APPENDIX: GEOREF (WEBSPIRS SYNTAX) LITERATURE SEARCH TERMS FOR CONGLOMERATE REFERENCES

All conglomerates: (conglomerates or conglomerate)

All QPC: (quartz conglomerate or quartz conglomerates or quartz pebble conglomerate or quartz pebble conglomerates or quartz cobble conglomerate or quartz cobble conglomerates or quartzose conglomerates or quartzose conglomerate)

Precambrian QPC: (Precambrian or Archean or Archaean or Proterozoic) and (All QPC)

Paleozoic QPC: (Paleozoic or Palaeozoic or Cambrian or Ordovician or Silurian or Devonian or Carboniferous or Mississippian or Pennsylvanian or Permian) and (All QPC)

Mesozoic QPC: (Mesozoic or Triassic or Jurassic or Cretaceous) and (All QPC)

Cenozoic QPC: (Cenozoic or Cainozoic or Tertiary or Paleogene or Neogene) and (All QPC)

QPC by Period: (Period name or (any Epoch name)) and (All QPC)
Example: (Silurian or Pridoli or Ludlow or Wenlock or Llandovery) and (quartz conglomerate or quartz conglomerates or quartz pebble conglomerate or quartz pebble conglomerates or quartz cobble conglomerate or quartz cobble conglomerates or quartzose conglomerates or quartzose conglomerate)

Rationale

The literature data are an imperfect proxy for the rock record, but they provide a valid first-order approximation, for the following reasons.

(1) The study assumes that the number of references is some function of the abundance of conglomerate for a given time period. Internal checks that support this assumption include:
   (a) The conglomerate GeoRef data and independent estimates of the mass-age distribution of sedimentary rocks are extremely similar (Fig. 2).
   (b) The data sets at the era and period level are collected independently, but the trends are the same whether constructed with results for the era name, or with the sum of the search results for the constituent periods. There is overlap between the subset of references that cites periods and the subset that cites eras, but there is also a substantial number of references that cite only one or the other, so the trend similarity is robust.

(2) Removal of highly studied units (e.g., the Witwatersrand Supergroup) from the database does not affect the pattern.

(3) In some cases, the time interval mentioned in the GeoRef record may not refer to the conglomerate mentioned in the same record; or a single conglomerate record may refer to more than one stratigraphic interval. However, these are nonsystematic errors, which do not introduce stratigraphic bias in the data set and consequently do not affect the overall patterns. In addition, random sampling of the GeoRef database indicates that this is not a large source of error for this study.

Table 1. Numbers of GeoRef records including reference to conglomerates and specific geologic
* Total number of records for each time interval, including references to subdivisions of the interv
† All records for each time interval that include "conglomerate" in any context.
§ Only records that specifically mention QPC. See appendix for search algorithms.

	A	B		C	
	Number of time interval records*	**Number of conglomerate records†**	**% of total**	**Number of QPC records§**	**% of conglomerate records**
ERAS					
Cenozoic	369555	4948	1.3	24	0.5
Mesozoic	226553	4737	2.1	29	0.6
Paleozoic	252113	5222	2.1	49	0.9
Precambrian	107427	2701	2.5	147	5.4
PERIODS					
Tertiary	200909	4391	2.2	25	0.6
Cretaceous	121278	2843	2.3	18	0.6
Jurassic	62442	1210	1.9	4	0.3
Triassic	46081	1329	2.9	8	0.6
Permian	49539	1279	2.6	5	0.4
Carboniferous	78243	1955	2.5	21	1.1
Devonian	50457	1064	2.1	8	0.8
Silurian	25216	488	1.9	3	0.6
Ordovician	38351	866	2.3	6	0.7
Cambrian	31887	911	2.9	13	1.4
Proterozoic	42442	1192	2.8	76	6.4
Archean	21094	477	2.3	28	5.9

	D	
	Number of Precambrian QPC units reported in GeoRef, absolute age known	**% of all Precambrian QPC records (n = 104)**
TIME (Ga)		
1.0-0.5	7	5
2.0-1.0	11	7
3.0-2.0	27	18

Table 2. Thin-section data for inter-clast material from QPC and polymict conglomerates. Contact data represent absolute numbers of contacts collected along a series of linear traverses. Compositional data were collected using basic (non-Gazzi-Dickinson) methods outlined in Harwood (1988). Grains coarser than sand size were ignored; grains silt-sized and finer were counted as matrix.

					Composition (volume %)				***Contacts (% total contacts)***			
	Unit	Age	Location	Data Points	Sand-sized quartz	Sand-sized lithics	Sand-sized feldspar and mica	Silt- and clay-sized matrix	Tangential	Linear	Nested	Inter-penetrating
QPC	Mazatzal Group 5-1	Proterozoic	Arizona	121	36	0	0	64	15	42	39	3
	Mazatzal Group 6-4	Proterozoic	Arizona	265	54	0	0	46	35	40	13	12
	Mazatzal Group 6-5	Proterozoic	Arizona	137	79	0	0	21	70	15	9	6
	Mazatzal Group 14-1	Proterozoic	Arizona	519	19	0	0	81	41	44	13	2
	Mazatzal Group 15-1	Proterozoic	Arizona	145	35	0	0	65	29	49	22	0
	Mazatzal Group 15-1	Proterozoic	Arizona	121	49	0	0	51	25	39	31	5
	Shawangunk Fmn. 2	Silurian	New York	122	82	0	0	18	17	50	30	3
	Shawangunk Fmn. 3	Silurian	New York	129	63	0	0	37	14	50	35	1
	Shawangunk Fmn. 7	Silurian	New York	136	52	0	0	48	22	55	18	4
Polymict	Derryveeny Fmn. 2	Ordovician	Ireland	213	61	25	8	5	27	69	2	2
	Derryveeny Fmn. 3	Ordovician	Ireland	206	58	25	15	1	28	64	3	6
	Derryveeny Fmn. 4	Ordovician	Ireland	212	89	5	2	4	14	78	7	1
	Rossroe Fmn. 1	Ordovician	Ireland	226	67	24	2	7	24	68	4	5
	Rossroe Fmn. 5	Ordovician	Ireland	223	64	26	2	8	29	64	4	3
	Rossroe Fmn. 6	Ordovician	Ireland	239	67	17	3	13	27	65	6	3
	Rossroe Fmn. 7.1	Ordovician	Ireland	219	58	28	11	3	32	65	2	2
	Rossroe Fmn. 7.2	Ordovician	Ireland	220	84	6	7	3	36	60	3	2
	Rossroe Fmn. 8	Ordovician	Ireland	219	69	21	5	6	31	60	7	3
	Rossroe Fmn. 9	Ordovician	Ireland	225	64	24	1	10	35	60	3	3
	Rossroe Fmn. 11	Ordovician	Ireland	205	70	23	4	2	24	69	5	3
	Rossroe Fmn. 12	Ordovician	Ireland	212	67	21	8	4	32	64	3	2
	Lettergesh Fmn. 14	Silurian	Ireland	228	75	11	3	11	37	60	0	4
	Lettergesh Fmn. 15	Silurian	Ireland	200	87	13	0	1	20	80	1	0
	Lettergesh Fmn. 16	Silurian	Ireland	223	66	18	8	7	14	82	4	1
	Lettergesh Fmn. 17	Silurian	Ireland	216	57	33	3	7	53	46	0	1
	Beltra Fmn. 22	Devonian	Ireland	211	70	20	5	5	39	51	8	3
	Beltra Fmn. 23	Devonian	Ireland	212	63	21	14	2	20	73	5	2
	Beltra Fmn. 24	Devonian	Ireland	205	46	45	6	2	13	84	2	3
	Bireen Fmn. 19	Devonian	Ireland	218	94	4	0	2	22	75	2	2
	Balsness Fmn. 6	Devonian	Norway	204	27	43	28	1	20	79	2	0
	Balsness Fmn. 8	Devonian	Norway	213	48	29	17	6	8	91	1	1
	Balsness Fmn. 9	Devonian	Norway	227	50	33	6	11	25	74	2	0
	Balsness Fmn. 13	Devonian	Norway	208	46	43	8	4	15	81	2	3
	Balsness Fmn. 17	Devonian	Norway	238	39	47	0	14	55	44	2	0
	Balsness Fmn. 19	Devonian	Norway	276	34	32	12	22	55	44	1	0
	Balsness Fmn. 20	Devonian	Norway	230	56	27	5	12	38	62	0	0