802) — (African) Clawed Toad

Family Pelobatidae Bonaparte, 1850 (spadefoot toads)

Pelobates Wagler, 1830

cultripes (Cuvier, 1829) — Western Spadefoot
fuscus (Laurenti, 1768) — Common Spadefoot
syriacus Boettger, 1889 — Eastern Spadefoot

Family Pelodytidae Bonaparte, 1850 (parsley frogs)

Pelodytes Bonaparte, 1838

caucasicus Boulenger, 1896 — Caucasian Parsley Frog
sp [composed by *P. ibericus* Sánchez-Herráiz, Barbadillo, Machordom and Sanchiz, 2000 — Iberian Parsley Frog and *P. punctatus* (Daudin, 1802) — Parsley Frog]

Family Bufonidae Gray, 1825 (true toads)

Bufo Laurenti, 1768

boulengeri Lataste, 1879 — African Green Toad
bufo (Linnaeus, 1758) — Common Toad
calamita (Laurenti, 1768) — Natterjack
viridis (Laurenti, 1768) — Green Toad

Family Hylidae Rafinesque, 1815 (tree frogs)

Hyla Laurenti, 1768

arborea (Linnaeus, 1758) — Common Tree Frog
intermedia Boulenger, 1882 — Italian Tree Frog
meridionalis Boettger, 1874 — Stripeless Tree Frog
sarda (de Betta, 1857) — Tyrrhenian Tree Frog

Family Ranidae Rafinesque-Schmaltz, 1814 (true frogs)

Pelophylax Fitzinger, 1843

ridibundus/bedriagae [composed by *P. ridibundus* (Pallas, 1771) — Marsh Frog and *P. bedriagae* (Camerano, 1882) — Bedriaga's Water Frog]
cretensis (Beerli, Hotz, Tunner, Heppich and Uzzell, 1994) — Cretan Water Frog
epeiroticus (Schneider, Sofianidou and Kyriakopoulou-Sklavounou, 1984) — Epirus Water Frog
kl. *esculentus/lessonae* [composed by *P. kl. esculentus* (Linnaeus, 1758) — Edible Frog and *P. lessonae* (Camerano, 1882) — Pool Frog]
kl. *grafi* (Crochet, Dubois, Ohler and Tunner, 1995) — Graf's Hybrid Frog
perezi (Seoane, 1885) — Iberian Water Frog
shqipericus (Hotz, Uzzell, Günther, Tunner and Heppich, 1987) — Albanian Pool Frog

Lithobates Fitzinger, 1843

catesbeianus (Shaw, 1802) — (American) Bull Frog

Rana Linnaeus, 1758

arvalis Nilsson, 1842 — Moor Frog
dalmatina Fitzinger in Bonaparte, 1838 — Agile Frog
graeca Boulenger, 1891 — Greek Stream Frog
iberica Boulenger, 1879 — Iberian Stream Frog

italica Dubois, 1987 — Italian Stream Frog
latastei Boulenger, 1879 — Italian Agile Frog
macrocnemis Boulenger, 1885 — Caucasian Frog
pyrenaica Serra—Cobo, 1993 — Pyrenean Stream Frog
temporaria Linnaeus, 1758 — Grass Frog

REPTILES

Order Testudines or Chelonii (turtles, tortoises and terrapins)

- Family Cheloniidae Oppel, 1811 (sea turtles)
Caretta Rafinesque-Schmaltz, 1814
caretta (Linnaeus, 1758) — Loggerhead ((Sea) Turtle)
- Family Dermochelyidae Fitzinger, 1843 (1825) (leatherbacks)
Dermochelys de Blainville, 1816
coriacea (Vandelli, 1761) — Leatherback
- Family Testudinidae Batsch, 1788 (tortoises)
Testudo Linnaeus, 1758
graeca Linnaeus, 1758 — Spur-thighed Tortoise
hermanni Gmelin, 1789 — Hermann's Tortoise
marginata Schoepff, 1792 — Marginated Tortoise
- Family Geoemydidae Theobald, 1868 (Old World terrapins)
Mauremys Gray, 1869
caspiica (Gmelin, 1774) — Caspian Terrapin
leprosa (Schweigger, 1812) — Spanish Terrapin
rivulata (Valenciennes, 1833) — Balkan Terrapin
- Family Emydidae Rafinesque, 1815 (New World terrapins)
Emys Duméril, 1805
orbicularis (Linnaeus, 1758) — European Pond Terrapin
Trachemys Agassiz, 1857
scripta (Thunberg in Schoepff, 1792) — Red-eared Slider or Terrapin

Order Squamata

- Family Agamidae Spix, 1825 or Fitzinger, 1826 (agamans)
Laudakia Gray, 1845
caucasica (Eichwald, 1831) — Caucasian Agama
stellio (Linnaeus, 1758) — Starred Agama
Phrynocephalus Kaup, 1825
guttatus (Gmelin, 1789) — Spotted Toadhead Agama
helioscopus (Pallas, 1771) — Sunwatcher Toadhead Agama
mystaceus (Pallas, 1776) — Secret Toadhead Agama
Trapelus Cuvier, 1817
agilis (Olivier, 1804) — Steppe Agama
- Family Chamaeleonidae Gray, 1825 or Rafinesque, 1815 (Chamaeleontidae) (chameleons)
Chamaeleo Laurenti, 1768
africanus Laurenti, 1768 — African Chameleon
chamaeleon (Linnaeus, 1758) — Mediterranean Chameleon
- Family Sphaerodactylidae Underwood, 1954 (least geckos)
Euleptes Fitzinger, 1843
europaea (Gené, 1839) — European Leaf-toed Gecko
- Family Gekkonidae Oppel, 1811 or Gray, 1825 (true geckos)
Alsophylax Fitzinger, 1843
pipiens (Pallas, 1827)
Cyrtopodion Fitzinger, 1843
caspium (Eichwald, 1831) — Caspian Gecko
Hemidactylus Oken, 1817
turcicus (Linnaeus, 1758) — Turkish Gecko
Mediodactylus Szczerbak and Golubev, 1977
kotschy (Steindachner, 1870) — Kotschy's Gecko
- Family Phyllodactylidae Gamble, Bauer, Greenbaum and Jackman, 2008 (leaf-toed geckos)
Tarentola Gray, 1825
mauritanica (Linnaeus, 1758) — Moorish Gecko

Family Lacertidae Batsch, 1788 (true lizards)

- Acanthodactylus* Wiegmann, 1834
erythrurus (Schinz, 1833) — Spiny-footed Lizard
- Algyroides* Bibron and Bory de Saint-Vincent, 1833
fitzingeri (Wiegmann, 1834) — Tyrrhenian Algyroides
marchi Valverde, 1958 — Spanish Algyroides
moreoticus Bibron and Bory de Saint-Vincent, 1833 — Greek Algyroides
nigropunctatus (Duméril and Bibron, 1839) — Dalmatian Algyroides
- Archaeolacerta* Mertens, 1921
bedriagae (Camerano, 1885) — Tyrrhenian Rock Lizard
- Dalmatolacerta* Arnold, Arribas and Carranza, 2007
oxycephala Duméril and Bibron, 1839 — Sharp-snouted Rock Lizard
- Darevskia* Arribas, 1997
alpina (Darevsky, 1967) — Western Caucasian Lizard
armeniaca (Méhely, 1909) — Armenian Lizard
brauneri (Méhely, 1909) — Brauner's Lizard
caucasica (Méhely, 1909) — Eastern Caucasian Lizard
daghestanica (Darevsky, 1967) — Daghestan Lizard
derjugini (Nikolsky, 1898) — Derjugin's Lizard
lindholmi (Lantz and Cyrén, 1936) — Lindholm's Lizard
praticola (Eversmann, 1834) — Meadow Lizard
rudis (Bedriaga, 1886) — Spiny-tailed Lizard
saxicola (Eversmann, 1834) — Rock Lizard
- Dinarolacerta* Arnold, Arribas and Carranza, 2007
montenegrina Ljubisavljevi, Arribas, Džuki and Carranza, 2007 — Prokletije Rock Lizard
mosorensis Kolombatovi, 1886 — Mosor Rock Lizard
- Eremias* Fitzinger in Wiegmann, 1834
arguta (Pallas, 1773) — Steppe Runner
velox (Pallas, 1771) — Rapid Runner
- Hellenolacerta* Arnold, Arribas and Carranza, 2007
graeca Bedriaga, 1886 — Greek Rock Lizard
- Iberolacerta* Arribas, 1997
aranica (Arribas, 1993) — Aran Rock Lizard
aurelioi (Arribas, 1994) — Aurelio's Rock Lizard
bonnali (Lantz, 1927) — Pyrenean Rock Lizard
cyreni (Müller and Hellmich, 1937) — Cyren's Rock Lizard
galani Arribas, Carranza and Odierna, 2006 — Galan's Rock Lizard
horvathi (Méhely, 1904) — Horvath's Rock Lizard
martinezricai (Arribas, 1996) — Martinez-Rica's or Peña de Francia Rock Lizard
monticola (Boulenger, 1905) — (West-)Iberian Rock Lizard
- Lacerta* Linnaeus, 1758
agilis Linnaeus, 1758 — Sand Lizard
bilineata Daudin, 1802 — Western Green Lizard
schreiberi Bedriaga, 1878 — Schreiber's Green Lizard
strigata (Eichwald, 1831) — Caspian Green Lizard
trilineata Bedriaga, 1886 — Balkan Green Lizard
viridis (Laurenti, 1768) — Eastern Green Lizard
- Ophisops* Ménétries, 1832
elegans Ménétries, 1832 — Snake-eyed Lacertid
- Podarcis* Wagler, 1830
bocagei (Seoane, 1884) — Bocage's Wall Lizard
carbonelli Pérez-Mellado, 1981 — Carbonell's Wall Lizard
cretensis (Wettstein, 1952) — Cretan Wall Lizard
erhardii (Bedriaga, 1876) — Erhard's Wall Lizard
filfolensis (Bedriaga, 1876) — Maltese Wall Lizard
gaigeae (Werner, 1930) — Skyros Wall Lizard
hispanicus complex [composed by *P. hispanicus* (Steindachner, 1870) — Iberian Wall Lizard, *P. liolepis* (Boulenger, 1905) — Catalanian Wall Lizard, and *P. vaucheri* (Boulenger, 1905) — Vaucher's Wall Lizard]
levendis Lymberakis, Poulakakis, Kaliontzopoulou, Valakos and Mylonas, 2008 — Pori Wall Lizard
lilfordi (Günther, 1874) — Lilford's Wall Lizard
melisellensis (Braun, 1877) — Dalmatian Wall Lizard
milensis (Bedriaga, 1882) — Milos Wall Lizard

- muralis* (Laurenti, 1768) — Common Wall Lizard
peloponnesiacus (Bibron and Bory de Saint-Vincent, 1833) — Peloponnesian Wall Lizard
pityusensis (Boscá, 1883) — Ibiza Wall Lizard
raffonei (Mertens, 1952) — Aeolian Wall Lizard
siculus (Rafinesque-Schmaltz, 1810) — Italian Wall Lizard
tauricus (Pallas, 1814) — Balkan Wall Lizard
tiliguerta (Gmelin, 1789) — Tyrrhenian Wall Lizard
waglerianus Gistel, 1868 — Sicilian Wall Lizard
Psammodromus Fitzinger, 1826
algius (Linnaeus, 1758) — Large Psammodromus
hispanicus Fitzinger, 1826 — Spanish Psammodromus
Scelarcis Fitzinger, 1843
perspicillata (Duméril and Bibron, 1839) — Moroccan Rock Lizard
Teira Gray, 1838
dugei (Milne-Edwards, 1829) — Madeiran Wall Lizard
Timon Tschudi, 1836
lepidus (Daudin, 1802) — Ocellated Lizard
Zootoca Wagler, 1830
vivipara (Jacquin, 1787) or (Lichtenstein, 1823) — Viviparous Lizard
Family Scincidae Oppel, 1811 or Gray, 1825 (skinks)
Ablepharus Fitzinger in Eversmann, 1823
kitabelii Bibron and Bory de Saint-Vincent, 1833 — Snake-eyed Skink
Chalcides Laurenti, 1768
bedriagai (Boscá, 1880) — Bedriaga's Skink
chalcides (Linnaeus, 1758) — Italian Three-toed Skink
ocellatus (Forskål, 1775) — Ocellated Skink
striatus (Cuvier, 1829) — Iberian Three-toed Skink
Eumeces Wiegmann, 1834
schneiderii (Daudin, 1802) — Schneider's Skink
Ophiomorus Duméril and Bibron, 1839
punctatissimus (Bibron and Bory de Saint-Vincent, 1833) — Limbless Skink
Family Anguillidae Gray, 1825 (slow worms)
Anguis Linnaeus, 1758
cephallonica Werner, 1894 — Peloponnesian Slow Worm
sp [composed by *A. colchica* (Nordmann, 1840) — Eastern Slow Worm, *A. fragilis* Linnaeus, 1758 — Slow Worm, and *A. graeca* Bedriaga, 1881 — Greek Slow Worm
Pseudopus Merrem, 1820
apodus (Pallas, 1775) — Glass Lizard
Family Blanidae Kearney, 2003 (Mediterranean worm lizards)
Blanus Wagler, 1830
cinereus/mariae [composed by *B. cinereus* (Vandelli, 1797) — Iberian Worm Lizard and *B. mariae* Albert and Fernández (2009) — Maria's Worm Lizard]
Family Typhlopidae Merrem, 1820 or Jan, 1863 (worm snakes)
Typhlops Schneider in Oppel, 1811
vermicularis Merrem, 1820 — Worm Snake
Family Erycidae Bonaparte, 1840 (sand boas)
Eryx Daudin, 1803
jaculus (Linnaeus, 1758) — Sand Boa
miliaris (Pallas, 1773) — Dwarf Sand Boa
Family Psammophiidae Boie, 1827 (African sand snakes and Montpellier snakes)
Malpolon Fitzinger, 1826
insignitus (Geoffroy Saint-Hilaire, 1827) — Eastern Montpellier Snake
monspeulanus (Hermann, 1804) — Western Montpellier Snake
Family Natricidae Bonaparte, 1840 (Eurasian water snakes)
Natrix Laurenti, 1768
maura (Linnaeus, 1758) — Viperine Snake
natrix (Linnaeus, 1758) — Grass Snake
tessellata (Laurenti, 1768) — Dice Snake
Family Colubridae Oppel, 1811 (colubrids)
Coronella Laurenti, 1768
austriaca Laurenti, 1768 — Smooth Snake
girondica (Daudin, 1803) — Southern Smooth Snake
Dolichophis Gistel, 1868

caspius (Gmelin, 1789) — Caspian Whip Snake
schmidti (Nikolsky, 1909) — Schmidt's Whip Snake
Eirenis Jan, 1863
collaris (Ménétries, 1832) — Collared Dwarf Snake
modestus (Martin, 1838) — Masked Dwarf Snake
Elaphe Fitzinger, 1833
dione (Pallas, 1773) — Dione Snake
quatuorlineata (Bonnaterre, 1790) — (Western) Four-lined Snake
sauromates (Pallas, 1814) — Blotched Snake or Eastern Four-lined Snake
Hemorrhois Boie, 1826
algius (Jan, 1863) — Algerian Whip Snake
hippocrepis (Linnaeus, 1758) — Horseshoe Whip Snake
ravergieri (Ménétries, 1832) — Mountain Whip Snake
Hierophis Fitzinger in Bonaparte, 1834
gemonensis (Laurenti, 1768) — Balkan Whip Snake
viridiflavus (Lacépède, 1789) — Western Whip Snake
Macroprotodon Guichenot, 1850
brevis (Günther, 1862) — Western or Iberian False Smooth Snake
cucullatus (Geoffroy Saint-Hilaire, 1809) — Eastern or African False Smooth Snake
Platyceps Blyth, 1860
collaris (Müller, 1878) — Reddish Whip Snake
najadum (Eichwald, 1831) — Dahl's Whip Snake
Rhinechis Michahelles in Wagler, 1833
scalaris (Schinz, 1822) — Ladder Snake
Telescopus Wagler, 1830
fallax (Fleischmann, 1831) — Cat Snake
Zamenis Wagler, 1830
hohenackeri (Strauch, 1873) — Transcaucasian Snake
longissimus/lineatus [composed by *Z. longissimus* (Laurenti, 1768) — Aesculapian Snake and *Z. lineatus* (Camerano, 1891) — Italian Aesculapian Snake]
situla (Linnaeus, 1758) — Leopard Snake
Family Viperidae Opperl, 1811 (true vipers)
Gloydius Hoge and Romano-Hoge, 1981
halys (Pallas, 1776) — Halys Pitviper
Macrovipera Reuss, 1927
lebetina (Linnaeus, 1758) — Levant Viper
schweizeri (Werner, 1935) — Milos Viper
Montivipera Nilson, Tuniyev, Andrén, Orlov, Joger and Herrmann, 1999
xanthina (Gray, 1849) — Ottoman Viper
Vipera Garsault, 1764
ammodytes (Linnaeus, 1758) — Nose-horned Viper
aspis (Linnaeus, 1758) — Asp Viper
berus (Linnaeus, 1758) — Adder
dinniki Nikolsky, 1913 — Dinnik's Viper
kaznakovi (Nikolsky, 1909) — Caucasus Viper
latastei (Boscá, 1878) — Lataste's Viper
seoanei (Lataste, 1879) — Seoane's Viper
ursinii/renardi [composed by *V. ursinii* (Bonaparte, 1835) — Meadow Viper and *V. renardi*]

Supplementary Material – Text S2

Text S2: R language (R 2.15, R Development Core Team, 2012) script for automatic production of species map. The script overlaps the three grid files (COUNTRIES, SEH/GBIF, and INTRODUCED) and looks for each species sequentially in the three grids, representing them with different colours. The result is exported to a jpg image format.

```
#IMPORTANT LIBRARIES TO LOAD
require(rgdal)
require(raster)
require(sp)
require(latticeExtra)

#DIRECTORY WHERE MAPS ARE SAVED
path<-"path_to_directory_with_maps"

# DIRECTORY WITH INPUT SPATIAL DATA (CHANGE THIS ACCORDING TO LOCAL SETTINGS)
allCountriesData<-"directory_with_input_spatial_data"
# READ SPECIES NAMES FROM THE CSV FILE (TEXT IS CHARACTER TYPE)
spNames<-read.csv("directory_with_input_spatial_data/species.csv",stringsAsFactor=FALSE)

#LOAD SHAPEFILES
allcountries<-readOGR(dsn=allCountriesData,layer='europe_grid_50_v22_allcountries_albers',stringsAsFactors=F)
seh_gbif<-readOGR(dsn=allCountriesData,layer='europe_grid_50_v15_seh_gbif_albers',stringsAsFactors=F)
introduced<-readOGR(dsn=allCountriesData,layer='europe_grid_50_introduced_v7_albers',stringsAsFactors=F)

#EXTRACT THE PROJECTION OF THE SHP
pj.allcountries <- OGRSpatialRef(dsn=allCountriesData,layer='europe_grid_50_v22_allcountries_albers')
pj.seh_gbif <- OGRSpatialRef(dsn=allCountriesData,layer='europe_grid_50_v15_seh_gbif_albers')
pj.introduced<- OGRSpatialRef(dsn=allCountriesData,layer='europe_grid_50_introduced_v7_albers')

#LOAD DEFINITIVE MAP, DEFINING THE SAME PROJECTION OF THE SHPs
mm<-readGDAL(fname=paste(allCountriesData,"draft_map_final.jpg",sep="/"),p4s=pj.allcountries,half.cell=c(0.5,0.5)
,silent=FALSE)

#PREPARE THE GRID FOR PLOT TRELLIS
#1- CREATE A NEW DATAFRAME HAVING, FOR EACH PIXEL, THE NAME OF THE COLOR TO BE USED
(THE NAME OF THE COLOR IS OBTAINED THROUGH fnz rgb() APPLIED TO EACH PIXEL)
attr.c<-vector("character", length(mm))
attr.c<-rgb(red=mm[[1]], green=mm[[2]], blue=mm[[3]], maxColorValue = 255)

#2- TRANSFORM IN FACTOR SO THE NAMES OF THE LEVELS ARE THE NAMES OF THE COLORS TO BE
PLOTTED
attr.c<-factor(attr.c)

#3- THE FIRST BAND OF JPG IS attr.c
mm[[1]]<-attr.c

#CREATE TRELLIS PLOTS
#1- FIRST THE MAP
map<-spplot(mm,'band1',col.regions=levels(attr.c),colorkey=F)

#2- SELECT THE NUMBER OF COLUMNS IN WHICH IN THE ITEM seh_gbif THERE ARE NO PRESENCE
DATA
r<-which(lapply(seh_gbif@data[,-c(1,2)],sum)==0)
#THEN THOSE WITH "GREEN" DATA
g<-which(lapply(seh_gbif@data[,-c(1,2)],sum)>0)
#THEN THOSE WITH "BLUE" and "RED" DATA
b<-which(lapply(introduced@data[,-c(1,2)],sum)>0)

#3- NOW FOR EACH SPECIES 2 'for' CYCLES
#SPECIES WITH BLUE, RED AND GREEN DATA
for (i in b){
```

```

a<-map + layer(sp.polygons(allcountries[which(allcountries@data[,i+2] == 1),
i+2],col='transparent',fill='red',alpha=0.5))
a<-a + layer(sp.polygons(introduced[which(introduced@data[,i+2] == 1),
i+2],col='transparent',fill='blue2',alpha=0.5))
a<-a + layer(sp.polygons(seh_gbif[which(seh_gbif@data[,i+2] == 1), i+2],col='transparent',fill='green',alpha=0.5))
a<-a + layer(sp.polygons(allcountries[,3],col='gray20',fill="transparent",alpha=1))
jpeg(filename=paste(path,names(allcountries)[i+2],'.jpeg',sep="),quality=100,width=1483, height =1183,res=100)
# Change layouts margins/paddings
trellis.par.set("layout.heights",list(top.padding=10, main=1, key.top=1))
plot(a)

# NOTES
# To see padding dimensions use function trellis.par.get("layout.heights")
# and trellis.par.set() to set them differently
# Font family and type are also configurable from lattice functions
# Print the species name on top
spName<-names(allcountries)[i+2]
ltext(741.5,70,ifelse(length(spNames[spName==spNames[,1,2])==0,"",spNames[spName==spNames[,1,2]]),cex=2,po
s=3,fontface="italic")
dev.off()
}

#SPECIES WITH BLUE AND RED
for (i in b) {
a<-map + layer(sp.polygons(allcountries[which(allcountries@data[,i+2] == 1),
i+2],col='transparent',fill='red',alpha=0.5))
a<-a + layer(sp.polygons(introduced[which(introduced@data[,i+2] == 1),
i+2],col='transparent',fill='blue2',alpha=0.5))
a<-a + layer(sp.polygons(allcountries[,3],col='gray20',fill="transparent",alpha=1))
jpeg(filename=paste(path,names(allcountries)[i+2],'.jpeg',sep="),quality=100,width=1483, height =1183,res=100)

# Change layouts margins/paddings
trellis.par.set("layout.heights",list(top.padding=10, main=1, key.top=1))
plot(a)
spName<-names(allcountries)[i+2]
ltext(741.5,70,ifelse(length(spNames[spName==spNames[,1,2])==0,"",spNames[spName==spNames[,1,2]]),cex=2,po
s=3,fontface="italic")
dev.off()
}
for (i in g) {
a<-map + layer(sp.polygons(allcountries[which(allcountries@data[,i+2] == 1),
i+2],col='transparent',fill='red',alpha=0.5))
a<-a + layer(sp.polygons(seh_gbif[which(seh_gbif@data[,i+2] == 1), i+2],col='transparent',fill='green',alpha=0.5))
a<-a + layer(sp.polygons(allcountries[,3],col='gray20',fill="transparent",alpha=1))
jpeg(filename=paste(path,names(allcountries)[i+2],'.jpeg',sep="),quality=100,width=1483, height =1183,res=100)

# Change layouts margins/paddings
trellis.par.set("layout.heights",list(top.padding=10, main=1, key.top=1))
plot(a)
spName<-names(allcountries)[i+2]
ltext(741.5,70,ifelse(length(spNames[spName==spNames[,1,2])==0,"",spNames[spName==spNames[,1,2]]),cex=2,po
s=3,fontface="italic")
dev.off()
}

#SPECIES WITHOUT GREEN AND BLUE DATA
for (i in r) {
a<-map + layer(sp.polygons(allcountries[which(allcountries@data[,i+2] == 1),
i+2],col='transparent',fill='red',alpha=0.5))
a<-a + layer(sp.polygons(allcountries[,3],col='gray20',fill="transparent",alpha=1))
jpeg(filename=paste(path,names(allcountries)[i+2],'.jpeg',sep="),quality=100,width=1483, height =1183,res=100)

# Change layouts margins/paddings

```

```

trellis.par.set("layout.heights",list(top.padding=10, main=1, key.top=1))
plot(a)
spName<-names(allcountries)[i+2]
ltext(741.5,70,ifelse(length(spNames[spName==spNames[,1],2])==0,"",spNames[spName==spNames[,1],2]),cex=2,po
s=3,fontface="italic")
dev.off()
}

#SPECIES WITHOUT RED AND BLUE DATA
for (i in g) {
  a<-map + layer(sp.polygons(seh_gbif[which(seh_gbif@data[,i+2] == 1), i+2],col='transparent',fill='green',alpha=0.5))
  a<-a + layer(sp.polygons(seh_gbif[,3],col='gray20',fill="transparent",alpha=1))
  jpeg(filename=paste(path,names(allcountries)[i+2],'.jpeg',sep="),quality=100,width=1483, height =1183,res=100)

  # Change layouts margins/paddings
  trellis.par.set("layout.heights",list(top.padding=10, main=1, key.top=1))
  plot(a)
  spName<-names(allcountries)[i+2]
  ltext(741.5,70,ifelse(length(spNames[spName==spNames[,1],2])==0,"",spNames[spName==spNames[,1],2]),cex=2,po
s=3,fontface="italic")
  dev.off()
}

#SPECIES WITHOUT RED AND GREEN DATA
for (i in b) {
  a<-map + layer(sp.polygons(introduced[which(introduced@data[,i+2] == 1),
i+2],col='transparent',fill='blue2',alpha=0.5))
  a<-a + layer(sp.polygons(introduced[,3],col='gray20',fill="transparent",alpha=1))
  jpeg(filename=paste(path,names(allcountries)[i+2],'.jpeg',sep="),quality=100,width=1483, height =1183,res=100)

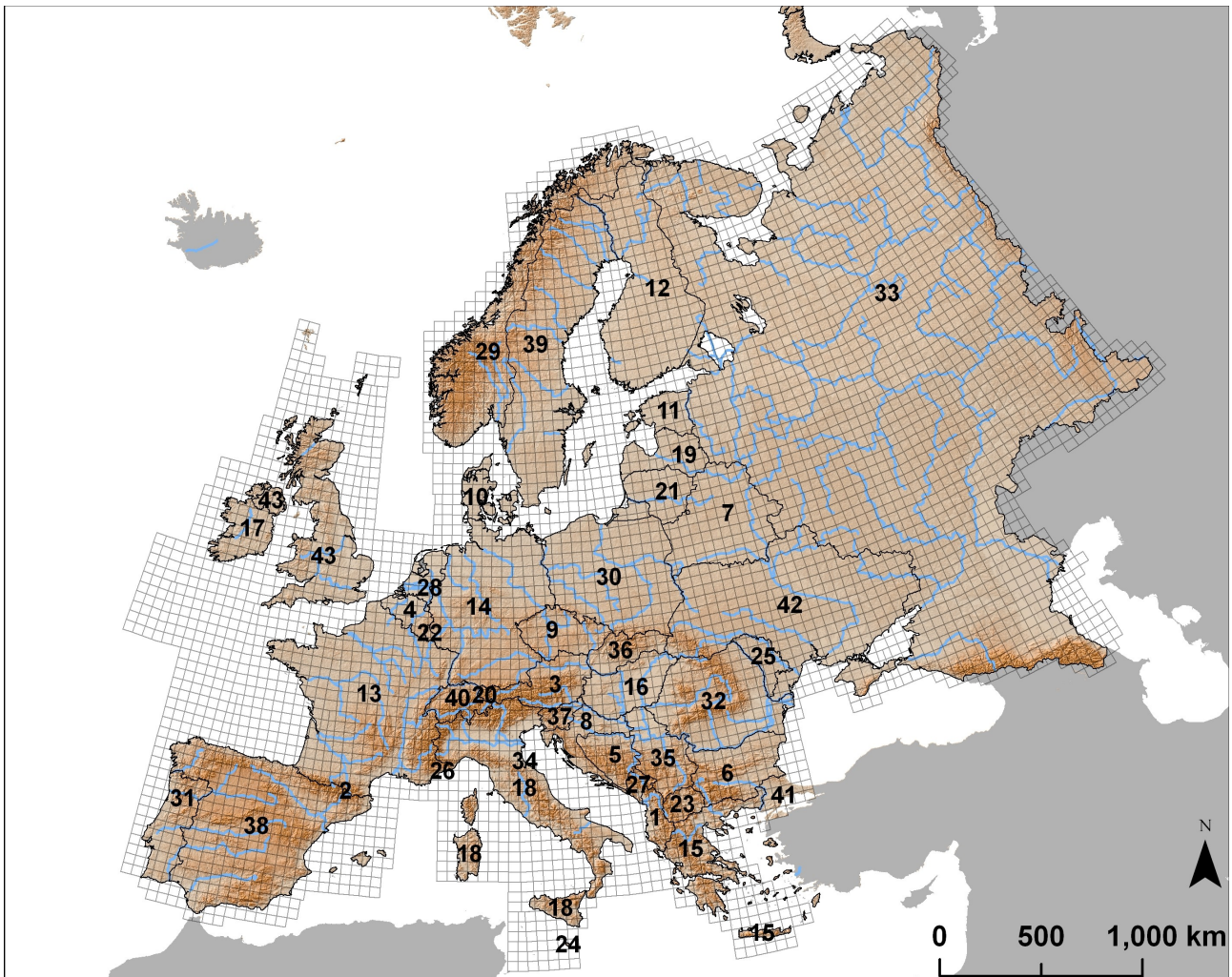
  # Change layouts margins/paddings
  trellis.par.set("layout.heights",list(top.padding=10, main=1, key.top=1))
  plot(a)
  spName<-names(allcountries)[i+2]
  ltext(741.5,70,ifelse(length(spNames[spName==spNames[,1],2])==0,"",spNames[spName==spNames[,1],2]),cex=2,po
s=3,fontface="italic")
  dev.off()
}

#SAVE IMAGE
save.image(paste(path,'grafici.RData',sep="))

```

Supplementary Material – Figure S1

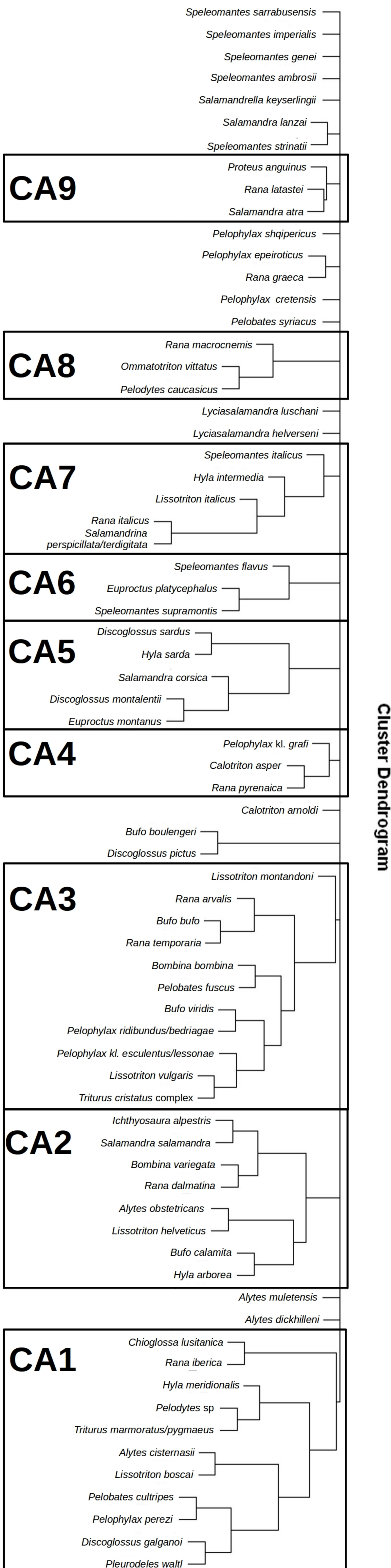
Map of the study area used in this compilation. We used the limits for Europe provided by Geocommons (<http://geocommons.com/overlays/76975>). See main text for details. Country codes are: Albania: 1; Andorra: 2; Austria: 3; Belgium: 4; Bosnia and Herzegovina: 5; Bulgaria: 6; Belarus: 7; Croatia: 8; Czech Republic: 9; Denmark: 10; Estonia: 11; Finland: 12; France: 13; Germany: 14; Greece: 15; Hungary: 16; Ireland: 17; Italy: 18; Liechtenstein: 20; Lithuania: 21; Luxembourg: 22; Former Yugoslav Republic of Macedonia: 23; Malta: 24; Moldova: 25; Monaco: 26; Montenegro: 27; Netherlands: 28; Norway: 29; Poland: 30; Portugal: 31; Romania: 32; Russia: 33; San Marino: 34; Serbia: 35; Slovakia: 36; Slovenia: 37; Spain: 38; Sweden: 39; Switzerland: 40; Turkey: 41; Ukraine: 42; United Kingdom: 43.



Dendrogram based on Jaccard's index showing main distribution types identified for European amphibians.

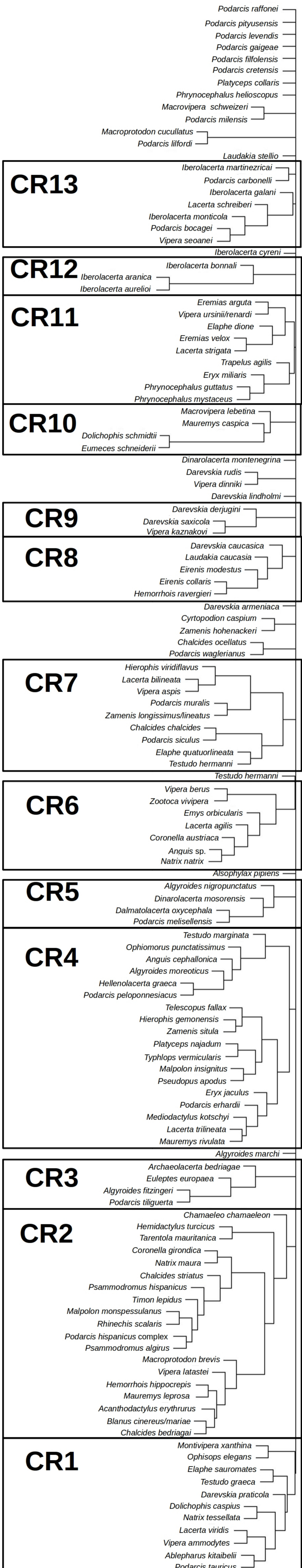
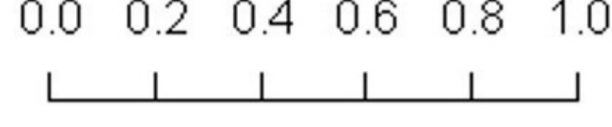
Height

0.0 0.2 0.4 0.6 0.8 1.0



Dendrogram based on Jaccard's index showing main distribution types identified for European reptiles.

Height



Cluster Dendrogram