Variation in clearance rates in Japanese mussel populations: bioaccumulation of organic contaminants or natural variability?

Alan Scarlett1*, Awantha Dissanayake2, Atsushi Ishimatsu3, Charles West1, Dave Jones1 & Steve Rowland1

Petroleum & Environmental Geochemistry Group, Plymouth University, UK
*Tel. +44(0)1752 584730, +44(0)798814272 (mob); email: alan.scarlett@plymouth.ac.uk
Institute for East China Sea Research, Nagasaki University, Japan

Background
- Seas of Japan reported to be amongst the most impacted by human activity (Halpern et al., 2008)
- Paucity of data for marine organic contaminants
- Unresolved complex mixtures usually overlooked
- Polar organic compounds particularly under reported

Methods
- Mussels, oysters and seagrasses collected from stations in Kyushu and Okinawa (Figs 1 – 6)
- Health of mussels measured using mussel clearance rate (CR) assay
- Health of seagrasses measured using fast fluorescence Fv/Fm, Area and Performance Index
- Polar Organic Chemical Integrated Samplers (POCIS) deployed for a month in Nagasaki Bay and Goto Island (clean site)
- Tissues of mussels and oysters analysed by GC-MS and GCxGC-ToF-MS

Results & Discussion
- Significantly lower mussel clearance rates (Fig. 4) for most stations compared to Goto Island (Stn 6)
- GC-MS analyses of bivalve tissues did not reveal known toxicants
- GCxGC-ToF-MS analyses underway
- Likely that observed differences in CR due to environmental variation
- POCIS analyses failed to show any known organic contaminants (analyses on-going)
- Significant differences in seagrass photosynthetic parameters (Fig. 5)
- Okinawa seagrasses undergoing natural annual senescence (Kagoshima seagrass perennial)

Conclusions
- Pilot study suggests coastal waters sampled in Kyushu relatively uncontaminated by known organic compounds
- Short term study of limited use
- Collaborative studies likely to be more productive

References

Fig. 1 Sampling station 5
Fig. 2 Location of sampling stations
Fig. 3 POCIS deployment, Stn 5
Fig. 4 Mussel clearance rates
Fig. 5 Seagrass health
Fig. 6 POCIS deployment, Stn 6

Acknowledgements
- European Research Council grant number: 228149
- JSPS post-doctoral research fellowship
- Greg Nishihara, Institute for East China Sea Research
- Ryuta Terada of the Faculty of Fisheries, Kagoshima
- Prof Takeshi Nakano and Dr Motoharu Suzuki, Osaka University
- Kris & Nate White, University of the Ryukyus
- Solomon Ethio for karaoke support