Study Site/ Location	Formations	Lithologies of Interface	Contact Type	Structure	Scientist
OUTCROP ANALOG SITES					
Gallinas Canyon (New Mexico) 35° 39' 37.4" N, 105° 20' 13.6" W	Del Padre Member of the Espiritu Santo Fm. overlying Precambrian Gneiss and Schist	Silica and calcite cemented massive fine- to very coarse-grained sandstone overlying crystalline basement which varies from gneiss, granite, basalt, and green schist	Type I	Faults were observed in the sedimentary units truncating against the contact and bisecting the contact. The outcrop was severely deformed. Mineralized and non-mineralized fractures were observed in the sedimentary units.	Mozely and Kerner (2015; M.S.), Evans and Hesseltine (2019; M.S.)
Phantom Canyon (Colorado) 38° 30' 43.3" N, 105° 06' 40.7" W	Pennsylvanian Fountain Fm overlying Precambrian Granite	Silica rich dolomitized marine carbonates with shallow karst erosion with intergranular microporosity and iron oxide minerals between dolomite grains overlying weathered granite with granitic dikes	Type I	Two normal faults were observed bisecting the contact with associated damage zones surrounding them. In both cases, the basement fault core was wider than the sedimentary fault core.	Mozely and Kerner (2015; M.S.)
Merrimack, Wisconsin	Cambrian Parfrey's Glen Fm overlying Precambrian Baraboo Quartzite	Pebble- to boulder-sized quartzite clast conglomerate overlying quartzite	Type 0	Boulders up to 2m in diameter were observed No faults were observed at this site.	Evans and Cuccio (2017; M.S.)
Presque Isle, Marquette, Michigan 46° 35' 24.7" N, 87° 23' 04.29" W	Proterozoic Jacobsville Sandstone overlying Archean Serpentinized Peridotites	Fine-medium grained subarkosic sandstone with iron oxide and clay alteration interbedded with cohesive conglomerates and friable, incohesive basal conglomerates with clasts consisting of jasperoid, quartz, feldspar, and sandstone overlying serpentinized peridotite	Type II	Sandstone, conglomerate, and regolith are all observed in direct contact with the underlying serpentinized peridotite Three of four observed faults truncate at the interface and are associated with iron oxide mineralization, while the fourth bisects the contact and appears as a silica rich vein in the basement rock	Bradbury and Cuccio (2017; M.S.)
Hidden Beach/Little Presque Isle, Marquette, Michigan 46° 37' 19.37" N, 87° 28'01.48" W	Proterozoic Jacobsville Sandstone overlying Archean Compeau Creek Gneiss	Fine-medium grained subarkosic sandstone with a basal conglomerate of sub-angular to rounded jasperoid, gneiss, and greenstone clasts overlying gneiss with inclusions of schist and thin veins of quartz and epidote	Type 0	Bleached fracture zones are present in the Jacobsville Sandstone. Small displacement faults only observed in basement rock with truncation at conglomerate layer In some cases, basement faults align with bleached vertical fractures in overlying sandstone	Bradbury and Cuccio (2017; M.S.)
Cody, Wyoming	Cambrian Flathead Sandstone overlying Precambrian Granite	Cambrian Flathead Sandstone overlying granite with a weathered horizon and presence of grus in some parts of the exposure	Type I	Faults were observed in both the sandstone and the granite as well as bisecting the contact between these two units. Both sandstone and basement hosted faults were observed truncating at the contact while vertical fractures were observed bisecting the contact. Sedimentary-hosted faults exhibit quartz, clay, and hematite mineralization while basement-hosted faults were quartz-rich, clay-rich, or chloritic.	Evans and Cuccio (2017; M.S.)

Baker's Bridge, Colorado	Precambrian Conglomerates, Devonian Tamarron Member of the Ignacio Fm, and McCracken Member of the Elbert Fm overlying Precambrian Baker's Bridge Granite	Precambrian conglomerates, quartz cemented, variably colored, planar laminated, cross bedded sandstone interbedded with thin (<15 cm) shale beds (Tamarron Sandstone) and sandy dolomite (McCracken Dolomite) overlying a relatively homogenous granite composed of microcline, perthite, quartz, plagioclase, and hornblende with accessory zircon, apatite, magnetite, calcite, and epidote	Type 0	Joints and fractures can be found cutting both the sedimentary strata and the basement rock with clay infilling. The basement rock is relatively fresh and unweathered.	Evans and Hesseltine (2019; M.S.)
DRILL CORE ANALOG SITES					
CPC BD-139 (Michigan) 359437 E, 4732092 N UTM Grid 17T	Cambrian Mt Simon Sandstone overlying Precambrian Gneiss	Cemented fine-grained laminated quartzarenite overlying a finely foliated, weathered gneiss	Type II	Fragmented carbonate veins were observed in the weathered portion of the basement rock	Evans and Cuccio (2017; M.S.)
CPC BD-151 (Michigan) 359024 E, 4738656 N UTM Grid 17T	Cambrian Mt Simon Sandstone overlying Precambrian Gneiss	Carbonate cemented fine-grained sandstone with fine-scale laminae and evidence of bioturbation/soft sediment deformation overlying a weathered gneiss	Type I/II	No faults were observed in the sedimentary strata. A sub-vertical alteration zone was observed in the basement rock approximately 3m below the contact	Evans and Cuccio (2017; M.S.)
UPH-1 (Illinois) 264394 E, 4709549 N UTM Grid 16T	Cambrian Mt Simon Sandstone overlying Precambrian Granite	Tan and purple cross bedded, medium-grained, well stored sandstone grading into interbeddred red and green siltstone grading into interbedded grus and siltstone overlying pink, coarse-grained granite with few fractures and minor alteration	Type I	No faults were observed in either the sedimentary strata or the basement rock, however altered microfractures were observed in quartz and feldspar grains in the upper 5m of the granite.	Evans and Cuccio (2017; M.S.)
Gogebic Core (Michigan)	Jacbosville Sandstone and Bessemer Sandstone overlying Michigamme Slate	The Jacobsville and Bessemer sandstones are red, medium- to course-grained, and well sorted with interbeds of mudstone and shale. The sandstones are jointed, bleached, and silicified. The Michigamme slate is oxidized, non-graphitic slate, graphitic slate, and interbeded graywacke.	Type II	The graphitic slate has faults surfaces with purple smear. The slates are cut by intermittent faults, clay gouges, bleached zones, leeched zones with abundant voids, pressure solution seams, folded and contorted layers, clay-rich shear zones, and broken core intervals. The contact between non-graphitic and graphitic slate includes a zone up to 2m thick of carbonate veins and marks the appearance of euhedral pyrite crystals. The sandstone and slates straddling the non-conformity are mineralized.	Evans and Hesseltine (2019, M.S.)

RC Taylor Whole Rock Drill Core (Nebraska)	Cambrian Lamotte Sandstone overlying sheared and weathered Proterozoic granitic basement	Arkosic, fine-grained, well sorted sandstone containing abundant glauconite and veinlets of quartz, calcite, and Fe-oxide overlying weathered and sheared granitic basement	Type I	Fe-oxide veins cut quartz, and calcite veins cut Fe-oxide and quartz veins indicating three separate mineralization events Fractures and veins are observed in both the sedimentary strata and the basement rock	Petrie, McClernan, and Tello (UG research)
B-1 Whole Rock Drill Core (SE Minnesota) E 590933, N 4847944 UTM NAD 83	Cambrian Mt. Simon Sandstone overlying Proterozoic mafic basement	Quartzites, weathered/altered contact, olivine metagabbro, grano-diorites, and pegmatites	Type I/II	Intensely weathered and altered contact zone marked by iron-oxides and iron-hydroxides, dolomite, siderite, clay Abundant structural discontinuities within cm's of the nonconformity contact and that serpentinization along fracture surfaces	Bradbury and Smith (M.S. *in progress*)
BO-1 Whole Rock Drill Core (SEMinnesota) E 598590, N 4820569 UTM NAD 83	Cambrian Mt. Simon Sandstone overlying Proterozoic mafic basement	Quartzites, weathered/altered contact, metagabbro-norite?, grano-diorites, diabase and pegmatite dikes	Type I/II	Intensely weathered and altered contact marked by iron-oxides and iron-hydroxides, dolomite, siderite, and clay Abundant structural discontinuities within cm's of the nonconformity contact and that extend ~ 50 m depth; clay coatings on fault surfaces with calcite, dolomite, iron-oxide fracture infillings	Bradbury and Smith (M.S. *in progress*)

Supplemental Table 1. Summary of nonconformity study sites.

Borehole	API	Location	Section, Township, Range
RC Taylor 1	26019050190000	Buffalo County, Nebraska	Sec 21, T11N, R18W
	Core was examined at the U. S. Geological Survey Core Research Lab in Denver, Colorado. 3984 – 4038 ft.		
CPC BD 139	21147001398000	St. Clair County, Michigan	Sec 7, T5N, R17E
	The core was examined at the Michigan Geological Survey, in Kalamazoo, Michigan. 4607 – 4633 ft.		
BO-1	DNR # 11918	Fillmore County, Minnesota	Section 22 T10N R8W
	The core was examined at Minnesota DNR Drill Core Library in Hibbing, Minnesota. 130-1600 ft.		

Supplemental Table 2. Summary of borehole locations and core intervals.