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## The Sea Ice Tracking System (SITU): A Community Tool for the Arctic and Antarctic

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The Sea Ice Tracking System (SITU), formerly known as the IceTracker or Lagrangian Ice Tracking System, has been expanded to include new functions facilitating a wide range of new applications (<http://icemotion.labs.nsidc.org/SITU/>). Ice motion vectors are calculated from an optimal interpolation of satellite-derived, free-drift and buoy drift estimates (Polar Pathfinder dataset, version 4, <https://nsidc.org/data/nsidc-0116>; International Arctic Buoy Program, <http://iabp.apl.washington.edu/>; NCEP/NCAR reanalysis, <https://www.esrl.noaa.gov/>). SITU now calculates forward and backward trajectories of Antarctic as well as Arctic sea ice from 1979 to 2018 and incorporates basin-wide contextual information including timeseries of bathymetry, ice concentration, ice age, ice motion, air temperature, pressure, and wind speed, along the tracks. A new animated background option allows users to visualize these basin-wide changing environmental conditions as the tracking progresses. SITU can be used by researchers, educators, local and indigenous communities, policy and planning professionals, and industries. For instance, geologists can use SITU to determine the provenance of sediment transported by sea-ice and deposited at an ocean core site; biologists can identify source region of biomass transported by sea-ice and seeding algal bloom in a given sea, or overlay bear and birds tracks over ice conditions or ice types animated in the background; coastal communities can backtrack ice to reveal age, origin and other factors that influence habitats of ice-associated species; people planning future expeditions can review recent ice conditions along potential cruise tracks, historians can compare current air temperatures, wind conditions, and ice concentration with past expeditions; students can learn about sea ice motion in the Arctic or compare recent ice drift (Tara or MOSAIC) with that of the epic expedition of Nansen. A new Eulerian option allows users to see changing conditions at one point over the full satellite record (1978 to present). This Eulerian depiction reveals variability as well as trends, and can provide context for data retrieved from a mooring, sediment trap, or sediment core. Publically hosted on the NSIDC Labs webpage, data can be downloaded graphically or in spreadsheet format for deeper analysis.