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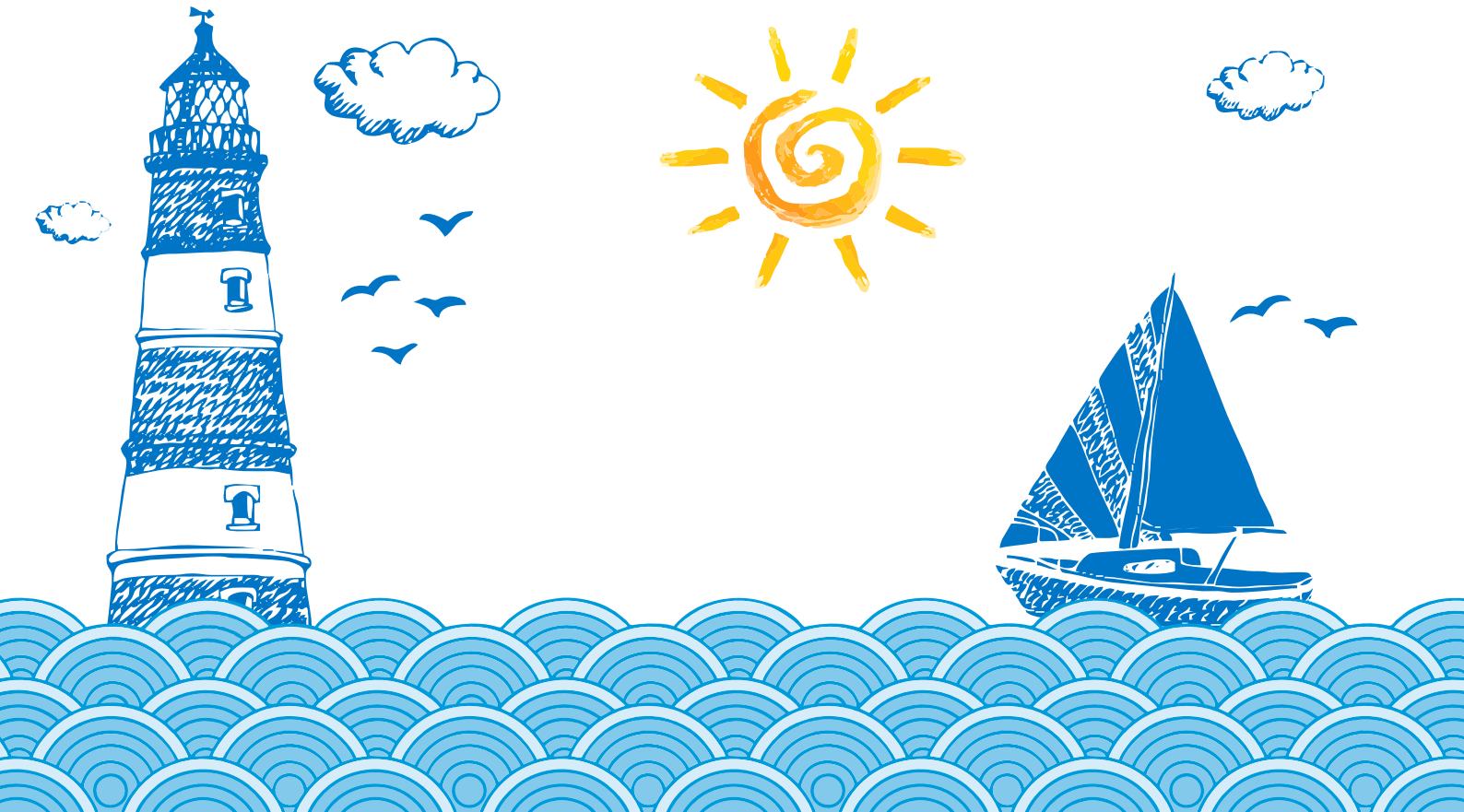
Groundwater Management and Governance

Coping with Uncertainty

Proceedings of IAH2019, the 46th Annual Congress of the International Association of Hydrogeologists, Málaga (Spain), September 22-27, 2019

Spanish Chapter of the International Association of Hydrogeologists (AIH-GE)

J. Jaime Gómez Hernández & Bartolomé Andreo Navarro



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SCIENTIFIC PROGRAMME

Topic 1 - Groundwater assessment and management

Groundwater management should be based on adequate resource assessment and aquifer functioning. Nevertheless, groundwater is in the origin of many conflicts. In many cases, these conflicts arise not due to groundwater availability but to poor management and governance.

Topic 2 - Groundwater and climate change

Countries from temperate zones of the Earth, such as Western Mediterranean countries of both Southern Europe and North Africa, are expected to experience impacts on the sustainability, quantity, quality, and management of water resources. Future scenarios forecast the decline in streamflow reducing reservoir storage for population supply. In this context, groundwater becomes an increasingly strategic resource to meet water demand from urban areas and agriculture.

Topic 3 - Groundwater sustainability and governance

Major changes are ongoing in population growth, human migration, and land use, increasing the stress on the available quantity and quality of water resources. Water demand is increasing particularly in regions where it is already scarce, both for human and agricultural uses. It is important to analyze the sustainability of groundwater use around the world, and especially of some of the largest aquifers in the world. At the current pace, aquifers on which millions of people depend could be depleted in the near future. Can we move from groundwater mining into groundwater usage of renewable resources?
Within this topic will be organized a session on **Groundwater and water security in developing countries (Topic 3.1)**.

Topic 4 - Groundwater footprint and virtual water

Water resources management is an important issue in arid and semi-arid regions. In many cases water conflicts arise not because of the scarcity in water resources but because of improper management. Concepts such as virtual water and water footprint can help in improving current management practices and provide new insights, a new awareness about the importance of the resource. The groundwater footprint has served to bring awareness about the current usage of groundwater and to point out the aquifers whose management is unsustainable. The low number of abstracts submitted to this Topic has been included in related topics.

Topic 5 - Tools, methods and models to study groundwater

This topic deals on the broad spectrum of methodologies and models conventionally applied in Hydrogeology (hydrogeological mapping, hydrodynamic, hydrochemistry, isotopes, tracers, etc.), but particularly to the most innovative ones and to new trends in modelling.

Within this topic several sessions will be organized:

- Topic 5.1 - Dynamic Analogues (TOTAL)
- Topic 5.2 - High island hydrogeology
- Topic 5.3 - Advanced modelling tools for subsurface hydrology: from the vadose zone to deep environments.
- Topic 5.4 - Innovative approaches for understanding groundwater flow systems

Topic 6 - Groundwater, wetlands and natural heritage

Most wetlands, particularly the permanent ones, are groundwater dependent. They are fragile ecosystems that can be located in the recharge or in the discharge areas of aquifers (some can be located in an intermediate position). To recognize the relationship between wetlands and groundwater is crucial for their adequate management and the preservation of the natural heritage to which they belong.

Topic 7 - Karst Hydrogeology

This section deals with the recent advances and novel application of research methods in hydrogeological studies in karst systems. Special emphasis will be focused on issues related to quantity and quality of karst waters, hydrodynamic, hydrochemistry and isotopes. A deeper understanding of tracing techniques by means of fluorescent and natural tracers are key aspects for a more precise conceptualization of carbonate karst aquifers. Additionally, new trends on groundwater recharge and water management as well as modeling methods for simulating flow distribution, solute transport and reactive (coupled) processes will also be highlighted in this topic.

Topic 8 - Groundwater quality and pollution processes

Groundwater usage, once available, very often depends on its quality. Groundwater quality is greatly modified by the geologic substratum, but also it is threatened by human-induced pressures and the appareance of emerging chemicals. Therefore, appropiate groundwater protection and remediation strategies (in case of polluted waters) must be applied for preserving present and future human health and its well-being.

Topic 9 - Groundwater and socio-economic development in Latin-America

Under this heading it is proposed to organize an Ibero-American mini-symposium, specifically targeted to Iberian and Latin-American participants, concerning on topics like mining activities, groundwater monitoring and assessment, socio-economic impact of groundwater.

Topic 10 - Urban groundwater

Groundwater forms a pivotal resource for future cities worldwide, for water, energy, flood mitigation, integrated surface-ground water management, and low carbon, equitable and sustainable cities. All abstracts on presentation of new scientific understanding of key processes of urban groundwater resources, contamination impacts and opportunities, are welcomed, as well as interdisciplinary presentations on urban planning, groundwater management and use.

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Hydrodynamic modeling of Ranney wells in Hungary

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The riverbank filtration systems are playing a major role in water supply of Hungary. The 35 -40 % of Hungary's water supply and about 75 % of our perspective water sources rely on these riverbank filtrated water sources.

In our work we deal with the seepage conditions of horizontal wells. Nowadays this well type, developed by Leo Ranney, is the most used water extract equipment for riverbank filtrated systems all over the world. The advantage of these well types that with the horizontal placement of the screens, we can increase the effective screen area, and we can provide bigger flowrate than the vertical wells in these geological situations. As we can experience, extreme water levels can be formed in our rivers, which can have the effect on the seepage conditions, and water treatment mechanism of riverbank filtrated systems. The MODFLOW software's Multi Node Well 2 (MNW2) module can handle the hydrodynamic calculations of horizontal, and angled wells. Our aim is to test the suitability of MODLOW software package's MNW2 module, for hydraulic modeling of Ranney wells. As a first step we would like to calibrate the MNW2 module, and for this we use other independent calculation methods. After the calibration we would like to use this module to determine real seepage conditions in existing riverbank filtrated systems.

With the help of hydraulic simulation, considering the extreme water levels of the rivers, we can optimize the operation of these type of horizontal wells, and we can react on extreme hydrological conditions in water supply.