ORIENT 3: A NEW INTEGRATED SOFTWARE PROGRAM FOR ORIENTATION DATA ANALYSIS, KINEMATIC ANALYSIS, SPHERICAL PROJECTIONS, AND SCHMIDT PLOTS

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Orient 3 is a new professional orientation data analysis and spherical projection program, with a user-friendly interface and simple data input. In 1986 Orient introduced modified Kamb contouring, Point Girdle Random diagrams, orientation fields, and automated domain analysis. Orient 3 brings a new level of accuracy and speed, with new tools, including interactive data analysis, UTM coordinate conversions, digitizing, and integration with Microsoft Excel, LibreOffice, Adobe Illustrator, Inkscape, CorelDRAW, and Google Earth. Features include circular histograms and frequency plots; upper and lower hemisphere orthographic, stereographic, and equal-area projections; Fisher, Watson, and Bingham confidence cones; unlimited coordinate system and data rotations; extensively configurable plots and symbols; color gradient plots; and vector graphics. The User Manual includes numerous tutorials, and a clarification of spherical projection terminology.

The stereographic projection, \( r = R \tan(\pi/4 - \delta/2) \), was known to the Greeks Hipparchus and Ptolemy, and given its present name by François d'Aguilon in 1613. The Lambert azimuthal equal-area projection, \( r = (2/\sqrt{2}) R \sin(\pi/4 - \delta/2) \), was invented by Lambert in 1772. In 1925 Walter Schmidt recognized that the stereographic projection was unsuitable for orientation data analysis due to its distortion of area, and introduced the equal-area projection for fabric analysis. Rejecting the stereographic, or Wulff, net used by mineralogists, Schmidt introduced the equal-area net, or Schmidt net, and data contouring. In 1944 Walter H. Bucher introduced the use of stereographic nets in structural geology, defining stereonet as a contraction of stereographic net, and stereogram as a diagram produced using the net. Diagrams produced using Schmidt's equal-area method are ubiquitous in structural geology and tectonics, however no succinct term exists for them. The term Schmidt plot is proposed for a lower-hemisphere Lambert azimuthal equal-area spherical projection of three-dimensional orientation data, such as foliation planes, joints, slickensides, magnetic vectors, crystallographic axes, fold axes, and lineations. These plots have been in common use in structural geology, tectonics, and related disciplines, since their introduction by Walter Schmidt in 1925.

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