14TH INTERNATIONAL CONFERENCE ON GEOSTATISTICS FOR ENVIRONMENTAL APPLICATIONS

PROCEEDINGS OF geoENV2022

Andrea Zanini & Marco D'Oria, Editors

UNIVERSITÀ DI PARMA

Andrea Zanini & Marco D'Oria
Editors

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Editors: Andrea Zanini & Marco D'Oria

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Preface

The 14th International Conference on Geostatistics for Environmental Applications (geoENV2022) was held in Italy, at the Campus of the University of Parma. From June 22 to June 24, 2022, over 80 experts on geostatistics gathered to discuss about environmental applications of this discipline.

This book contains the abstracts and extended abstracts submitted to the conference and focusing on geostatistics applied to different fields such as: ecology, natural resources, environmental pollution and risk assessment, forestry, agriculture, geostatistical theory and new methodologies, health, epidemiology, ecotoxicology, inverse modeling, multiple point geostatistics, remote sensing, soil applications, spatio-temporal processes and surface and subsurface hydrology.

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Hans Wackernagel – Mines Paris Tech, Universitè PSL – France

Keynote lectures

Wednesday, June 22, 2022

Carolina Guardiola Albert, Geological Survey of Spain (IGME-CSIC)

Exploitation of InSAR ground movement measurements through geostatistics

Thursday, June 23, 2022

Leonardo Azevedo, CERENA, Instituto Superior Técnico, Universidade de Lisboa, Portugal

Modelling the ocean with acoustic waves: a geostatistical inversion approach

Friday, June 24, 2022

Laura Poggio, ISRIC – World Soil Information, the Netherlands

Geostatistics, machine learning and spatial patterns

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COUPLED SURFACE-SUBSURFACE HYDROLOGICAL MODEL FOR THE ESTIMATION OF NET RECHARGE OF THE KONYA CLOSED BASIN, TURKEY

Onur Cem Yologlu (1)* - Nadim Copty (1) - Izel Uygur (1) - Mehmet Can Tunca (1) - Elif Bal (1) - Buse Yetisti (2) - Irem Daloglu (1) - Ali Kerem Saysel (1)

Bogazici University, Institute of Environmental Sciences, Istanbul, Turkey (1) - Universitat Politècnica de Catalunya, Barcelona, Spain (2)
** Corresponding author: ncopty@boun.edu.tr*

Abstract

The accurate estimation of aquifer recharge is essential for the sustainable utilization of groundwater resources. This task is particularly challenging for large watersheds where the definition of the surface-subsurface system parameters is associated with high level of uncertainty. In this paper a water flow model, based on the coupling of the HYDRUS and MODFLOW computer programs, is developed for the Konya closed basin, one of the major agricultural regions of Turkey. Groundwater levels in the semiarid basin have experienced rapid decline in recent years due to excessive over exploitation. The problem is exacerbated by the large number of unregulated groundwater extraction wells, estimated to exceed 70,000 in number, rendering the estimation of actual groundwater extraction rates highly uncertain. The regional model, covering an area of about 62,000 km2, simulates unsaturated vertical flow through the vadose zone and groundwater flow through the underlying aquifer system. The model combines data collected at different scales including point groundwater level data, meteorological data and pumping test data, as well as land use, surface topography and water content (GRACE) satellite data. To better define the precipitation spatial distribution, cokriging of precipitation and topography data was used. Groundwater extraction data were estimated based on historical agricultural yields and crop water demands. Historical groundwater level data were used as the main calibration parameter. Results show that the model was able to reproduce the observed groundwater level trends of the past 2 decades. Recharge areas are mostly located in the higher elevation regions of the basin with water flowing towards the central portions of the plain where intensive irrigation is located. The modeling results underscore the impacts of the expansion of irrigated lands and the switch to more water-demanding crops on the basin's overall water deficits.

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