Salinity and water cycle: Air-sea freshwater balance

<u>Gary Lagerloef</u>[†]; Raymond Schmitt; Julian Schanze; Hsun-Ying Kao [†]Earth and Space Research, USA Leading author: <u>Lager@esr.org</u>

More than three-fourths of the global water cycle consists of the annual rainfall and evaporation freshwater exchange between the ocean and atmosphere. The water cycle is expected to intensify in a warmer climate, with shifting large-scale rainfall and drought patterns. Ocean salinity variations in recent decades provide a clear indicator of such changes and offer a key index for monitoring future climate variability related to the hydrologic cycle. In this sense, the ocean behaves like a rain gauge. This simple idea will also contribute to resolving the major discrepancies among rainfall climatologies. Addressing these problems requires a full understanding of complex upper ocean processes such as mixing and advection that balance the net freshwater flux at the surface. In this paper, we explore the current understanding of the upper ocean and atmospheric freshwater budgets, and the gaps between them. The global surface salinity measurement system, including both in situ instruments and satellites, along with regional upper ocean process studies, will soon be in place to advance these studies.