

## PERMANOVA in Plymouth

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Plymouth, UK, where a number of marine institutes and organisations are based, was the venue for a workshop on Multivariate Analysis in Ecology and Environmental Science for complex designs using PERMANOVA+ for PRIMERv6. The workshop was hosted by PRIMER-E (a spin-out company of Plymouth Marine Laboratory) at the Marine Biological Association, from where a splendid view can be enjoyed of the Plymouth Sound, one of the largest natural harbours in the world. The increasingly popular methodology and software attracted 33 enthusiastic scientists (mainly active in marine ecology) from 17 countries, who embarked on a week-long journey into the world of permutational statistics. The group comprised a variety of scientists with different backgrounds, which stimulated discussions across disciplines, but also indicates the wide applicability of the PERMANOVA methodology.

The workshop was led by Marti J. Anderson, Professor in Ecological Statistics at the New Zealand Institute for Advanced Study (NZIAS), Massey University, and the developer of the PERMANOVA methodology, who was assisted by Prof. Bob Clarke (Primer-E, PML, MBA) and Ray Gorley (Primer-E). In concert, they were able to bring PERMANOVA and PRIMER alive! It must be said that the organisers did a great job at coming up to the high expectations. Being able to hold someone's attention to



*The PERMANOVA group take advantage of the sunny weather for a photo opportunity.*

explain a statistical test is tricky at the best of times, so we can only stand in awe at their ability to keep the crowd fully engaged for a whole week (and Marti's ability to memorise!). The appreciation was mutual, the instructors had a great time teaching, explaining and entering tricky discussion with an alert crowd. Wonderful to see how such occasions bring a dynamic platform for everyone to engage in discussions on the "whys and why not's" in statistics.

The week was packed with lectures, exercises, discussions and practical sessions for own data, organised in recurring themes such as Permutational Analysis of Variance (PERMANOVA), Dissimilarity measures, Principal Coordinate Analysis (PCA), Dispersion Homogeneity (PERMDISP), Complex multi-factorial designs and permutation tests, Variance components, unbalanced and ANCOVA designs, DISTLM and distance-based redundancy analysis (dbRDA), and Canonical Analysis of Principal Coordinates (CAP). I would highly recommend this course for people who want to use this increasingly popular methodology and software. HERMIONE, thank you for funding my participation!