General comments

This paper presents the application of common statistical (correlation analysis and regression) and geostatistical (residual kriging) techniques to the study of relationship between chloride deposition and potential covariates (coastal distance, elevation, slope angle and orientation), followed by the mapping of chloride deposition and concentration. Both types of techniques rely on different assumptions, a fact that has been overlooked by the authors. In particular, the tests of hypothesis regarding the significance of correlation coefficients are based on the assumption of spatial independence of observations, which is invalidated by the spatial structure of the semivariogram of Figure 6a. Traditional linear regression also assumes the stationarity of the regression coefficients throughout the study area, which is not always appropriate. Other techniques, such as geographically-weighted regression and kriging with an external drift, provide ways to incorporate the spatial coordinates of observations directly into the correlation analysis and to account for spatially varying impact of covariates. The most critical issue in the paper is the uncertainty map displayed in Figure 7d. Instead of adding up standard deviations (a quantity that is not additive), the authors should have added up variances, then compute the square root of that sum. This mistake led to an overestimation of the uncertainty intervals, which explains the conservative nature of uncertainty measures noticed by the authors.

Specific comments

The cross-validation study should be better explained. Traditionally, one observation is discarded at a time and re-estimated using the remaining observations and the semivariogram model fitted to the entire dataset. It is unclear whether the authors have computed a new semivariogram and conducted a new regression each time one observation was discarded.

Technical corrections

1. Page 5860, line 23. Write “significantly associated”.
2. Page 5861, line 24. The authors should clarify what they mean by “direction kriging”.