

## ***Interactive comment on “Transport at basin scales: 2. Applications” by A. Rinaldo et al.***

### **Anonymous Referee #4**

Received and published: 10 November 2005

#### General comments:

This paper belongs to a set of two, which are devoted to flow and solute transport modelling at the basin scale. The first paper provides the theoretical background and two examples, while the second presents a comprehensive application of the theory to a basin discharging towards the Venice lagoon. This splitting in two parts is justified due to the large amount of material covered.

The “application” paper to be discussed here is devoted to the transport of nitrate, i.e. nonpoint sources are treated. The basin is quite complex, which is underpinned by the fact that a total of 23 pathways has to be studied. Validations of the calibrated model support the applicability of the Lagrangian approach presented in the first paper.

The manuscript is in general well written and the authors succeed in presenting the many different facets of the studied basin and the obtained results in a clear and structured manner. The topic is of high interest in the hydrosciences as catchment-scale

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and basin-scale problems receive increasing attention concerning water quantity and water quality issues. The paper represents an important contribution to these issues as it may serve as a very helpful example how to deal with such large-scale flow and transport modelling tasks. Therefore, the manuscript certainly deserves publication. I am recommending minor revision according to some suggestions / questions outlined below.

#### Specific comments:

1. p. 1644, l. 25 and Fig. 1, 9<sup>th</sup> line of caption:

Please indicate why site A or node A represent an “inner” gauging station or an “inner” node, respectively.

1. In Tab. 2 season-dependent values for overall porosity and overland velocity in agricultural areas are given. Please spend a few words to explain where these seasonal differences come from.

#### Technical corrections:

1. p. 1642: l. 23-26:

Let me suggest to reword this sentence as follows: “The observation that the main part of annual loads from nonpoint sources is carried by a few flood events rather than during normal hydrologic conditions is particularly relevant to our modelling approach but was somewhat little acknowledged up to now.”

1. p. 1643, l. 23: “Lagrangian” instead of “lagrangian”

2. p. 1643, l. 26: “Dese” instead of “Dese-Zero”?
3. p. 1644, l. 4: “geomorphically” instead of “gemorphically”
4. p. 1644, l. 9:

Please do not mention Fig. 1a here as listed river names are not given in this figure

1. p. 1645, l. 21: “have” instead of “has”
2. p. 1647, l. 2: skip “a”
3. p. 1647, l. 8: Should “ground truths” be replaced by “surface information”?
4. p. 1648, l. 17 and 20: “vapour” instead of “vapor”
5. p. 1650, l. 8:

“each considerably smaller in size than ...” instead of “each of size considerably smaller than ...”

1. p. 1650, l. 12: “Gaussian” instead of “gaussian”
2. p. 1650, l. 27: “transform” instead of “Transform”
3. p. 1652, l. 16 and Tab. 2: “ $i = 1 \rightarrow 23$ ” or “ $i = 1, \dots, 23$ ” instead of “ $i = 1, 23$ ”

(A similar occurrence is found in the caption of Tab. 1 for the index  $k$ .)

1. p. 1652, l. 17: “models” instead of “model”

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2. p. 1652, l. 19: “takes place” instead of “take place”
3. p. 1653, l. 13: “in terms of” instead of “in term of”
4. p. 1654, l. 2: What is meant by “*h*”?
5. p. 1656, l. 6: “ Figs. 8 to 10” instead of “Figs. 8 and 9 to 10”
6. p. 1656, l. 17: “Penman-Monteith” instead of “Penman-Montieth”
7. p. 1656, l. 18: “affect” instead of “affects”
8. p. 1656, l. 24: “consist” instead of “consists”
9. p. 1657, l. 1: “half hour” instead of “half-hour”
10. p. 1657, l. 4: “s” as part of a unit should not be in italics
11. p. 1658, l. 8: “nitrate” instead of “nitrates”
12. p. 1658, l. 10: skip “to”
13. p. 1658, l. 27 – p. 1659, l. 2:

Let me suggest to reword the final part of this sentence as follows: “. . . , in particular as far as the maximum flux concentrations and the N-NO<sub>3</sub> loads transferred to the Venice lagoon are concerned.”

1. p. 1659, l. 17 and p. 1660, l. 11: “Monte Carlo” instead of “Montecarlo”
2. p. 1660, l. 12: “N-NO<sub>3</sub>” should not be in italics
3. p. 1660, l. 13: “papers” instead of “Papers”

4. p. 1661, l. 5: “source areas” instead of “ sources areas”
5. p. 1661, l. 14/15 and Fig. 11, 1<sup>st</sup> line of caption: “Monte Carlo” instead of “MonteCarlo”
6. Tabs. 1 – 3 contain some Italian words like “legenda”, which should be translated into English.
7. Tab. 1, 2<sup>nd</sup> line of caption:

It is said that “channels are label(l)ed in the top inset” of Fig. 1a but this does not seem to be the case.

1. Tab. 1, 8<sup>th</sup> line of caption:

“hydrodynamic dispersion coefficient” instead of “hydrodynamic dispersion”

1. Tabs. 2 and 3: Top lines “FLOW” and “TRANSPORT” could be deleted.
2. Tab. 2:  $L_i$  should be explained after the formula given in the bottom line.
3. Tab. 3: “thickness” instead of “tickness” (three times)
4. Fig. 2, 2<sup>nd</sup> line of legend: “Agriculture” instead of “Agricoltura”
5. Fig. 3, 3<sup>rd</sup> line of caption: “employs” instead of “employed”
6. Fig. 4, 3<sup>rd</sup> line of legend: Reference should be with respect to Fig. 1 instead of Fig. 2.
7. Fig. 4: Please add length scale.

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8. Figs. 6 and 9:

Please indicate in the captions that numbers given in the legends refer to the respective insets. It would also be helpful to add length scales to the insets

1. Fig. 9, 4<sup>th</sup> line of legend: Please add “(dotted line)” to the description of item i).

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Interactive comment on Hydrology and Earth System Sciences Discussions, 2, 1641, 2005.

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