Supplement 1: List of radiolarian taxa included in the SO-RAD dataset.

Taxon name	Reference
Acanthodesmia micropora (Popofsky)	Petrushevskaya, 1971
Acanthodesmia viniculata (Müeller)	Petrushevskaya, 1971
Acanthosphaera Ehrenberg spp.	Boltovskoy, 1998; Boltovskoy and Riedel, 1980
Acrobotrys teralans Renz	Renz, 1976
Acrosphaera arktios (Nigrini)	Nigrini, 1970
Acrosphaera cyrtodon (Haeckel)	Strelkov and Reshetnyak, 1971
Acrosphaera inflata Haeckel	Haeckel, 1887
Acrosphaera lappacea (Haeckel)	Johnson and Nigrini, 1980
Acrosphaera mercurius Lazarus	Lazarus, 1992
Acrosphaera murrayana (Haeckel)	Hilmers, 1906
Acrosphaera spinosa Caulet	Caulet, 1986
Actinomma antarcticum (Haeckel)	Nigrini and Moore, 1979
Actinomma arcadophorum Haeckel	Haeckel, 1887
Actinomma boreale Cleve	Cortese and Bjørklund, 1998
Actinomma delicatulum (Dogiel and Reschetnjak)	Petrushevskaya, 1967
Actinomma Haeckel	Haeckel, 1860
Actinomma hastatum (Haeckel)	Rogers and De Deckker, 2007
Actinomma leptodermum (Jørgensen) gr.	Boltovskoy, 1998; Cortese and Bjørklund, 1998
Actinomma medianum Nigrini	Nigrini and Moore, 1979
Actinomma popofski (Petrushevskaya)	Petrushevskaya, 1967
Actinomma sol Cleve	Boltovskoy, 1998
Actinomma trinacria (Haeckel)	Cortese and Bjorklund, 1998
Actinosphaera Hollande and Enjumet	Hollande and Enjumet, 1960
Amphiplecta acrostoma Haeckel	Haeckel, 1887
Amphirhopalum ypsilon Haeckel	Haeckel, 1887
Androspyris fenestrata (Haeckel)	Goll, 1980
Anomalacantha dentata Mast	Mast, 1910
Antarctissa denticulata (Ehrenberg)	Petrushevskaya, 1967
Antarctissa Petrushevskaya spp.	Nigrini and Moore, 1979; Petrushevskaya, 1967
Antarctissa strelkovi Petrushevskaya	Petrushevskaya, 1967
Anthocyrtidium ophirense (Ehrenberg)	Petrushevskaya, 1968
Anthocyrtidium zanguebaricum (Ehrenberg)	Haeckel, 1887
Arachnocorys umbellifera Haeckel	Haeckel, 1860
Archipilium orthopterum Haeckel	Haeckel, 1887
Artobotrys borealis (Cleve)	Petrushevskaya, 1971
Artostrobus annulatus (Bailey)	Boltovskoy, 1998; Petrushevskaya, 1967, 1971
Artostrobus joergenseni Petrushevskaya gr.	Petrushevskaya, 1967
Axoprunum stauraxonium Haeckel	Nigrini and Moore, 1979
Botryocampe inflata (Bailey)	Matsuzaki et al., 2015; Itaki, 2009; Haeckel, 1887
Botryocephalina armata Petrushevskaya	Petrushevskaya, 1965
Botryocyrtis scutum (Harting)	Boltovskoy, 1998; Nigrini and Moore, 1979
Botryopyle cribrosa (Ehrenberg)	Haeckel, 1887
Botryostrobus aquilonaris (Bailey)	Boltovskoy, 1998; Nigrini and Moore, 1979; Petrushevskaya, 1967
Botryostrobus auritus/australis (Ehrenberg)	Boltovskoy, 1998; Nigrini and Moore, 1979; Petrushevskaya, 1967
Botryostrobus Haeckel	Haeckel, 1887

Buccinosphaera invaginata Haeckel	Haeckel, 1887
Callimitra Haeckel	Haeckel 1881
Carpocanarium papillosum (Ehrenberg)	(Ehrenberg), 1872
Carpocanistrum Haeckel spp.	Boltovskoy, 1998; Nigrini and Moore, 1979
Cenosphaera cristata Haeckel	Haeckel, 1887
Cenosphaera Ehrenberg spp.	Boltovskoy, 1998; Nigrini and Moore, 1979
Cenosphaera sp. aff. *C. perforata* Haeckel	Benson, 1983
Ceratocyrtis galeus (Cleve)	Bjoerklund, 1976
Ceratocyrtis histricosa (Joergensen)	Petrushevskaya, 1971
Chromyechinus antarctica (Dreyer)	Itaki, 2009; Petrushevskaya, 1967
Circodiscus microporus (Stoehr)	Petrushevskaya and Kozlova, 1972
Cladococcus abietinus Haeckel	Haeckel, 1887
Cladoscenium ancoratum Haeckel	Haeckel, 1887
Cladoscenium limbatum Joergensen	Joergensen, 1905
Cladoscenium sp. 1	No reference
Cladoscenium tricolpium (Haeckel)	Joergensen, 1900
Clathrocanium coarctatum Ehrenberg	Ehrenberg, 1872
Collosphaera confossa Takahashi	Takahashi, 1991
Collosphaera huxleyi Mueller	Mueller, 1855
Collosphaera macropora Popofsky	Popofsky, 1917
Collosphaera tuberosa Haeckel	Haeckel, 1887
Collosphaeridae	Several species of the subfamily Collosphaeridae Mueller; Boltovskoy, 1998
Cornutella profunda Ehrenberg	Boltovskoy, 1998
Corocalyptra craspedota (Jørgensen)/cervus (Ehrenberg)	Bjørklund, 1976; Boltovskoy, 1998; Petrushevskaya, 1971
Corythospyris stapedius (Haeckel)	Goll, 1978
Cubotholus Haeckel	Haeckel 1887
Cycladophora bicornis (Popofsky)	Nigrini and Moore, 1979
Cycladophora davisiana cornutoides (Petrushevskaya)	Petrushevskaya, 1967
Cycladophora davisiana davisiana (Ehrenberg)	Boltovskoy, 1998; Nigrini and Moore, 1979; Petrushevskaya, 1967
Cypassis Haeckel	Haeckel 1887
Cypassis irregularis Nigrini	Nigrini, 1968
Cyrtolagena laguncula (Haeckel)	Boltovskoy, 1998; Petrushevskaya, 1971
Dendrospyris Haeckel	Haeckel 1881
Dictyocoryne profunda Ehrenberg	Boltovskoy, 1998; Nigrini and Moore, 1979
Dictyocoryne truncatum (Ehrenberg)	Boltovskoy, 1998; Nigrini and Moore, 1979
Dictyophimus archipilium Petrushevskaya	Petrushevskaya , 1975
Dictyophimus crisiae Ehrenberg/*hirundo* (Haeckel)	Boltovskoy, 1998; Nigrini and Moore, 1979
Dictyophimus Ehrenberg	Ehrenberg 1847
Dictyophimus infabricatus Nigrini	Nigrini, 1968
Dictyophimus killmari (Renz)	(Renz), 1974
Dictyophimus macropterus (Ehrenberg)	Takahashi, 1991
Didymocyrtis tetrathalamus (Haeckel)	Boltovskoy, 1998; Nigrini and Moore, 1979
Druppatractus irregularis Popofksy	Popofsky, 1912
Druppatractus variabilis Dumitrica	Dumitrica, 1973; Takahashi, 1991
Enneaphormis rotula Haeckel	Haeckel, 1887
Euchitonia elegans (Ehrenberg)/*furcata* Ehrenberg gr.	Boltovskoy, 1998

Eucyrtidium acuminatum (Ehrenberg)	Ehrenberg, 1847
Eucyrtidium annulatum (Popofsky)	(Popofsky), 1913
Eucyrtidium anomalum (Haeckel)	(Haeckel) Haeckel, 1862
Eucyrtidium calvertense (Martin)	Martin, 1904
Eucyrtidium cienkowskii Haeckel	Haeckel, 1887
Eucyrtidium Ehrenberg emend. Nigrini spp.	Boltovskoy, 1998; Nigrini and Moore, 1979
Eucyrtidium hexagonatum Haeckel	Haeckel, 1887
Eucyrtidium hexastichum Haeckel	Haeckel, 1887
Eucyrtidium octocolum (Haeckel)	Petrushevskaya, 1971
Eucyrtidium teuscheri Haeckel	Haeckel, 1887
Euphysetta elegans Borgert	Borgert, 1902
Euphysetta nathorstii Cleve	Cleve, 1899
Euphysetta staurocodon Haeckel	Takahashi, 1991
Gondwanaria campanulaeformis (Campbell and Clark)	(Campbell and Clark), 1945
Gondwanaria dogieli Petrushevskaya	Petrushevskaya, 1979
Gondwanaria Petrushevskaya and Kozlova	Petrushevskaya and Kozlova 1975
Gonosphaera primordialis Jørgensen 1905	Jørgensen 1905
Heliodiscus asteriscus Haeckel	Boltovskoy, 1998; Nigrini and Moore, 1979
Hexacontium arachnoidale Hollande	Hollande, 1960
Hexacontium enthacanthum Joergensen	Joergensen, 1900
Hexacontium gigantheum Cortese and Bjorklund	Cortese and Bjorklund, 1998
Hexacontium laevigatum Haeckel	Haeckel, 1887
Hexacontium melpomene (Haeckel)	Van de Paverd, 1995
Hexacontium pachydermum Joergensen	Joergensen, 1900
Hexalonche amphisiphon Haeckel	Haeckel, 1887
Hexapyle dodecantha Haeckel gr.	Boltovskoy, 1998; Nigrini and Moore, 1979
Hexastylus spp. Haeckel gr.	Rogers and De Deckker, 2007
Hymeniastrum euclidis Haeckel	Nigrini and Moore, 1979
Lamprocyclas maritalis Haeckel s.l.	Boltovskoy, 1998; Nigrini and Moore, 1979
Lamprocyrtis hannai Campbell and Clark	Boltovskoy, 1998
Lamprocyrtis nigriniae (Caulet)	Kling, 1973
Lampromitra coronata Haeckel	Haeckel, 1887
Lampromitra quadricuspis Haeckel	Haeckel, 1887
Lampromitra schultzei (Haeckel)	Takahashi, 1991
Larcopyle buetschlii Dreyer	Boltovskoy, 1998; Nigrini and Moore, 1979
Larcopyle polyacantha (Campbell and Clark)	Lazarus et al., 2005
Larcopyle pylomaticus (Riedel)	Lazarus et al., 2005
Larcopyle weddellium Lazarus et al.	Lazarus et al., 2005
Larcospira bulbosa Goll and Bjoerklund	Goll and Bjoerklund, 1989
Larcospira quadrangula Haeckel	Haeckel, 1887
Larnacilla typus Haeckel	Haeckel, 1887; Dumitrica, 1989 (as Larnacopylomma)
Lipmanella bombus Haeckel	Haeckel, 1887
Lipmanella dictyoceras (Haeckel)	Kling, 1973
Lirella melo (Cleve)	Takahashi, 1991
Liriospyris reticulata (Ehrenberg)	Goll, 1968
Litharachnium tentorium Haeckel	Haeckel, 1860
Litheliidae/Pyloniidae Haeckel	Haeckel, 1887
Lithelius minor Jørgensen gr.	Boltovskoy, 1998; Nigrini and Moore, 1979

Lithelius nautiloides Popofsky	Boltovskoy, 1998; Nigrini and Moore, 1979; Petrushevskaya, 1967
Lithelius sp. 1	No reference
Lithelius spiralis Haeckel	Haeckel, 1860
Lithocampe ? *furcaspiculata* (Harting)	Boltovskoy, 1998; Nigrini and Moore, 1979 (as P. corbula); Petrushevskaya, 1967
Lithocampe ? *platycephala* (Ehrenberg)	Cortese et al., 2003; Petrushevskaya, 1967
Lithomelissa (?) sp. A Petrushevskaya	Petrushevskaya, 1967
Lithomelissa Ehrenberg	Ehrenberg, 1847
Lithomelissa hystrix Joergensen	Joergensen, 1900
Lithomelissa laticeps Joergensen	Joergensen, 1905
Lithomelissa setosa Jørgensen	Cortese et al., 2003; Takahashi, 1991
Lithomelissa sp. B	No reference
Lithomelissa thoracites Haeckel	Petrushevskaya, 1971
Lithostrobus cuspidatus Haeckel	Haeckel 1887
Lonchosphaera spicata Popofsky	Popofsky, 1908
Lophophaena buetschlii (Haeckel)	Petrushevskaya, 1971
Lophophaena Ehrenberg	Ehrenberg 1847
Lophophaena hispida (Ehrenberg)	Petrushevskaya, 1971
Lophospyris pentagona (Ehrenberg)	(Ehrenberg), 1872; Petrushevskaya, 1971
Mitrocalpis araneafera Popofsky	Popofsky, 1908
Peridium longispinum Jørgensen	Bjørklund, 1976; Bjørklund et al., 1998
Peripyramis circumtexta Haeckel	Haeckel, 1887
Peromelissa phalacra Haeckel	Boltovskoy, 1998; Petrushevskaya, 1971
Phormacantha hystrix (Joergensen)	Joergensen, 1905
Phormospyris stabilis Goll	Goll, 1976
Phormostichoartus corbula (Harting)	Nigrini, 1977
Phorticium clevei Haeckel	Boltovskoy, 1998; Petrushevskaya, 1967
Plectacantha cremastoplegma Nigrini	Nigrini, 1968
Plectacantha oikiskos Jørgensen	Jørgensen, 1905
Plectopyramis dodecomma Haeckel	Haeckel, 1887
Porodiscus Haeckel	Haeckel, 1881
Protocystis balfouri (Murray)	Borgert, 1911
Protocystis harstoni (Murray)	Murray, 1885; Schroeder, 1913
Protocystis swirei (Murray)	Haecker, 1908
Pseudocubus obeliscus Haeckel	Haeckel, 1887
Pseudodictyophimus bicornis (Ehrenberg)	Welling, 1997
Pseudodictyophimus gracilipes (Bailey) s.l.	Boltovskoy, 1998 (as Dictyophimus gracilipes)
Pseudodictyophimus gracilipes multispinus Bernstein	Bernstein, 1934
Pseudodictyophimus horrida (Petrushevskaya)	Petrushevskaya, 1975
Pseudodictyophimus platycephalus (Haeckel)	Petrushevskaya, 1971
Pterocanium auritum Nigrini & Caulet	Nigrini and Caulet, 1992
Pterocanium charybdeum (Mueller)	(Mueller), 1858
Pterocanium korotnevi (Dogel)	Dogel and Reshetnyak , 1952
Pterocanium praetextum eucolpum Haeckel	Haeckel, 1887
Pterocanium praetextum praetextum (Ehrenberg)	Boltovskoy, 1998; Nigrini and Moore, 1979; Petrushevskaya, 1971
Pterocorys clausus (Popofsky)/*zancleus* (Mueller)	Boltovskoy, 1998; Nigrini and Moore, 1979
Pterocorys hertwigii (Haeckel)	Petrushevskaya, 1971
Pterocorys minythorax (Nigrini)	Nigrini and Moore, 1979

Pteroscenium pinnatum Haeckel	Haeckel, 1887
Pylospira octopyle Haeckel	Haeckel, 1887
Rhizoplegma boreale Popofsky	Popofsky, 1908
Saccospyris antarctica Haecker	Boltovskoy, 1998; Petrushevskaya, 1967
Saccospyris conithorax Petrushevskaya	Petrushevskaya, 1965
Saccospyris spp. Haecker	Haecker, 1907
Saturnalis circularis Haeckel	Haeckel, 1887
Schizodiscus stylotrochoides Dogiel	Petrushevskaya, 1967
Sethoconus tabulatus Haeckel	Haeckel, 1887
Siphocampe arachnea (Ehrenberg) gr.	Nigrini, 1977
Siphocampe lineata (Ehrenberg) gr.	Takahashi, 1991
Siphonosphaera socialis Haeckel	Haeckel, 1887
Solenosphaera zanguebarica Brandt	Brandt, 1905
Sphaeropyle robusta Kling	Kling, 1973
Sphaerozoum punctatum Müller	Rogers and De Deckker, 2007
Spongaster tetras Ehrenberg	Boltovskoy, 1998; Nigrini and Moore, 1979
Spongodiscus resurgens Ehrenberg	Boltovskoy, 1998
Spongopyle osculosa Dreyer	Nigrini and Moore, 1979
Spongotrochus glacialis Popofsky	Boltovskoy, 1998; Nigrini and Moore, 1979; Petrushevskaya, 1967
Spongotrochus Haeckel/*Spongopyle* Dreyer	Haeckel, 1860; Dreyer, 1889
Spongurus cylindricus Haeckel	Haeckel, 1860
Spongurus sp. cf. *S. elliptica* (Ehrenberg)	(Ehrenberg), 1872
Stichocorys seriata Joergensen	Joergensen, 1905
Stichopilidium kruegeri (Popofsky)	Nishimura & Yamauchi, 1984
Stichopilium bicorne Haeckel	Haeckel, 1887
Stylatractus Haeckel	Haeckel, 1887
Stylatractus neptunus Haeckel	Nigrini and Moore, 1979; Petrushevskaya, 1967
Stylatractus ostracion (Haeckel)	Haeckel, 1887
Stylatractus sp. A	No reference
Stylochlamydium asteriscus Haeckel	Boltovskoy, 1998; Nigrini and Moore, 1979
Stylochlamydium Haeckel	Haeckel 1881
Stylochlamydium venustum (Bailey)	Boltovskoy, 1998; Nigrini and Moore, 1979
Stylodictya aculeata Jørgensen	Boltovskoy, 1998; Nigrini and Moore, 1979; Petrushevskaya, 1967
Stylodictya Ehrenberg	Ehrenberg, 1847
Stylodictya tenuispina Jørgensen	Nigrini and Moore, 1979
Stylodictya validispina Haeckel	Boltovskoy, 1998; Nigrini and Moore, 1979; Petrushevskaya, 1967
Stylosphaera Ehrenberg	Ehrenberg, 1847
Styptosphaera ? spumacea Haeckel	Nigrini and Moore, 1979
Tessarastrum straussii Haeckel	Haeckel, 1887; Takahashi, 1991 (as Amphirhopalum straussii)
Tetraphormis dodecaster (Haeckel)	Takahashi, 1991
Tetrapyle octacantha Mueller/*Octopyle stenozona* Haeckel gr.	Boltovskoy, 1998; Nigrini and Moore, 1979
Theocorys veneris Haeckel	Haeckel, 1887
Theocorythium trachelium (Ehrenberg) s.l.	Boltovskoy, 1998; Nigrini and Moore, 1979; Petrushevskaya, 1971
Tholospyris gephyristes Huelsemann	Bjørklund et al., 1998
Triceraspyris antarctica (Haecker)	Haecker, 1908
Trissocyclidae Haeckel, emend. Goll	Haeckel, 1881; Goll, 1968
Trisulcus testudus Petrushevskaya	Petrushevskaya, 1971
Trisulcus triacanthus Popofsky	Popofsky, 1913

Zygocircus productus (Hertwig)	Haeckel, 1887
Nassellaria Ehrenberg, indet.	Ehrenberg, 1875
Spumellaria Ehrenberg, indet.	Ehrenberg, 1875

Supplement 2: Recommended taxonomic groupings to simplify/harmonise the dataset. Adapted from Cortese & Prebble, 2015.

Taxa	Group
Actinomma delicatulum	ACTINOMMA DELICATULUM/POPOFSKII
Actinomma popofskii	
Anthocyrtidium ophirense	ANTHOCYRTIDIUM OPHIRENSE/ZANGUEBARICUM
Anthocyrtidium zanguebaricum	
Acrosphaera arktios	COLLOSPHAERIDAE
Acrosphaera cyrtodon	
Acrosphaera inflata	
Acrosphaera lappacea	
Acrosphaera murrayana	
Acrosphaera spinosa	
Buccinosphaera invaginata	
Collosphaerid	
Collosphaera confossa	
Collosphaera huxleyi	
Collosphaera macropora	
Collosphaera tuberosa	
Solenosphaera zanguebarica	
Siphonosphaera socialis	
Druppatractus variabilis	DRUPPATRACTUS VARIABILIS/OSTRACION
Stylatractus ostracion	
Eucyrtidium spp.	EUCYRTIDIUM SPP
Eucyrtidium acuminatum	
Eucyrtidium annulatum	
Eucyrtidium anomalum	
Eucyrtidium calvertense	
Eucyrtidium cienkowskii	
Eucyrtidium hexagonatum	
Eucyrtidium hexastichus	
Eucyrtidium octocolum	
Eucyrtidium teuscheri	
Hexacontium enthacanthum	HEXACONTIUM PACHY/ENTHA
Hexacontium pachydermum	
Lampromitra coronata	LAMPROMITRA PENTALACTIS/QUADRICUSPIS
Lampromitra quadricuspis	
Lithelius minor	LITHELIUS MINOR/SPIRALIS
Lithelius spiralis	
Lithomelissa setosa	LITHOMELISSA SETOSA Group
Lithomelissa hystrix	
Trisulcus testudus	
Phormacantha hystrix	PHORMACANTHA/PLECTACANTHA
Plectacantha cremastoplegma	
Plectacantha oikiskos	
Pseudodictyophimus gracilipes	PSEUDODICTYOPHIMUS GRACILIPES S.L.
Pseudodictyophimus gracilipes multispinus	
Pseudodictyophimus platycephalus	
Pseudodictyophimus bicornis	
Pterocanium praetextum praetextum	PTEROCANIUM PRAETEXTUM/EUCOLPUM
Pterocanium praetextum eucolpum	
Saccospyris antarctica	SACCOSPYRIS ANTARCTICA
Saccospyris conythorax	
Spongopyle osculosa	SPONGOPYLE OSCULOSA/RESURGENS
Spongodiscus resurgens	