**Supplementary Information 1**

**Bio-ORACLE v2.0: extending marine data layers for bioclimatic modelling**

Reliability of marine data layers determined with *in situ* quality-controlled data

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Table 1. Statistical downscaling performance of Kriging and Inverse Distance Weighting (IDW) for different variables. Analyses performed with mean absolute error (MAE), root mean square error (RMSE) and nonparametric Kruskal-Wallis testing the difference between mean values (α = 0.05).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Layer** | **Unit** | **MAE** | | **RMSE** | | **Kruskal-Wallis** |
|  |  | Kriging | IDW | Kriging | IDW |  |
| Temperature | ºC | 0.061 | 0.073 | 0.132 | 0.154 | 0.987 |
| Salinity | PSS | 0.027 | 0.033 | 0.059 | 0.071 | 0.960 |
| Current velocity | m•s-1 | 0.003 | 0.004 | 0.007 | 0.009 | 0.986 |
| Nitrate | μmol•m-3 | 0.003 | 0.005 | 0.008 | 0.010 | 0.983 |
| Phosphate | μmol•m-3 | 0.003 | 0.004 | 0.007 | 0.009 | 0.989 |
| Silicate | μmol•m-3 | 0.004 | 0.004 | 0.008 | 0.010 | 0.990 |
| Dissolved molecular oxygen | μmol•m-3 | 0.004 | 0.005 | 0.007 | 0.009 | 0.986 |
| Dissolved iron | μmol•m-3 | 0.004 | 0.005 | 0.007 | 0.009 | 0.988 |
| Chlorophyll | mg•m-3 | 0.003 | 0.004 | 0.007 | 0.009 | 0.985 |
| Phytoplankton | μmol•m-3 | 0.003 | 0.004 | 0.007 | 0.011 | 0.986 |
| Primary productivity | g•m-3•day-1 | 0.003 | 0.004 | 0.007 | 0.010 | 0.991 |

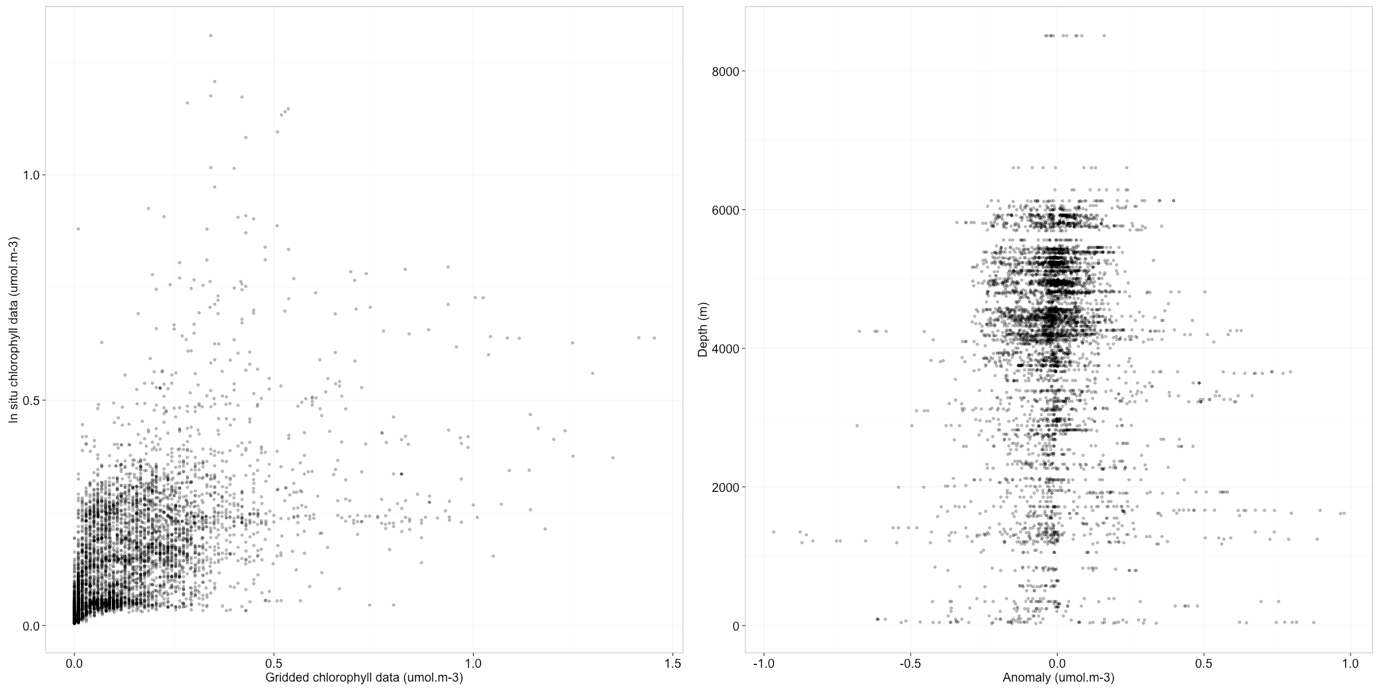


Fig 1. Accuracy of downscaled layer of chlorophyll data. (left panel) Correlation between the interpolated and *in situ* data for chlorophyll. (right panel) Difference (anomaly) between the interpolated and *in situ* data against depth.

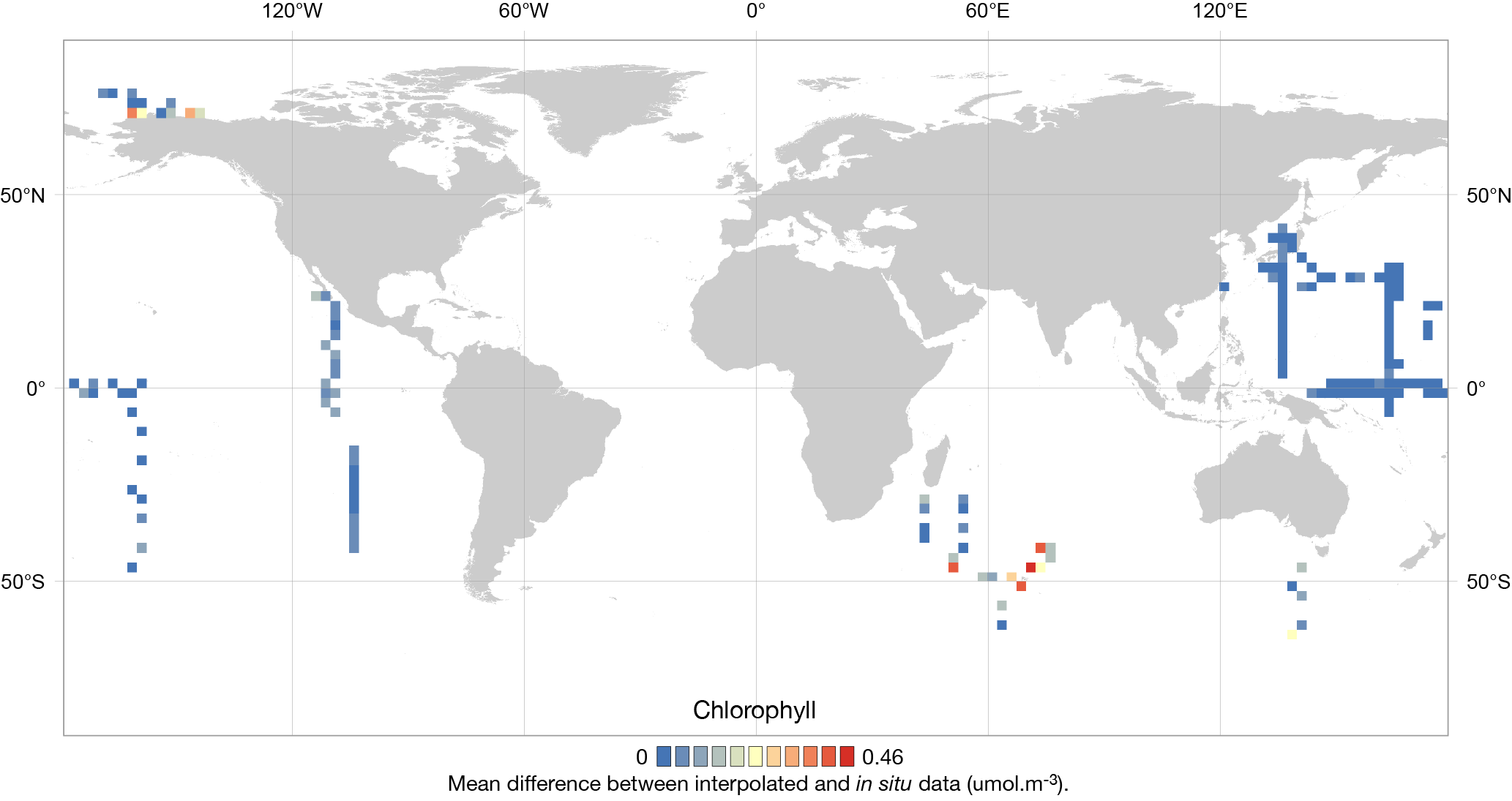


Fig 2. Spatial distribution of the error of chlorophyll data shown as the average difference between the interpolated and *in situ* data.

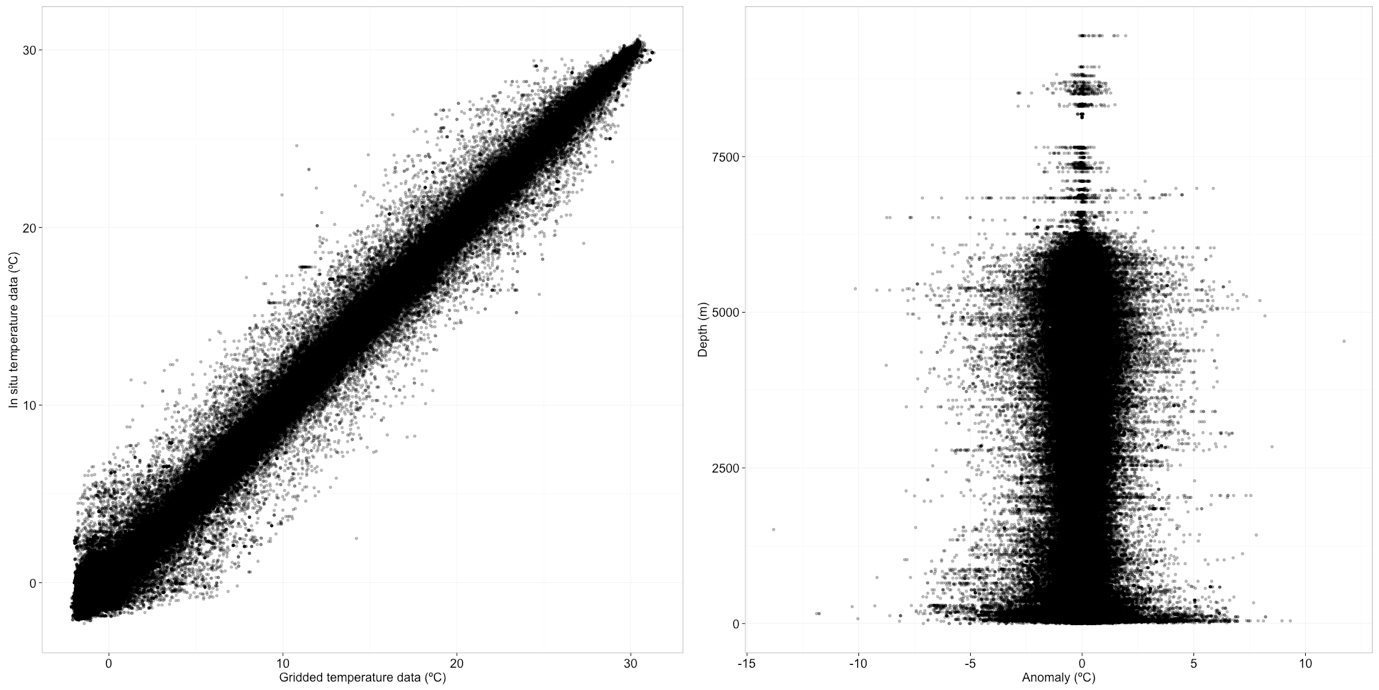


Fig 3. Accuracy of downscaled ocean temperature data. (left panel) Correlation between the interpolated and *in situ* data for temperature. (right panel) Difference (anomaly) between the interpolated and *in situ* data against depth.

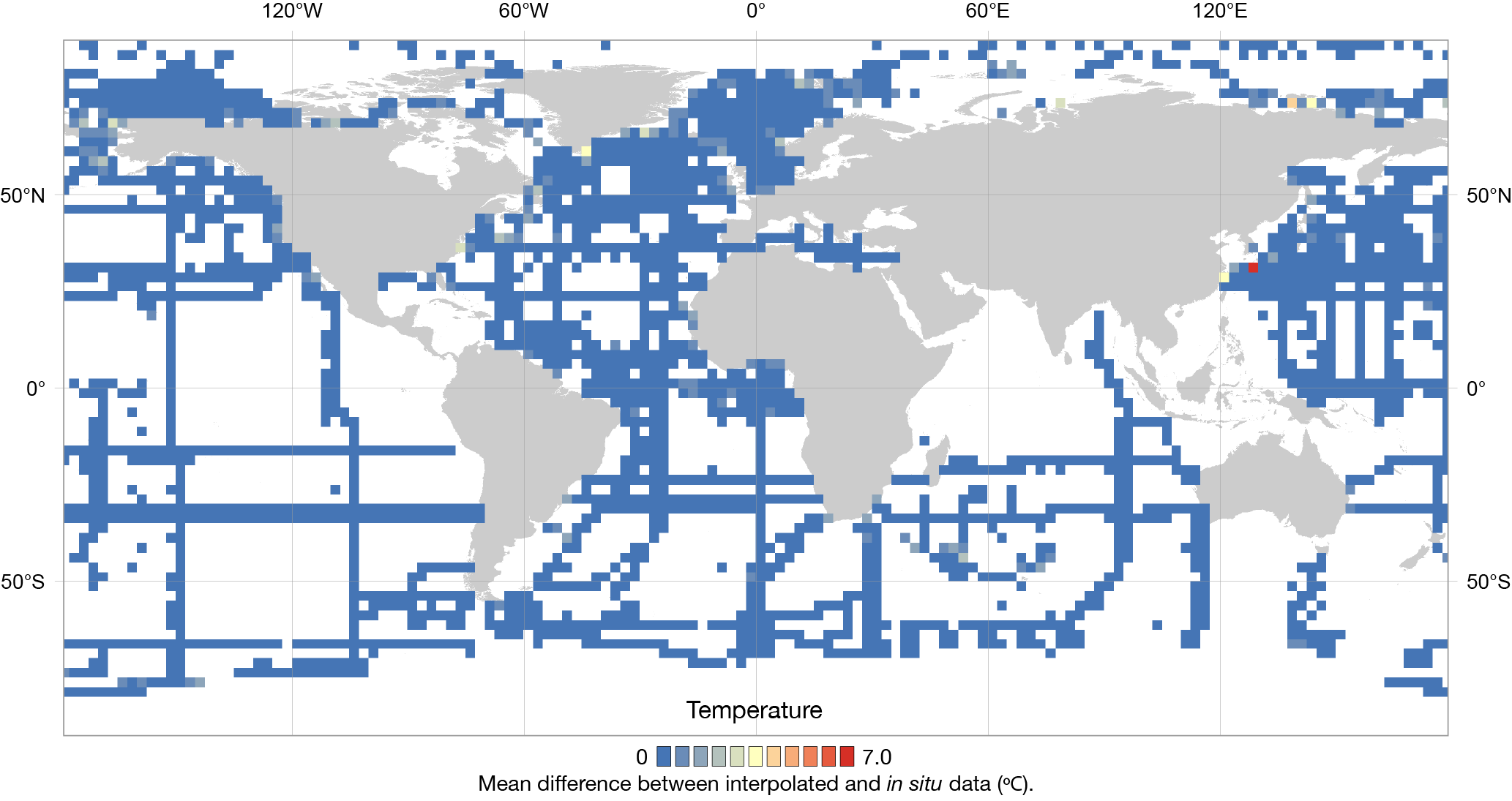


Fig 4. Spatial distribution of the error of ocean temperature data shown as the average difference between the interpolated and *in situ* data.

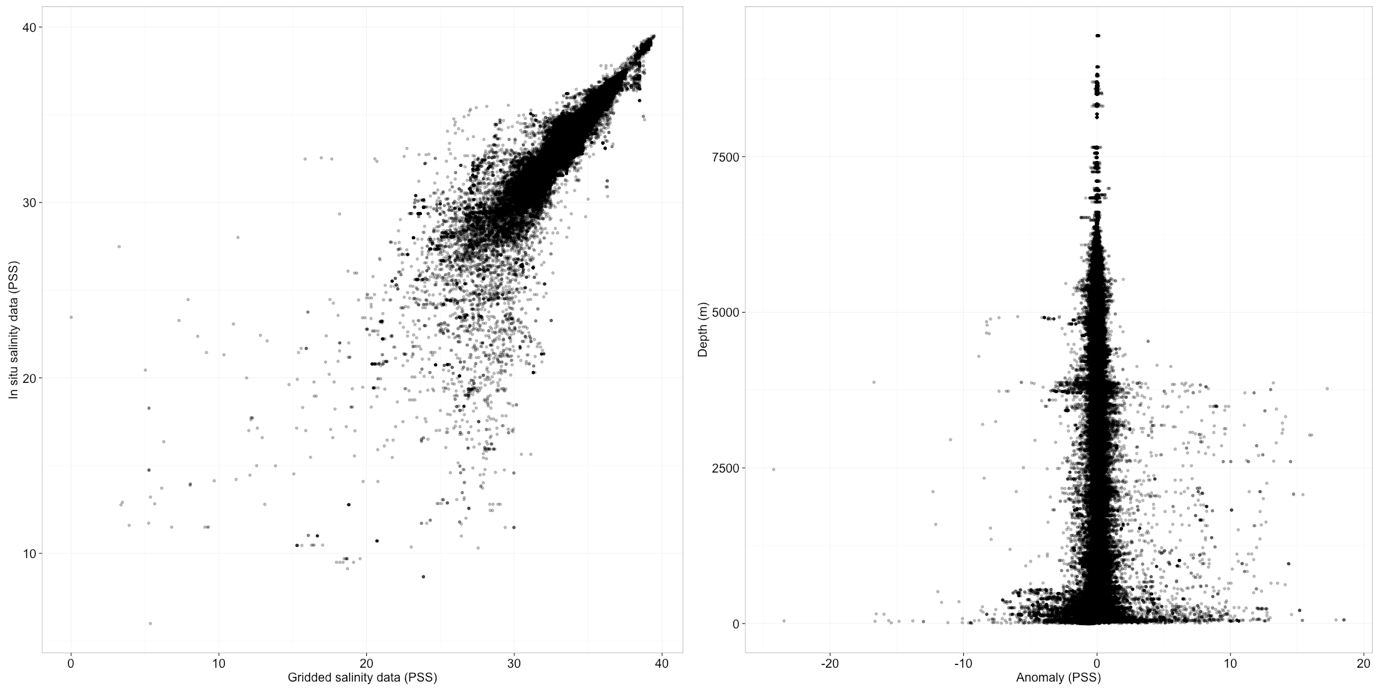


Fig 5. Accuracy of downscaled ocean salinity data. (left panel) Correlation between the interpolated and *in situ* data for salinity. (right panel) Difference (anomaly) between the interpolated and *in situ* data against depth.

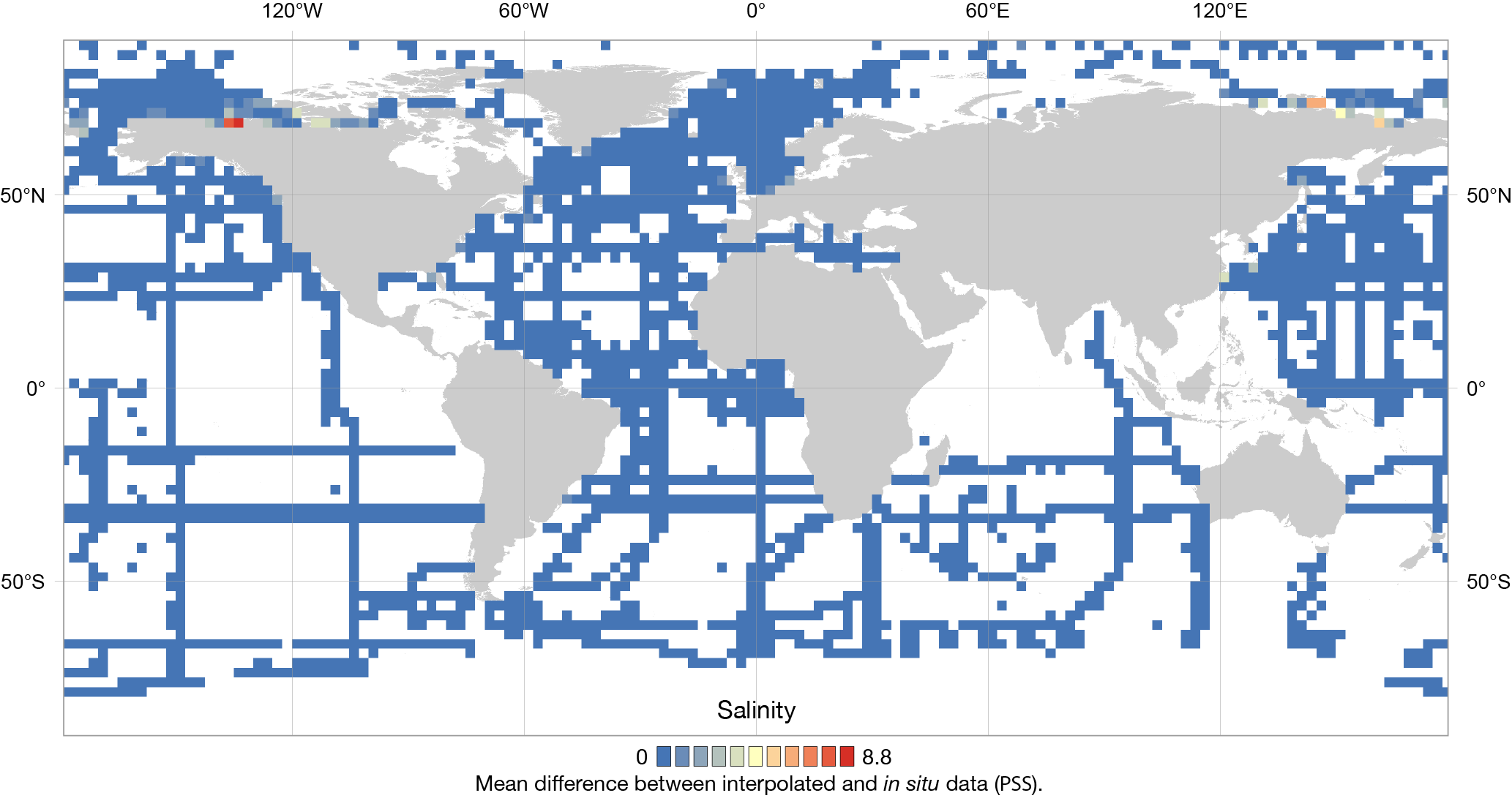


Fig 6. Spatial distribution of the error of ocean salinity data shown as the average difference between the interpolated and *in situ* data.

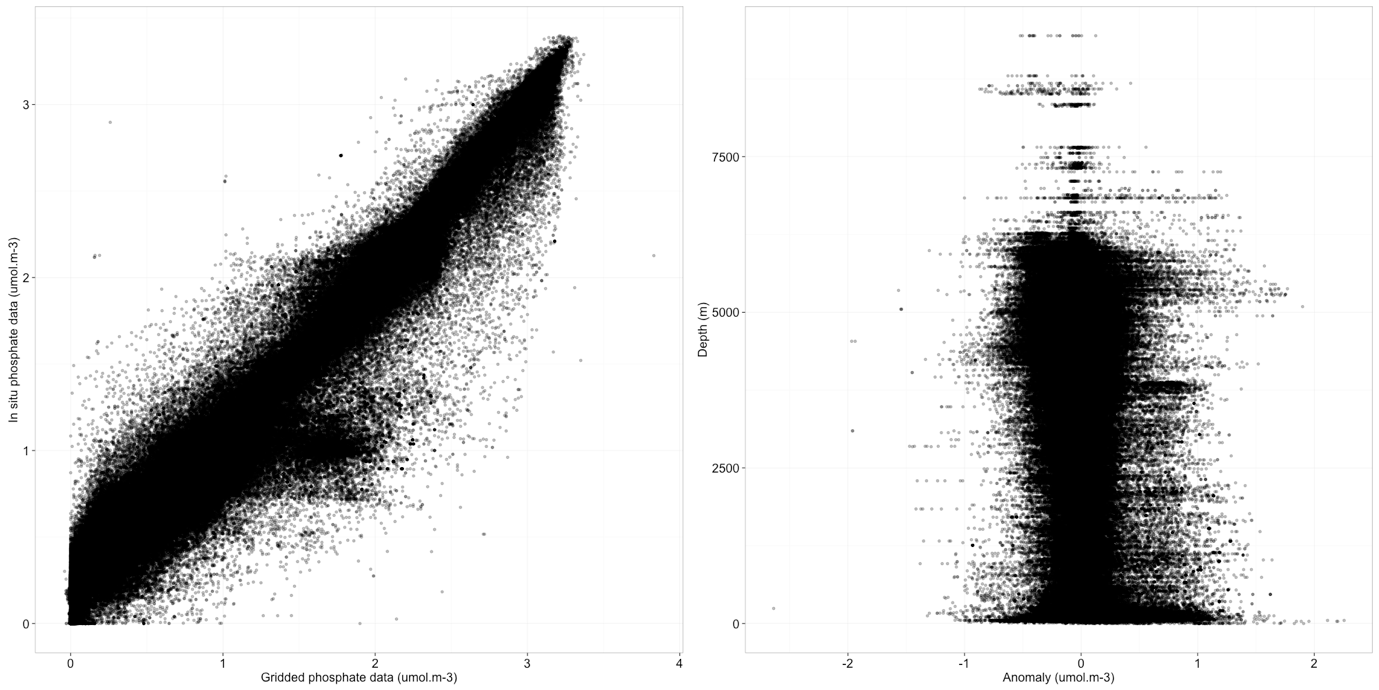


Fig 7. Accuracy of downscaled phosphate data. (left panel) Correlation between the interpolated and *in situ* data for phosphate. (right panel) Difference (anomaly) between the interpolated and *in situ* data against depth.

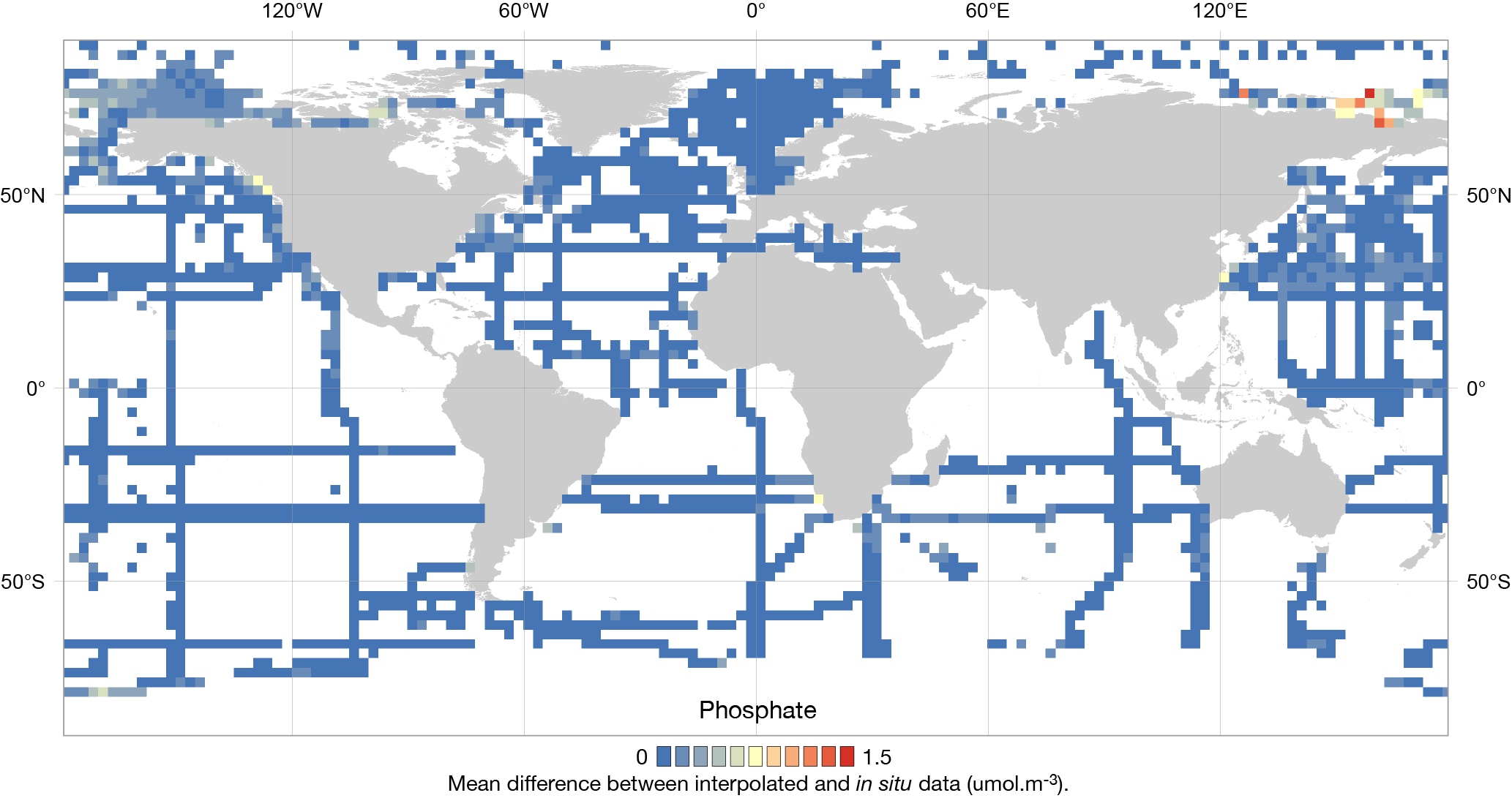


Fig 8. Spatial distribution of the error of phosphate data shown as the average difference between the interpolated and *in situ* data.

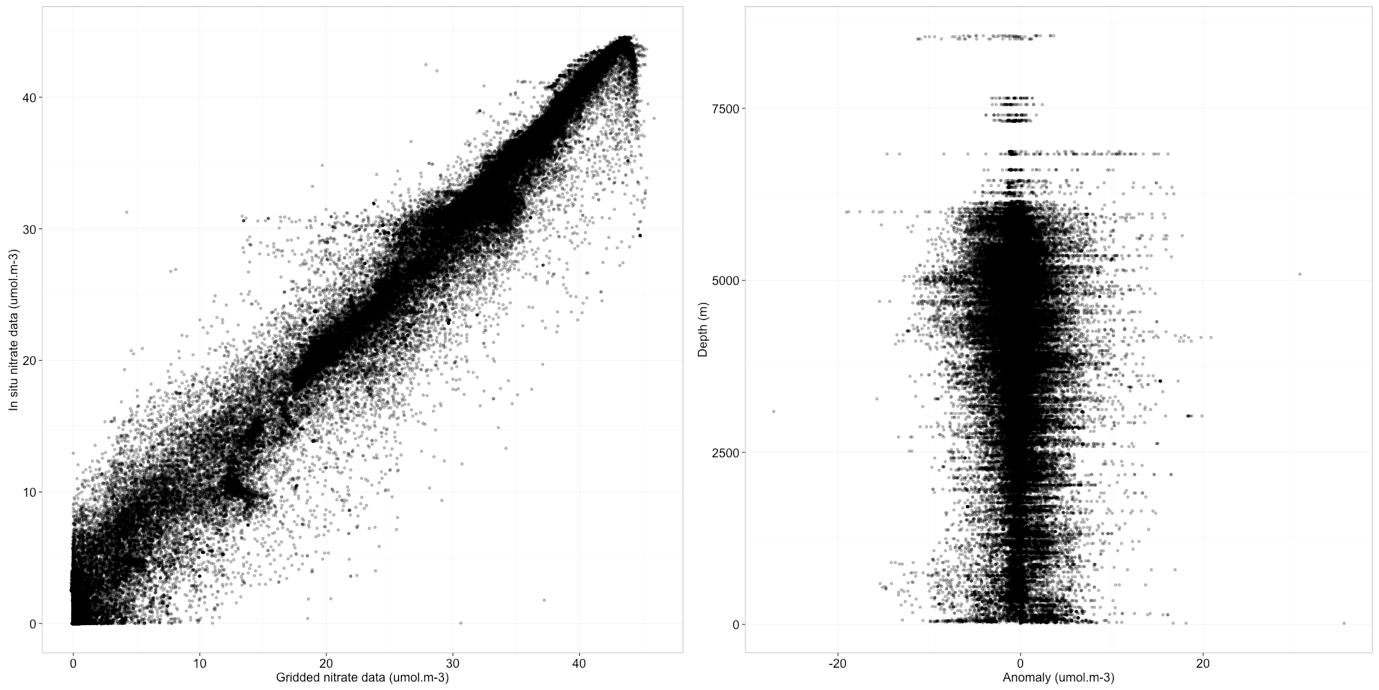


Fig 9. Accuracy of downscaled nitrate data. (left panel) Correlation between the interpolated and *in situ* data for nitrate. (right panel) Difference (anomaly) between the interpolated and *in situ* data against depth.

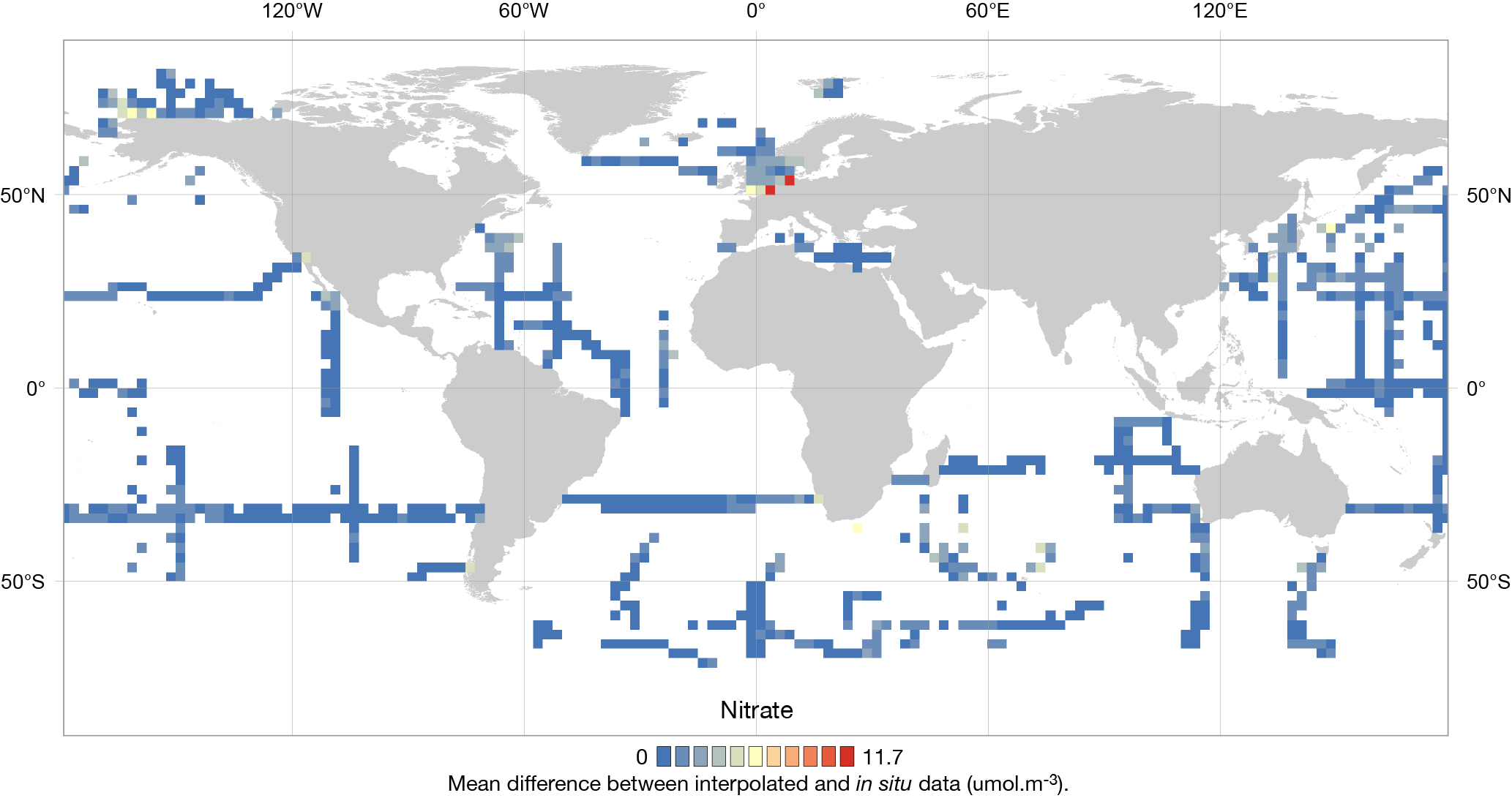


Fig 10. Spatial distribution of the error of nitrate data shown as the average difference between the interpolated and *in situ* data.

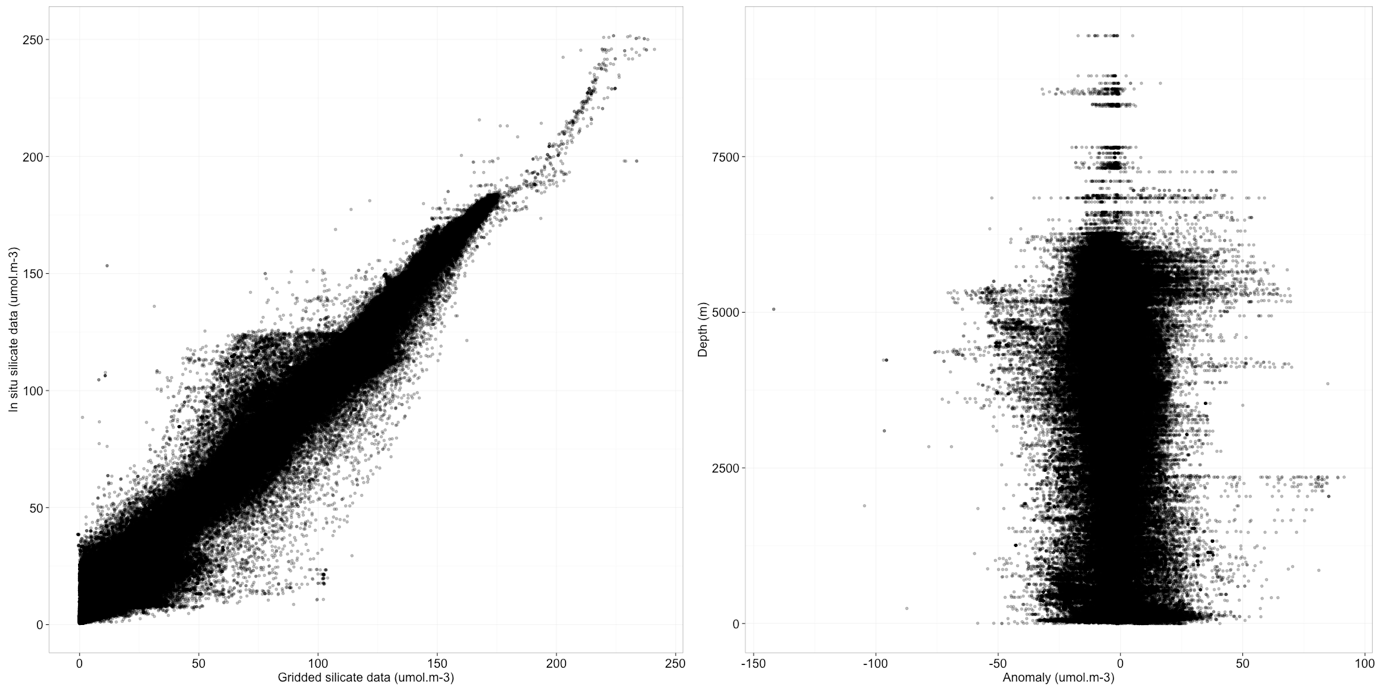


Fig 11. Accuracy of downscaled silicate data. (left panel) Correlation between the interpolated and *in situ* data for silicate. (right panel) Difference (anomaly) between the interpolated and *in situ* data against depth.

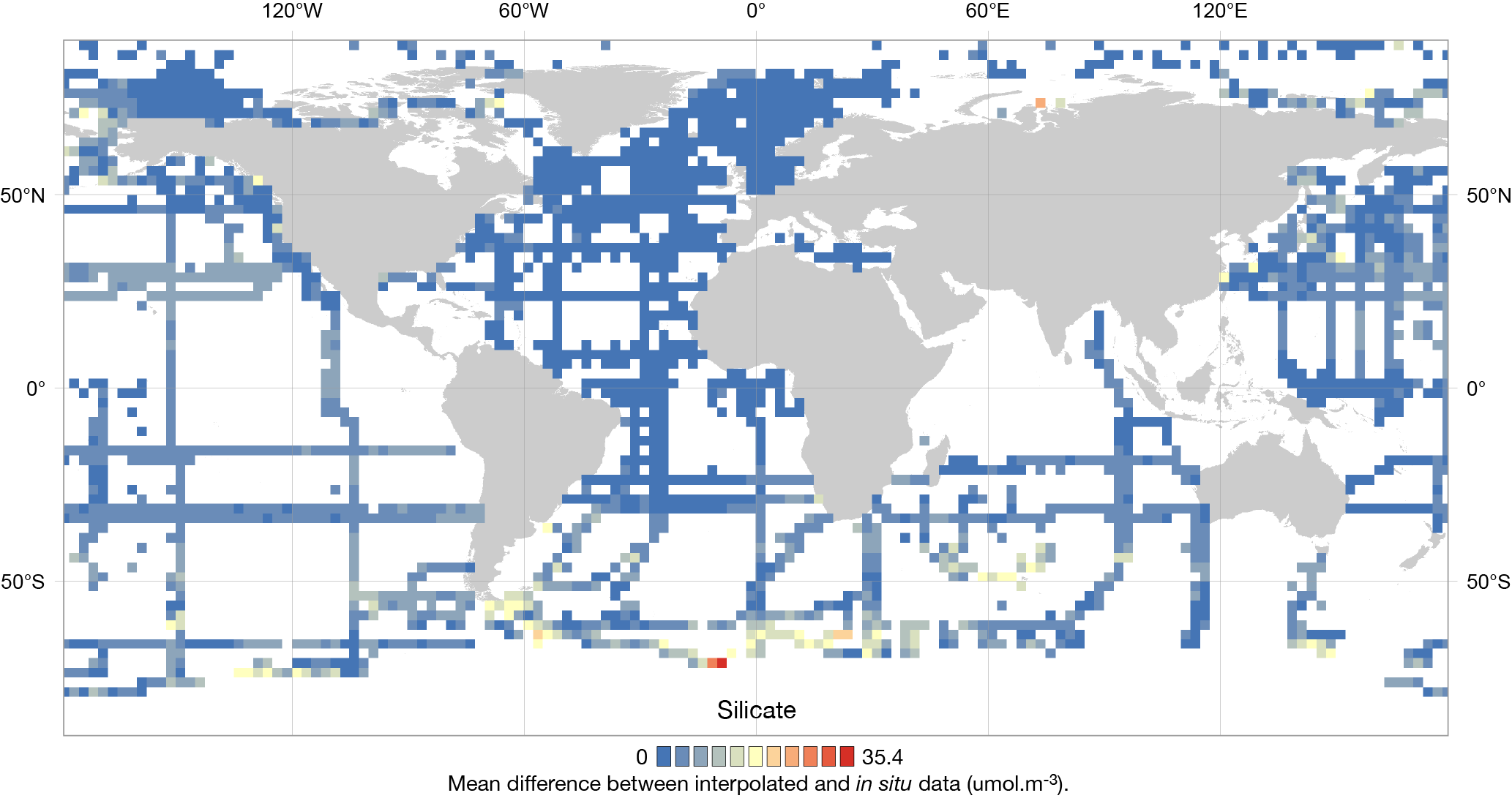


Fig 12. Spatial distribution of the error of silicate data shown as the average difference between the interpolated and *in situ* data.

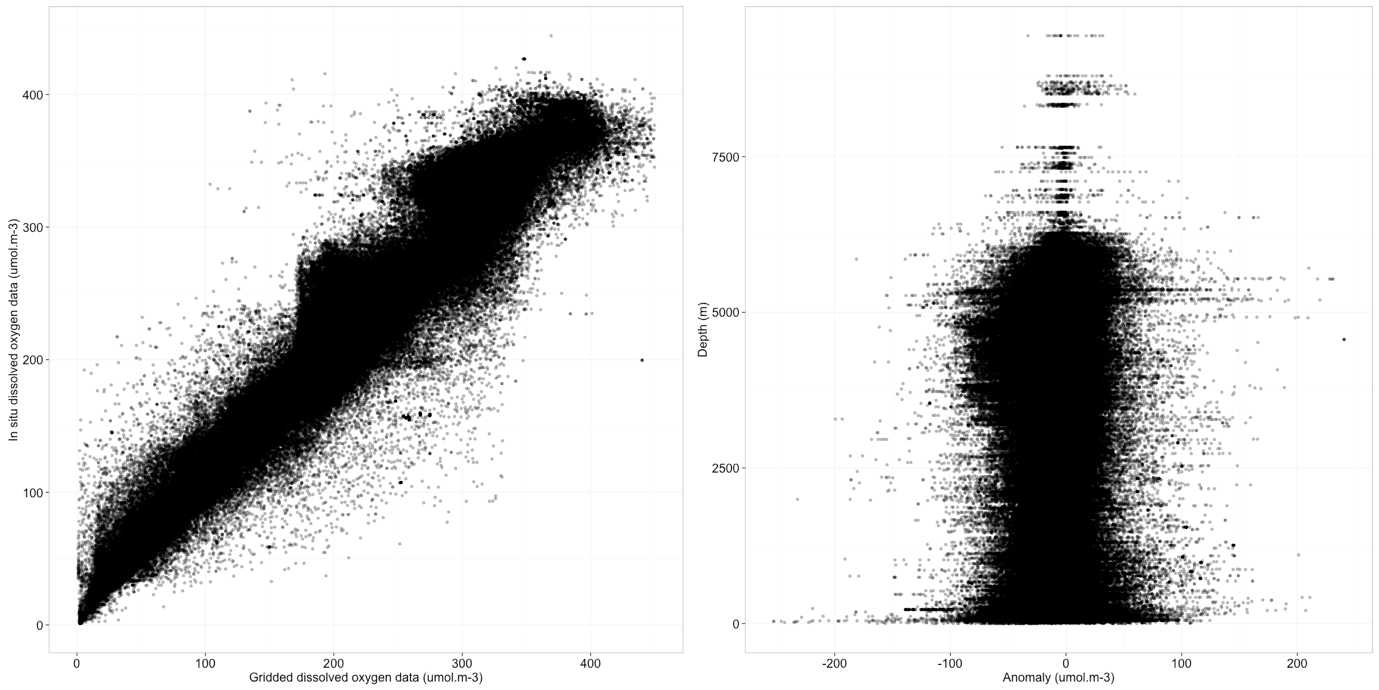


Fig 13. Accuracy of downscaled dissolved molecular oxygen data. (left panel) Correlation between the interpolated and *in situ* data for oxygen. (right panel) Difference (anomaly) between the interpolated and *in situ* data against depth.

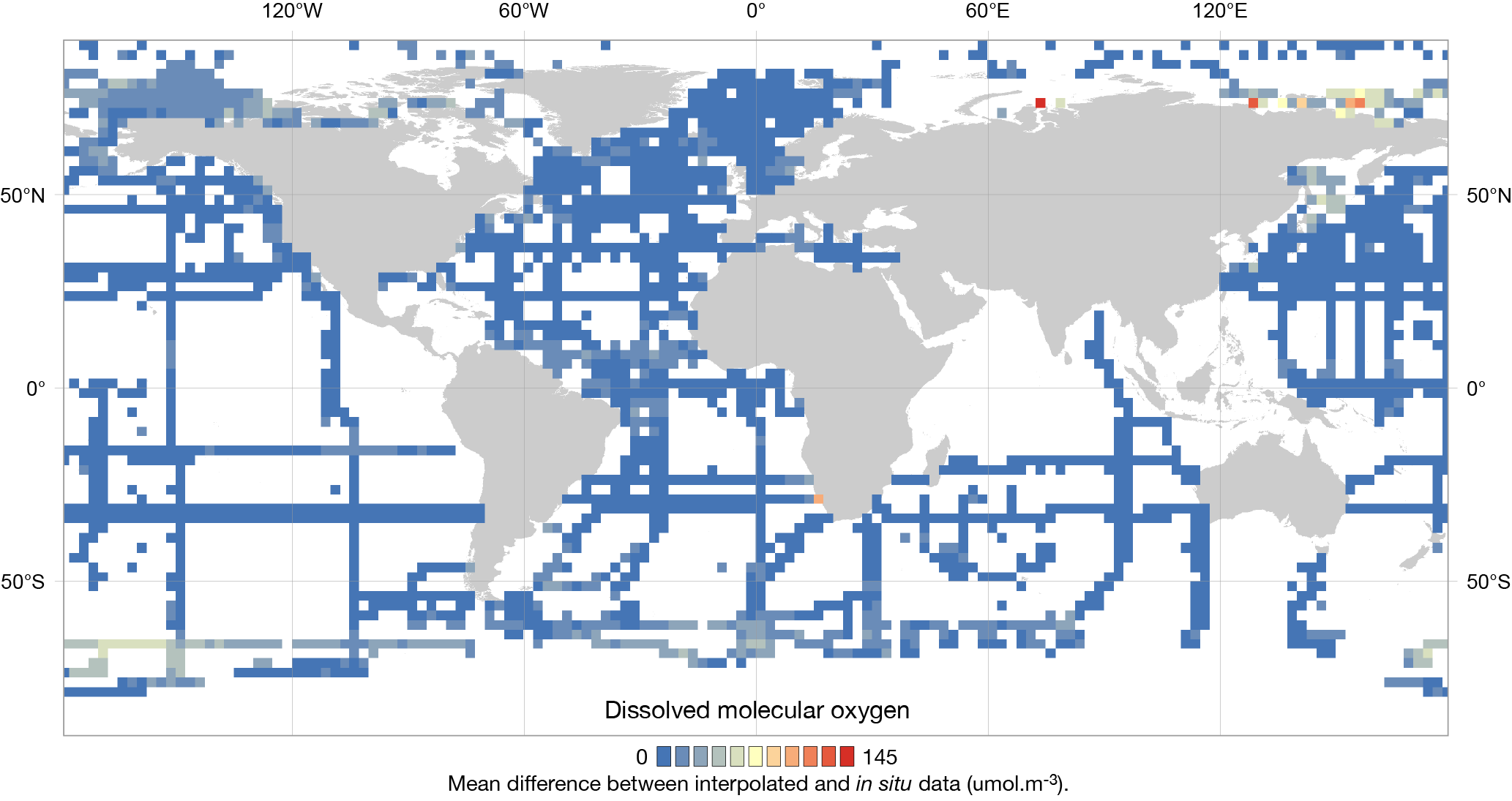


Fig 14. Spatial distribution of the error of dissolved molecular oxygen data shown as the average difference between the interpolated and *in situ* data.