The Messinian salinity crisis questioned

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Researchers on the deep-drilling ship *Glomar Challenger* made a startling discovery back in the early 1970s. They discovered that the Mediterranean Sea is underlain by a thick 'evaporite' below hundreds of metres of sediments or sedimentary rock. This 'evaporite' is around one kilometre thick and covers about 2.5 million km^2, based on seismic data. In the middle of the deeper basins, it could be as thick as 1.5 to 1.8 km. This 'evaporite' is one of many examples of 'saline giants' that have long been a problem for uniformitarian geology because of the lack of a modern analogue.[1] For a while, there was considerable controversy over the meaning of Mediterranean deposits, but Kenneth Hsü and colleagues concluded that the 'evaporites' were formed when the Mediterranean Sea dried up in the past.[2,3] This is called the late Miocene Messinian salinity crisis. It is very well accepted by uniformitarian scientists today. Hsü has even bragged that future generations of school children will be taught the Messinian salinity crisis as gospel truth.[4]

Another 'catastrophic' uniformitarian event

What especially made the Messinian salinity crisis controversial was that Hsü and colleagues considered the event rapid. In fact, the dreaded term '*catastrophic*' was applied:

> 'The almost synchronous onset and termination of the Mediterranean salinity crisis implies catastrophic changes of environments in a region over two and half million square kilometers in extent. This fact did much to throw doubts on Lyell's substantive uniformitarianism.'[5]

The Messinian salinity crisis postulates that the Mediterranean Sea essentially dried up, depositing the salts in the water on the bottom. However, such an event would result in an average of only 20 m of salts with 60 m in deeper basins.[6,7] This would require that the full Mediterranean Sea would have evaporated 50 times! Supposedly, these events were controlled by tectonics at the Strait of Gibraltar.

Since the evaporation rate of the Mediterranean Sea is probably 1 to 2 m/year, it would take on the order of millennia, or perhaps tens of millennia depending upon other variables, for the Sea to completely dry up once.[1] Although the uniformitarian scientists consider the timing catastrophic on their timescale, the total time for the whole Messinian crisis supposedly spanned a period from 5.96 to 5.33 million years ago.[8]

What is the 'proof' of the multiple desiccation of the Mediterranean Sea?

Hsü and colleagues present six main 'proofs' for their 'desiccating deep-basin model'.[9] The first is nodular, or 'chicken wire', anhydrite ($CaSO_4$), which is supposedly an 'infallible criterion'[10] of a hot subaerial environment, since the critical temperature for the precipitation of anhydrite is 58°C, excluding brines saturated with halite (sodium chloride), which precipitate at 20°C.[10] The second proof is prograding sabkha (salt flat) depositional cycles. The third is halite crystals interpreted as having been caused by ephemeral saltpans. Fourth, there are 'stromatolitic' laminations claimed to be from algal or cyanobacteria mats in the peritidal zone. Hsü and colleagues were quite dogmatic about the significance of these 'stromatolites', claiming:

> 'Stromatolites appear near the top of the depositional sequence; they formed only when the brine pool was sufficiently shallow to permit the growth of algae.'[11]

Fifth, signs of desiccation are demonstrated by a desiccation crack in halite. The last proof is a 'bullseye' pattern of 'evaporite' deposition in plan view, consisting of a halite–potash zone at the basin centre surrounded by outer rings of gypsum-anhydrite and carbonates.

All these 'proofs' considered equivocal or incorrect by some researchers

These six 'proofs' are now being challenged due to further information on real evaporites.[12] Lawrence Hardie and Tim Lowenstein scrutinized the original drill cores that spawned the idea of the Messinian salinity crisis. They took into account much progress in understanding shallow-water evaporite processes in hot saline lakes, pans and sabkhas.

They conclude that nodular, or 'chicken wire', anhydrite can form under a variety of conditions, besides a dry sabkha, including burial diagenesis. This anhydrite is not an infallible indicator of a sabkha origin. For a sabkha origin, advocates of the Messinian crisis need to show that the anhydrite and its host sediments are part of a shallowing-upward succession on a tidal flat. This brings us to the second so-called proof, sabkha depositional cycles. Hardie and Lowenstein noted that the drill cores are a long way off from what has been learned about Holocene cycles on modern sabkhas such as the Persian Gulf. They declare:

> 'On the basis of all these features a strong case can be made against a sabkha origin and for, instead, resedimentation of shallow water selenite [transparent gypsum] fragments and gypsum grains … .'[13]

The third 'proof' is halite crystals. Hardie and Lowenstein report that their examination of thin sections of the Messinian halites indicates that Hsü and colleagues' comparison with modern salt pans is unjustified.[14] They further write that the halite crystal aggregates have all the characteristics of 'subaqueous cumulates' built up by settling out of precipitates formed at the brine–air interface. A number of other fine details of the halite crystals can be reinterpreted as due to other mechanisms besides salt-pan evaporation. These halites could have been deposited under thousands of metres of water. While discussing halite, the researchers found that desiccation cracks, the fifth 'proof', are conspicuously missing while they should be abundant if the paleoenvironmental interpretation of Hsü and colleagues is correct. They point out that Hsü and colleagues were basing their deduction on just one crack!

The fourth 'proof' is stromatolites in which modern analogues are found in the marine margins of hot, dry regions today. These so-called stromatolites are mostly flat to wavy laminated anhydrite, gypsum, and dolomitic mudstone with dark partings.[15] The claimed stromatolites have a superficial resemblance to modern stromatolites. The evidence for organic matter representing the fossilized algae films is the semi–opaque to opaque character of alternate laminae. Hardie and Lowenstein discovered that little detailed examination was carried out on these laminations, the laminations do not cap the top of depositional cycles, the so-called stromatolites lack mud cracks, and alternative explanations were ignored or minimized.[16] There are many processes that can account for the laminites:

> 'Demicco and Hardie (1994) in their discussion of the origin of laminites stressed that wavy and crinkled laminites can form by a variety of processes not involving cyanobacterial mats.'[16]

Furthermore, *most* ancient structures that are claimed to be stromatolites lack evidence for their organic origin.

> 'In addition, very few ancient stromatolites preserve direct evidence that cyanobacteria were responsible for building the structure, a fact that has made resolution of the origin of stromatolites difficult … .'[17]

Maybe, 'stromatolites' in sedimentary rocks are inorganic structures?[18]

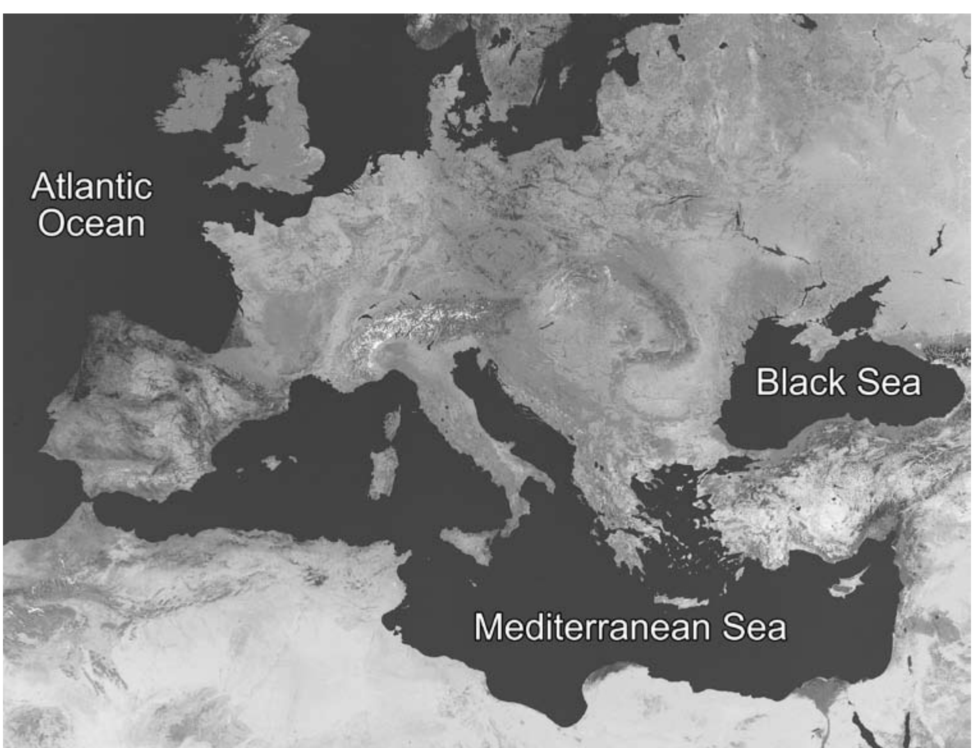
The sixth, and last proof, of the Messinian salinity crisis is a bullseye distribution of 'evaporites' in plan view. Hardie and Lowenstein state that such an 'evaporite' distribution can '… just as easily form in a deep brine body rimmed by shallow shelves'.[19]

After examining the original cores upon which the Messinian crisis was based, Hardie and Lowenstein summarize:

> 'On the basis of our examination of the DSDP Legs 13 and 42A cores of the Messinian evaporites beneath the floor of the deep Mediterranean it is our view that the evidence presented by the DSDP scientists for the shallow-water origin of these evaporates is equivocal and is far from being the "conclusive evidence" it is claimed to be (Hsü 1972a, p. 386). A number of the features of these evaporites presented as evidence of shallow-water conditions are, in fact, more compatible with deposition under deep-water (below wave base) conditions, while others can only be considered as of uncertain origin.'[19]

A better description would be to call the deposit a *precipitite*, as suggested by two other uniformitarian critics of the Messinian salinity crisis:

> 'In referring to 'evaporite' of the evaporitic facies, the term begs the question as it implies dessication [*sic*]. For clarity, geology needs a new term; namely 'precipitite', rock created by precipitation.'[6]



Further problems with the Messinian salinity crisis

There are other problems besides those already mentioned for accepting the uniformitarian spin on the Mediterranean Sea precipitites. There is the supposed depth of the Mediterranean basin during this so-called crisis. Hsü and colleagues claimed that the 'salinity crisis' occurred in a deep basin, but not as deep as today. However, there is disagreement on the depth of this event.[20] The present-day distribution of the precipitites in and around the Mediterranean basin spans a vertical range of almost 5 km. The evaporites are actually exposed on Sicily and northern Libya. So, one must conclude that significant tectonics has taken place since the deposition of the precipitites, or else that the whole area was underwater during the precipitation event, or both. Some workers claim that the basin dropped 2.5 km in post-Miocene time, so that the 'crisis' occurred in a very shallow basin. This would compound the problem of accounting for the total depth of the precipitites, as the Mediterranean Sea would have to mostly evaporate hundreds of times, which would be easier due to the shallow water.

Hardie and Lowenstein also point out that the DSDP cores only sampled the very top of the precipitites—only tens of metres of gypsum–anhydrite and literally only tens of centimetres of halite. They question how a history of such a huge body of 'evaporites' can be deduced from such a meagre sampling.

The suggested uniformitarian mechanism to block off the Mediterranean Sea in order to dry it up and form 'evaporites' is enigmatic.[8] A sea-level fall has been eliminated, so that only leaves a 1-km uplift for the initial blockage, followed by yo-yo tectonics thereafter to fill, and then dry, the Mediterranean Sea dozens of times.

Submarine canyons that cut the margin of the Mediterranean Sea were once used as evidence for the desiccated basin. However, the canyons were mostly formed before the deposition of the precipitites since some of the canyons are filled with these deposits.[8,21] Furthermore, submarine canyons are common along the margins of continents and many large islands, which cannot be attributed to desiccation events. Dietz and Woodhouse point out the problem of the formation of deep canyons by rivers when the basin is supposed to be bone dry.[6] I would also think that much clastic material would be incorporated within the precipitites, but such is not the case. The sedimentary rocks in the precipitites are oceanic pelagic oozes.[1]

Creationist deductions

The uniformitarian Earth science literature is loaded with paleoenvironmental deductions. Scientists commonly describe the paleoenvironment as if they were there, usually with few caveats. They certainly do not tell us that the deductions are based on uniformitarian–long-age assumptions, and that there could be other interpretations. It is possible that a particular environmental deduction is correct and also applies in a Flood model, but each individual case must be examined on its own merit.

The Messinian salinity crisis was considered to be certain by advocates. Now we find that the case was flimsy, even despite newer evidence for sabkha depositional environments. We must not be taken in by authoritative arguments of paleoenvironmental certainty.[22] One ex–young-earth creationist (who never accepted biblical authority) has been hoodwinked by such paleoenvironmental deductions and suggests that the Genesis Flood was the filling up of the Mediterranean Sea after its desiccation.[23] He displays a lack of critical ability when examining the Messinian 'salinity crisis' and other uniformitarian deductions.[24] It is obvious that he looks at the rocks and fossils through uniformitarian glasses.

One would not expect true evaporites to form in the Flood, but the idea of precipitating the chemicals out is likely. The details of the formation of such huge precipitites need work. Creationists need a major research project, not only on the Messinian precipitites, but also on many of the other monstrous precipitites in the sedimentary rocks. Since the scale of the deposits is so large, it seems unthinkable that the precipitites could be post-Flood. Thus, the Flood/post-Flood boundary in the Mediterranean and surrounding areas is likely to be in the late Cenozoic.

Acknowledgment

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