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Supplement of

Brief communication: Seasonal prediction of salinity intrusion in the Mekong Delta

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Supplement S1 – data coverage of salinity measurements

As described in the main article, the salinity measurement in the Vietnamese Mekong Delta (VMD) are operationally collected during the dry season from December to May or June. However, the measurements are not collected continuously, but only for a number of days in a row, with some days without measurements in between. On the days with measurements, 12 water samples are taken per day (2-hourly sampling interval) for laboratory analysis of salinity. Figure S1 shows the time coverage of salinity measurements at Son Doc:

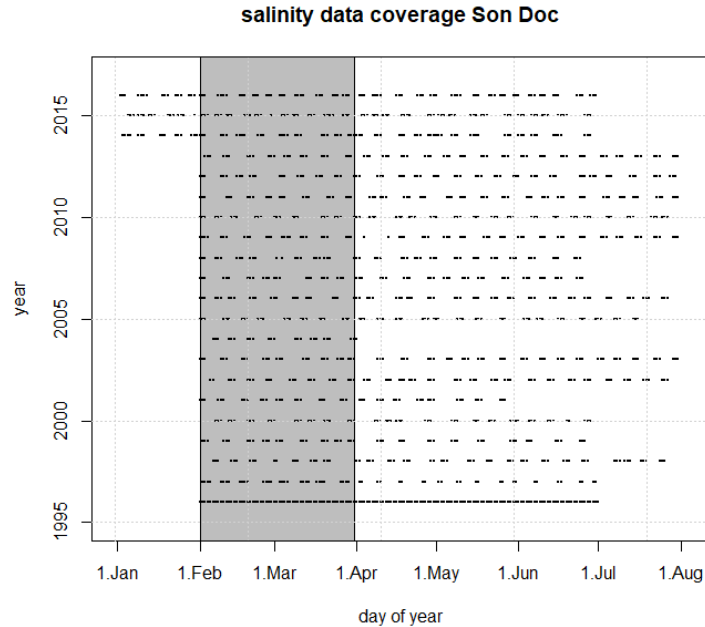
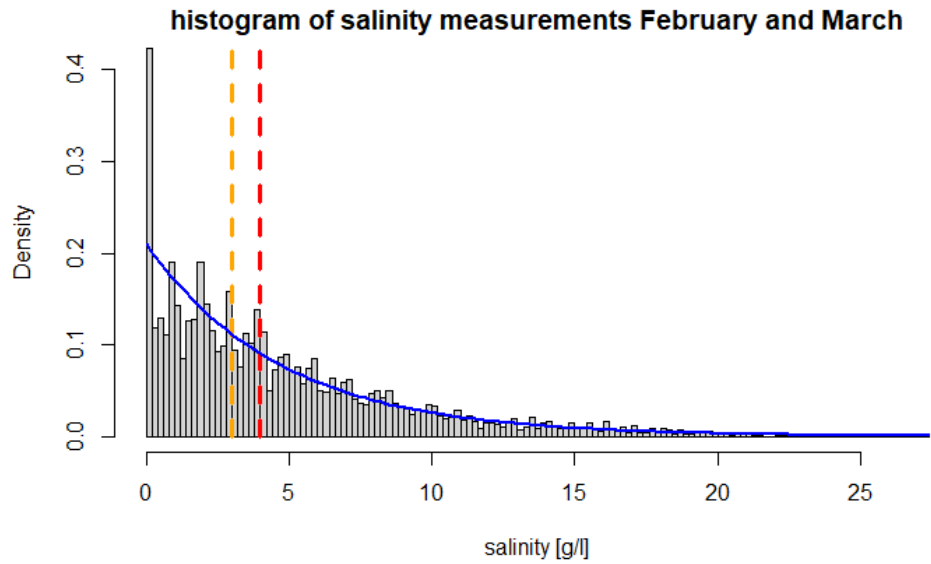


Figure S1: Days with salinity measurements at gauge Son Doc from 1996 to 2016. Every dot represents a day with measurements, i.e. 12 samples at 2-hour intervals. The shaded area highlights the months February and March, for which the mean salinity was calculated and used as predictand in the forecast model.

Figure S1 shows that the measurements are almost similarly distributed during February and March (the grey shaded area) in the different years. The mean salinity in February and March, which is the predictand of the forecast model, is calculated from these 2-hourly measurements. The mean number of samples in February and March from 1997 - 2016 is 310 samples with a standard deviation of 38. These sample statistics along with the similarity of the temporal sampling shown in the figure above means that the sampling schemes (in terms of numbers and schedule) of the individual years are well comparable, and a bias caused by the sampling scheme is unlikely. The exception is the year 1996, which has continuous measurements without breaks. In order to test a possible bias in the 1996 data in relation to the other years, the 1996 data was resampled 1000 times with the mean number of samples of the other years (i.e. 312 samples of 719 samples in February-March 1996). The resampled mean FebMar salinity in 1996 is 3.28 g/l, which is practically identical to the mean of all samples (3.27 g/l). Therefore we can reject the assumption of a bias in the data introduced by the sampling scheme.

25 **Supplement S2 – distribution of predictand**

Figure S2 shows the distribution of the 2-hourly salinity measurements in February and March for the period 1996 – 2016. The distribution is exponential, with a rate of 0.2102293. The p-value of a one-sample Kolmogorov-Smirnov test is $6.973e^{-12}$, thus the hypothesis of an alternative distribution is rejected.



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Figure S2: Histogram and fitted exponential distribution (blue line) of the salinity measurements in February and March in the period 1996 – 2016. The orange dotted line indicates the 3 g/l threshold, the red dotted line the 4 g/l threshold.

According to the exponential distribution of the FebMar salinity data, the thresholds of mean salinity of 3 g/l and 4 g/l used as predictand are exceeded by 53% and 43% of the time in February and March, respectively.

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40 **Supplement S3 – table of predictors**

The following ENSO and SSI predictors were tested in the model development:

Predictor	April	May	June	July	August	September	October	November	December
ENSO1	X	X	X	X	X	X			
ENSO3	X	X	X	X	X	X			
ENSO4	X	X	X	X	X	X			
ENSO34	X	X	X	X	X	X			
SSI1				X	X	X	X	X	X
SSI2				X	X	X	X	X	X
SSI3				X	X	X	X	X	X
SSI4				X	X	X	X	X	X
SSI6				X	X	X	X	X	X

For the different ENSO indexes the monthly values for the month indicated in the table with an “X” were used. SSI1 indicates the 1-month Standardized Streamflow Index, SSI2 the 2-month Standardized Streamflow Index, and so forth. SSI1 was derived
 45 for the months indicated in the table with an “X”. The multi-month SSI’s (SSI2 to SSI6) were derived for the respective number of months backward from the months indicated in the table with “X”.