The Basement Rocks of the Brisbane Area, Australia: Where Do They Fit in the Creation Model?

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ABSTRACT

A geological model based on a plain reading of the Bible suggests that geological processes acting in the past varied in nature and intensity from time to time. Consequently, characteristics such as the physical scale of a rock unit, its degree of disturbance, how the unit responds to disturbance, its texture and fossil content will help classify the rock unit within a biblical framework. This concept has been applied to the basement rocks of the Brisbane area, Australia. Following a process of elimination, it is concluded that the basement rocks were deposited early during the Flood event, that is, the Eruptive phase as defined by Walker's biblical geologic model.

INTRODUCTION

One of the important tasks facing creationists is to correlate geological data within a biblical framework. Geological data are currently interpreted and presented in terms of an evolutionary framework. As a result, when a person inspects a geological map or reads a geological textbook it is not obvious how the data could possibly relate to biblical history.

In 1994 Walker[1] presented a geologic model based on the Bible at the Third International Conference on Creationism in Pittsburgh, Pennsylvania. The model provides a framework to interpret the geology of an area in terms of a biblical understanding of Earth history. A number of criteria were suggested by which rocks can be classified. Froede has independently proposed the same concept, that creationists use a geological framework based on the Bible, but has not developed the idea to where it can be used for classification purposes.[2]

This paper examines the basement rocks in the Brisbane area, Australia to see if they can be classified within the framework of Walker's biblical geologic model.

RELATIONSHIP BETWEEN THE BIBLE AND GEOLOGY

The purpose of a biblical geologic model is to successfully link two different sources of information, namely, written biblical history and observed geological data. Whenever different sources of information are encountered, such as field notes and map information, they need to be related together. Unless this is done neither source will be of assistance to the other. Map information, for instance, provides no assistance to navigation until a location on the map can be tied to a physical location on the ground.

The inability to link separate sources says nothing about the accuracy or reliability of the information. The absence of a link simply means that one source of information is not able to shed light on the other source. If an incorrect link is assumed the result will be confusion and error. Both sources of information may still be accurate and reliable, yet the further one proceeds the more difficulties are encountered. The problem is not with the information but with the link.

The purpose of this paper, then, is to correlate the written historical record of the Bible, which is assumed to be

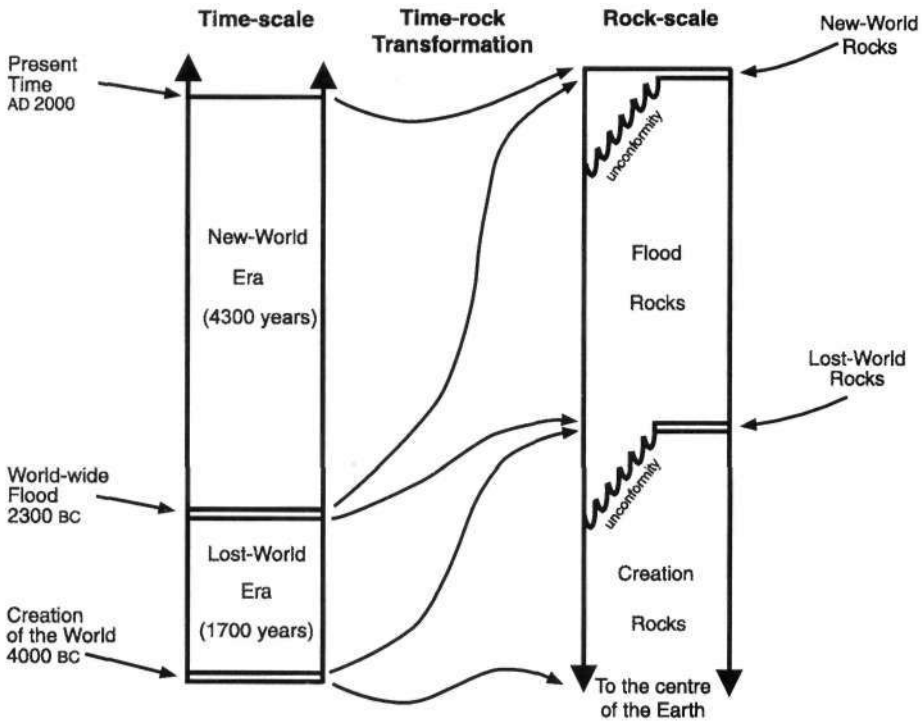

Figure 1. *Overview of Walker's biblical geologic model.*

accurate and reliable, with the geological information as recorded in geological reports and maps for a specific area (the Brisbane basement rocks). First, the geological model based on the Bible as presented in Pittsburgh will be outlined. Then the geology of the Brisbane area will be examined with a view to classification within this model. As further attempts are made to establish links between the biblical record and the geological information the usefulness of the model will be tested.

THE BIBLICAL GEOLOGIC MODEL

Figure 1 shows an overview of the biblical geologic model as presented by Walker.[3] The time-scale is shown on the left, with the most recent time at the top and the earliest at the bottom. The scale is divided into four parts, each clearly identified with the biblical record. Two **events** are shown, the Creation **event** having a duration of six days and the Flood **event** lasting about one year. The 1,700 year period between the Creation event and the Flood event is called the Lost-World **era,** while the 4,300 year period from the Flood event to the present time is called the New-World **era.**

The term 'event' conveys the idea of a significant happening within a short period of time, where as 'era' relates to a much longer period of time. These terms reinforce the idea that according to the Bible geologic processes varied in intensity (rate of work) at different times in the past.

The length of the time-scale reflects the length of time associated with the events and eras. The dates shown are based on Ussher's chronology,[4] but changes to these dates, even of 1,000 years or so, would not affect the validity of the model.

Correlated with the time-scale is a second scale, a rock-scale, shown to the right with the most recent rocks at the top, and the earliest rocks at the bottom; the same way they occur in the Earth. The lengths of the rock-scale units conceptually correspond to the quantity of rock material found on the Earth today and stand in marked contrast to the length of the units of the time-scale.

This concept of time-rock correlation is fundamental to the biblical geologic model and reflects the non-uniform effect of historical events on the geology of the Earth. The concept focuses on the geologically significant processes indicating the relative intensity of those processes. The idea is indicated by arrows which, for example, point from the Creation event on the time-scale to the rocks on the rock-scale formed during that event. Similarly, arrows point from the Flood event on the time-scale to the rocks on the rock-scale formed during the Flood. Even though the Creation and Flood events happened quickly, they were responsible for almost all the rocks present on the Earth today. The long eras, which make up virtually the whole time-scale, do not contribute significantly to the rock-scale. Because these eras have such little impact on the rock-scale, the exact dates for the Creation and the Flood, within reason, are not critical to the model.

For ease of classification and systematic analysis the four parts of the time-scale are sub-divided as shown in Figure 2, using the time and process information in the Bible. The first level of sub-division is termed the stage. The Creation event is divided into two stages, the Foundational stage of two days' duration and the Formative stage lasting four days. The Flood event is divided into two stages, the Inundatory stage and the Recessive stage.

The last level of classification is termed the phase. The Foundational stage has two phases, the Original and Ensuing phases. The Formative stage also has two phases, the Derivative and Biotic phases. The Lost-World era is not further divided and so has only one phase of the same name. The Inundatory stage of the Flood event is divided into three phases, the Eruptive, the Ascending and the Zenithic phases. The Recessive stage of the Flood event has two phases, the Abative and Dispersive phases. For the New-World era two phases have been included, the Residual and Modern phases.

The duration of each phase varies considerably, as shown

on the figure. The duration of the Inundatory stage of the Flood is shown at 60 days, while the Recessive stage duration is 300 days. This is consistent with Genesis 7:17, which says *'for forty days the Flood kept coming on the earth.'* However, it is possible that, based on Genesis 7:24 and 8:3, the Inundatory stage may have been longer at 150 days, making the Recessive stage about 210 days long. This possible uncertainty in the timing should be kept in mind.

The aim of the model is for all component parts, such as each event, era, stage and phase, to relate to a geologically significant process with easily identifiable starting and finishing criteria as described in the Bible. In this way it should be possible to correlate the model with the geology in the field.

Note that even though the terms event, era, stage and phase are shown for convenience on the rock-scale, they are actually time terms. It is proposed that the rocks formed at these times be given the same name, but with the time term replaced with the word 'rocks'. For example, rocks formed during the Derivative phase would be called Derivative rocks, and those formed during the Inundatory stage, Inundatory rocks.

Finally, four geological actions as described in the Bible are shown in Figure 2. In chronological order the first is the Foundational action, which represents the very first creative act that founded the Earth in the beginning (Genesis 1:1). Also during the Creation event, the Formative action took place on Day Three (Genesis 1:9) causing the waters which covered the Earth to be gathered together into the ocean basins and allowing dry land to form. At the beginning of the Flood the Eruptive action burst open the springs of the great deep (Genesis 7:11) initiating the inundation of the continents. And lastly, the operation which closed the springs of the great deep (Genesis 8:2) and produced the new ocean basins is called the Abative action. Following this action the waters of the Flood receded from the Earth.

Although these actions and their effects are described in Scripture, their specific nature is not clear. In geologic terms an action can be defined as a world-scale geologic disturbance which formed or modified the large-scale geologic structures of the Earth. Actions are represented on the figure as a single arrow, but in fact may have involved a sequence of tectonic activity continuing over one or two, or more, phases. Numerous suggestions have been made as to the specific form of some actions, including rapid subduction of the pre-Flood ocean floor,[5] lateral movement of the continents following the impact of a giant meteorite,[6] lateral movement of the continents following rupture of the

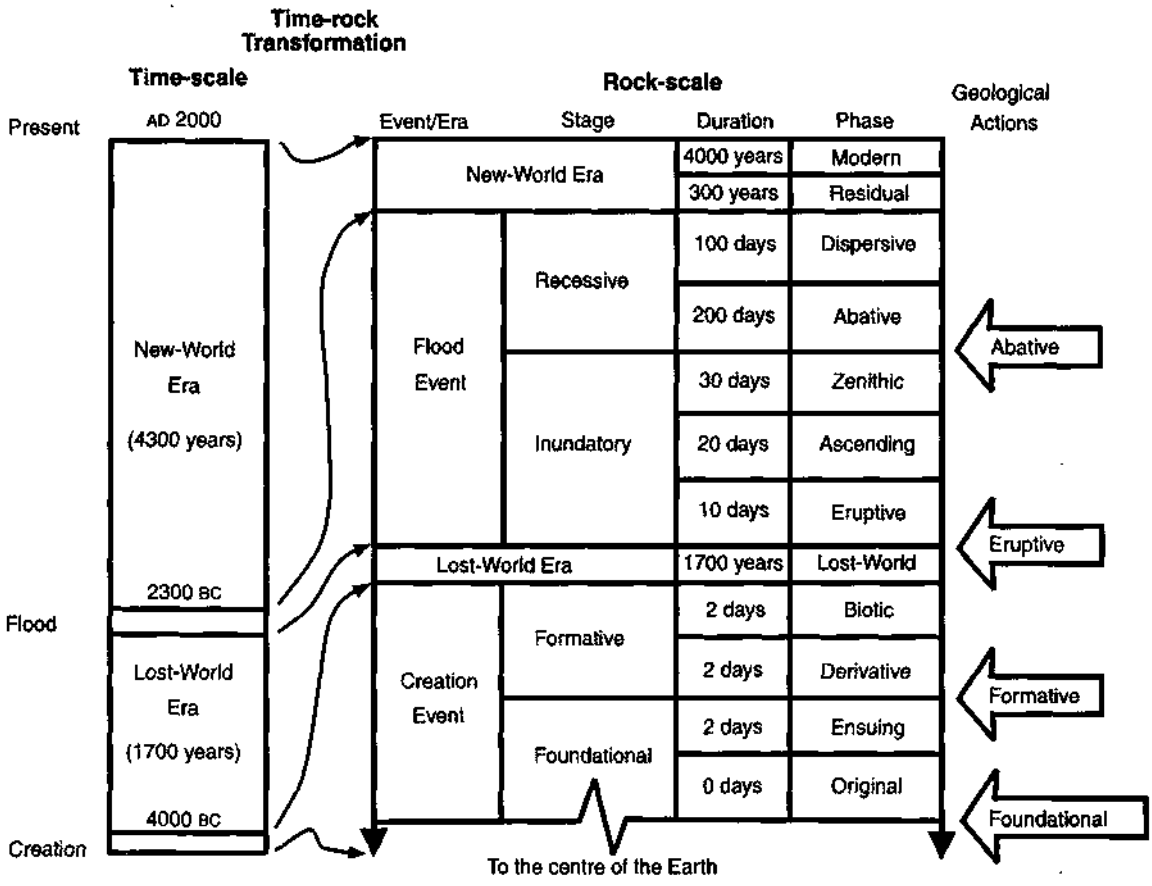

Figure 2. *Walker's biblical geologic model. The duration of the Inundatory stage of the Flood is shown at 60 days (a little more than 40 days), making the duration of the Recessive stage about 300 days. However, the biblical account can be interpreted at ISO days for the Inundatory stage, making the Recessive stage just over 200 days.*

crust,[7] and crustal distortion due to the gravitational attraction of a celestial body approaching the Earth.[8] As far as the model is concerned, the key concept involves significant tectonic and crustal movements accompanied by major changes to the surface shape of the Earth. An action, therefore, would substantially disturb any pre-existing geologic structures on the Earth and initiate secondary water-driven geologic processes.

It is clear that the model is derived from the Bible. Geological principles such as erosion, sedimentation and superposition have been incorporated, but at this stage the geologic data have not been consulted. Consequently, the relative volume of rock material currently present on the Earth for each phase is not known. Nor is it known if some phases are now absent. While we are confident of finding New-World rocks and Flood rocks, it is possible that rocks formed earlier during the Lost-World era and the Creation event may have been destroyed during the Flood. Flood rocks must have been derived from Creation rocks and Lost-World rocks by erosion, alteration, melting and magmatic differentiation. The point is that the model provides a coherent framework for approaching the data from a biblical point of view.

CLASSIFICATION CRITERIA

Inherent in the biblical model is the concept that past geologic processes varied in nature and intensity from time to time. Biblically, most of the rocks of the Earth must have formed under different geologic processes to the slow and gradual, relatively small-scale processes observed today. It is anticipated that this variation in magnitude will be reflected in certain unique geologic characteristics and help classify rock formations within the framework of the model.

Some potentially useful geological characteristics have been deduced from the nature and sequence of the processes detailed in the Bible. These include the physical scale of the geologic structure and whether it has been disturbed by tectonic processes since deposition. In addition, the manner in which the structure has responded to disturbances would be significant, as would the texture of the rocks and the presence or absence of fossils. Fossil footprints of terrestrial creatures have special importance for classification within the biblical geologic model. This list is preliminary because, with experience, additional criteria will be found useful.

To differentiate between rocks formed during the Creation event and rocks formed at later times two important metaphysical questions must be addressed. The first involves the processes operating during Creation week. From the outset we must recognise that it is not possible to constrain the hand of God to natural laws during the six creative days. However, it is reasonable to assume that natural laws would have operated once supernatural actions were completed. For example, the creation of the first bird was a supernatural act which has not been humanly observed and has never been repeated. However, once the creature was formed, we can accept that its physiological functions, such as breathing, blood circulation and digestion, would have been like what we observe today. In the same way, the creation of the Earth instantaneously on the first day was a supernatural act. However, subsequent processes such as the movement of water and the precipitation of dissolved material would have followed natural processes.

The second question involves the form of creation. Would God instantaneously create rocks with an apparent history? Fossils in rocks, for example, look like they lived and died before the rock was formed. Most creationists today conclude that rocks were not created instantaneously *ex nihilo* containing fossils. Apart from the illusion of history, the appearance of fossilised dead animals would not be consistent with a good creation. Furthermore, fossils are easily explained as being animals and plants destroyed during the Flood event.

Many sedimentary and metamorphic rocks appear to be derived from pre-existing source rocks. Igneous rocks have also been established as often derived from pre-existing source rocks by melting. By the same reasoning such rocks would not be expected to be readily recognised as having been instantaneously created by God. This is not to say that sedimentary or metamorphic rocks were not produced during the Creation event by natural processes operating at that time. However, it is impossible now to know what the rocks created instantaneously by God out of nothing would have looked like, since they were not derived from pre-existing source rocks.

Scale	Limiting Volume (km^3)	Typical length by width by thickness (km)
World	← 100,000,000	3,000 km x 3,000 km x 10 km
Continental	← 10,000	100 km x 100 km x 1 km
Regional	← 10	10 km x 10 km x 0.1 km
Local		

Table 1. *A scale classification for geological structures.*

Scale

The biblical model proposes that the geographical extent of geological processes was different at different times in the past. Consequently, the scale of a geological structure should give an indication of the geographical extent of the process involved in forming that structure. It is anticipated therefore that scale will be a useful characteristic for classifying geological structures. Naturally the scale of a geological structure refers not only to its geographical extent but also to its thickness.

As a convenient measure four categories of scale are here defined: world scale, continental scale, regional scale and local scale. Perhaps the most useful single parameter is the volume of material in a geological structure. A helpful scheme is set out in Table 1. This table indicates, for example, that a world-scale structure would involve more than 100,000,(X)0 km^3 of material, whereas continental-scale structures would involve between 100,000,000 km^3 and 10,000 km^3 of material. Typical dimensions to achieve a volume of 100,000,000 km^3 would be 3,000 km by 3,000 km in areal extent coupled with a thickness of 10 km. Any combination of dimensions achieving a comparable volume could be considered equivalent from a scale point of view.

Degree of Disturbance

A definite sequence for past geological disturbances is set out by the biblical model. The major disturbances of great intensity are the Foundational action, the Formative action, the Eruptive action and the Abative action. Such actions would significantly disturb structures already formed. For any geologic structure the degree of disturbance would depend on the number and intensity of actions to which it was exposed. It is expected therefore that the degree of disturbance of rock structures will assist in their classification.

Tectonic activity during the New-World era would be of much lesser intensity and would have disturbed the geologic structures of the Earth to a much lesser extent. The same would be anticipated of tectonic activity during the Lost-World era.

Response of the Structure

According to the biblical model definite time periods, which vary greatly in duration, separate past geological actions. For example, there were only two days between the Foundational and Formative actions, but over 1,700 years between the Formative and Eruptive actions. Similarly, the time between the Eruptive and Abative actions was relatively short at 60 days compared with the 4,000 years which have elapsed since the Abative action to the present. (As discussed earlier the duration of the Inundatory stage may have been 150 days, but this is still a relatively short time.)

How soon a geological structure is disturbed after its formation will affect the way in which it responds to the disturbance. Broadly, a rock formation may respond in a plastic manner with oozing, twisting, bending and folding, or it may respond in a brittle manner displaying faulting, crushing and fracturing.

The response of rocks to imposed stress is an involved process. Even hard and brittle rocks can respond in a plastic manner if they are deeply buried when disturbed.[9] It should also be noted that the concept of brittle and plastic depends on the scale at which the units are viewed. For example, numerous, small, brittle failures can add together to give smooth curves and flow-like structures which, when viewed from a distance, look like a plastic response.

The biblical geologic model introduces two additional factors affecting the response of rocks to disturbances, factors not normally considered in uniformitarian models. The first factor involves the extent to which a sediment has hardened since deposition and before disturbance. Material properties of rocks such as fracture strength, elasticity and viscosity, which prescribe how the rock will respond to disturbance, all depend on the degree of diagenesis. This in turn depends on such factors as the physical and chemical characteristics of the rock material, temperature and pressure resulting from depth of burial, and the time between deposition and disturbance. Given the right chemical situation, soft sediment can harden rapidly. Concrete, for example, can set within a few hours and reach full strength after a month or two. Yet, even though sediments could harden quickly, the biblical model suggests that sometimes rocks would have been disturbed and deformed while still soft.

The second factor arises because large volumes of sediments would be deposited rapidly and contain significant amounts of water. The presence of water in soft sediments reduces the stress required to produce deformation and assists the relative movement of grains to each other.

It is expected therefore that the response of rocks to disturbance will help classify units within the biblical model when the timing of geological actions is taken into account.

Textures

The textures of rocks and how these would be classified within a biblical framework involve a number of issues. The first is the anticipated texture of sedimentary rocks deposited at different times. The biblical model envisions that the hardness of source material would vary from time to time, as would the erosive intensity of water-driven geologic processes. These differences would affect the texture of the resultant sedimentary rocks.

For example, rocks formed from fine, soft unconsolidated source material would have a fine texture, no matter how intense the erosive action of flowing water. On the other hand, the texture of rocks derived from hardened source material would depend on the erosive intensity of the water flows. Intense erosive action on hard, strong rock would produce rocks of coarse texture, such as conglomerates and breccias. Clasts of soft sediments could be eroded from partially hardened source rock. These would exhibit plastic behaviour after deposition or be rounded in shape.

The second issue, a metaphysical one, involves the texture of rocks formed during the Original phase of the Creation event. The concept of the Original phase is of an instantaneous supernatural creation out of nothing at the beginning of the first day. The nature of such created rocks was discussed in a previous section, where it was proposed that it is impossible now to know what such rocks would have looked like, since they were not derived from pre-existing source rocks. Consequently, we do not know whether igneous, sedimentary or metamorphic rocks would

have been formed during the Original phase of the Creation event.

The third issue, also of a metaphysical nature, is whether volcanic activity occurred during the Creation event producing extrusive igneous rocks. Considering that each step in the creation process during the Creation event was described as 'good' by the Creator (for example, Genesis 1:4), it is hard to conceive of highly explosive volcanic activity at this time. For the sky to be filled with debris ejected by volcanic eruptions and accumulating into large deposits of pyroclastics would seem to run counter to the concept of a perfect creation. It certainly would not be 'good' for the atmosphere to be dense with scalding hot ash that settled and welded itself into crystal tuff. Nor is it likely that the contamination would clear in time, ready for the creation of birds, animals and people within a few days, because ash can persist in the atmosphere for weeks or months after volcanic eruptions. It would appear unlikely therefore that tuffs and pyroclastics would have formed during the Creation event.

There is a remote possibility that certain igneous rocks could form during the Creation event without spoiling the new creation. Magmatic material could be extruded under the ocean or within the crust of the Earth without harm. Even extrusive volcanic rocks could form on land, provided the extrusion was not explosive or injurious to the environment, and provided the lava flow was in an isolated location where it could cause no damage. These processes however would not produce pyroclastics or crystal tuffs.

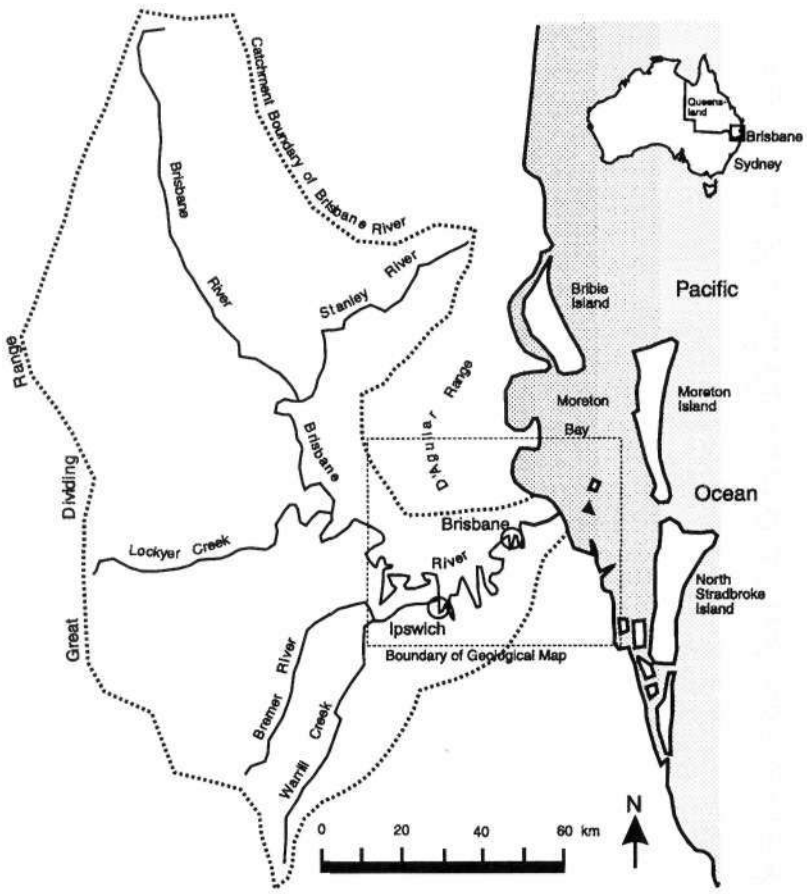

Figure 3. *The Brisbane area.*

Fossils

Fossils are described as the remains of organisms that lived in the past.[10] As discussed earlier, metaphysically, it is considered that all fossils have been formed since life was created during the Creation event, and that no fossils were created supernaturally within the rocks.

Fossils indicate rapid burial of living creatures before they decompose, and before being consumed by other creatures. The state of preservation of the fossil would indicate how quickly the organism was buried, and whether it was subsequently disturbed. The distribution of fossils would reflect the distribution of life on the Earth at the time of the Flood and the order in which they were buried by the Flood. The requirement for rapid burial makes it more likely for fossils to form during the Flood than during the Lost-World or New-World eras.

Note that the Biotic phase has been included within the Creation event. This phase allows for the remote possibility that some plankton or other organic material may have become trapped after its creation when sediments were forming in the oceans.[11] Such a possibility raises the metaphysical issue of *'death before the curse of death which followed Adam's sin'*.[12] However, the Bible never ascribes to plants the attributes of a 'living thing', and therefore they do not die when consumed.[13] Consequently, the possibility of fossiliferous organic material within rocks formed during the Creation event and prior to the Fall is not inconsistent with the biblical record.

The use of fossils to correlate strata is fundamental to current geological practice and routinely employed to interpret geological structures within a region. Fossils have also been used to set up geological systems with their alleged world-wide 'time zones', and as such are utilised to tie regional geology from different parts of the world into a universal time sequence. From a biblical perspective, fossils should be useful for classifying rocks on a regional basis, and their distribution would relate to the progressive destruction of biogeographical zones. However, the model provides no basis for assuming a time correlation on an inter-regional scale based on fossil evidence, because this would require each index fossil to be deposited world-wide at the same time during the whole of the Flood event.[14]

GEOLOGY OF THE BRISBANE AREA

Now that the biblical model has been described and a number of classification criteria outlined, we will attempt to classify as a test case the basement rocks of the Brisbane area. The actual area examined is 60 km long and 50 km wide, as indicated within the rectangle shown on Figure 3.

A simplified geological map of the area after Willmott and Stevens[15] is shown in Figure 4. The geology has been reduced to three broad type categories: basement rocks, intrusive units of granitic texture, and rocks on the basement.

The basement rocks occupy a reasonably large proportion of the area trending from a north-west to south-east direction and form the high elevation hilly country of the D'Aguilar Range and the hilly country south of Brisbane.

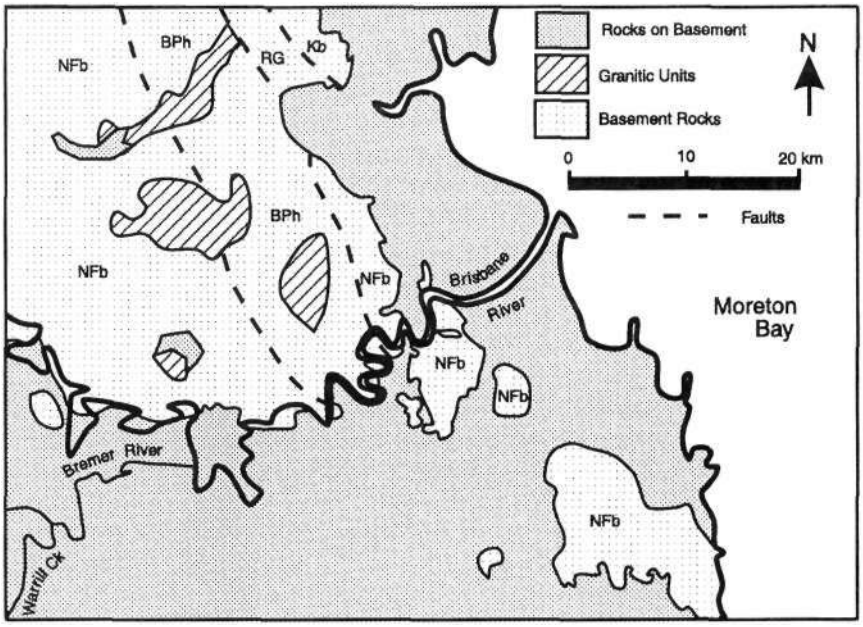

Figure 4. *Simplified geology of the Brisbane area. Key to geological units:*
Nfb: Neranleigh-Fernvale beds *RG: Rocksberg Greenstone*
BPh: Bunya Phyllite *Kb: Kurwongbah beds*

Diorite, granodiorite and adamellite plutons intrude the basement rocks to the north-west.[16]

The majority of the rocks which lie over the basement are sedimentary, although there are some minor volcanic units occupying restricted areas. All these units lie against the basement rocks, with either an uncomformable or faulted contact.[17]

GENERAL DESCRIPTION OF BASEMENT ROCKS

As can be seen in Figure 4 the basement rocks occupy a significant part of the area of interest. Four rock units have been defined: the Neranleigh-Fernvale beds, the Bunya Phyllite, the Rocksberg Greenstone and the Kurwongbah beds.[18]

The lithologies of these four rock units which comprise the basement of the Brisbane area are described in a number of sources[19-22] and are summarised in Table 2.

The Neranleigh-Fernvale beds are hard, chiefly metasedimentary rocks, now folded and steeply inclined.[23] Five different lithologies having a blocky and structurally complex relationship to each other are recognised within these beds.

The dominant rock type within the Neranleigh-Fernvale beds is a spilitic metavolcanic[24] commonly referred to as greenstone. It has a greenish-grey colour, and is fine grained. Sometimes it has a blocky appearance with few traces of the original flows, while in other places it has a foliated and fractured appearance.[25] The term spilitic refers to the belief that the greenstone is altered basaltic lava, typically of submarine origin, in which the feldspar has been albitised. This alteration is believed to be the result of chemical reaction between seawater and the hot basalts.[26]

Conglomerate lenses up to 300 mm thick crop out at

Neranleigh-Fernvale beds	Bunya Phyllite	Rocksberg Greenstone	Kurwongbah beds
Spilitic metavolcanics (most abundant)	Metavolcanics (intercalated lenses)	Spilitic metavolcanics (flow and pyroclastics)	Basic metavolcanics (abundant intercalated lenses)
Conglomerate lenses (minor, pebble to boulder)			
Arenite/Greywacke (in places oolitic, crinoid fragments)	Arenite (minor)		
Argillite (minor)			
	Phyllite	Phyllite, schist (minor)	Phyllite, slate, schist (minor)
Chert, jasper (some large lenses, bedded, radiolarian)			Chert (minor bands)

Table 2. *The lithology of the rock units comprising the basement of the Brisbane area.*

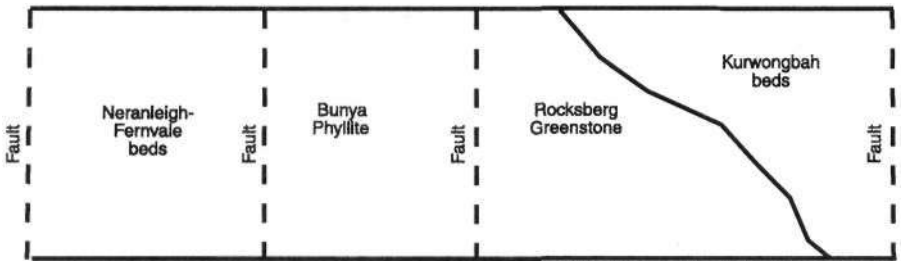

Figure 5. *Relationship between the geological units comprising the basement rocks of the Brisbane area.*

different stratigraphic levels within the Neranleigh-Fernvale beds outside the immediate area of interest to the south. Clasts which range from pebbles to boulders are of two types: angular fragments 10 to 200 mm long, and rounded pebbles and boulders from 10 to 1,000 mm in diameter.[27]

Greywacke is another abundant lithology within the Neranleigh-Fernvale beds, consisting of a hard, poorly-sorted, fine-grained sandstone containing abundant feldspar and rock fragments in a clay-rich matrix. Large angular fragments of black shale from surrounding sediments are common in places. This arenite forms thick bands with few traces of individual beds, and where exposed has a blocky appearance. Fossil crinoid fragments have been found within these rocks in some areas.[28]

Another minor lithology within the Neranleigh-Fernvale beds is argillite, a hardened and slightly recrystallised mudstone or shale, very fine-grained with bedding commonly visible. It grades into slate locally and is closely fractured in many exposures.[29]

The Neranleigh-Fernvale beds also contain significant horizons of tough, fine-grained, silica-rich rocks such as quartzite, chert and jasper. These rocks are very hard, with distinct bedding in some places but massive and blocky in others. Fossils of radiolaria are found within the chert in a number of localities.

The Bunya Phyllite is a more intensely crumpled and deformed metamorphic unit. It is light to medium grey, banded with layers of quartz and mica. The quartz layers are commonly contorted by later small folds and then cut by narrow veinlets of quartz. The mica crystals lie in one direction, giving the slaty cleavage and providing a distinct sheen to the rock.[30]

Thin beds of arenite resembling those of the Neranleigh-Fernvale beds occur in the south-western belt of outcrop of the Bunya Phyllite unit. Metavolcanic rocks are observed but rare.[31]

The Rocksberg Greenstone consists almost entirely of spilitic metavolcanic flows and pyroclastics similar to the rocks within the Neranleigh-Fernvale beds. The rocks are foliated and crumpled. In some places sizeable crystals of pyroxene are visible. Some minor phyllite and schist also occurs within the unit.[32]

The Kurwongbah beds are composed of basic metavolcanics (greenstone), minor argillite and quartzite similar to those within the Neranleigh-Fernvale beds.[33]

The relationship between the four units which form the basement of the Brisbane area is illustrated in Figure 5. The Neranleigh-Fernvale beds, Bunya Phyllite and Rocksberg Greenstone have a faulted relationship with each other.[34] The boundary between the Rocksberg Greenstone and Kurwongbah beds may result either from interfingering of sedimentary or volcanic rocks, or from repetition by folding or faulting.[35]

The relationship between the basement rocks and the other rocks in the Brisbane area is illustrated in the interpretive generalised cross-section shown in Figure 6. The basement forms an anticlinal core which is intruded at the centre by granitic igneous masses.[36] At the contact with the granite the basement rocks have been metamorphosed to hard hornfels.[37] The rocks which have been deposited on the basement have either an unconformable or faulted contact at the surface.[38]

GEOLOGICAL INTERPRETATION

The general approach to classification within the biblical model is a process of elimination based on the characteristics already discussed above. The basement rocks are the most difficult units to classify in the region because there is a conspicuous lack of fossils. Moreover, different lithologies within the units cannot be correlated with each other on account of the units being extensively deformed, leaving them in a faulted and blocky relationship with each other. Consequently the units have appeared in different positions on geological maps since the time they were first explored. Originally assigned to the Precambrian, they were later moved to the Silurian, but now they are shown straddling the Devonian-Carboniferous boundary. The biblical model will draw on different characteristics of the rocks to classify them within the biblical framework.

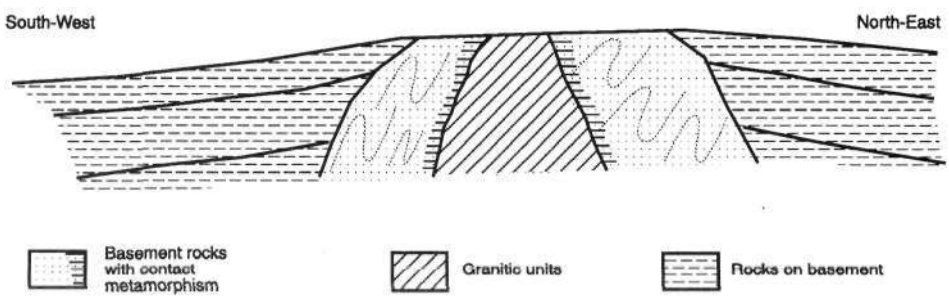

Figure 6. *Generalised SW-NE geological cross-section in the Brisbane area.*

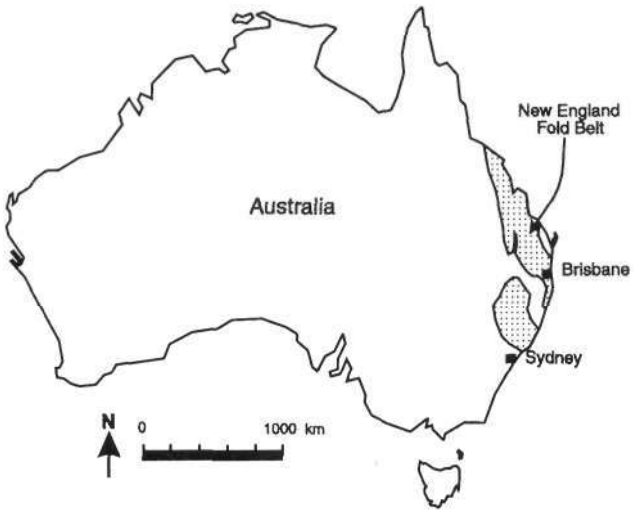

Figure 7. *The New England Fold Belt.*

Scale

We note that the basement metasediments within the area of interest form part of a much larger structure termed the New England Fold Belt,[39] a region nearly 300 km wide extending along the Australian coastline about 1,500 km, as shown in Figure 7. A fold, or orogenic, belt is a linear region that has been folded and deformed in a mountain-building episode. The concept of the New England Orogen has changed over the years depending on the various geological ideas in vogue at the time. Initially the belt was envisaged as a geosynclinal scheme, then a two-dimensional plate tectonic model, and more recently the interpretation follows a terrane approach. The New England Orogen is regarded as a tectonic collage comprising numerous terranes which amalgamated, accreted and interacted with the margin of Gondwana.[40]

Even though the structure comprises a collage of terranes, for the purposes of establishing its scale the different units may be considered together. Certainly the sediments were all deposited before the end of the orogenic event which ties them into a distinct time zone. Coupling the extensive geographic area of the sediments with their thickness we find that they are indeed of large scale. Early estimates of the thickness of the Neranleigh-Fernvale beds were at 7,000 m maximum, whereas currently they are described as of an indeterminate but large thickness. For the Bunya Phyllite early estimates have the thickness at 3,000 m maximum, but now the thickness is described as indeterminate, but may be less than 2,000 m. The thickness of the Kurwongbah beds is given as indeterminate. Similarly for the Rocksberg Greenstone early estimates have the thickness at 3,000 m maximum, whereas later estimates have the thickness as indeterminate, but large.[41,42]

Assuming 3,000 m average thickness for the metasediments and taking the aerial dimensions of the 1,500 km long and 300 km wide New England Fold Belt, the calculated scale of the structures is in excess of 1,000,000 km^3. By assessing the unit as continental scale, we can attempt a preliminary fit within the biblical classification scheme. This is summarised in Table 3.

Because the geological structure is of continental scale it would not have been deposited during the Lost-World and the New-World eras; that is the Modern, Residual and Lost-World phases as shown in Table 3. We would expect that the intensity of geological processes at these times would be similar to the intensity of geological processes operating at present and produce local or perhaps regional-scale structures.

The formation of continental-scale structures would also be unlikely during the Dispersive phase of the Flood event. Although considerable quantities of water would flow from the continents at this time, deposition from the dispersed watercourses would be of regional and local scale.

The early Recessive stage of the Flood event, the Abative phase, may involve continental-scale structures as the waters flowed off the continents in large coherent sheets of wide geographic extent. However, the Recessive stage would be less likely from a relational aspect. Almost all the other rocks in the area are deposited on the basement rocks, indicating that if the basement rocks were formed during the Flood event it would be early in that event. Consequently it would be unlikely that they would have formed during the

Event/Era	Stage	Phase	Does unit fit in phase?
New-World		Modern	No — Local scale expected
		Residual	No — Regional and local scale expected
Flood	Recessive	Dispersive	No — Regional and local scale expected
		Abative	Yes, but unlikely because unit is foundational to other geology in the area
	Inundatory	Zenithic	Yes
		Ascending	Yes
		Eruptive	Yes
Lost-World		Lost-World	No — Local scale expected
Creation	Formative	Biotic	Yes
		Derivative	Yes
	Foundational	Ensuing	Perhaps — World scale expected
		Original	Perhaps — World scale expected

Table 3. *Classification of continental scale rocks within the biblical model.*

Event/Era	Stage	Phase	Does unit fit in phase?
New-World		Modern	No — Minimal disturbance expected
		Residual	No — Minimal disturbance expected
Flood	Recessive	Dispersive	No — Minimal disturbance expected
		Abative	No — Minimal disturbance expected
	Inundatory	Zenithic	Unlikely — Only moderate to minimal disturbance expected
		Ascending	Yes — Moderate to intense disturbance expected
		Eruptive	Yes — Moderate to intense disturbance expected
Lost-World		Lost-World	
Creation	Formative	Biotic	Yes — Intense to moderate disturbance expected
		Derivative	Yes — Intense to moderate disturbance expected
	Foundational	Ensuing	Unlikely — Intense disturbance expected
		Original	Unlikely — Intense disturbance expected

Table 4. *Classification of moderate to intense disturbance within the biblical model.*

Abative phase.

Continental-scale structures would be consistent with deposition during the Creation event, particularly during the Formative stage. To raise the Lost-World continents above the waters covering the Earth at the time would involve continental-scale geological processes and result in continental-scale geological structures. By the same reasoning continental-scale structures would be expected during the Inundatory stage of the Flood event, when continental-scale geological processes flooded the continents with water.

By identifying the rock units as part of a continental-scale structure we have narrowed the number of possible phases where the units could be classified within the biblical model. However, there is still a range of uncertainty and we need to consider other criteria to be more specific.

Degree of Disturbance

All the rock units which make up the basement rocks of the Brisbane area have been extensively disturbed, making it difficult to recognise the stratigraphic succession.[43] The Neranleigh-Fernvale beds have tight folds with rotated bedding.[44] The beds are steeply inclined, displaying moderate to steep dips.[45] The Bunya Phyllite is a more intensely crumpled, contorted and deformed metamorphic unit which also has moderate to steep dips. The Rocksberg Greenstone has up to two generations of folding and dominant transpositional layering. That is, the dominant direction of the beds is parallel to the orientation of the axial plane of the folds of the units. The Kurwongbah beds have three generations of folding recognised and dominant transposition layering parallel to the first generation axial plane foliation. The unit also has moderate to steep dips.[46,47]

Summing up, the basement rocks of the Brisbane area have experienced moderate to intense disturbance, which can help classify the rocks within the context of the biblical model. The probability that these units formed during a particular phase of the biblical model is summarised in Table 4.

The presence of moderate to intense disturbance within the basement rocks of the Brisbane area would require deposition early in the geological history to allow time for exposure to the deforming effect of geological actions. This would rule out the New-World era and the Recessive stage of the Flood event, that is, the Modern, Residual, Dispersive and Abative phases, because rocks deposited at these times would be exposed to only limited tectonic activity.

Disturbance of this nature would be possible following deposition during the early phases of the Flood event assuming the Eruptive action extended over several phases, but less likely during the Zenithic phase when the majority of the Eruptive action would have been nearing completion.

The Lost-World phase needs no further consideration as it has already been ruled out on the basis of the scale of the basement rocks.

Deposition during the Creation event is possible because rocks deposited at this time would be exposed to a number of disturbances. The early phases of the Creation event would be less likely than the later phases, because the units display moderate to intense disturbance. Intense to very intense disturbance would be anticipated for rocks formed early in the Creation event, because they would be deformed by the Formative action while soft, as well as by the geological actions during the Flood event.

The moderate to intense character of the disturbance experienced by the rocks has enabled improved discrimination over that possible with the scale criteria. The disturbance displayed by the rock units has made the Zenithic, Ensuing and Original phases less likely.

Response of the Structure

The basement rocks of the Brisbane area exhibit both a brittle and a plastic response. The Neranleigh-Fernvale beds indicate plastic response in the form of open folds and isoclinal folds, particularly the chert beds. They also exhibit a brittle response in the form of large-scale thrust faults. In the Bunya Phyllite several generations of folding are

recognised, while only minor local faulting has been observed. The Rocksberg Greenstone has up to two generations of folding recognised, with dominant transpositional layering. In the Kurwongbah beds three generations of folding are recognised. Faulting is recognised only locally.[48,49]

The folds within the structures could indicate that the formations have been disturbed while still plastic. Brittle response is indicated by the fact that the formations are closely fractured in many exposures, blocky in appearance, and cut by straight and narrow quartz veins.[50] Further evidence of a large-scale brittle response is provided by the units tending to have a faulted relationship with each other. In fact, it is difficult to correlate the beds with each other because they are typically separated from other units by faults.[51]

The presence of both plastic and brittle response helps classify the units as summarised in Table 5. (Note that comments are not necessarily included against phases which have already been eliminated as possibilities in earlier sections.)

The plastic response suggests that the sediments were exposed to disturbance while still soft. The brittle response indicates that the formations had already hardened before they were disturbed, which would make deposition late in the Flood event during the Dispersive, Abative or Zenithic phases unlikely. Sediments deposited at these times would not have sufficient time to harden or be exposed to significant geological actions to respond in a brittle manner. The dual plastic and brittle response displayed would tend to favour the Creation event. Deposition of the sediments during the Creation event would provide opportunity for plastic disturbance at that time. Subsequently, after the sediments had hardened, the sediments would respond in a brittle manner to disturbances during the Flood event. Alternatively, it is possible for a plastic and brittle response to have occurred during the Flood event provided deposition was early enough in the event and hardening of the sediments was rapid enough. It is still not possible to discriminate further at this stage.

Texture

The textures of the six different lithologies which comprise the basement rocks of the Brisbane area are summarised in Table 6.[52]

Although the greenstone is described as spilitic or of submarine origin, the presence of subaerial pyroclastics and crystal tuff is also reported. If this depositional environment is correctly interpreted, then deposition during the Creation event would be eliminated by the metaphysical arguments already outlined with respect to classification criteria. There remains, therefore, the Flood event as the most likely time for the formation of the greenstone.

As a point of interest, Hunter[53] suggests that Archaean greenstone sequences were deposited during *'Stage I of the Flood (Day 1 to 40)'* being the result of *'upward* (vertical) *movement of fluids on a massive scale.'* He submits that the composition of these fluids might include water and steam with dissolved minerals, gases and magma, reflecting an origin from deep within the Earth released when the *'springs of the great deep burst forth (Genesis 7:11).'* Hunter also suggests that the greenstone sequences from other parts of the geological column might also be the products of 'Stage I' of the Flood event. This is consistent with the conclusion reached here.

The conglomerate lenses have been derived from pre-existing source rock. As discussed already under classification criteria, this would preclude their formation during the Original phase, because there were no rocks existing before the Original rocks. Deposition of angular shale clasts during the Ensuing Phase is unlikely because the source material is expected to be soft. However, the conglomerates could be deposited during any other phase of the biblical model.

Some idea of the relative timing of the various units associated with the basement rocks of the Brisbane area can be inferred from the texture of the conglomerate lenses. Firstly, sufficient time would have been required for the source rocks to harden before being eroded to produce the clasts. Hardening of the sediments could occur within days or weeks given suitable conditions.[54] Secondly, the composition of the clasts provides constraints on the sequence of geological events. The angular shale fragments

Event/Era	Stage	Phase	Does unit fit in phase?
New-World		Modern	
		Residual	
Flood	Recessive	Dispersive	Unlikely to have enough time to harden
		Abative	Unlikely to have enough time to harden
	Inundatory	Zenithic	Doubtful whether enough time to harden
		Ascending	Perhaps — Plastic expected but brittle possible if hardening was rapid
		Eruptive	Perhaps — Plastic expected but brittle possible if hardening was rapid
Lost-World		Lost-World	
Creation	Formative	Biotic	Yes — Plastic and brittle expected
		Derivative	Yes — Plastic and brittle expected
	Foundational	Ensuing	Yes — Plastic and brittle expected
		Original	Yes — Plastic and brittle expected

Table 5. Classification of plastic and brittle response within the biblical model.

Type of Rock	Texture
Spilitic metavolcanics	Volcanic — pyroclastics, crystal tuff, basalt flows with occasional pillow structures, dolerite sills
Conglomerate lenses	Angular shale fragments 10 mm to 200 mm long. Rounded granite, adamellite, granodiorite, and some chert and limestone from 10 mm to 1,000 mm in size. Feldspathic matrix has grain size from medium to coarse sandstone. Silt and clay fractions are absent.
Arenite/Greywacke	Grains range from fine to very coarse, but generally medium to coarse. Grains are angular to subrounded and the boundaries are often altered by severe compaction. Grains are feldspathic and lithic. Feldspathic grains of plagioclase (commonly saussuritised), unaltered orthoclase, and microcline. Lithic fragments include chert, schist and quartzite. Coarser grained beds may contain abundant shale clasts which show signs of plastic behaviour since deposition. Quartz content is variable but can be up to 30 per cent. Silicified ooliths occur in some areas. Beds can be massive or vary in thickness up to 3 m. Normal and occasional reverse grading has been observed.
Argillite	Finely grained, shale and siltstone, thinly bedded.
Phyllite	The grain size of all constituent minerals is about 0.01 mm, except that of granular quartz in veins which is about 0.25 mm.
Chert, jasper	Interbedded with shale and arenite.

Table 6. *The texture of the rocks comprising the basement of the Brisbane area*

composing the conglomerate have presumably been derived from the argillite within the basement rocks, therefore making the conglomerate younger than the shale. In the same way the conglomerate would be younger than the chert because it contains chert clasts. The rounded clasts of granite, granodiorite and adamellite are of similar composition to the granitic units which, as shown in Figure 4, outcrop within* the basement rocks. Within the Neranleigh-Fernvale beds, therefore, the conglomerate lenses would appear to be the youngest lithology.

The texture of the arenite or greywacke has been attributed to rapid deposition.[55] One indication of this is the wide range in grain size, from very fine clay to very coarse sand-sized grains. This wide grain-size range indicates that there has not been a suitable mechanism or sufficient time to sort the material into a more limited or homogeneous size range. Another indication of rapid deposition is the angular shape of the grains, implying limited time for the grains to abrade against each other and produce a rounded shape. These features which are characteristic of greywacke around the world are not observed in rocks forming at the present time.[56] A third sign of high energy sedimentation is the presence of shale clasts within the beds. The current flow was obviously intense enough to erode the shale and incorporate the clasts into the arenites as they were being deposited. The power of the process is also indicated by sharp, and in places scoured, basal contacts. Other evidence for rapid deposition is seen in the internal and external bedding characteristics of the units, such as level and persistent bedding and graded bedding. Finally, the thick and massive beds indicate large volumes of sediment, which is also suggestive of rapid deposition.

Once again, using the meta-physical argument already discussed under classification criteria, the greywacke could not have been created instantaneously during the Original phase because it has been derived from pre-existing rock. The requirement for large-scale high energy processes as indicated by the distinct texture of the greywacke would rule out deposition during the Lost-World or New-World eras where the processes do not have the required energy. Deposition during the Ensuing phase is conceivable, but we would possibly not anticipate lithic fragments or angular clasts because the source material is expected to be soft. It is conceivable that greywacke could have formed during any other phase of the biblical model.

The argillite, or shale, is composed of very fine grains of clay and silt. Apart from the Original phase, rocks of this texture could be deposited during any other phase of the biblical model.

The phyllite is comprised of very fine grains. Leaving out the Original phase, rocks of this texture could be deposited during any other phase of the biblical model.

The bedding exhibited by the chert suggests it is of sedimentary nature, and as a derived rock it would not have been formed during the Original phase. Nevins[57] describes the three major theories for the formation of chert and argues that no chert is forming today. If this argument is accepted, the formation of chert would be ruled out during the New-World era. One could not be as sure of the possible formation of chert during the Lost-World era, because the water cycle at this time is unknown. It is conceivable that the circulation of water within and around the lithosphere was different during the Lost-World era and may have been conducive to the formation of chert. Nevins suggests that the deposition of chert is the result of chemical precipitation of silica gel during the Flood event.[58] Such deposition would be feasible during the last three phases of the Creation event, as well as during the Flood event.

The conclusions from the discussion of the possible classification of each rock texture within the biblical model are summarised in Table 7.

As a result of this analysis the Original phase has been

Phase	Greenstone	Conglomerate	Greywacke	Argillite	Phyllite	Chert
Modern			No			Unlikely
Residual			No			Unlikely
Dispersive						
Abative						
Zenithic						
Ascending	Perhaps	Perhaps	Perhaps	Perhaps	Perhaps	Perhaps
Eruptive	Perhaps	Perhaps	Perhaps	Perhaps	Perhaps	Perhaps
Lost-World			No			
Biotic	No	Perhaps	Perhaps	Perhaps	Perhaps	Perhaps
Derivative	No	Perhaps	Perhaps	Perhaps	Perhaps	Perhaps
Ensuing	No	No	Unlikely	Perhaps	Perhaps	Perhaps
Original	No	No — Not expected to be derived from pre-existing rocks, though could have appearance of age and process.				

Table 7. *Classification of textured rocks within the biblical model,*

eliminated and the remainder of the Creation event would now seem to be unlikely.

Fossils

No fossils have been found in the Bunya Phyllite, the Kurwongbah beds or the Rocksberg Greenstone.[59]

Fossils have been found at several localities in the Neranleigh-Fernvale beds. Firstly, invertebrate macrofossils have been reported from interbedded oolitic arenite and argillite exposed in a road cutting. The fossils consist of grain-sized specimens or fragments of crinoidea stem and calyx plates, brachiopods and bryozoa. They are not believed to have formed *in situ.*[60] Secondly, radiolaria microfossils have been found in cherts at three localities. Radiolaria are about 0.1 mm in diameter and are considered the remains of plankton. Some of the specimens found are illustrated in Figure 8.[61] Both types of fossils are found in specified horizons within the Neranleigh-Fernvale beds rather than evenly distributed throughout the unit.[62]

The distribution of fossils enables classification within the biblical model as shown in Table 8.

The presence of fossils rules out deposition during the first three phases of the Creation event, because life had not been created at this time. The fact that the fossils consist of fragments of crinoidea, brachiopods and bryozoa would indicate that the rocks were not formed during the Biotic phase. It is only anticipated that tiny marine organisms may possibly have been trapped at that time. It is hard to imagine that other parts of the creation such as crinoidea, brachiopods and bryozoa would be destroyed and fossilised so quickly after being created. The presence of fossils is consistent with deposition during the Flood event.

If the unit was deposited during the Flood event, then an explanation is required for the absence of fossils in the Bunya Phyllite and the Kurwongbah beds which are of sedimentary origin.[63] Not only are macroscopic creatures such as brachiopods, trilobites and graptolites lacking, but also microscopic specimens such as pollen, foraminifera and radiolaria. It is generally thought that the sediments were derived from the continental slope and deposited by turbidity currents generated after a slump. It is difficult to imagine how rocks formed by this process at the time of the Flood, with the oceans containing abundant microscopic life, could have no fossils whatsoever. Hunter also recognises the problem when he suggests that the Archaean strata belong to the early stages of the Flood event. He says,

> *'Lack or paucity of fossils in Archaean strata might be attributable to the destruction of organisms by intense turbulence, heat, volcanism and subsequent metamorphism, and should perhaps be considered an expected characteristic of these strata.* '[64]

It is possible that, rather than slumping from the continental slope, the sediments were eroded from the Lost-World ocean crust as the waters escaped from inside the Earth after the fountains of the deep were broken up. The

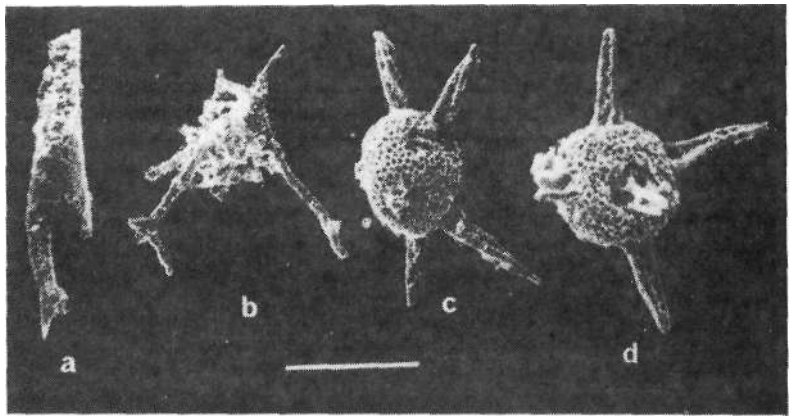

Figure **ft** *Radiolaria fossils from chert horizons in the Neranleigh-Fernvale beds. Length of scale bar in µm as follows*
(a) 100µm (b) 125µm (c) 125µm (d) 110µm

Event/Era	Stage	Phase	Does unit fit in phase?
New-World		Modern	Yes — Fossils are expected
		Residual	Yes — Fossils are expected
Flood	Recessive	Dispersive	Yes — Fossils are expected
		Abative	Yes — Fossils are expected
	Inundatory	Zenithic	Yes — Fossils are expected
		Ascending	Yes — Fossils are expected
		Eruptive	Yes — Fossils are expected
Lost-World		Lost-World	Yes — Fossils are expected
Creation	Formative	Biotic	No — Only microscopic marine organisms
		Derivative	No — Life was not created
	Foundational	Ensuing	No — Life was not created
		Original	No — Life was not created

Table 8. *Classification of fossils within the biblical model.*

source of this water and sediment, being from regions which possess no life whatever, would explain the absence of fossils in the rock units. In addition, sediments from this source might be expected to be fairly basaltic in composition.

Discussion and Summary

Table 9 summarises the results of applying the different classification criteria. The continental scale of the units eliminates the Modern, Residual, Dispersive and Lost-World phases as indicated by the X on the table. Continental scale also puts a question against the Abative phase. Exposure to moderate to intense disturbance confirms the elimination of the Modern, Residual and Dispersive phases, and excludes the Abative phase as well. Degree of disturbance also queries the Zenithic, Ensuing and Original phases. The combined plastic and brittle response of the units places a question against the Dispersive, Abative and Zenithic phases. The volcanic texture of the greenstone eliminates the Creation event. None of the sedimentary rocks such as the conglomerates, greywacke, argillite, phyllite or chert could have formed during the Original phase. The greywacke and chert are also not likely during the Modern or Residual phases. The texture of the greywacke also rules out the Lost-World era. The presence of fossils rules out the Creation event as a possible time for the formation of the rocks.

Phase	Scale	Disturbance	Response	Greenstone	Conglomerate	Greywacke	Argillite	Phyllite	Chert	Fossils
Modern	X	X				X			X	
Residual	X	X				X			X	
Dispersive	X	X	?							
Abative	?	X	?							
Zenithic		?	?							
Ascending										
Eruptive										
Lost-World	X					X				
Biotic				X						X
Derivative				X						X
Ensuing		?		X	?	?				X
Original		?		X	X	X	X	X	X	X

Table 9. *Summary of the classification of the basement rocks of the Brisbane area within the biblical model.*
X marks phases eliminated as a possible time for the formation of the rocks on the basis of the classification criteria shown.
? marks phases which are questionable.

When the total information from the range of classification criteria is considered together, all but the first two phases of the Flood event have been eliminated.

Is it possible that some lithologies were deposited at different times from others, some, say during the Creation event, and others during the Flood event? If so, which lithology would be a candidate for deposition during the Creation event? The greenstone is not likely to have formed during the Creation event because of the presence of pyroclastics and crystal tuffs. Neither are the conglomerate lenses likely to have been deposited during the Creation event, because these were the last lithology of all the units to have been deposited based on the texture and composition of the clasts. The fossil fragments found in the greywacke indicate deposition during the Flood event and not during the Creation event. The argillite is often interbedded with the arenite suggesting deposition at the same time and therefore during the Flood event.[65] The phyllite is considered a finer grained part of the same sequence[66] and as such would be deposited at the same time as the other units. Although the chert contains radiolaria and could conceivably have been deposited during the Biotic phase of the Creation event, it is commonly interbedded with shale and greywacke[67] which would suggest contemporaneous deposition during the Flood event. On the basis of this reasoning there would not appear to be a case for placing some of the lithological units in the Creation event and others in the Flood event. The evidence strongly suggests that all lithologies were formed in the early part of the Flood event. It would seem necessary to place deposition as early as possible in the event, that is, the Eruptive phase, to allow time for hardening and brittle behaviour to occur during the Flood event.

One possible scenario for the origin of the sediments follows the current geological thinking, which is based on modern analogues.[68] The situation commences with the Flood waters flowing off the Lost-World continents at the beginning of the Flood event. Huge volumes of sediment from the continents would have been deposited at the margins of the Lost-World continental shelves prograding into the oceans. Slumping on the steep inclines of the soft and unstable deposits would have set up turbidite flows carrying sediment into the deeper parts of the ocean basins, forming the arenite and argillite. Under this scenario though, it is difficult to explain how the large chert deposits would have formed, and why such large volumes of sediments would contain no fossils. It is also difficult to explain how sediments which were eroded from the continents, transported long distances to the continental slopes, and then slumped onto the ocean floor, could exhibit an unsorted and angular texture as is seen in the arenite.

An alternative explanation for the geological history of the region follows the ideas of Hunter[69] and Brown.[70] This scenario envisages the Flood waters bursting out from under the lithosphere into the Lost-World oceans at the beginning of the Flood as the fountains of the deep were broken up. Immense quantities of sediment eroded from the lithosphere would be deposited in the Lost-World oceans forming the arenite and argillite. At the same time hot magma sourced from the mantle deep below the crust would extrude through the fissures and flow across the ocean floor. The resulting differences in temperature and chemical composition between silica-rich subcrustal water and the cooler waters of the ocean would provide ideal conditions for contemporaneous deposition of silica as chert layers entrapping microscopic organisms. Later during the Inundatory stage of the Flood event crustal shortening due to tectonic activity would compress the soft sediments, deforming them and raising them above sea level, at which time pyroclastics and tuff deposits were formed. Continued lithification of the sediments would produce strong rocks which would subsequently respond in a brittle manner to disturbances throughout the remainder of the Flood event.

CONCLUSION

This paper has tested the usefulness of Walker's biblical geologic model[71] to classify the geology of the Brisbane area within a biblical framework. The basement rocks of Brisbane are notoriously difficult to classify, because they have been extensively deformed and have very little fossil content.

The biblical model consists of 12 geological phases. Four phases cover the six-day Creation event, one phase covers the 1,700 year period between the Creation and the Flood, five phases cover the Flood event lasting one year, and two phases cover the 4,300 year period from the Flood to the present time. The model is designed such that each phase is related to distinct historical circumstances during which specific geological processes were operating, thus providing a time-scale by which rocks may be classified.

A number of potentially useful classification criteria have been considered, including the physical scale of the geological structure, the degree of disturbance, how the structure responded to disturbance, the rock texture, and fossils. These criteria have been used to classify the basement rocks in the Brisbane area. Because of the need to discriminate between rocks formed during the Creation event and rocks formed subsequently it is not possible to avoid metaphysical issues, such as the relationship between supernatural and natural processes during the Creation event, the possible attributes of created rocks, and the plausibility of death before the curse of death which followed Adam's sin.

The scale criterion, which is based on the volume of rocks, eliminated some phases as possible formation times. The disturbance criterion confirmed the conclusions from the scale criterion and excluded additional phases. The response of the unit to disturbance provided no extra discrimination, but was consistent with the scale and disturbance characteristics. The texture criteria, particularly for some lithologies, eliminated more phases as possible depositional times. The occurrence of fossils also helped

discriminate between phases.

Application of the classification criteria within the biblical geologic model provides a disciplined and systematic approach to relate the geology of an area to the Bible. It is possible to reach a reasoned position on where the rocks fit within the biblical model using a whole range of characteristics. Overall the model provides a reasonable link between the geology of an area and the biblical record. However, it is not possible with the criteria used to have precise control on the placement of geological units within the model, a feature which would obviously be desirable.

Finally, it is concluded that the basement rocks of the Brisbane area were deposited during the earliest phase part of the Flood event, the Eruptive phase.

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