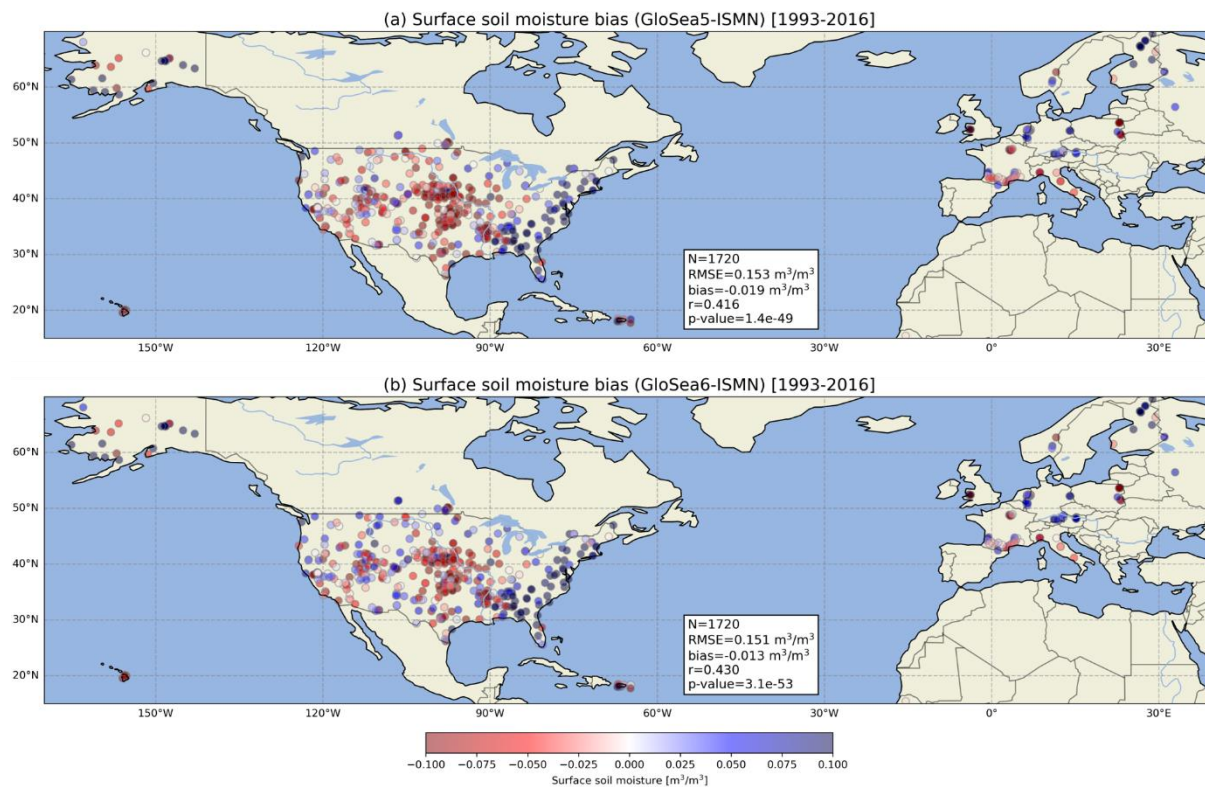
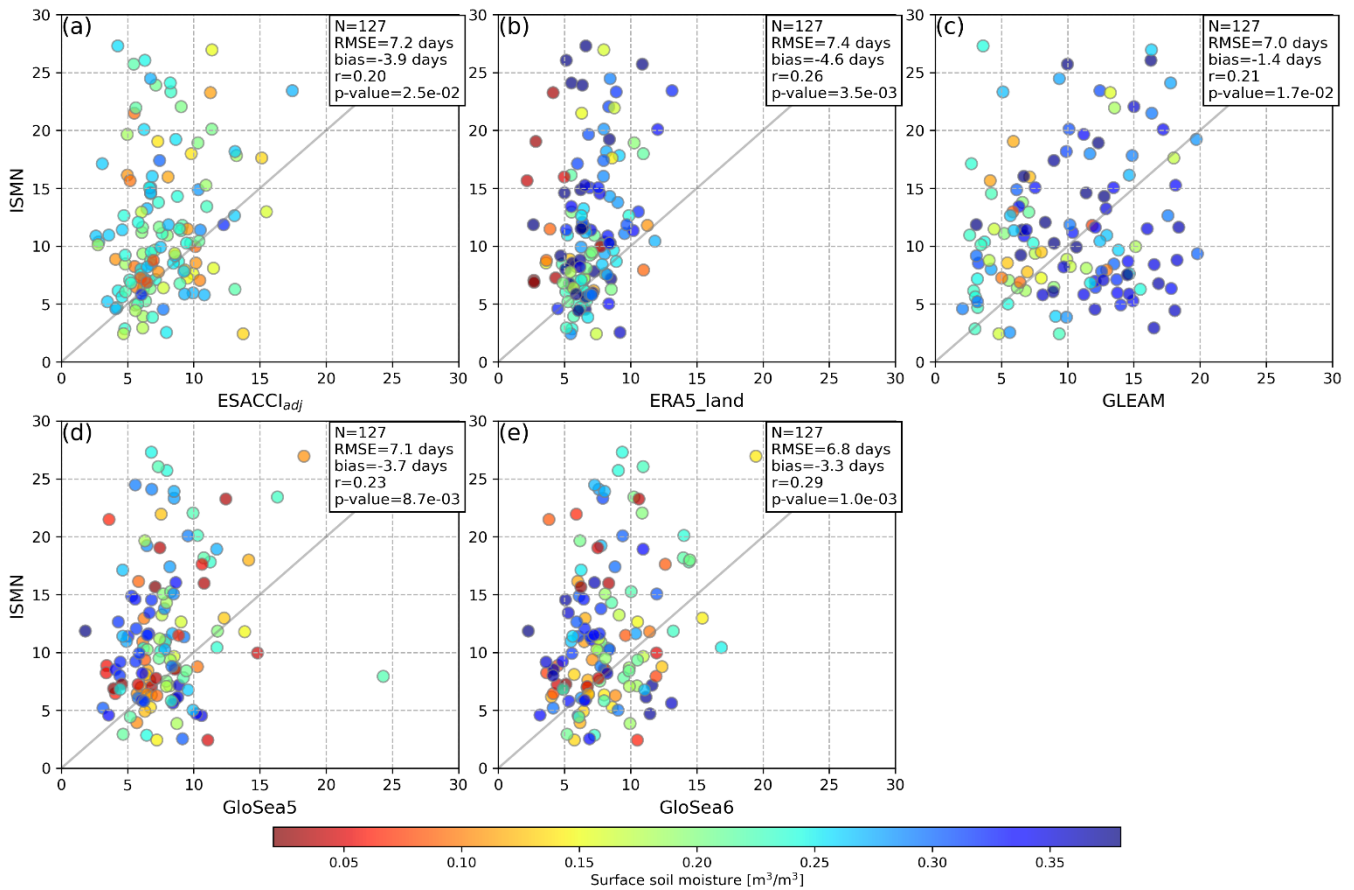
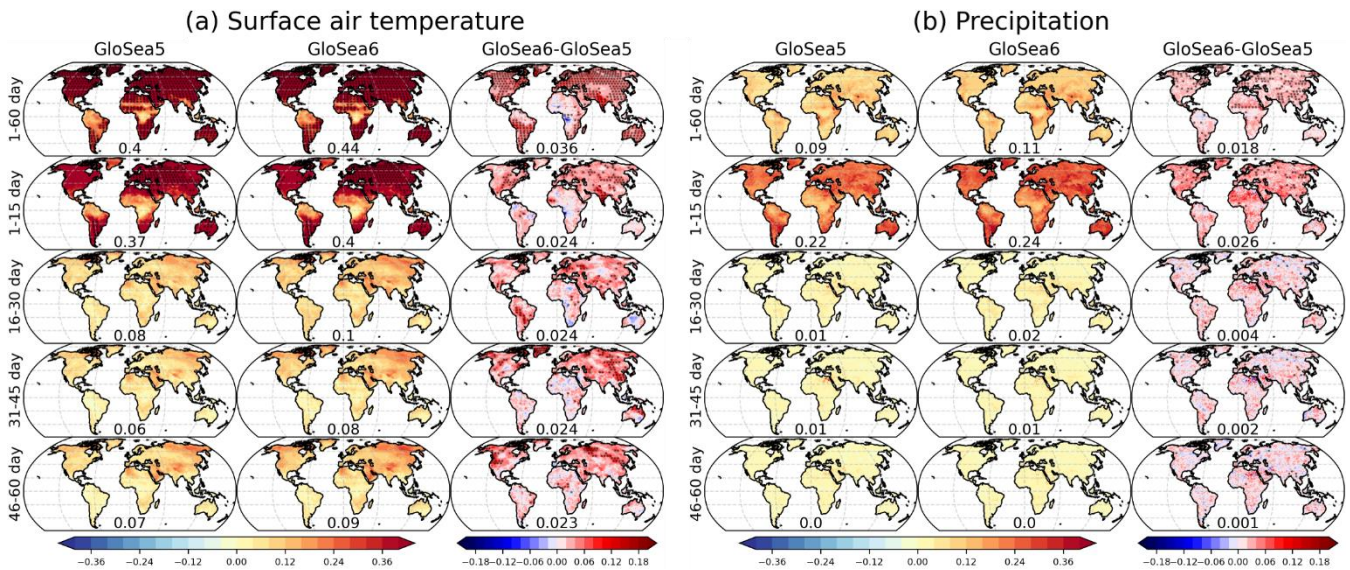
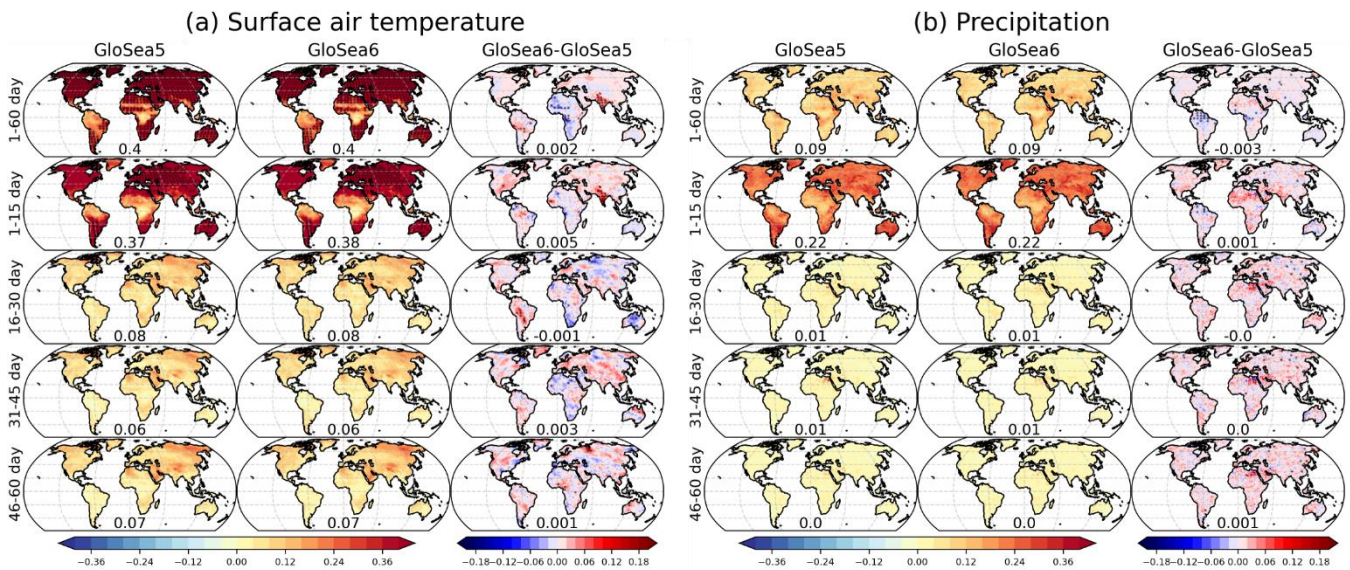
Supplementary materials

Supplementary Figure 1: Spatial distribution of surface soil moisture bias from (a) GloSea5 and (c) GloSea6 against in-situ measurements, where a number of validation samples, RMSE, bias, Pearson correlation coefficient, and its p-value are denoted in the lower-center corner.

Supplementary Figure 2: Scatter plot of soil moisture memory from (a) ESACCI_adj, (b) ERA5-Land, (c) GLEAM, (d) GloSea5, and (e) GloSea6 against in-situ measurements, where a number of validation samples, RMSE, bias, Pearson correlation coefficient, and its p-value are denoted in the upper-left corner. Shading colour indicates the climatological mean of surface soil moisture from each product.

Supplementary Figure 3: Spatial distribution of forecast skill, measured by the temporal correlation coefficient, for (a) surface air temperature and (b) precipitation in GloSea5 and GloSea6 across lead forecast days initiated in May–August of 1993–2016, where all available ensemble members are used. Dotted areas indicate statistical significance at a 95% confidence level.

Supplementary Figure 4: Same as Supplementary Fig. 3, but when only three ensemble members are used for the assessment in GloSea5 and GloSea6.