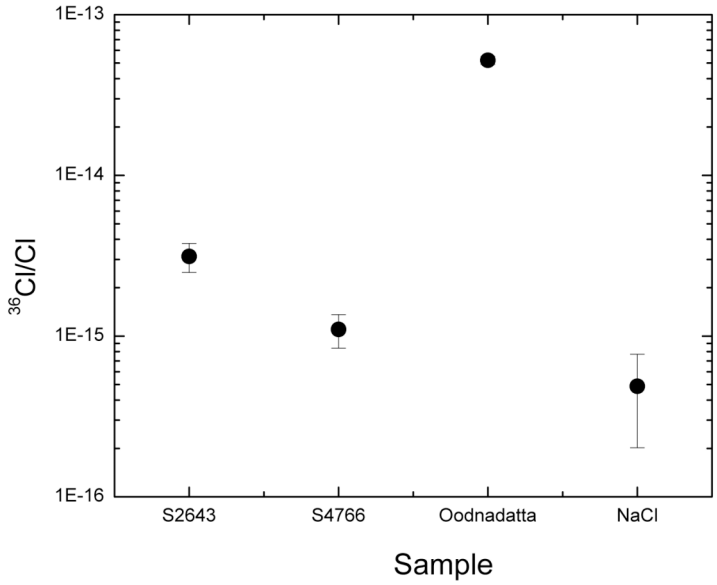
PUSHING THE LIMITS OF ACCELERATOR MASS SPECTROMETRY BY AN ORDER OF MAGNITUDE
Measurement of ^{36}Cl in seawater samples

For the first time, an AMS experiment was performed at HRIBF to detect ^{36}Cl in a seawater sample. We have successfully measured ^{36}Cl/Cl ratios as low as a few times10^{-16} pushing the level of sensitivity for this isotope by **an order of magnitude** over any other facility in the US and proving that ^{36}Cl can be measured at the levels required for a tracer in oceanography [1].
The highest terminal voltage in the world and a folded geometry make the 25-MV Tandem accelerator provide unique opportunities of performing the highest sensitivity measurements for AMS for some isotopes. The folded geometry of this electrostatic machine, which involves a 180 degree magnet in the terminal, can provide an early magnetic filter to suppress contaminant molecular fragments (e.g. from $^{12}CH_2$ or ^{13}CH) and therefore an unparalleled clean background. This unique configuration will provide the best instrumental conditions for ^{14}C of any AMS machine.
Many common problems and needs exist between the fields of AMS and Radioactive Ion Beam (RIB) science such as efficient production of the species of interest, isobar removal, and stable machine operation. Very likely a renewed interest in AMS from nuclear physics laboratories will emerge in connection with RIBs [2]. For AMS, a high energy electrostatic accelerator such as the 25-MV Tandem with its great specificity can be the precursor to other more specialized devices, which are measured against the large machine capability.



Measurements of ^{36}Cl in various seawater samples such as S2643 taken 4km deep in the Atlantic Ocean (34E51N N, 20E42N W), S4766 from the Pacific (44E0N S, 64E39N E), a reference sample (Oodnadatta) and a "blank" from a salt mine in Ontario, Canada (NaCl)

[1] A. Galindo-Uribarri *et al.*, to be published in Nuclear Instrum. Methods Phys. Res.B (2007)
[2] P. Hausladen *et al.*, Intl. Journal of Mass Spectrometry, 251(2006)119.