

## ***Interactive comment on* “The role of integrated high resolution stratigraphic and geophysic surveys for groundwater modelling” by S. Margiotta et al.**

### **Anonymous Referee #1**

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1. DOES THE PAPER ADDRESS RELEVANT SCIENTIFIC QUESTIONS WITHIN THE SCOPE OF HESS ?

The general purpose of the paper can be considered consistent with the wide scope of HESS, because it regards the aquifer modelling in a coastal contaminated area by means of a multidisciplinary integrated approach.

2. DOES THE PAPER PRESENT NOVEL CONCEPTS, IDEAS, TOOLS, OR DATA ?

Original contributions can be recognised more in the data than in concepts, ideas and

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tools which are usual for this type of study.

### 3. ARE SUBSTANTIAL CONCLUSIONS REACHED ?

The conclusions reached are not very substantial, tending more to the valorisation of a multidisciplinary approach than to the reconstruction of a consistent recharge/flow/contamination model of the surficial aquifer, even if in a conceptual manner only.

### 4. ARE THE SCIENTIFIC METHODS AND ASSUMPTIONS VALID AND CLEARLY OUTLINED ?

The conceptual hydrogeological model appears weak especially for the hydraulic characterisation of the aquifers more than for their hydrostratigraphic and geometrical characterisation. In fact, only broadly ranging hydraulic conductivity data and no hydraulic transmissivity estimations of the aquifers were mentioned in the paper. The fundamental purpose of the paper, aimed to the integration of different methods, appears to fail regarding the incorporation of the results of geophysical methods in the conceptual hydrogeological model, which has been implemented in Groundwater Vistas. The use of the geophysical methods (ERT) for groundwater contamination detection appears to be more postulated than demonstrated as for the case showed in Fig. 14, in which a positive resistivity anomaly (A) was interpreted as due to pollution, without any other supporting data (stratigraphical and hydrogeochemical). Moreover it seems to be above all critical the fact that a contaminant plume increases aquifer resistivity instead of decreasing it.

### 5. ARE THE RESULTS SUFFICIENT TO SUPPORT THE INTERPRETATIONS AND CONCLUSIONS ?

According to the lack of a consistent hydrogeological approach, the results can be considered partially relevant.

### 6. IS THE DESCRIPTION OF EXPERIMENTS AND CALCULATIONS SUFFICIENTLY

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COMPLETE AND PRECISE TO ALLOW THEIR REPRODUCTION BY FELLOW SCIENTISTS (TRACEABILITY OF RESULTS) ?

No. It is not clear what aquifers'hydraulic data (hydraulic conductivity, hydraulic transmissivity and effective porosity), initial water table condition and steady or transitory conditions were considered to run the groundwater model. Moreover, a sensitivity analysis of the model to hydraulic parameters should be shown.

7. DO THE AUTHORS GIVE PROPER CREDIT TO RELATED WORK AND CLEARLY INDICATE THEIR OWN NEW/ORIGINAL CONTRIBUTION ?

Within the text, there are sufficient references regarding general geological and hydrogeological aspects and the advances reached by Authors in this paper appear to be clear respect the previous knowledge.

8. DOES THE TITLE CLEARLY REFLECT THE CONTENTS OF THE PAPER ?

No. The present title has a strong methodological character, that contrasts with the routine methods usually applied in hydrogeological studies. It is possible to suggest focusing the title about the influence of the urban structure "Asse Attrezzato" on the groundwater flow in the surficial aquifer.

9. DOES THE ABSTRACT PROVIDE A CONCISE AND COMPLETE SUMMARY ?

Yes, but with the limitations inherent to the paper.

10. IS THE OVERALL PRESENTATION WELL STRUCTURED AND CLEAR ?

The presentation is regularly structured for what concerns the geological and stratigraphical characterisation, but it is not well structured regarding the integration of the geophysical methods in the conceptual hydrogeological model, which was implemented in Groundwater Vistas.

11. IS THE LANGUAGE FLUENT AND PRECISE ?

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Yes, it is generally good, even if in some cases the scientific terms and the construction of phrases are incorrect and very close to the Italian form. For example: p. 2863, r. 14) in the subsoil; p. 2863, r. 20) conducted by us ; p. 2868, r. 16) in these sediments circulate the waters of the deep groundwater body ; p. 2871, r. 11) quadrate; p. 2871, rr. 14 and 17) quota and quotas. It is strongly recommended a revision of the text by a technician/scientist mother tongue.

## 12. ARE MATHEMATICAL FORMULAE, SYMBOLS, ABBREVIATIONS, AND UNITS CORRECTLY DEFINED AND USED ?

There are no mathematical formulae, symbols, abbreviations and units to evaluate.

## 13. SHOULD ANY PARTS OF THE PAPER (TEXT, FORMULAE, FIGURES, TABLES) BE CLARIFIED, REDUCED, COMBINED, OR ELIMINATED ?

Yes, all the hydraulic data regarding the aquifers have to be shown clearly in appropriate tables and figures as well as the results of the groundwater model calibration.

## 14. ARE THE NUMBER AND QUALITY OF REFERENCES APPROPRIATE ?

Yes, for the initial part. Instead they are poor for the groundwater model.

## 15. IS THE AMOUNT AND QUALITY OF SUPPLEMENTARY MATERIAL APPROPRIATE ?

No. Figures have to be graphically improved and the more figures an tables have to be added, especially for what concerns the hydraulic characterisation of the aquifers.

## GENERAL COMMENT

The general purpose of the paper can be considered consistent with the wide scope of HESS, because it regards the aquifer modelling in a coastal contaminated area by means of a multidisciplinary integrated approach. Original contributions can be recognised more in the data than in concepts, ideas and tools which are usual for this type of study. The conclusions reached are not very substantial, tending more to the

valorisation of a multidisciplinary approach than to the reconstruction of a consistent recharge/flow/contamination model of the surficial aquifer. The conceptual hydrogeological model appears weak especially for the hydraulic characterisation of the aquifers more than for their hydrostratigraphic and geometrical characterisation. The fundamental purpose of the paper, aimed to the integration of different methods, appears to fail regarding the incorporation of the results of geophysical methods in the conceptual hydrogeological model, which has been implemented in Groundwater Vistas. The present title has a strong methodological character, that contrasts with the methods used and usually applied in hydrogeological studies. It is possible to suggest focusing the title about the influence of the urban structure "Asse Attrezzato" on the groundwater flow in the surficial aquifer.

The paper appears generally poor, especially for the aquifer hydraulic characterisation and for the groundwater model implementation. Therefore the paper cannot be published in the present form, but it should be submitted to another round of review, after the integration with new data regarding aquifer hydraulic characterisation and groundwater modelling.

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