



Mapping Antarctic sea ice albedo properties from MISR fused with MODIS

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Thanks to Sebastian Val & Kevin Mueller, NASA-JPL and
Steve Protack, NASA-LaRC for supply of the MISR special product

Original work from QA4ECV received funding from the EU-FP7 Programme under no. 607405



EGU 2020
7 May 2020

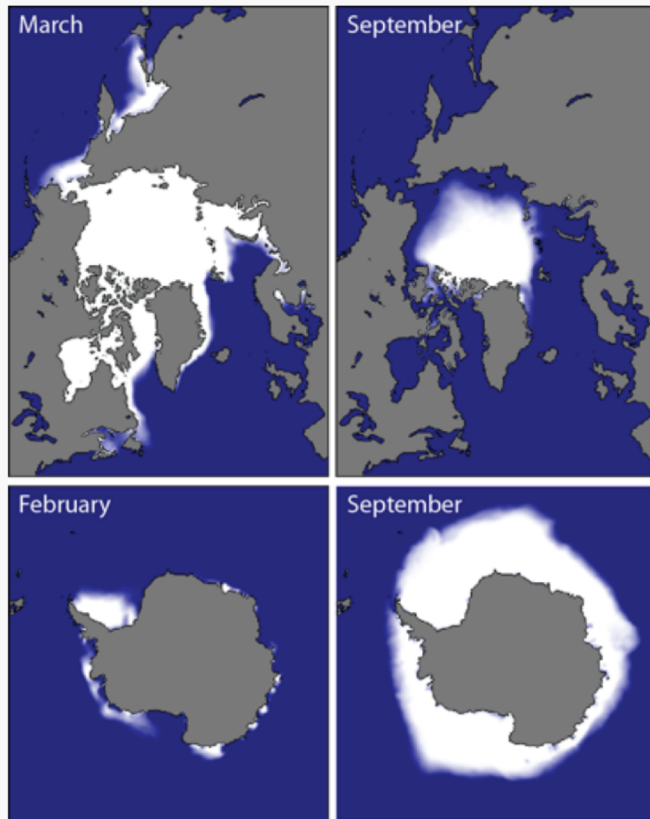


Why sea-ice BRF/BRDF/albedo?



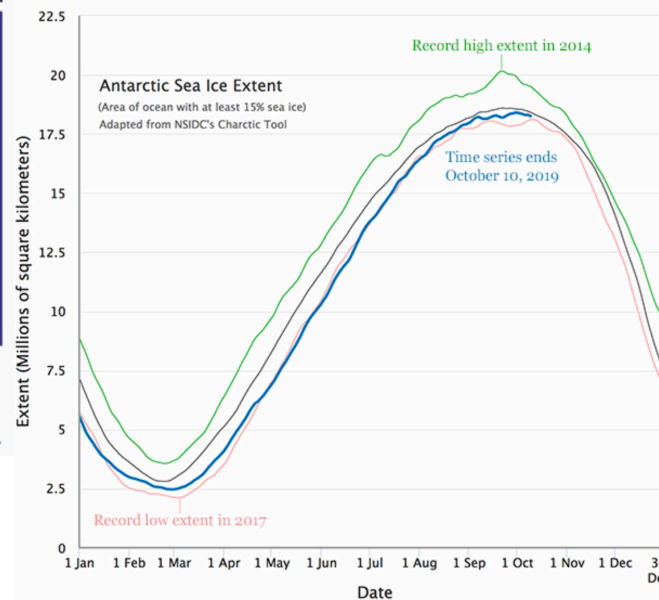
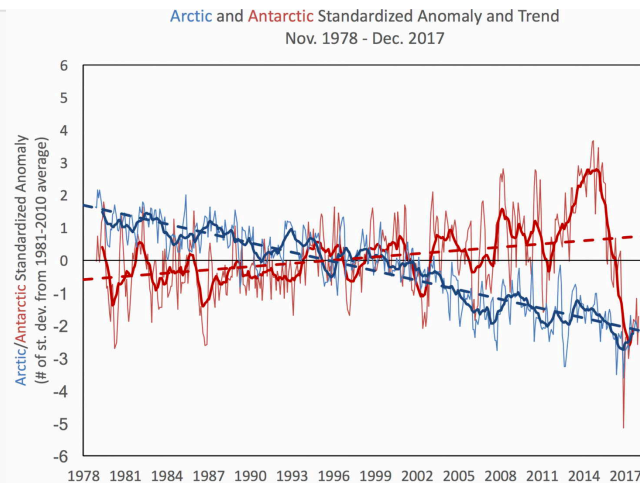
Stroeve et al., Climatic Change (2012) 110:1005–1027,
DOI 10.1007/s10584-011-0101-1

What do we know about Arctic and Antarctica sea-ice coverage?



Sea ice climatologies: Arctic and Antarctic sea ice concentration climatology from 1981-2010,

Courtesy of NSIDC



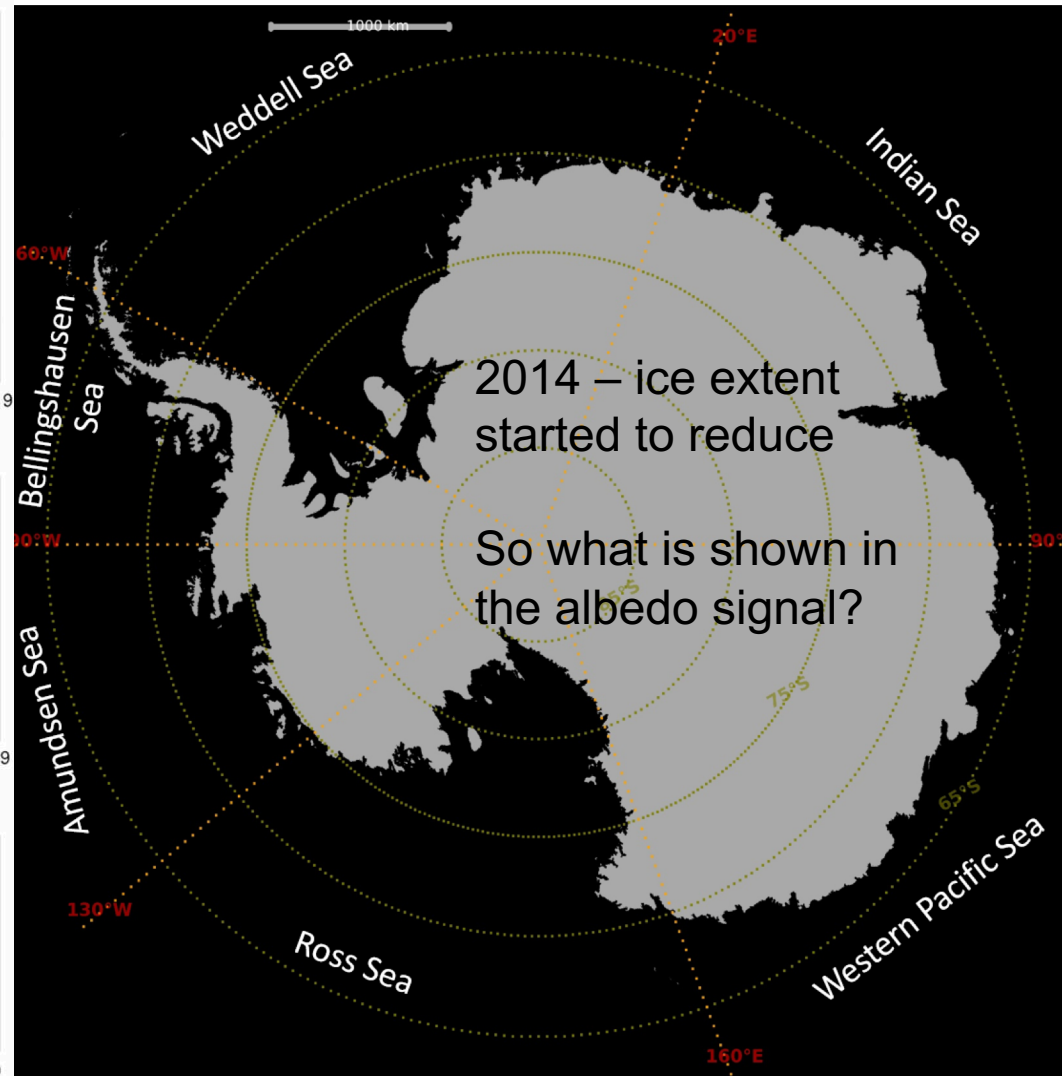
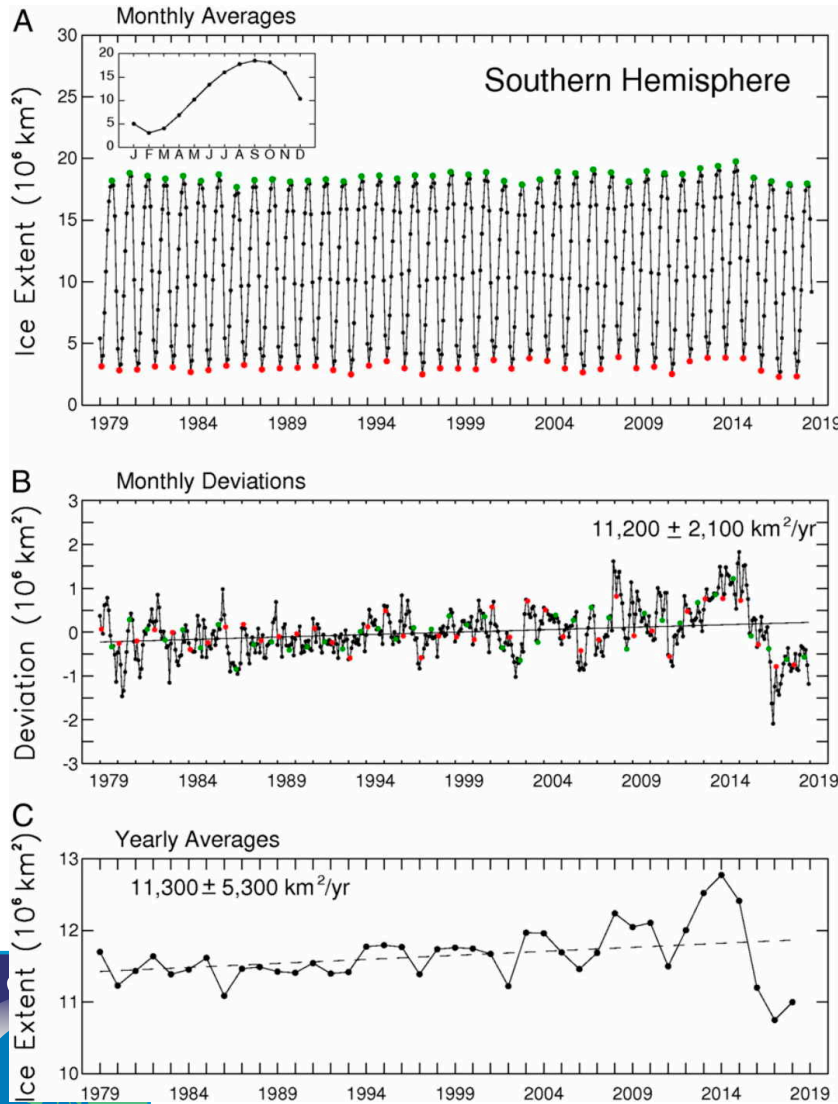
2014 – ice extent started to reduce

So what is shown in the albedo signal?

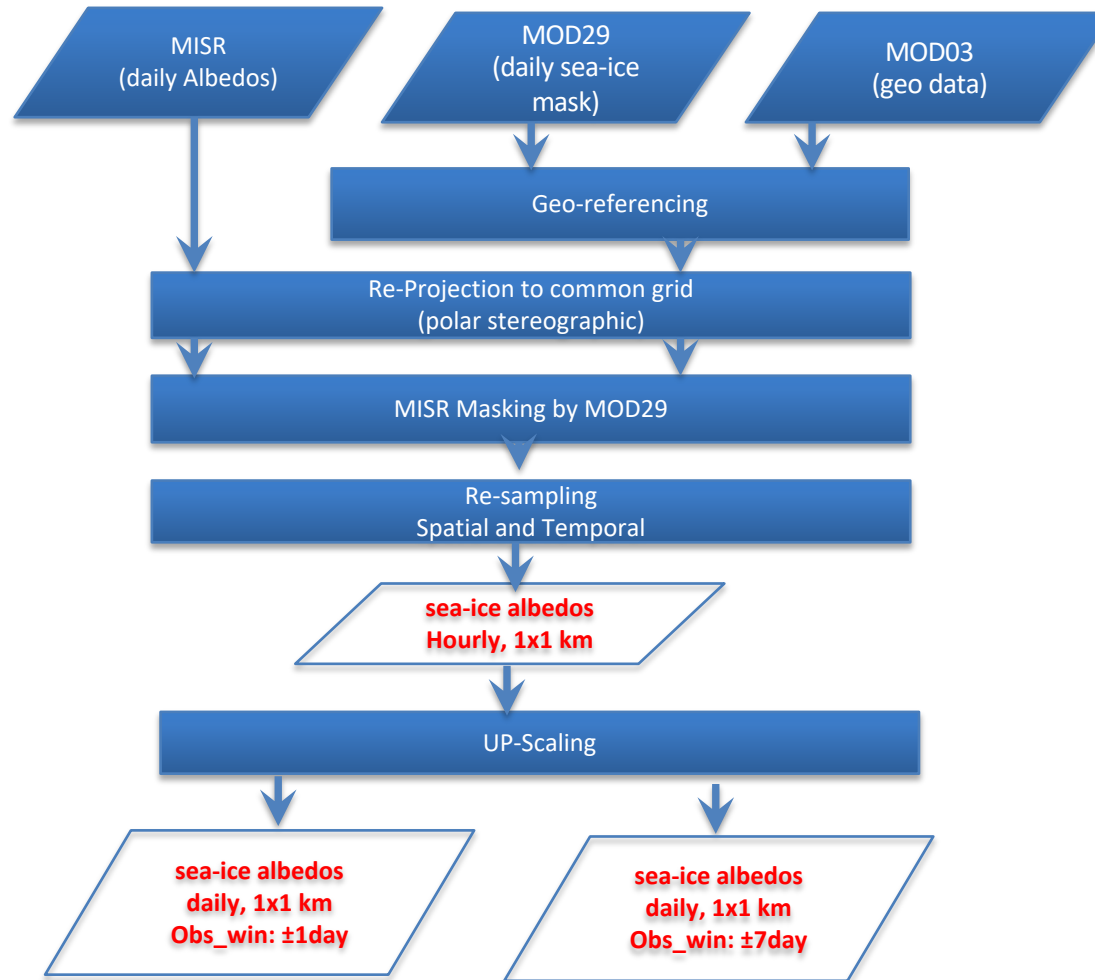


What do we know about Antarctica sea-ice extent since the start of remote sensing?

Taken from Parkinson (PNAS, 2019)




MISR sea ice albedo Processing Flowchart




Applied to all MISR orbits from Oct-Mar for years 2000-2016
up to -65°S (same as Arctic coverage down to 65°N)




Products

- BHR_blue
 - Mean
 - Stdev
 - Num
 - BHR_green
 - Mean
 - Stdev
 - Num
 - BHR_red
 - Mean
 - Stdev
 - Num
 - BHR_nir
 - Mean
 - Stdev
 - Num
 - Other
 - Lat
 - Lon
 - flags
- 

- Daily, ± 1 day
 - Daily, ± 3 days
 - Daily, ± 7 days



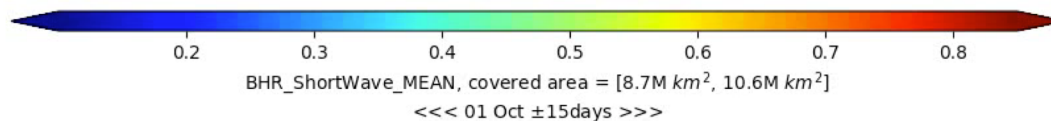
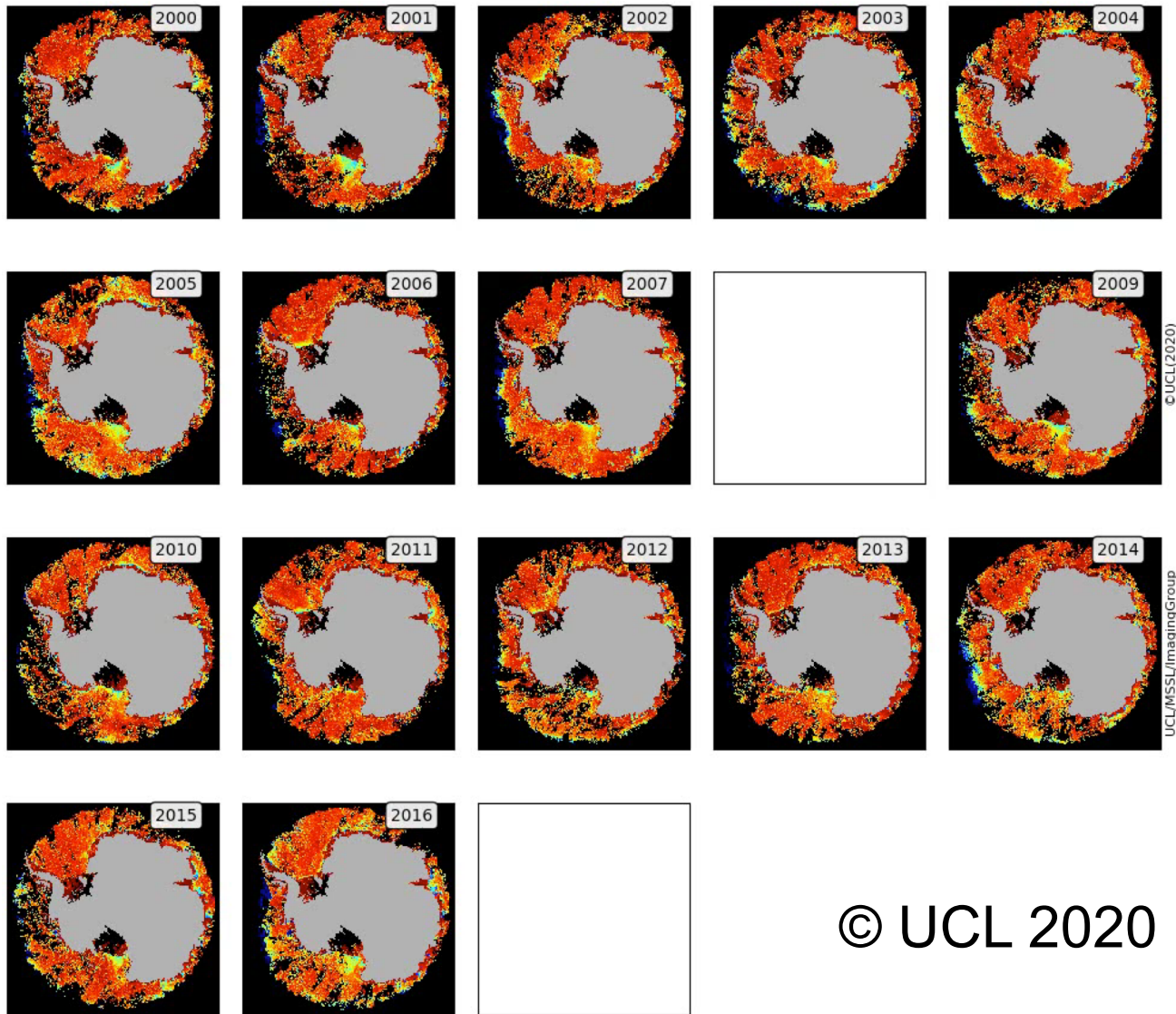
- 1km x 1km
 - 5km x 5km (1-grid)



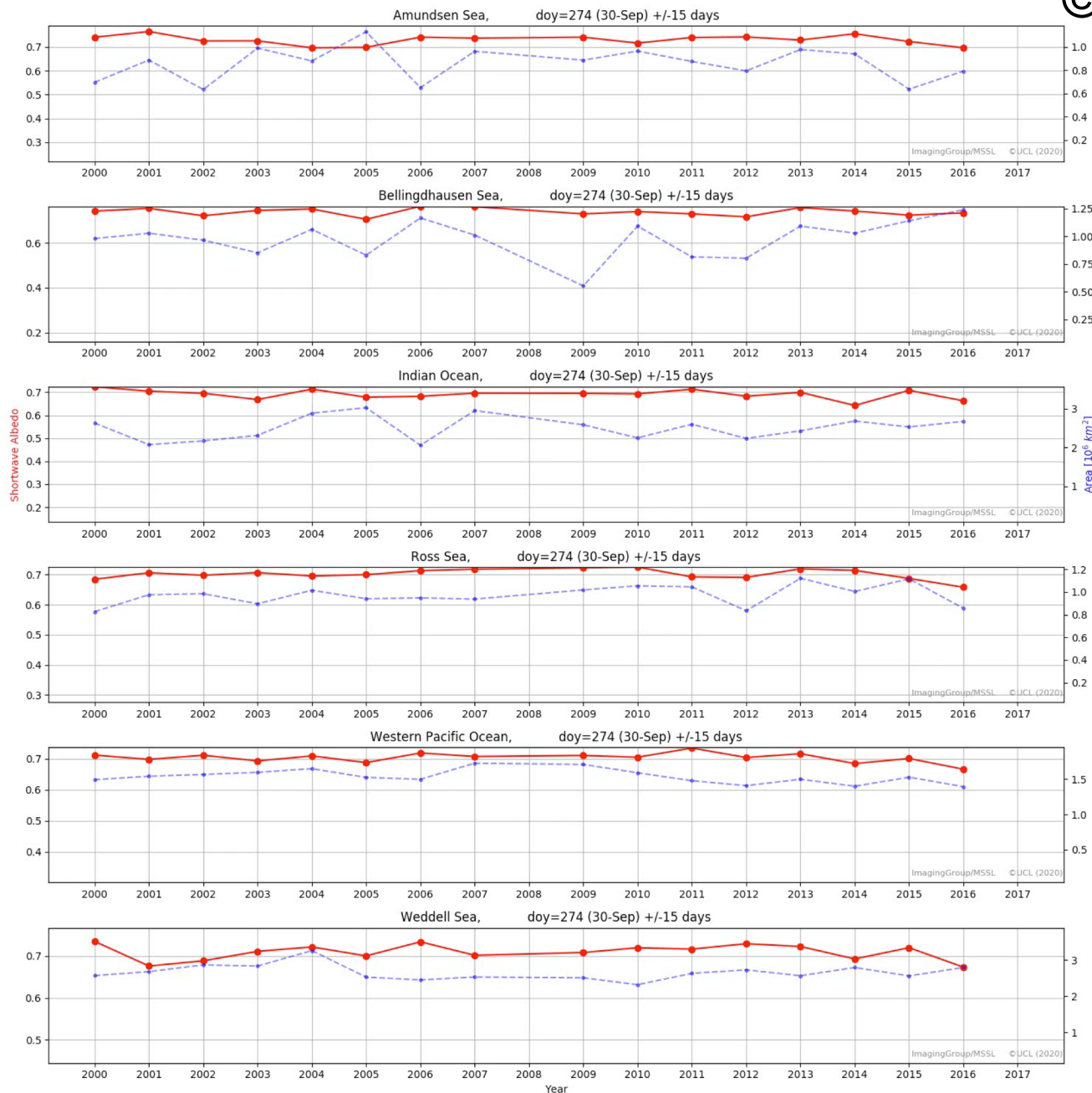
- North Pole
 - South Pole



Day by day MISR sea-ice albedo



Day by day MISR sea-ice albedo

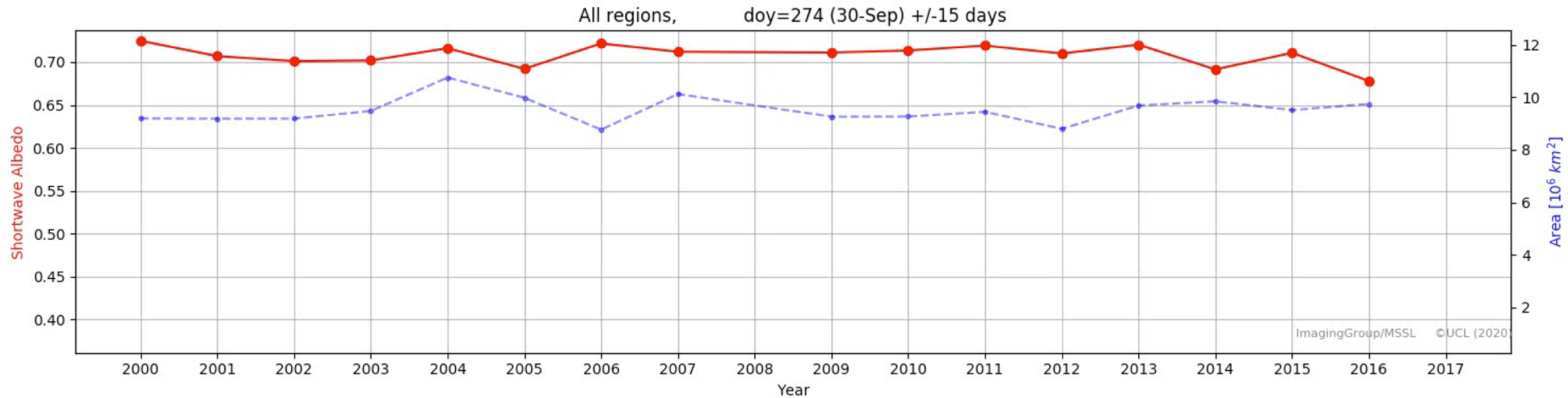


Area
 10^6
sq.km



Day by day MISR sea-ice albedo

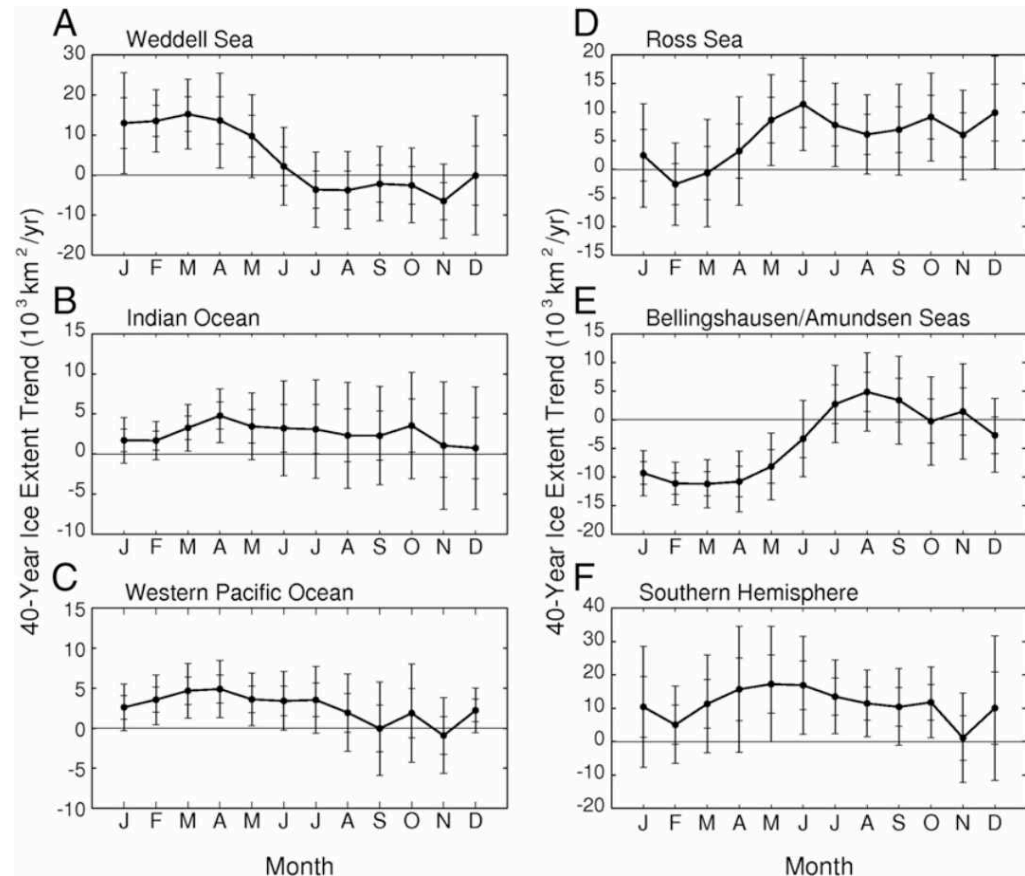
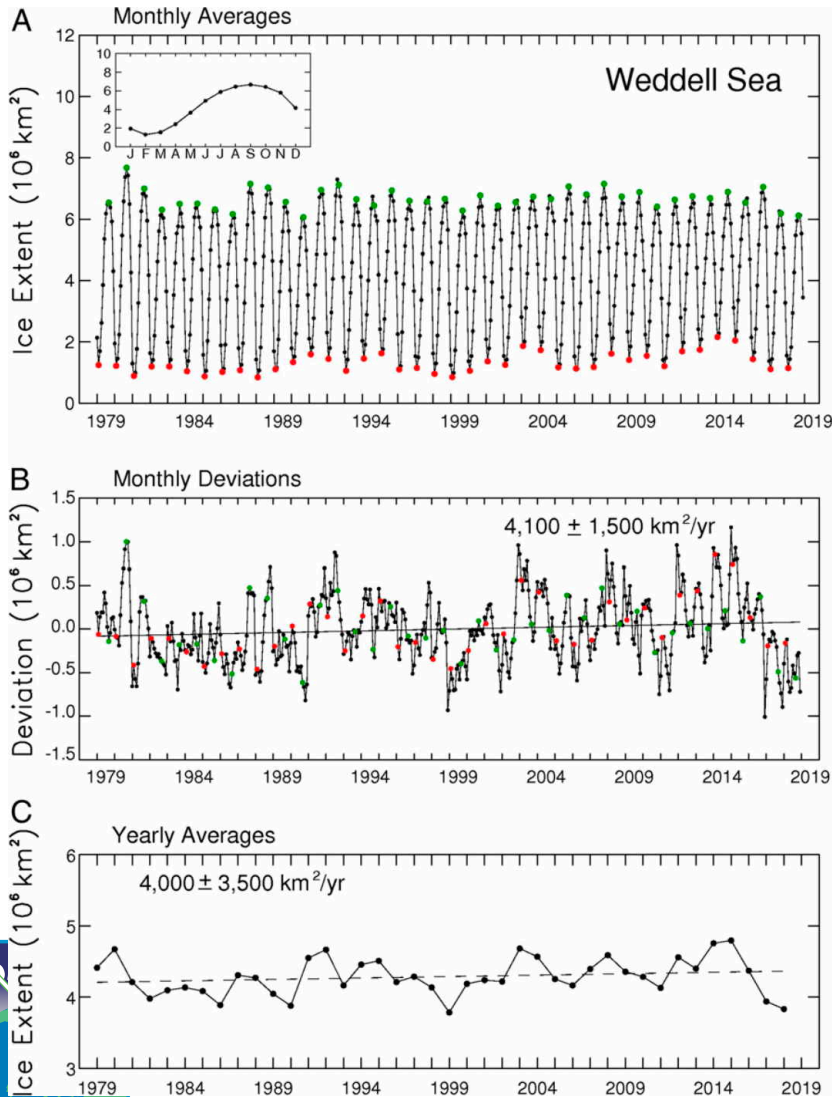
2000-2017



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How do these observations compare with passive microwave sea ice extent



Taken from Parkinson (PNAS, 2019)



Summary & Future Work

- High quality Sea-Ice Albedo products in terms of:
 - Accuracy (assessed over US-BRW which was previously published*)
 - Spatial (1km) & Temporal (every orbit, \pm daily, \pm 7-daily, \pm 15days) resolution
 - Accessibility & Simplicity
- Some issues left to resolve:
 - Reprocessing up to 2020 to be completed in Q4/2020, up to latitude -55° S
 - 100s of missing and incomplete MISR files spread throughout the time period
 - Rarity of in-situ data for validation
 - Comparison with CryoSAT + SMOS sea ice thickness & volume will be difficult in austral summertime
 - Intercomparison with other composite products from VIIRS
- Surface roughness analysis being done in conjunction with results

*Kharbouche, S.; Muller, J.-P. Sea Ice Albedo from MISR and MODIS: Production, Validation, and Trend Analysis. Remote Sens. 2019, 11, 9. DOI: 10.3390/rs11010009

