Catastrophic Sedimentation: Giant Submarine Landslides

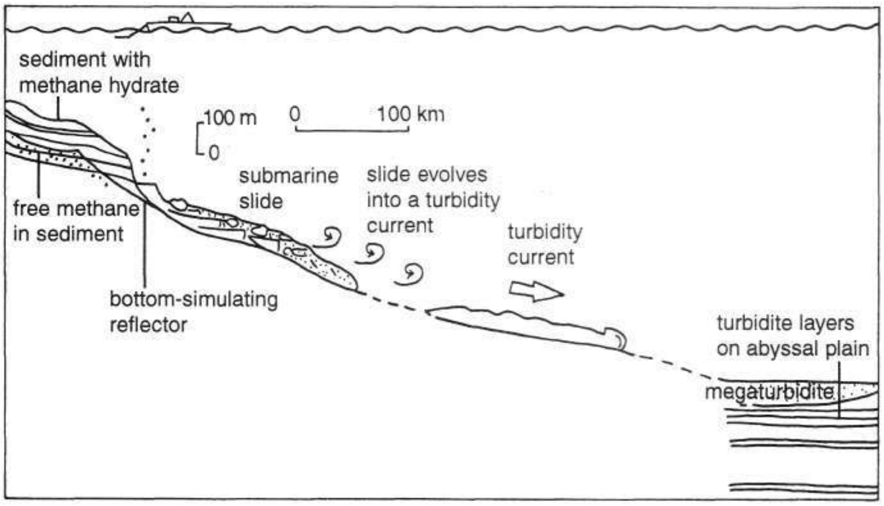

Figure 1. *The likely mode of formation of a megaturbidite deposit — unstable sediment accumulations collapse when perturbed by an earthquake or methane release, resulting in a submarine landslide and flow of dense currents of sediment (turbidity currents) down a continental slope. The end result is turbidite sequences on the abyssal plain.*

The evidence of episodic catastrophic sedimentation on a large scale is increasingly being recognised. Some time ago, giant submarine landslide deposits were recognised off Hawaii.[12] Some of the landslides flowed over 200 km, and some had debris volumes exceeding 5,000 cubic km. Blocks of rock up to 10 km long that had been transported more than 50 km were found.

Such submarine landslides can generate enormous turbidity currents that can carry enormous quantities of sediments down to the oceans' abyssal plains. There the sediments are deposited as turbidites (see Figure 1). The most famous historic submarine landslide was that which occurred on November 18, 1929, when an earthquake on the Grand Banks of Newfoundland (Canada) set off a 20 cubic km submarine landslide.[3] The slide in turn generated an erosive, turbulent sediment flow (turbidity current) that carried 200 cubic km of debris at speeds up to 65 kph into the deeper water of the abyssal plain.

Turbidites are well known in the geological record, where they are readily recognised by tell-tale features that are now well known from investigations of such recent turbidite deposits on the ocean floor. And more turbidite deposits, particularly large-volume turbidites termed 'mega-turbidites' or 'megabeds', are being found during exploration of the deep ocean floors and drilling through the deep sea sediments.

The discovery of one such deposit has just been reported — an 8-10 m thick 'megaturbidite' on the deep floor of the western Mediterranean.[4] The volume of the deposit is 500 cubic km, enough to cover all of Texas waist deep in mud and sand. The location of this 'megaturbidite' is the Balearic Abyssal Plain (see Figure 2), which with an area of some 60,000 square km is the largest plain in the Mediterranean Sea. High resolution seismic profiles across the plain had consistently shown this 8-10 m thick turbidite layer as conspicuous, thick and laterally continuous, its top being about 10-12 m below the sea floor. Five cores were then obtained 100-120 km apart and confirmed that

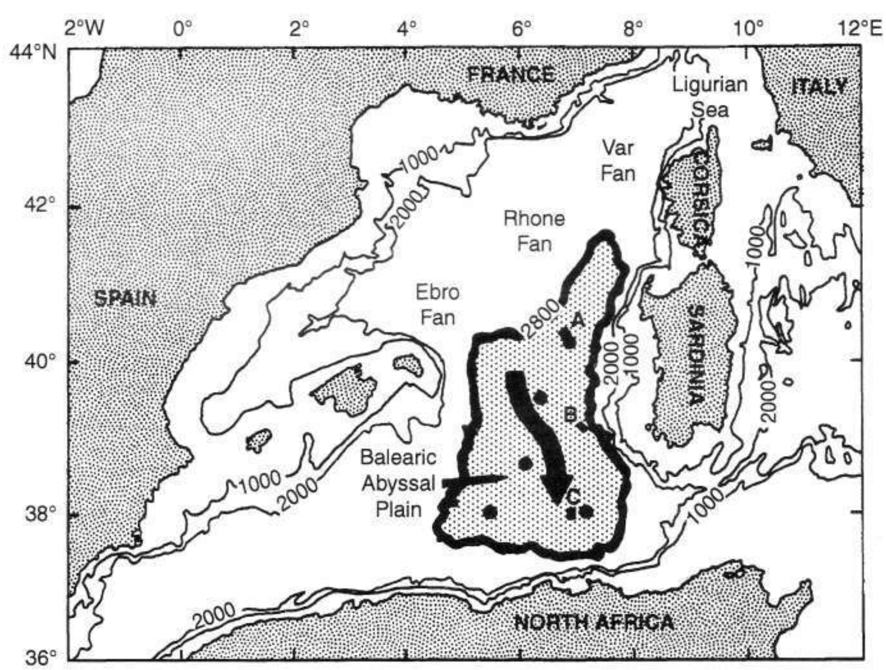

Figure 2. *Map of the western Mediterranean Sea showing the location of the Balearic Abyssal Plain, as defined by the 2,800 m contour, shown in bold, with the distribution of the megaturbidite bed shown within it. the arrow indicates the emplacement direction, the dots indicate the positions of the sediment cores, and A, B, C are where the seismic profiles were taken.*

the megaturbidite layer was indeed as interpreted from the seismic profiles.

From radiocarbon dating it was determined that the event which triggered the deposition of this megaturbidite occurred during the Ice Age, which was of course fairly recent during the current post-Flood era. The basal sand of the megabed thickens and coarsens in grain size towards the north, suggesting emplacement from that direction. Three major fan systems are present on the northwestern Mediterranean margin — the Var, Rhone and Ebro (see Figure 2). All drain glaciated hinterlands and would have had high rates of sediment supply during the Ice Age. The exceptional size of the Balearic Abyssal Plain megabed suggests that it was an unusual event in terms of size, and therefore may have had, in uniformitarian terms, an extraordinary trigger. Rothwell *et al.*[4] concluded that it was probably catastrophic destabilisation of margin or fan sediments, possibly due to sudden release of methane (trapped as hydrates — ice-like solids formed of water and gas in the sediments) and/or earthquake activity after a long period of accumulation with an increased rate of sediment supply.

Submarine slides thus occur especially where huge piles of unstable sediment build up, and can be enormous. Off the mouth of the Amazon, slides capable of producing megaturbidites as big as this western Mediterranean one must have also taken place during the Ice Age. One has left a 120-m headscarp, a submarine cliff as high as a 40-storey building. One of the best sets of submarine landslides is the Storegga ('Great Edge') suite, three slides whose immense headwall, nearly 300 km long, runs roughly along the edge of the continental shelf of Norway.[3] Debris, up to 450 m thick, is spread a distance of 800 km out to the 3.6 km-deep abyssal floor. The enormous first slide was much bigger than the western Mediterranean one — the volume involved would cover the area of Alaska above head height — and has left a scar much bigger than Maryland.

Several years ago, Oard raised a very relevant question — where are all the pre-Pleistocene giant landslide deposits?[5] In other words, why are so few large landslide deposits similar to those described here recognised in the pre-Pleistocene sedimentary record, which would include the Flood strata? Such ancient large landslide deposits should be easily observed if the sedimentary rocks accumulated over vast eons of time and the present is the key to the past. Woodcock[6] has suggested that perhaps geologists have misinterpreted the evidence of such submarine landslide deposits.

Quite so, says Oard, in answering his own question. Some of the Flood-deposited sediments did slide off into basins and are the deposits called 'tillites' that have been misinterpreted as evidence of pre-Pleistocene ice ages.[7] Submarine mass flows can duplicate most, if not all, the special features found in these 'tillites' that are attributed to ancient ice ages.[8,9] Oard has now documented the evidence that the major 'tillite' deposits throughout the geological record all around the globe, including South Africa's well known, massive Dwyka Tillite, can be more consistently interpreted as produced by giant submarine landslides/mass flows.[10]

Furthermore, even submarine landslide deposits with huge blocks of debris like those found off Hawaii today have been identified in the geological record. Working in the Mohave Desert west of Las Vegas, Austin and Wise have mapped blocks over 1.5 km wide in the Kingston Peak Formation, a megabreccia that could only have been deposited by a giant submarine landslide.[11] They also correlated this unit with the Sixtymile Formation in the Grand Canyon, with the same widespread catastrophic event responsible for the large blocks in the lowermost Tapeats Formation at the Great Unconformity.

Even using the principle of the present is the key to the past (uniformitarianism), large-scale catastrophically-deposited rock units are being increasingly recognised. But it's that same principle which blinds geologists from accepting a catastrophic global Flood as responsible not only for the submarine landslide/mass flow deposits, but for all the rock layers in-between. Nevertheless, catastrophism is again fashionable in geology!

REFERENCES

1. Moore, J. G., Clague, D. A., Holcomb, R. T., Lipman, P. W., Normark, W. R. and Torresan, M. E., 1989. Prodigious submarine landslides on the Hawaiian ridge. **Journal of Geophysical Research,** 94:17,465-17,484.
2. Moore, J. G., Normark, W. R. and Holcomb, R. T., 1994. Giant Hawaiian underwater landslides. **Science,** 264:46-47.
3. Nisbet, E. G. and Piper, D. J. W., 1998. Giant submarine landslides. **Nature,** 392:329-330.
4. Rothwell, R. G., Thomson, J. and Kahler, G., 1998. Low-sea-level emplacement of a very large Late Pleistocene 'megaturbidite' in the western Mediterranean Sea. **Nature,** 392:377-380.
5. Oard, M. J., 1995. Where are all the pre-Pleistocene giant landslide deposits? **CEN Tech. J.,** 9(l):69-70.
6. Woodcock, N. H., 1979. Size of submarine slides and their significance. **Journal of Structural Geology,** 1:137-142.
7. Oard, M. J., 1994. Submarine mass flow deposition of pre-Pleistocene 'Ice Age' deposits. *In:* **Proceedings of the Third International Conference on Creationism,** R. E. Walsh (ed.), Creation Science Fellowship, Pittsburgh, Pennsylvania, pp. 407-418.
8. Schermerhorn, L. J. G., 1974. Late Precambrian mixtites: glacial and/or nonglacial? **American Journal of Science,** 274:673-824.
9. Oberbeck, V. R., Marshall, J. R. and Aggarwal, H., 1993. Impacts, tillites, and the breakup of Gondwanaland. **Journal of Geology, 101;1-19.**
10. Oard, M. J., 1997. **Ancient Ice Ages or Gigantic Submarine Landslides?** Creation Research Society Monograph 6, Creation Research Society Books, Chino Valley, Arizona.
11. Austin, S. A. and Wise, K. P., 1994. The pre-Flood/Flood Boundary: as defined in Grand Canyon, Arizona and eastern Mohave Desert, California. *In:* **Proceedings of the Third International Conference on Creationism,** R. E. Walsh (ed.), Creation Science Fellowship, Pittsburgh, Pennsylvania, pp. 37-47.

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