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Differences between evolution of Titan's and Earth's rivers – further conclusions

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1.Abstract
Titan is the only celestial body, beside the Earth, where liquid is present on the surface. Liquid forms a number of lakes and rivers. In our research we use numerical model of the river to determine differences of evolution of rivers on the Earth and on Titan. We have found that transport of sediments on Titan is more effective than on Earth for the same river geometry and discharge. We have found also the theoretical explanations for this conclusion.

2.Introduction
Titan is a very special body in the Solar System. It is the only moon that has dense atmosphere and flowing liquid on its surface. The Cassini-Huygens mission has found on Titan meandering rivers, and indicated processes of erosion, transport of solid material and its sedimentation. This paper is aimed to investigate the similarity and differences between these processes on Titan and the Earth.

3. Basic equations of our model
The dynamical analysis of the considered rivers is performed using the package CCHE modified for the specific conditions on Titan. The package is based on the Navier-Stokes equations for depth-integrated two dimensional, turbulent flow and three dimensional convection-diffusion equation of sediment transport.

4. Parameters of the model
We considered our model for a few kinds of liquid found on Titan. The liquid that falls as a rain (75% methane, 25% nitrogen) has different properties than the fluid forming lakes (74% ethane, 10% methane, 7% propane, 8.5% butane, 0.5% nitrogen). Other parameters of our model are: inflow discharge, outflow level, grain size of sediments etc. For every calculation performed for Titan's river similar calculations are performed for terrestrial ones.

5. Results and Conclusions
The results of our simulation show the differences in behaviour of the flow and of sedimentation on Titan and on the Earth. Our preliminary results indicate that transport of material by Titan's rivers is more efficient than by terrestrial rivers of the same geometry parameters. We also distinguish that suspended load is the main way of transport in simulated Titan's conditions. In future we will do the experimental modelling in sediment basin to confirm results from computer modelling.

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