Water circulation between solum and weathered layer examined by Tank Model analysis related to weathering reaction

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Tank Model is a discharge analysis model to make an accurate estimate of low water discharge from the river basin. Solum covering the ground, had been built up as the result of activity of natural vegetation and microbe. The physical property of solum is characterized by large porosity and small density contrary to the weathered layer. Difference of physical property between solum and weathered layer corresponds to first tank and second tank in Tank Model. In the study we prepared model distribution of one day precipitation from average return period of one day precipitation. And with the model distribution of one day precipitation, we calculated infiltration, upper migration of water caused by transpiration and storage in each tank, applying Tank Models which represent the discharge of River Ayusawa and River Kawauchi in the same Sakawa river system. Mode of water circulation cycle between first tank and second tank caused by regular intervals of small rain and fine day was presented using the model distribution of one day precipitation. The result of Tank Model calculation in case of River Kawauchi, 1000mm average annual precipitation, is showed in Fig.1 Carbon dioxide was produced as the result of activity of microbe in the A layer, and dissolved into water in first tank . Then it was transported into second tank by unsaturated infiltration. At first cycle of infiltration, density of hydrocarbonic acid ion is diluted by remaining water in the second tank caused by prior big rain. But dilution rate of density of hydrocarbonic acid ion decrease at next cycle and the initial density is kept at third cycle. Increase of the cycle number will bring acceleration of chemical weathering.

Keywords: solum, water circulation, Tank Model, Sakawa River System, average annual precipitation, chemical weathering