Observations for climate: Measuring the Upper layer Temperature of the Arctic Ocean (UpTempO)

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The surface layer (0-50 m) of the Arctic Ocean has in recent years experienced unprecedented summertime warming. The causes are still under investigation, but are undoubtedly related to extreme summer sea ice retreat, which allows more atmospheric heating and northward advection of warm subarctic waters. Warming surface waters in turn melt more sea ice ("ice-albedo feedback") and delay fall ice growth. They also affect marine ecosystems, atmospheric boundary layer characteristics, and water mass formation. Presently, we can observe ocean surface temperatures by satellite, although these data need more validation and do not tell us about the vertically integrated heat content of the upper ocean. Hydrographic cruise data can measure sub-surface warming, but provide only a "snapshot" view of the warming at one time during summer. Ice-based buoys exist that can measure temperature profiles, but these are not optimized for observing the open sea. Thus our†objective†is to fill this gap in the Arctic Observing Network measurement strategy, i.e., to measure the time history of summer warming and subsequent fall cooling of the seasonally open water areas of the Arctic Ocean. We will focus on those areas with the greatest ice retreat, i.e., the northern Beaufort, Chukchi, East Siberian, and Laptev Seas. We plan to maintain an array of inexpensive ocean thermistor string buoys in the seasonally ice-free regions of the Arctic Ocean.