We highly appreciate your valuable effort in evaluating our paper and your skilled and helpful comments. Please find our reply below:

General comments

This study evaluates the possibility to use MODIS data to estimate the extent and depth of shallow groundwater tables through the use of the Surface Energy Balance System (SEBS) model. In a companion paper the authors demonstrated the clear link between shallow groundwater and the surface energy balance. This case study correlates results of SEBS to field measurements of groundwater and soil moisture.

- Although the authors clearly illustrate and analyse the correlations between groundwater depth, soil moisture and surface energy balance components, it is not clear how SEBS can be operationally used to estimate shallow groundwater depth.
- SEBS results were useful to demonstrate the spatial effect of shallow groundwater depth on surface energy fluxes. This is valuable in bringing that effect within climate studies and land surface models.

- A validation of mapping groundwater depth and extent based on an independent set of measurements or another study area has not been done. Therefore, the question whether MODIS can be operationally used to estimate the extent and depth of shallow groundwater tables remains partially unanswered.
- We consider our investigation in this case study as one step in the way to the operational exploitation of satellites in groundwater studies and modeling. There are still many efforts to be exerted to reach this aim. In our future view of this process, a fully transient 3D groundwater model should be involved, and should be capable of simulating also the dynamic interaction between water table and surface moisture and temperature. This model can be then supported by accompanying time series of thermal imageries. We will emphasize this in the manuscript.

- Also the accuracy of mapping shallow groundwater depth with this remote sensing approach remains unclear. The paper can be improved by discussing these issues in more detail.
- We will enrich the paper by this discussion.

Specific comments:

- Page 8676, lines 21-22: explain the generic type of device used to measure soil moisture (e.g. TDR, FDR, neutron probe), how the device was calibrated and its measurement accuracy.
- The Hydra Probe is a Frequency Domain Reflectometer (FDR). It uses a reflected electromagnetic radio wave in soil to determine the dielectric constants. It employs patented algorithms to convert the signal

response into the dielectric constants and thus the soil moisture and soil electrical conductivity. It has four calibrations that provide good performance in most mineral soils regardless of texture or organics. The calibrations are sand, silt, clay and loam. The loam soil calibration is the default calibration and is suitable for silt loams, loams, clay loams, silty clay loams, sandy clay loams, sandy loams, and some medium textured clays. It has an accuracy of +/- 0.03 (m^3m^{-3}) and a precision of +/- 0.003 (m^3m^{-3}). We will add a brief description of this sensor.

- Page 8676, line 24: give more details on the "simple sounding device" used to measure the water table depth. Give name of the device, generic name of the technique and calibration method.
- The simple sounding device is manufactured locally at the General Organization for Land Reclamation. It consists of a metal cup that makes a sound when its edge touches the water surface. This cup is attached to a measuring tape. Both the absolute level and the height above ground of the top of the casing are already known. By measuring the distance between the water surface and the top of casing both water level and water depth are known. The device precision is about +/- 0.5 cm. It is not that sophisticated device, but it is suitable for shallow depths prevailing in such areas.

- In section 4.5 is stated that equation 11 was originally developed for the vadose zone. Can you adapt the equation for the derivation of top soil moisture based on your field data and SEBS results?
- This is correct. Equation 11 was not specifically tailored to the top soil; however, it was useful to validate the distribution pattern of soil moisture. Developing this equation to express the top soil moisture is an interesting topic to be examined in upcoming studies. Obviously, this requires further measurements and correlation investigations.

Technical corrections
In general the paper is written in clear English and well structured. However, the use of articles ("the" or "a(n)") in the paper is not always correct:

- Page 8672, line 7: change to "...area within the Al-Balikh..."
- Page 8673, line 2: change to "A shallow water table..."
- Page 8674, line 20: change to "...mapping the shallow groundwater effect..."
- Page 8674, line 29: change to "...within the Al-Balikh..."
- Page 8675, line 14: change to "...within the Al-Balikh..."
- Page 8676, line 12: change to "...was a dry cold..."
- Page 8677, line 3: change to "...per day, the MODIS instrument..."
- Page 8677, line 11: change to "...Using the MODIS Reprojection..."
- Page 8678, line 7: change to "...The SEBS algorithm..."

- Page 8679, line 3: change to "...temperatures at the land surface..."
- Page 8679, line 11: change to "...temperature near the land..."
- Page 8682, line 17: change to "...fluxes had a sharper..."
- Page 8682, line 18: change to "...to follow the water table..."
- Page 8682, line 25: change to "...at the land surface..."
- Page 8682, line 27: change to "...and diminishes the net radiation..."
- Page 8685, line 29: change to "...mapping the shallow groundwater..."

Other technical corrections:
- Consider changing page 8672, lines 5-9 to: "To inspect the capacity of MODIS for detecting the shallow groundwater effect on land surface temperature and the surface energy balance in an area within the Al-Balikh River basin."
- Page 8674, line 1: change to "...for vegetation effects..."
- Page 8674, line 7: change to "...it may be worth..."
- Page 8674, line 14: change to "...changing shallow groundwater effects..."
- Page 8675, line 6: replace "shot" with "acquired"
- Page 8676, line 14: change to "...at nighttime and...at daytime."
- Page 8677, line 13: change to "...resampled to 1km..."
- Page 8677, line 15: provide reference for ILWIS
- Page 8677, line 18: change "temperature" to "land surface temperature"; change "indexes" to "indices"
- Change caption 3 to "The Surface Energy Balance System" In this section the units of the parameters and variables are missing.
- Page 8678, line 4 and 8: change "indexes" to "indices"
- Page 8678, line 13-14: Missing link between paragraph and equation 1.
- Page 8681, lines 1-6: describe the procedure fo cross tabulation in a generic way and not software specific
- Page 8682, line 17: fig.8 should be fig. 9
- Page 8682, line 24: change "Investigating the reason behind this phenomenon..." to "Investigating the cause of this phenomenon..."
- Page 8682, line 25: change to "...areas suffer from soil salinity..."
- Page 8683, line 13: R2 should not be typed italic
- Page 8685, line 1: formulate more subtle "...proved to be an excellent choice..."
- Page 8685, line 3: Reformulate "Shooting the area...", e.g. "Acquiring images over the area..."
- Fig. 5: use 2 digits on y-axis label
- Fig. 7: change in caption "...temperatures at 17 January..." to "...temperatures on 17 January..."
- Many thanks for your hard effort and careful inspection of our manuscript. Certainly these corrections will improve it.