Replay to Reviewer 2

Clearly, there is a strict analogy between space and time, at least in the case of one-dimensional space. Hence, under the hypothesis of isotropy, analytical methods are to a broad extent equivalent. Typically, time series analysis allows us to analyse spatial structure in terms of auto-correlation functions and generalisation of state-space models. For this particular method of regression in the time and space domain, unlike the methods of kriging and cokriging (Vieira et al., 1983) the assumption of stationarity of observations is not required.

1) **Justification of isotropy hypothesis for θ and h series of our experiment**

In the isotropic case the structure of series in question is usually very straight forward and can be approximated by an AR(1) given by $Z_t = \phi Z_{t-1} + w_t$, or in the anisotropic case, by a SAR(1) model given by $Z_t = \phi_1 Z_{t-1} + \phi_2 Z_{t+1} + w_t$.

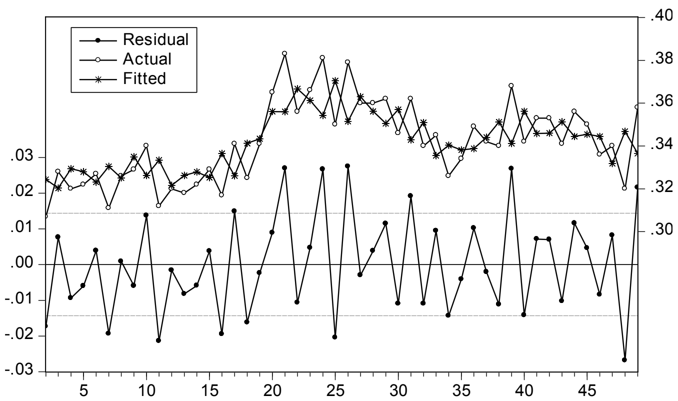
We will show by means of calculation reported below that if $\phi_1 = \phi_2$ than the SAR(1) reduces to the AR(1) model.

Model estimation (θ_3 serie)

Dependent Variable: θ_3
Method: Least Squares
Sample (adjusted): 2 49
Included observations: 48 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.085814	0.041861	2.049984	0.0462
θ_3(-1)	0.395646	0.140920	2.807588	0.0074
θ_3(1)	0.353370	0.148806	2.374701	0.0219

R-squared	0.456772	Mean dependent var	0.341625
Adjusted R-squared	0.432628	S.D. dependent var	0.019076
S.E. of regression	0.014369	Akaike info criterion	-5.587037
Sum squared resid	0.009291	Schwarz criterion	-5.470087
Log likelihood	137.0889	Hannan-Quinn criter.	-5.542841
F-statistic	18.91907	Durbin-Watson stat	2.957367
Prob(F-statistic)	0.000001		



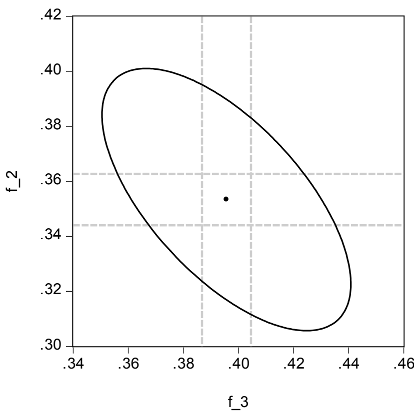


Figure 1a: signal and noise for θ; **1b:** 95% confidence region of ϕ_1 and ϕ_2 parameters.

Model estimation (h serie)

Dependent Variable: h_3
Method: Least Squares
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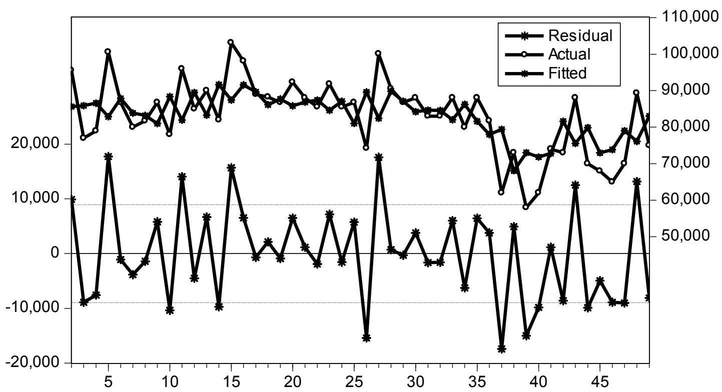
Sample (adjusted): 2 49
Included observations: 48 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	29088.27	12629.00	2.303292	0.0259
$h_3(-1)$	0.331742	0.134150	2.472924	0.0172
$h_3(1)$	0.317556	0.137405	2.311101	0.0255

R-squared	0.290757	Mean dependent var	83018.23
Adjusted R-squared	0.259235	S.D. dependent var	10382.31
S.E. of regression	8935.811	Akaike info criterion	21.09398
Sum squared resid	3.59E+09	Schwarz criterion	21.21093
Log likelihood	-503.2556	Hannan-Quinn criter.	21.13818
F-statistic	9.223967	Durbin-Watson stat	2.748824
Prob(F-statistic)	0.000439		



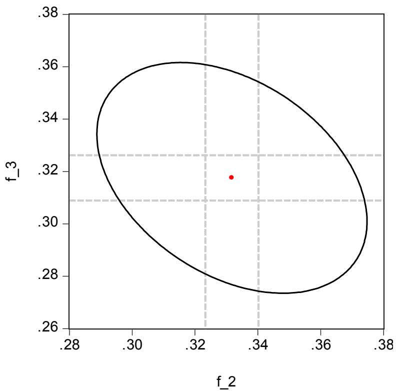


Figure 2a: signal and noise for h serie, **2b:** 95% confidence region for f_1 and f_2 parameters.

We note from the tables and figures reported, that the estimated ϕ_1 and ϕ_2 parameters are statistically identical. This implies that the soil water status measured in our experiment, in terms of volumetric moisture content θ and soil water potential h, has an isotropic distribution and therefore SAR and SARMA models reduce to AR and ARMA models on the transect which can be analyzed by means of typical statistical analysis of the time series.

2) Bivariate analysis

Consistent with the objective of analyzing the parameters in question has a bivariate dynamic system and statistically modelling their intrinsic variability in space, attempts will be made to verify once again the usefulness of the multivariate approach based on the use of the state-space models. In our case soil water status under transient condition (drainage without evaporation) can be described with sufficient accuracy by suitable resolution of space mash along the examined transects. Both used sensor (TDR and tensiometer) cannot be placed to closer distance (<30 cm) due to interference. However is useful to remember that soil water potential h is a continuous function in the flow field.

Best regards the Authors