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UNIVERSITY of  
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INSTITUTE FOR MARINE  
& ANTARCTIC STUDIES



## PERMANOVA+ workshop

*Multivariate Analysis for Ecology & Other Sciences*

**PRESENTER:** Distinguished Professor Marti J. Anderson (Massey University and PRIMER-e)  
**DATES:** 16<sup>th</sup> - 20<sup>th</sup> January 2023  
**VENUE:** Institute for Marine & Antarctic Studies (IMAS), University of Tasmania, Hobart, Tasmania, Australia.

### Overview

This **PERMANOVA+ Workshop** will be held at the Institute for Marine & Antarctic Studies (IMAS), Hobart, Tasmania, Australia, and will take place over 5 days (Monday 16<sup>th</sup> - Friday 20<sup>th</sup> January 2023, 09:00 - 17:00 each day). The workshop is designed to give a fundamental understanding of how to analyse and gain insights from multivariate data using the software **PERMANOVA+**, an add-on package to **PRIMER 7**. Participants will learn through lectures, demonstrations, and practical experience with the software. The final day of the workshop (Friday 20<sup>th</sup> January) will be an “own data” session, in which participants will have free time to **analyse their own data** using PRIMER 7 with PERMANOVA+. The presenter will be close at hand to answer questions and provide support.

Participants are expected to bring their own laptop. Software may be purchased (at a discounted price – see below) *or* a **free** fully functional (but time-limited) licence of PRIMER 7 with PERMANOVA+ will be made available to registered participants for trial use during the workshop. Note that PRIMER is a Windows-only product, so Macs need to run in Windows emulation.

**Note:** Participants are expected to have some basic knowledge of multivariate analysis, although this is not compulsory. We highly recommend attending an online PRIMER 7 workshop before participating in a PERMANOVA+ workshop. **There will be an online PRIMER 7 workshop held 21<sup>st</sup> – 25<sup>th</sup> November 2022, in Australian Eastern Daylight Time - AEDT (UTC +11 hrs). Details of that (and other) online workshops can be found here: <https://www.primer-e.com/workshops/>.**

### Content

**PERMANOVA+** is an add-on package for PRIMER 7. It allows robust analysis of multivariate data in response to complex sampling/experimental designs on the basis of a resemblance measure of choice, with rigorous inferences obtained using permutation methods. The methods in PERMANOVA+ enable formal models, tests, and predictions to be achieved for multivariate ecological (and other) systems that are over-parameterised (i.e., have too many variables) and/or that demonstrate substantial non-normality. Familiarity with the core methods in PRIMER and/or some prior knowledge of basic multivariate methods is desirable. However, the workshop will

emphasise conceptual understanding, use and interpretation of the methods for scientists and practitioners, so no prior background in statistics is assumed.

Participants will explore the following core topics:

- estimation of components of variation in complex experimental designs, including interactions, covariates, contrasts, fixed or random factors, crossed or nested models, unbalanced designs, environmental impact designs, randomised blocks or repeated measures (**PERMANOVA**);
- tests for homogeneity of multivariate dispersions and analyses of beta diversity (**PERMDISP**);
- multivariate regression and model selection procedures (**DISTLM**);
- unconstrained ordination (**PCO**, **nonmetric MDS** and **metric MDS**), particularly with the aim of visualising the most important factors structuring multivariate data in a given context;
- dissimilarity-based multivariate multiple regression and model selection (**DISTLM**), including constrained ordination (distance-based redundancy analysis **dbRDA**), especially to relate biotic data to environmental (or other explanatory) variables;
- canonical analysis of principal coordinates (**CAP**), including leave-one-out allocation success for discriminant analysis, canonical correlation analyses and the predictive placement of new points into existing canonical model spaces.

## Venue

This workshop is hosted by IMAS, University of Tasmania, in association with the [International Temperate Reefs Symposium 2023](#) (ITRS). All sessions will be held at **Aurora Lecture Theatre** in the **IMAS Salamanca Building**, 20 Castray Esplanade, Battery Point, Hobart, Tasmania, Australia. Further information, including directions to the venue, can be found [HERE](#).

## Workshop Fees

The workshop fee **includes** all course materials, coffee/tea and snacks during breaks, free Wi-Fi, and a temporary fully functional time-limited software licence key for the duration of the workshop, **but not** meals, accommodation, the separate (discounted) cost of purchasing time-unlimited software or GST for New Zealand residents.

The **prices to register** for this **in-person workshop** are:

	Professional Registration (\$USD)	Full-time Student Registration (\$USD)
<b>EARLY BIRD</b> prices valid until <b>30<sup>th</sup> November 2022</b>	\$ 880.00	\$ 580.00
Prices <b>AFTER</b> 30 <sup>th</sup> November 2022	\$ 1,080.00	\$ 680.00

All prices are in United States dollars (\$USD). Please note that our Global Equitability Pricing (GEP) percentage discounts **do not apply to registration for in-person workshops** such as this one.

**NOTE:** Those registered for the [International Temperate Reefs Symposium \(ITRS 2023\)](#) are eligible for **10% off** the above registration prices.

## Discounted Software Prices for Workshop Participants

Workshop participants may purchase time-unlimited software at **10% off** our [standard software prices](#) in \$USD. Participants not residing in Australia, New Zealand and the USA might be eligible for our [Global Equitability Pricing \(GEP\)](#) on all our software products. The workshop software discount (10%) will be applied **on top of** the GEP-adjusted price appropriate for each individual customer. This means that the amount you pay for our software products **depends on your country of residence**.

## Registration

To register, please fill out the registration form available on the [PRIMER-e website](#) and return it directly to [primer@primer-e.co.nz](mailto:primer@primer-e.co.nz) to secure your place. The deadline for registration and payment is **17<sup>th</sup> December 2022**. Late registrants will only be accepted if space permits. Please get in touch with us directly on [primer@primer-e.co.nz](mailto:primer@primer-e.co.nz) if you have any questions, and especially:

- if you would like to **obtain a quote** for your registration (with or without software), including all **discounts** for which you are eligible;
- if you wish to register **more than one individual** from your organisation and pay on a single invoice; or
- if you wish to purchase **more than one software licence** at discounted prices on a single invoice.

## About the Presenter

**Distinguished Professor Marti J. Anderson** (Massey University and PRIMER-e, *FRSNZ*) holds the Professorial Chair in Ecological Statistics at the New Zealand Institute for Advanced Study (NZIAS) at Massey University in Auckland. She is also the Director of PRIMER-e. Her core research is in community ecology, biodiversity, multivariate analysis, experimental design and resampling methods, with a special focus on developing novel statistical methods for ecology. She has developed all of the statistical methods in PERMANOVA+ and especially loves engaging in the dynamic interactions with students, academics and professionals that have become a trademark of the PRIMER/PERMANOVA+ international workshops, shedding new light on multivariate data.