REPORTS OF DISCOVERY OF THE "ELTANIN CRATER" ARE CONTRADICTED BY DATA. Rainer Gersonde[1], Frank T. Kyte[2], T. Frederichs[3], U. Bleil[3], and Gerhard Kuhn[1]. [1]Alfred Wegener Institut fur Polar- und Meeresforschung, Postfach 120161, D-27515 Bremerhaven, Germany (rgersonde@awi-bremerhaven.de). [2]Center for Astrobiology, Institute of Geophysics and Planetary Physics, University of California, Los Angeles, CA 90095-1567, USA (kyte@igpp.ucla.edu). [3]Earth Science Department, University of Bremen, Postbox 330440, Bremen, 28334.

Deposits of the Eltanin impact event were first discovered as an Ir anomaly in deep-sea sediments of late Pliocene age deposited in the South-East Pacific Ocean [1] (Fig. 1). These were found to contain coarse ejecta composed of an Ir-rich melt rock derived directly from the impacting asteroid, and several percent unmelted meteorites, since named the Eltanin meteorite [2]. A 1995 *RV Polarstern* expedition to the suspected impact region [3] found that sediments in the region around the Freeden Seamounts (57.3˚S 90.5˚W; we previously called these the San Martin Seamounts, but they were officially named Freeden in 1999) contained high concentrations of meteoritic ejecta – typically ≥1 g/cm^2. They also found that sediments in this region had been severely disrupted by the impact, which ripped-up and redeposited sediments as old as Eocene in age.

Two recent abstracts [4,5] claim possible identification of a submarine source crater for the Eltanin impact event. Although this is only described as a possible identification of a "prospective Eltanin crater," statements like "seismic lines show a clear ejecta blanket around the Eltanin Crater," and the presentation of these results make it clear that the authors consider this identification to be correct. This purported submarine crater is supposed to be 132 km in diameter and centered at 53.7˚S 90.1˚W (Fig. 1). In this abstract we wish to state categorically that our extensive study of the Eltanin impact event, including detailed exploration of the impact area and even a pass through the hypothetical crater show that these authors cannot possibly have found the Eltanin impact site.

We are currently working on core samples and geophysical data from a 2001 expedition, which includes up to 17 new sediment cores covering an area of >80,000 km^2. We explored an area extending from ~55 to 58˚S and 89 to 95˚W, using bathymetric mapping, echosounding profiles of near-surface sediments, and sediment piston coring. Our initial results [6-8] show that disturbance from the impact clearly extends for about 100 km north and east of the Freeden Seamounts (Fig. 1). However, with increasing distance to the north and the east, the concentrations of ejecta decrease and thick deposits of disturbed sediments are not present. One core (PS58/294-1; 55.85˚S, 92.12˚W) was taken only 271 km from the center of the purported "Eltanin crater" (Fig. 1). Here, we found undisturbed late Pliocene sediments. The ejecta deposit must have been thin as it was subsequently smeared by bioturbation as is normal in these sediments. Our preliminary results on this core show that only ~0.1 g/cm^2 of meteoritic ejecta were deposited there, at least an order of magnitude less than is found in the disturbed region to the south. New data from extensive integrated magnetobiostratigraphic studies indicate that the impact occurred during the lowermost Matuyama Chron, a period of reversed magnetic polarity, at about 2.5 Ma.

Several lines of evidence argue against the hypothetical 132 km Eltanin impact crater. **First**, all our data indicate that the greatest disturbance and highest concentrations of meteoritic material are in the vicinity of the Freeden Seamounts. The physical disturbance and ejecta concentrations clearly decline quickly to the east and north (i.e., in the direction of the hypothetical crater); we have no significant data to constrain this to the west or south of the seamounts. The data appear to be most consistent with an impact in the region near the northern edge of the seamounts. **Secondly**, all our analyses of the impact ejecta indicate that the projectile did not even form a significant crater on the ocean floor. The bulk chemistry of the impact melt rocks is essentially that of the parent mesosiderite asteroid with an admixture of a few percent Na, K, and Cl derived from seawater salts [9]. There is no geochemical evidence to support the possibility that the asteroid was mixed with any significant fraction of sediments or basalt that would be in a typical ocean lithosphere target. We find it inconceivable that a deep ocean impact large enough to form a 132 km crater could avoid mixing of projectile and target. Even if there were no mixing, we expect that excavation of this crater would produce abundant terrestrial ejecta including considerable volumes of shocked basaltic rock from the oceanic lihosphere. No such materials have been identified in any of the 21 sediment cores examined to date. **Thirdly**, in our exploration of the region as far north as 55˚S, we find no evidence of disturbed sediments near the purported crater. At site PS58/294, which is about two diameters from the center of the hypothetical crater (271 km), our core contains traces of meteoritic ejecta, consistent with an origin as distal ejecta from an impact near the Freeden

Seamounts. There is no evidence of disturbance or ejecta from terrestrial target material, which we should expect if there were a 132 km crater only a short distance to the north. **Finally**, and most significantly, during our 1995 expedition, we passed through the region of the hypothetical crater. Our echosounding profiles of near-surface sediments showed nothing unusual in the sediments in this region. We obtained the 17.72 m long piston core PS2664-1 (53°49´S, 89°34´W) only 37 km from the center of the proposed impact structure (Fig. 1). The upper 7.95 m consist of diatomaceous mud. Integrated geomagentic and diatom biostratigraphic dating of this section indicates a continuous sediment record extending back into the late Gauss Chron, thus documenting the past ca. 2.7 Ma. No sediment and geomagnetic disturbance is visible at the interval in the lowermost Matuyama that corresponds to the age of the Eltanin impact, which definitely precludes the presence of a crater formed by the Eltanin impact in this region.

In summary, all credible data contradict the hypothesis that the Eltanin impact formed a 132 km crater at the locality proposed by [4,5]. We object to further use of the term "Eltanin crater" unless this can be proven undisputedly to be derived from the Eltanin impact. Although we consider it unlikely that the Eltanin impact formed a true crater, the impact might have formed a mapable structure on the ocean floor which we may find in future expeditions. We believe that the term "Eltanin crater" should be reserved for this possible future discovery.

References: [1] Kyte, F. T., Zhou, Z., and Wasson, J. T. (1981) Nature 292, 417-420. [2] Kyte, F. T., and Brownlee, D. E. (1985) Geochim. Cosmochim. Acta 49, 1095-1108. [3] Gersonde et al. (1997) Nature 390, 357-363. [4] Glatz C.A., Abbott D.H., and Nunes A.A. (2002) GSA Abs. Prog. v. 34, No 6, p. 401. [5] Abbott D.H., Glatz C.A., Burckle L., and Nunes A.A. (2003) LPSC XXXIV abs. # 1858. [6] Gersonde et al. (2002) AGU Fall Meeting abs.# OS22C-0285 [7] Kyte et al. (2002) AGU Fall Meeting abs.# OS22C-0287 [8] Frederichs et al (2002) AGU Fall Meeting abs.# OS22C-0286. [9] Kyte F.T. (2002) Deep Sea Res. II 49, 1029-1047.

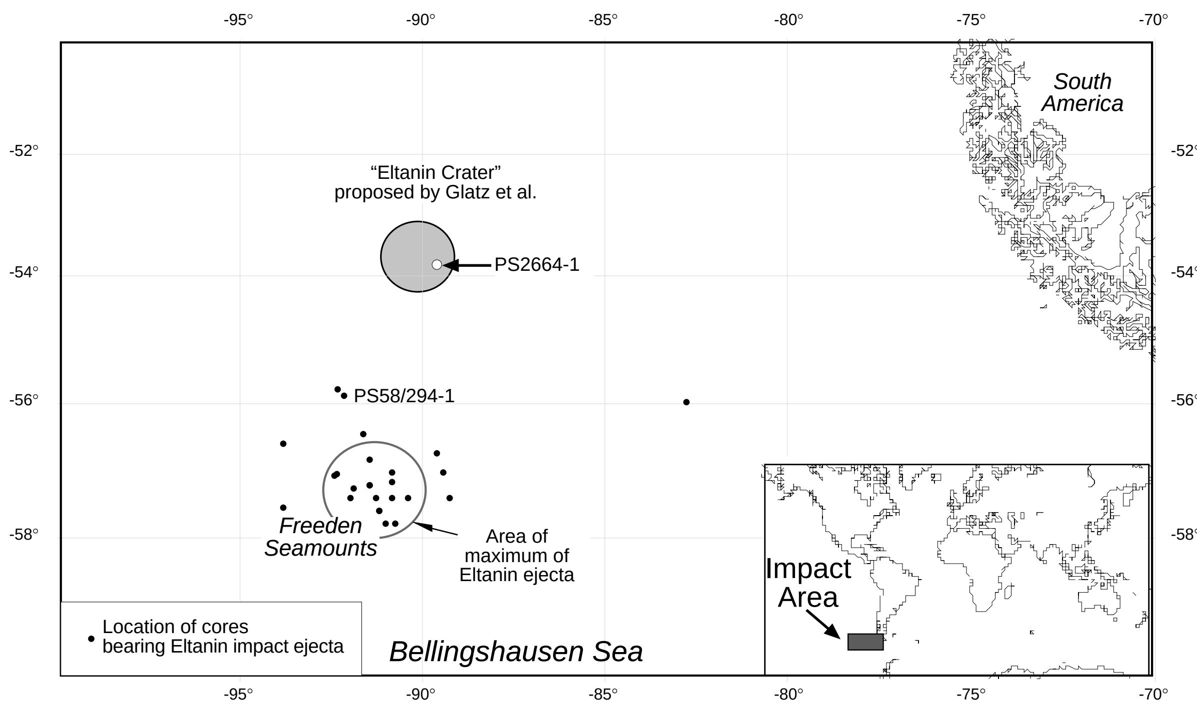

Fig. 1. Location of sediment cores bearing Eltanin impact ejecta in the South-East Pacific Ocean and the hypothetical 132 km "Eltanin crater" purported by [4, 5]