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Implementation of New Subgrid Runoff Parameterization in NWP models

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ýLand Surface Schemes that are one of the most important components in climate and ýnumerical weather prediction (NWP) models have concentrated on surface energy and ýwater budgets. Water budget in which precipitation is divided to evapotranspiration, ýrunoff and changing in soil moisture varies by different parameterization among land ýsurface schemes.ý Runoff is one of the major components of the water budget and unrealistic simulation of ýrunoff can have effects on other components in water budget; consequently on the laten ýheat flux between atmosphere and land surface. Different representations of runoff in ýNWP models are relatively simple because runoff is conceptually difficult to represent in ýthose models. Topography has a major control on the distribution of soil moisture and ýrunoff. Hence, the main objective in this study is, which parameterization of runoff is ýbest represented the observed river flows in NWP models.ý The impact of new runoff parameterization is carried out by using NOAH LSM in ýWeather Research and Forecasting‘(WRF) model coupled to the Simple TOPMODEL ýý(SIMTOP) algorithms considered surface runoff and subsurface runoff as exponential ýfunctions of water table depth. In NOAH LSM, runoff is represented by using simple ýwater balance (SWB) model in which maximum infiltration represented by a nonlinear ýfunction. Also, surface runoff occurs when intensity of precipitation exceeds soil's ýmaximum infiltration.ý The SIMTOP is like TOPMODEL that implemented topographic information (expressed ýby topographic index) and the nature of soil (expressed by reducing hydraulic ýconductivity with soil depth). The SIMTOP is simpler than TOPMODEL because it ýreduces parameters that are needed to be calibrated. The surface runoff is the sum of two ýcomponents, the first generated by infiltration excess (Horton mechanism) and the ýsecond, refers

to variable contributed area by saturation excess (Dunn mechanism). The ýSIMTOP's subsurface runoff is represented due to topographic control, bottom drainage ýand saturation excess. ý The NOAH-SIMTOP that is the coupled model of NOAH and SIMTOP, is implemented ýwith four soil layers and unconfined aquifer that is utilized in the part below the model ýsoil column to represent realistic concept of discharge processes. The model results will ýbe compared with the uncoupled model (NOAH LSM) and observed stream flows in ýKaroon river in south west of Iran.ý