Free and open source desktop and Web GIS solutions

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Community-based development through collaboration amongst software developers and researchers distributed globally has led to a wealth of feature-rich applications of Free and Open Source Software for Geoinformatics (FOSS4G). In the FOSS4G, development model online source code repository, mailing lists, and a Wiki provide the software developers and users with a virtual and ubiquitous platform for the implementation of new methods, algorithms, and tools as well as for refinement and enhancements of the existing code. For end users, this development model provides highly interoperable, sophisticated software at no cost. This approach is both flexible and immune to vendor lock-ins. Further, the reproducibility of results and quality assessment of methods is greatly facilitated

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since full access to the underlying algorithms is guaranteed. The source code is typically published under free and open source software licenses with end-user rights to run the program for any purpose, to study how the program works, to adapt it, and to redistribute copies including modifications.

The FOSS4G offers software libraries for map projection and data format conversion, desktop Geographic Information Systems (GIS), Web mapping/Web-GIS, spatial databases, geostatistics, and metadata catalogues. Most FOSS4G software packages run natively on common operating systems and may be installed and used without restriction in any commercial or non-commercial environment at no cost for the end users.

Open Source Geospatial Foundation (OSGeo, <http://www.osgeo.org>) serves as an umbrella organization whose mission is to support the collaborative development of FOSS4G and promote their widespread use. OSGeo provides a common forum and shared infrastructure for improving cross-project collaboration. Acceptance of a project to OSGeo depends on a successful incubation process which includes a detailed source code audit to identify any license incompatibilities in the code. This incubation process also confirms that the project is supported by a healthy community, including validation of the rules and processes governing the project's management. Since its inception in 2006, OSGeo has been providing organizational support for building a vibrant international community to advance geospatial technologies and solutions using open source software, open data and open standards.

This special issue is brought forth with the aim of presenting the rich capabilities of FOSS4G to foster original research and enable deployment of innovative solutions. The issue covers a broad range of topics, highlighting the diversity of methods, tools, and applications of FOSS4G. The first two papers introduce new tools and applications for vegetation analysis, first as a

component of LiDAR data filtering (Brovelli M.A. and Lucca S.) and then satellite-based application in natural park conservation (Lobo A., Ara F., Baró F., Camino C.). The next three papers focus on the development of novel geoprocessing algorithms and models important for urban environments such as mapping of CO emissions (Migliaccio F., Carrion D., Zambrano C.); a new method for urban street network generalization based on line-of-sight analysis (Wang W.C.); and model of building vulnerability in an earthquake (Baiocchi V., Dominici D., Ferlito R., Giannone F., Guarascio M., Zucconi M.).

The most dynamic development in FOSS4G in recent years has been in the area of Web-GIS applications. Two papers in this special issue focus on Web-GIS technologies, specifically on enhanced GPS positioning as Web Service (Realini E., Yoshida D., Reguzzoni M., Raghavan V.) and on web-based spatial decision support system for accessibility analysis (Burdziej J.). The last paper explores the usage of FOSS4G

libraries in execution and management of complex scientific workflows (McFerren G., van Zyl T., Vahed A.).

The papers in this special issue represent only a small sample of versatility of FOSS4G, but they illustrate the current trend that combines continuing core developments for desktop systems with rapidly expanding Web-GIS capabilities and their transition from mapping towards processing services and workflows.

The publication of this special issue of Applied Geomatics was made possible by the submission of papers of high quality and also adhering to the submission deadline by the authors. The reviewers of this special issue are gratefully acknowledged for their careful scrutiny and constructive suggestions on the manuscripts. Our sincere thanks to Prof. Alessandro Capra, Editor-in-Chief, Applied Geomatics, and the editorial staff for their unstinted support for bringing out this special issue. We sincerely hope that this Special Issue would stimulate many new and innovative ideas for future research and strengthening global partnerships to further FOSS4G.