OVERTHRUST EVIDENCE AS OBSERVED AT FAULTS CAUSED BY THE SAN FERNANDO EARTHQUAKE†

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Creation geologists have shown that where overthrust faulting has taken place, there is considerable evidence to support such action. Uniformitarian geologists assert that overthrust faulting must have taken place in order to explain vast rock sequences that are "out of order" with respect to the evolutionary geologic column. In some of these supposed instances of overthrusting, there are none of the usual physical evidences to support overthrust action.

Overthrust activity has been observed on a small scale along various fault escarpments of the San Fernando earthquake of February 9, 1971. In each case, the small overthrust manifested one or more of the expected evidences for overthrusting. This evidence supports the creation geologists in rejecting the overthrust hypothesis wherever physical evidence is lacking, despite the fact that large rock sequences are indeed out of order with the geologic column. It is asserted that the Flood view is a more natural view in that it does not demand a certain preconceived ordering of the fossils, and hence does not require postulating overthrusts where no physical evidence exists.

Introduction

Geologists have recognized for many years that fault surfaces or "planes" show the motion of one fault face against the other by striations, slickensides, fluting, tectonic breccia, and ground rock powder.[1] Flood geologists such as Clifford Burdick and Harold Slusher[2] have insisted that overthrust faults should also show such evidence. When such signs of tectonic activity are absent and one stratum lies in apparent conformity above another, there is no *physical* reason to affirm the overthrust hypothesis in such a locality.

Yet in several locations such as the so-called "Lewis Overthrust" in Montana and Canada (as reported by Clifford Burdick[3] and Walter Lammerts[4]), and in the Empire Mountains of Arizona (as reported by Clifford Burdick and Harold Slusher[5]) uniformitarian geologists have argued for ancient overthrusts because rock formations that are considerably "younger" in terms of the evolutionary-uniformitarian geologic column) rest under rocks that are supposedly "older."

Flood geologists have reasoned that these so-called "upside down" formations in the strata were actually deposited in sequence as a result of the Global Flood or subsequent related cataclysm, and therefore may be used as evidence against the evolutionary geologic column. Because of their great confidence in the column, however, uniformitarian geologists continue to hold that such regions must have been overthrusted in past ages. If this were so, then some. overthrusts must have taken place with few or none of the usual marks of tectonic activity.

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In fact the present concept as stated by K. J. Hsu[6] is that the major movement occurred when the rocks were at 400° C. and flowed over the lower layers. The classic example of this is the Glarus overthrust of jurassic rocks over Eocene near Schwanden, Switzerland.* This same explanation is given for similar low angle thrusts such as can be found in Glacier National Park. Such a "rock flow" concept is not inconsistent with flood geology postulates except that from our viewpoint the sediment would readily flow if under any pressure since it had not yet hardened.

In any event the older view of solid rock being thrust over equally solid lower layers is no longer tenable or indeed held by younger theoreticians such as Hsu. The amount of shearing and rock breakage would simply be too great as shown by even the small overthrusts resulting from the recent San Fernando earthquake.

During that earthquake, February 9, 1971, the ground north and east of the fault moved as much as six feet vertically, and six feet horizontally with an acceleration of over one gravity, registering about 6.6 on the Richter scale.[7] Three obvious fault escarpments of this earthquake will be pictured and discussed: 1) The Interstate 210 escarpment, 2) the Foothill Boulevard escarpment, 3) and the Lopez Canyon escarpment. In addition, some discussion of blacktop sliding is also undertaken.

Observations

Interstate 210 Escarpment

This line of faulting is located about 0.2 miles north and west of the Maclay Avenue bridge of Interstate 210 (Foothill Freeway). The concrete of this highway buckled and fractured such that a concrete block northwest of the fracture was

*See article by Dr. Walter E. Lammerts elsewhere in this issue.

Figure 1. Interstate 210 fault line in concrete: overall view. As the concrete was broken, whole slabs were shoved across other slabs during the earthquake. Barbara Howe is seen in this and other photographs.

Figure 2. Interstate 210 fault line in concrete: closeup. Here actual overthrusting occurred. Slab to left was elevated more than nine inches higher than that at right and moved across the other slab during the earthquake. This site provides an excellent model of overthrusting. Note the ground concrete and powdered material nearby. There were striae apparent on the surfaces which rubbed against each other.

shoved south over the concrete block on the opposite side of the fracture line (Figure 1). At some points along this fault, the one concrete block (northwest) was elevated at least nine inches higher than the other block and was pushed south some distance laterally. The movement of these two blocks against each other provides an example of overthrust activity on a very small scale (Figure 2).

In the earth fill at the side of the freeway, some 50 feet north and east of this cement fracture, the fault escarpment is seen as a simple crack in the clay soil (Figure 3). The earth above the clay fracture line is about six inches higher than that immediately to the south and east. There is no evidence of actual overthrusting in this clay region of the Interstate 210 fault escarpment.

Foothill Boulevard Escarpment

This fault line runs northeast and southwest parallel to the north edge of Foothill Boulevard, about 0.1 mile south and east of the Vaughn Street intersection. Although a general buckling and breaking of both concrete and blacktop can be seen (Figures 4 and 5) the Foothill Boulevard fault does not present a valuable area in which to study overthrusting, because the overthrust which existed was removed by highway crews soon after the earthquake, and now one can view only the embankment remaining after the road repair. This escarpment does demonstrate the great vertical component in this earthquake, however, as the curbing and land northeast of the fracture now stand more than three feet above the road itself (Figure 5) which lies southwest of the fault.

In the vacant lot somewhat northwest of the road edge where Figure 4 was taken, the fault line is located in loose soil. Here one finds no line of fracture or overthrust but only a mound of earth resembling the work of some giant mole.

Lopez Canyon Fault Escarpment

This fault line is found on the property at 12221 Lopez Canyon Road. A long escarpment is visible in the Repetto Formation.[8] Along the line of fracture one side moved three feet upward and a few inches to the south (Figure 6). Since there was both vertical and some lateral thrusting here, it is another example of overthrust action on small scale. Figure 7 shows the actual face of material which slipped up and against the other side of the fault line during the earthquake. This locality is an excellent site at which to judge the effects of overthrust faulting on rock faces involved.

Trailer Park Blacktop

On a dead-end street within the Blue Star Trailer Court, Filmore Ave., San Fernando, California, the earthquake caused considerable move-

Figure 3. Interstate 210 fault line in clay road bank. North and east of the highway the fault line is visible in the earth fill. There is no evidence of overthrusting in this soft material although the one side of the fissure is now about six inches higher than the other.

Figure 4. Foothill Boulevard fault escarpment. Here the actual fault line can no longer be seen because of road repair. It is obvious, however, that the sidewalk was elevated several feet in relation to the road bed. This view is toward the southwest, along the fault.

Figure 5. Foothill Boulevard escarpment. Despite road repair, the great vertical component of the San Fernando earthquake is fully evident in this view toward the northeast.

Figure 6. Lopez Canyon fault escarpment: overall view. A long escarpment is visible here where the stratum portion at the right (Repetto formation) was elevated as high as three feet vertically and shoved several inches south across the portion of the same stratum at the left. Small superimposed white arrow indicates direction of the overthrust. Behind Barbara Howe is a portable seismograph placed at at this location by Museum scientists.

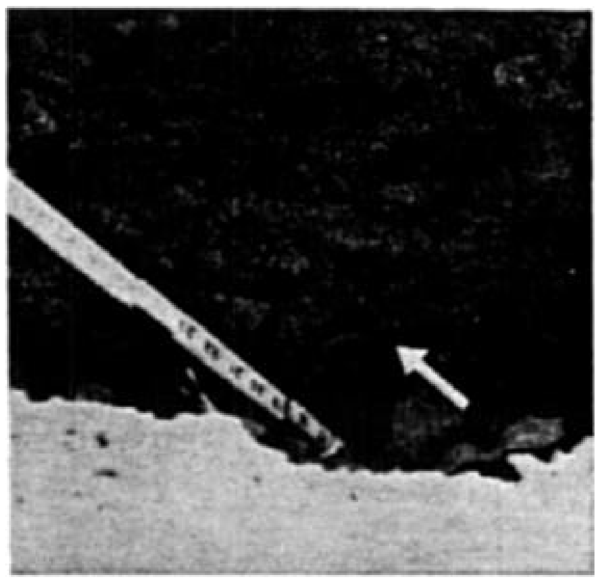

Figure 7. Lopez Canyon fault escarpment: closeup view of striated clay surface. Here the surface of the northern block (which slid up and over the southern block) can be seen. Note cracking in the moist Repetto clays which occurred through drying since the earthquake and has nothing to do with overthrust action. Note slickensides faintly visible almost parallel to the measuring stick. Rock movement occurred in the direction of the superimposed arrow up and sideways. The slickensides are faintly visible parallel to and ahead of the arrow. In a miniature overthrust the slickensides were present as testimony to the overthrust action.

Figure 8. Overall view of twisting and faulting in blacktop of Blue Star Trailer Court, San Fernando, California. The fracturing, slanting, and toppled nature of the blacktop would in itself be evidence of overthrusting.

ment and thrusting of blacktop. Figure 8 illustrates the overview of faulting which occurred in that trailer park.

At certain locations sheets of blacktop were thrust up and over slabs of concrete or other pieces of blacktop. Some blacktop was thrust about three feet laterally (southwestward) over a slab of concrete (Figure 9). The thrust occurred in the direction of the superimposed arrow beneath. The blacktop was turned over manually to expose the surfaces of thrust which are photographed in Figure 10.

In this instance, striations were evident on the under surface of the blacktop but not in the concrete. Some sandstone which had been beneath the blacktop originally was carried along and striations could be seen in this material although they were not deep. When one piece of blacktop slid over another piece of blacktop, striations were visible in the sand carried along and there was some grinding of the stones in the blacktop against other stones present in the lower strata of blacktop. Marks of sliding and grinding were not nearly so evident as at the Interstate 210 escarpment where concrete was thrust over concrete.

Figure 9. A blacktop, concrete overthrust. Philip Howe is standing on a blacktop slab which was moved some three feet laterally southwestward (direction of superimposed arrow) during the San Fernando earthquake. This is an example of a soft material (asphalt) moving over a harder material (concrete).

Figure 10. Closeup view of overthrust surfaces, blacktop on concrete. The blacktop slab of Figure 9 was lifted manually and turned so that to the left one can see the surface of blacktop which slid across the concrete to the right. Some sandstone which had been originally beneath the blacktop can be seen as it was moved along with the blacktop. Some evidence of sliding is evident on the blacktop surface but not on the hard concrete. Perhaps a greater weight of sediments atop the blacktop would have caused greater evidence for overthrust action here. Overthrust evidences are not as obvious at this location as they were at the Interstate 210 escarpment where concrete overrode concrete.

Discussion

Not every fault zone in the San Fernando earthquake provides a situation in which to analyze overthrust faulting. In soft beds of loose earth or clay the fault may be seen as a ridge or mound rather than a fracture (as in the field near the Foothill Boulevard Fault). Sometimes soft clay will simply crack as on the roadside of the Interstate 210 fault. While faults in such soft materials do not help illustrate common effects of overthrust faulting, they do suggest that extremely soft material will not submit to overthrust faulting but will buckle or simply crack instead.

At the Interstate 210 overthrust one can view what happens when blocks of concrete rub against one another. As Burdick and Slusher indicated for large overthrusts[9], there are such evidences as ground rock powder and striae apparent where the two slabs have rubbed against each other during the earthquake.

In a somewhat softer matrix (the Repetto Formation at Lopez Canyon) there are also evidences of overthrusting at the contact line—slickensides visible on the claystone. Scientists from the Los Angeles County Museum of Natural History collected fresh slickensides two days after the earthquake in the Saugus Formation of Little Tujunga Canyon (a canyon not far from Lopez Canyon). Grooves in the clay were formed during the earthquake or one of its aftershocks.

Museum scientists report that soon the clay began to dry and crack such that there was crumbling of the stratum when it was being placed in the museum.[10] But certain samples of these slickensides were preserved and are presently on display in the museum as evidence of overthrusting.

It is probable that at the trailer park and at the Interstate 210 escarpment scratches, grooves, and other evidences of thrusting would have been more marked had there been a heavy burden of sediments above the rocks which slid. In the case of the blacktop, there was only the weight of about three inches of blacktop to press the sliding stratum against the lower layer. Accordingly, evidences of overthrusting were only very slight.

In a typical overthrust (as conceived by the historical geologist), a tremendous overburden of sediments would have weighted down upon the thrusting stratum to accentuate the evidences for grinding beneath. The greatly twisted and broken condition of the blacktop would have been further conclusive evidence of overthrusting. In contrast certain of the supposed overthrusts of historical geology have perfectly flat and otherwise unbroken contact lines with strata beneath for vast distances.

The large overthrusts such as those postulated to account for the wrong order of formations at Glarus, Switzerland, and in Glacier National Park were then either deposited in this position or flowed into place as suggested by K. T. Hsu, when under great pressure and at over 400° C. Certainly if overthrusted after the rock had hardened, these strata would show abundant evidences of faulting such as indicated even in these very small movements. A more careful study of all these supposed overthrusts is needed to see if there is indeed any evidence for melting and flow of the rock.

Conclusions

Data from this analysis of both concrete and soft strata indicate that where thrust faulting took place it was accompanied by one or more of the usual evidences—gouge layers, slickensides, ground rock powder, etc. Such consistent hallmarks of overthrusting confirm the previous assertions of Burdick and others.

This evidence also highlights the severe problems facing a uniformitarian geologist who holds that thrust faulting has occurred where there is no physical evidence to support such a claim. Problems arise for the uniformitarian geologist because of his persistent attempt to preserve the geologic column in the face of negative evidence.

In the flood view, however, fossil sequences would be expected to vary somewhat from place to place. The flood view of stratification is a more natural one because it does not require vast and unreasonable overthrusts to preserve a preconceived notion about the order in which fossils "ought" to occur.

References

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[7]Printed labels from the Los Angeles County Museum of Natural History accompanying several displays related to the San Fernando earthquake. Also, through conversation with a geologist, Mr. Mark Tippetts.

[8]*Ibid.*

[9]Burdick and Slusher. *Op. cit.*, p. 52.

[10]See note 7.