Introduction: Shock metamorphism occurs in impact events and has been studied for decades. Quartz and plagioclase are two major rock-forming minerals on Earth and their shock metamorphic effects have been studied extensively [1-3]. In the case of the K/Pg boundary Chicxulub multi-ring impact crater, drill cores recovered impact breccias, in which shock metamorphic effects of quartz, plagioclase and other minerals have been reported [4-10]. However, the samples of these studies are from suevite and impact melt rocks rather than un-brecciated target basement rocks. The IODP-ICDP Expedition 364 project drilled the peak ring of the Chicxulub crater and recovered brecciated basement granites, in which shock metamorphic effects and reduction of precision due to mixing with other mineral phases, were separated quartz and plagioclase crystals and milled them for XRD analysis. Polished thick sections were produced for 15 samples to measure the refractive index of quartz.

Results: PDFs of quartz. We have observed and measured PFs and PDFs of 262 quartz grains in the 36 thin-sections (Fig. 1). These data suggest that most of the quartz (>90%) developed 1 set (21-64%) and 2 sets (22-58%) of PDFs. So far, quartz crystals with 3 sets of PDFs were only observed in 7 of the 11 samples. No correlation of the number of PDFs sets in quartz with depth is observed.

XRD features of whole rocks and quartz. X-ray diffractometer (XRD) scan of 147 whole rock samples analyzed at Bremen by the Onshore Science Party and 10 at CUG. There is remarkable variation of their peak heights, which is a possible indicator to estimate the shock pressure they experienced [1-2]. Analysis of the peak-heights at half-width for all 157 samples from top to bottom, revealed a slight reduction of this parameter for the four peaks. The regression lines of quartz is Y
XRD intensities of quartz are generally consistent from 750 to 1350mbsf (Fig. 3), although there is local sharp variation. Meanwhile, the FWHM of quartz is consistently 0.04 from top to bottom, suggesting that diaplectic quartz glass is not present. This is consistent with microscope observation. These XRD results all together indicate that there is no remarkable shock pressure changes recorded in these samples.

Figure 3 X-ray diffraction scan results for quartz from the basement granites of Chicxulub crater.

**Discussion:** PDFs sets, their crystallographic planes and diaplectic glass of quartz are most important indices for shock pressure estimation [1-2]. In these granite samples, most quartz crystals have one or two sets of PDFs, no diaplectic quartz glass, nor coesite have been found. The little variation of number of PDFs sets (Fig. 1) and very small XRD reduction from top to bottom together indicate the shock pressures are generally homogeneous. The slight decrease of XRD reduction in general imply the lower part granite expe-

-28.59x + 13185 (R² = 0.0445) and of plagioclases is Y = -22.253x + 7857.3 (R² = 0.1148).

The estimated shock pressures of the granites are preliminary results. To further and better determine the shock metamorphic effects and estimate shock pressure quantitatively, we are also doing infrared absorption spectra of quartz and plagioclase, and measure crystallographic planes of PDFs of quartz. We hope these integrated study can provide reliable shock pressure estimation of the basement rocks.

It should be noted that, due to post impact alteration, some PDFs are not pristine and display decorated features, so the measured refractive index could not provide precise original impact induced reduction. We will further study the relationships among the shock metamorphic effects in different minerals.

**Acknowledgements:** The IODP-ICDP Expedition 364 Science Party is composed of S. Gulick (US), J. V. Morgan (UK), E. Chenot (France), G. Christeson (US), P. Claeyts (Belgium), C. Cockell (UK), M. J. L. Coolen (Australia), L. Ferrière (Austria), C. Gebhardt (Germany), K. Goto (Japan), H. Jones (US), D. A. Krins (US), J. Lofi (France), L. Xiao (China), C. Lowery (US), C. Mellett (UK), R. Ocampo-Torres (France), L. Perez-Cruz (Mexico), A. Pickersgill (UK), M. Poelchau (Germany), A. Rae (UK), C. Rasmussen (US), M. Rebollo-Vieyra (Mexico), U. Riller (Germany), H. Sato (Japan), J. Smit (Netherlands), S. Tikoo-Schantz (US), N. Tomioka (Japan), M. Whalen (US), A. Wittmann (US), J. Urrutia-Fucugauchi (Mexico), K. E. Yamaguichi (Japan), and W. Zylberman (France).

This study was supported by the Science and Technology Development Fund (FDCT) of Macau (Grant No. 107/2014/A3 and 039/2013/A2) and Doctoral Fund of Ministry of Education of China (Grant No. 20130145130001).
