Geophysical Research Abstracts
Vol. 15, EGU2013-14136-1, 2013
EGU General Assembly 2013

Upon erosion processes and dynamic condition of river bed

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This work deals with soil erosion processes due to the water streams in river beds and furrows in irrigation and concerns the interaction between river bed or soils and water flow. The dimensioning of the hydraulic processes and phenomena, including the processes causing erosion of the river beds and soils and the permanent alteration of their state in practice is done based on the flow velocities averaged-out in time. It is known however that the real, actual velocities are pulsation velocities, which are irregularly variable in time and by size and nature different from the averaged-out. The erosion processes and condition of river beds depending on the hydrodynamic energy indices like as flow turbulent intensity [U+F074] and probability coefficient M of the water flow and its pulsation velocities. This condition is most often expressed in terms of the time-averaged velocities which are fictitious in their essence. The real velocities which cause erosion are pulsation velocities and irregularly variable, with varying repetition and quantity of the probability coefficient M.
Based on analytical studies, there is established a range of the optimal meanings of M, resp. of the utmost non-furrowing velocity for which the soil has sufficient protection against erosion for a flow velocity that meets the practical requirements.
On this basis a hydrodynamic method is established and proposed for determination and prognostication of the state of the river beds and can serve for the prognostication and prevention of irrigation erosion process and the engineering facilities upon high waters and floods. It is used to determine and prognosticate the condition where the bed is at rest, at utmost equilibrium or in process of erosion – lowering upon the passage of a high wave or upon high water.

Keywords: soil erosion, hydrodynamics, non-furrowing velocity, pulsation velocities, flow in natural beds, flood prevention.