OCEANIC IMPACTS AND RELATED ENVIRONMENTAL PERTURBATIONS. R. Gersonde, Alfred Wegener Institute, P.O. Box 120161, Bremerhaven 27515, Germany.

Only ca.13% of the ca.165 known terrestrial impact structures have been identified to originate in marine environments. The marine impacts have been reported from shallow water marginal or epicontinental seas, except one, the Eltanin impact, that was discovered in the deep-sea basin of the southeast Pacific. Reasons for the mismatch between the numbers of continental and deep-sea impacts include (i) the relatively young age of oceanic basins, (ii) the post-impact burial of marine impact structures, (iii) the deceleration and disintegration of small projectiles in the water column preventing the formation of impact traces at the deep-sea floor, (iv) the inaccessibilty of the deep-sea floor, and (v) the lack of programs for the detection of oceanic impacts.

In contrast to continental impacts, oceanic impacts will generate megatsunamis that could potentially devastate coastlines. This includes destruction of coral reefs, destabilisation of shelf ice and shelf deposits and the backwash of terrestrial material. Future oceanic impacts represent a potential hazard because impact-generated large-scale tsunamis can cause enormous loss in populated coastal areas, including areas located at great distances of the impact ground-zero. Another specific threat related to oceanic impacts is the ejection of large quantities of water and salt into the atmosphere. Such deposition might lead to depletion of the ozone shield, to acidification of surface regions and could affect the Earth´s albedo and the power of greenhouse forcing. Despite the great potential of oceanic impacts for causing sudden disturbance of past and future Earth´s climate, environment and life, our knowledge on these processes is still quite limited.

To date, the only example for a deep-ocean impact is the late Pliocene (2.15 Ma) Eltanin impact in the 5000 m deep Bellingshausen Sea. Originally discovered in 1981, based on an Ir-anomaly[1], and documented in more detail in 1997 [2], the Eltanin impact represents a baseline for further impact-related studies and modeling, and the identification of other deep-sea impacts.

Combined with seismic and sediment core data, numeric modeling represents the most important tool to understand the complex impact-related processes such as short-term effects (pressure, velocities, shock waves) in the water column, large scale oceanic phenomena (e.g. tsunami generation and propagation), the effects of shock waves and oceanic processes on the sediment cover and basement, as well as perturbations in atmospheric and environment.

References: [1] Kyte, F.T. et al. (1981) *Nature, 292*, 417-420. [2] Gersonde, R. et al. (1997) *Nature, 390*, 357-363.