TOPICS IN ADVANCED TOPOLOGY FOR CARTOGRAPHY

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ABSTRACT:

Cartography has embraced the fundamental principles of combinatorial topology with great benefit to the development of the mathematical theory of maps Many other useful tools available from other areas of topology have gone unrecognized and unused. Several of those areas are illustrated here Usually the cartographer considers only the most basic topological properties of static, simply-connected, two-dimensional manifolds or surfaces. Here we present some of the advanced topological theory that may be utilized to address the more difficult, higher-dimensional, dynamic problems of cartography Some of the problems viewed from a new topological perspective include generalization, deformation over time, 3-D representation and 2-D representation of 3-D features, algebraic operations on map features, unified theory of map projections, and orientation Some topological tools used to examine these problems include homotopy theory, homology and cohomology theory, topological groups and vector spaces, and global analysis These sophisticated tools are simplified for use by the mathematically adept cartographer.