



Royal Netherlands
Meteorological Institute
*Ministry of Infrastructure and the
Environment*

ERS Ocean Calibration for reprocessing



Jeroen Verspeek, Ad Stoffelen, Anton Verhoef
IOVWST International Ocean Vector Winds Science
Team meeting
12-19-26 April and 3 May 2022



Outline

- Introduction
- Ocean calibration
 - NOC and Cone Metrics
- Wind statistics
- Conclusions and outlook



Introduction

- ERS1 and ERS2 scatterometers were operational from August 1991 to June 2001
- Reprocessing planned with ERA5 stress-equivalent 10 m background winds
- The level1b data has been reprocessed by ESA (ASPS data)
- The ASPS data and BUFR data from the operational archive partly complement each other in time and space



Ocean Calibration

For the ERS1 and ERS2 scatterometers several calibration periods are considered

The calibration periods are selected by on the basis of satellite and scatterometer instrument events and anomalies

ERS1

- p0: 1991-08-01 to 1991-12-27 (only available in ASPS data set)
- p1: 1991-12-28 to 1993-12-23 (BUFR data set starts at 1992-03-02)
- p2: 1993-12-24 to 1994-01-13
- p3: 1994-01-14 to 1995-03-21
- p4: 1995-03-22 to 1996-06-02

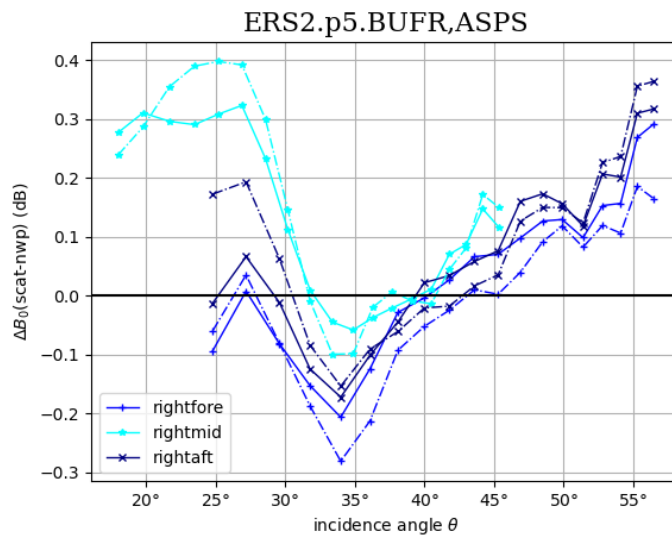
ERS2

- p5: 1996-03-20 to 1996-08-04
- p6: 1996-08-06 to 1997-06-18
- p7: 1997-06-19 to 1998-10-25
- p8: 1998-10-26 to 2001-01-15

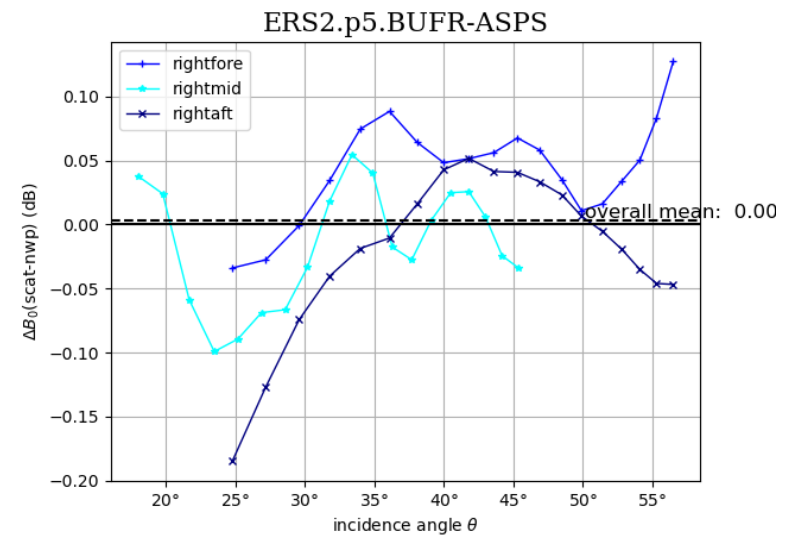


NOC residuals

- NWP ocean calibration compares scatterometer backscatter with NWP wind generated backscatter
- Residuals for ASPS and BUFR data are substantial and differ substantial from each other



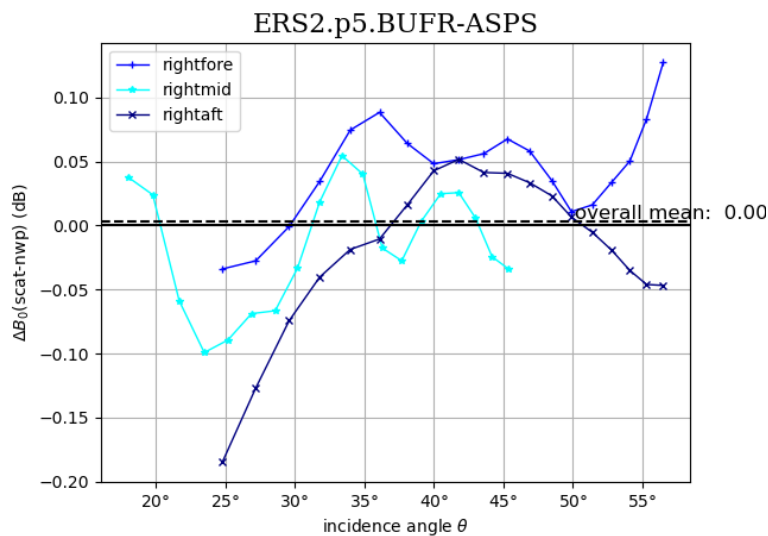
NOC residuals



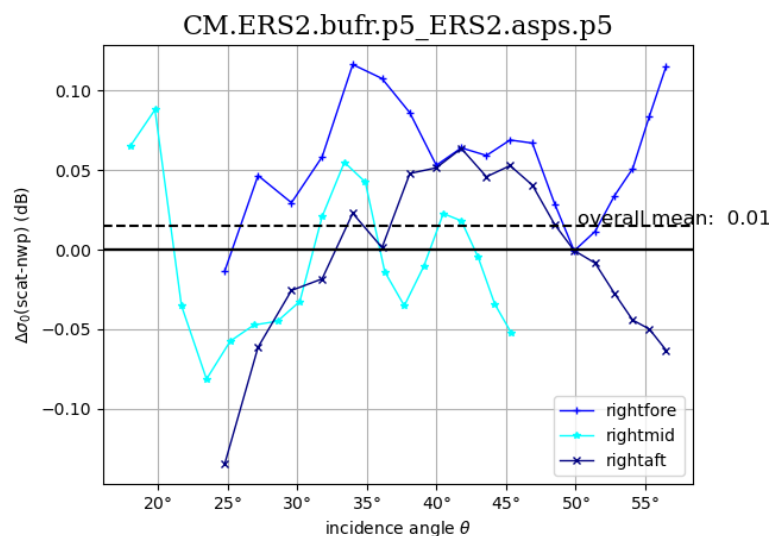
NOC double difference

Cone Metrics residuals

- Cone Metrics compares scatterometer backscatter data from two time periods
- With Cone Metrics no NWP winds are involved
- CM Residuals from BUFR versus ASPS data from p5: 1996-03-20 to 1996-08-04
- Are consistent with NOC (double difference) from the same data



NOC



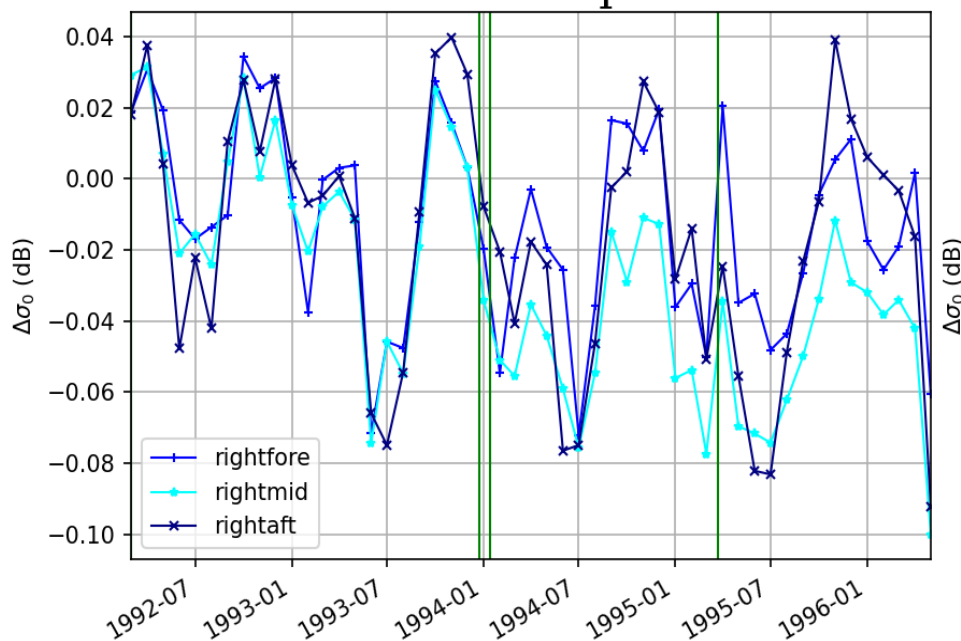
Cone Metrics



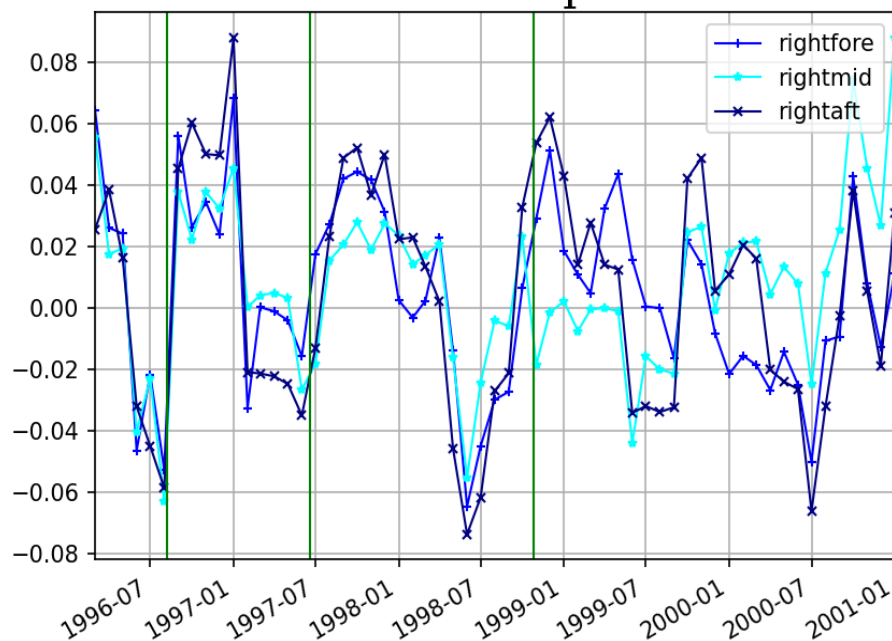
NOC trends

- Seasonal variations due to changes in global wind variability
- Stable over the long term

ERS1.asps



ERS2.asps



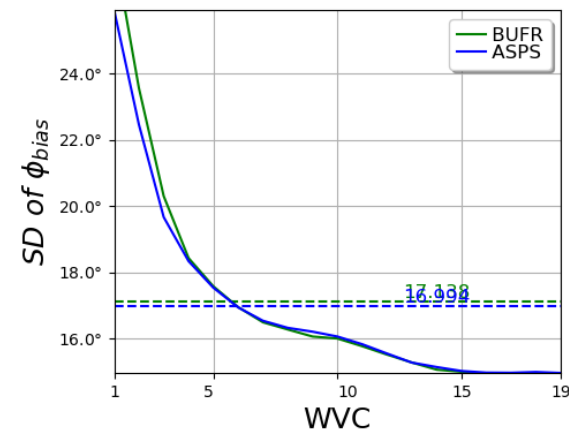
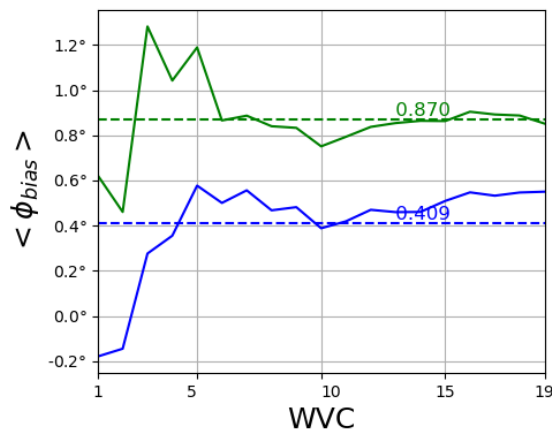
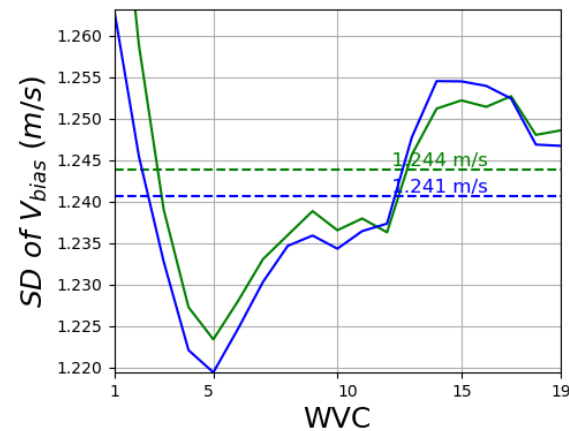
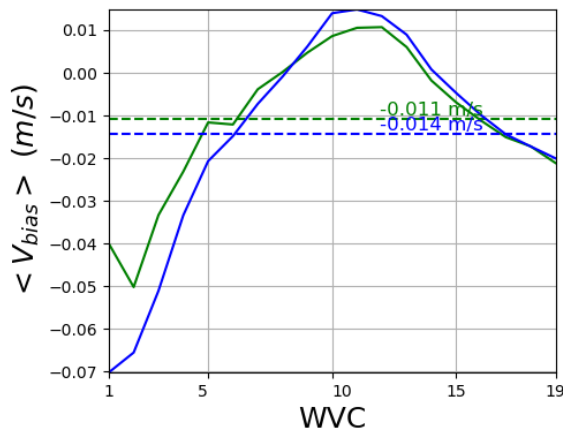


ERS wind statistics

ERS2 data from period p5: 1996-03-20 to 1996-08-04

- ASPS and BUFR data give comparable wind statistics

ERS2.p5



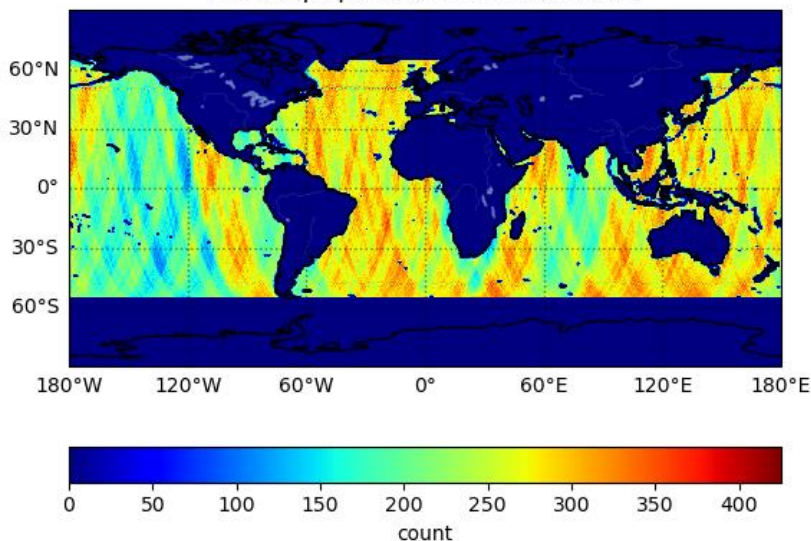


ERS asps-bufr collocations

- Spatial coverage of ASPS and BUFR datasets for period p5
- Irregular but covering the whole globe
- ASPS and BUFR are partly overlapping, partly supplementing

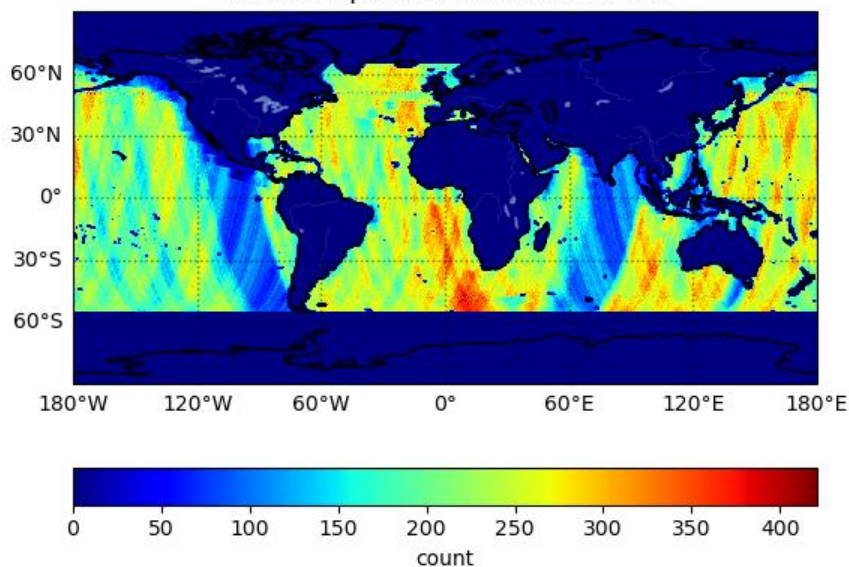
ASPS

ERS2.asps.p5 total count: 27009174



BUFR

ERS2.bufr.p5 total count: 23172538

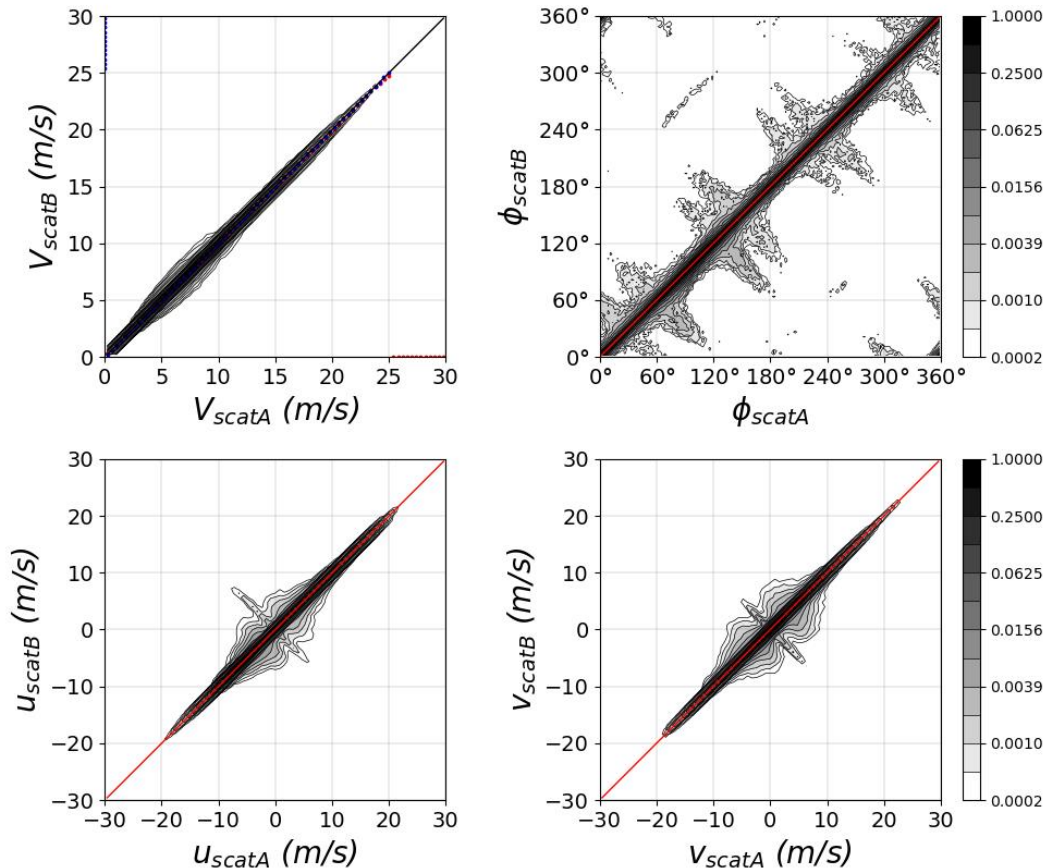




ERS asps-bufr collocations

- Wind statistics from collocated ASPS and BUFR data
- Wind speed histogram shows good agreement
- For small incidence angles, differences in wind retrieval cause ambiguity removal to select different solutions

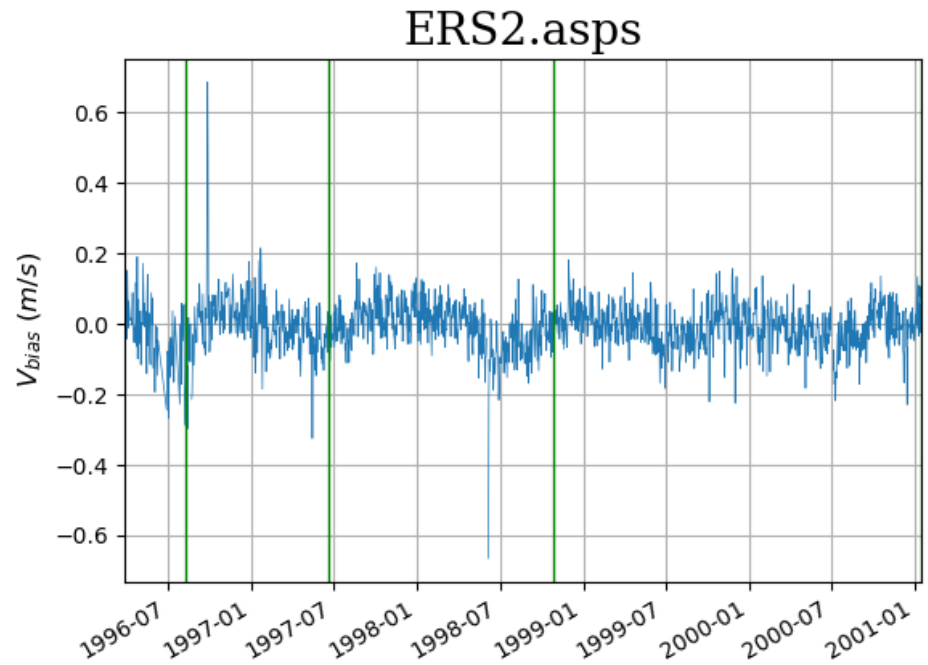
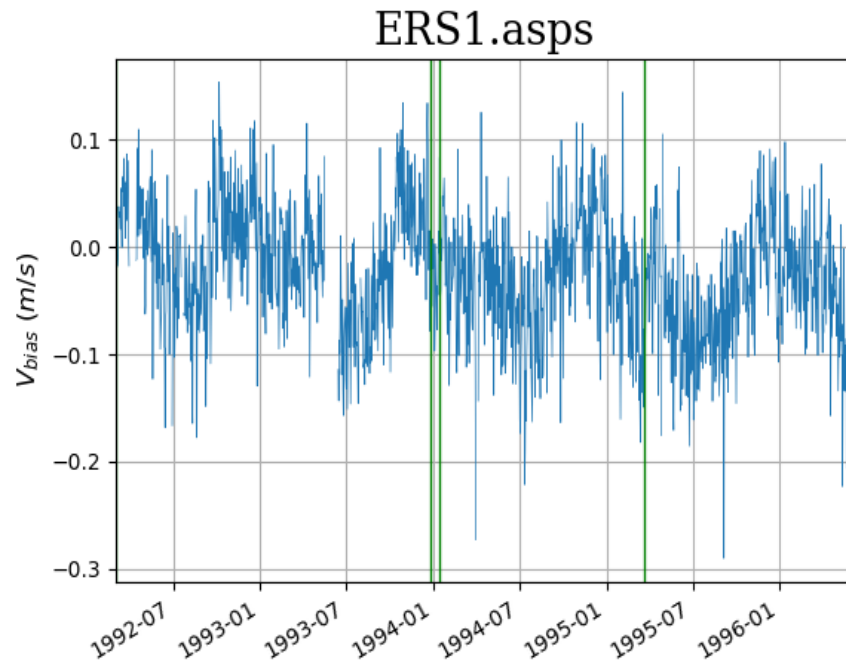
x=ERS2.asps.p5, y=ERS2.bufr.p5





ERS wind speed bias

- Over the life span of ERS1/ERS2
- Vertical green lines mark the calibration periods
- Each calibration period is corrected with its applicable NOC correction table
- Variations on a daily and seasonal basis, and stable over the long term

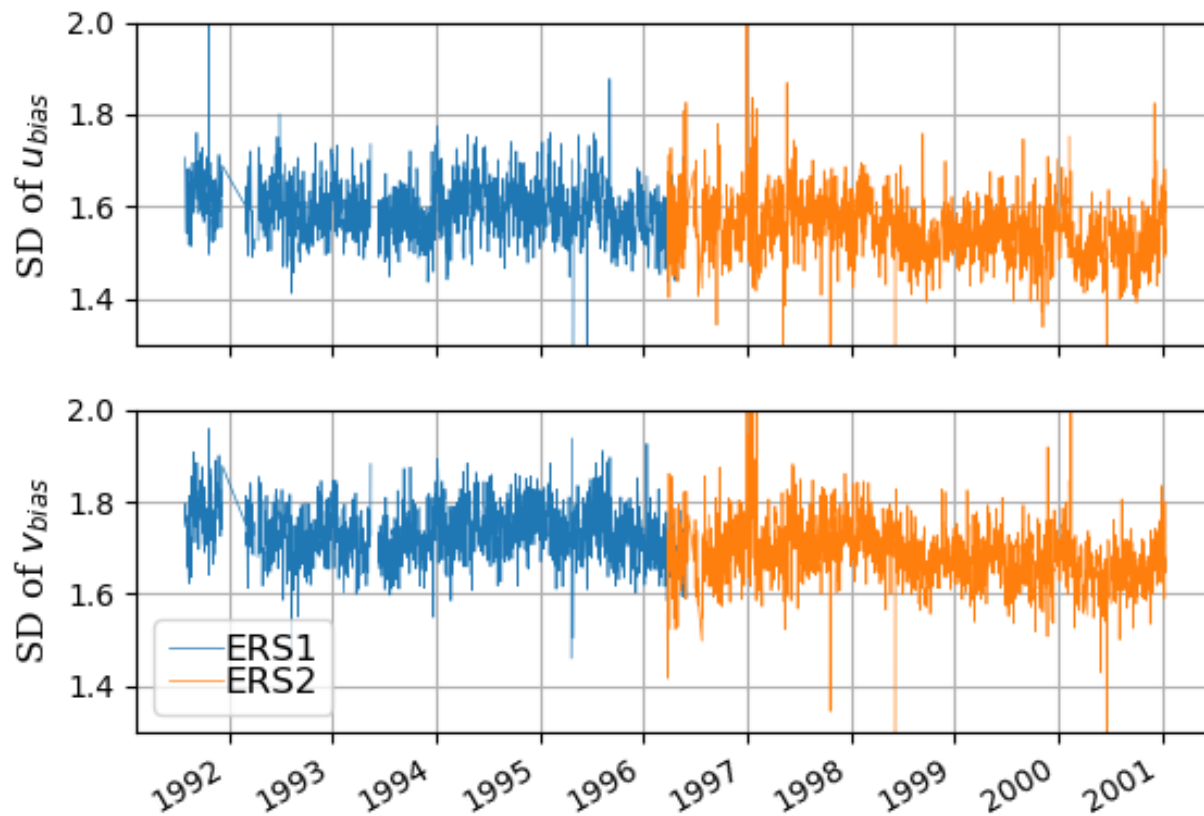




ERS SD of (u, v) bias

- Wind component bias standard deviations show a slightly decreasing trend
- The ERS error standard SD is expected to be constant over time,
- but more assimilated satellite data cause improvements in ECWMF model wind over time

SD of (u, v) wind components





Conclusions and outlook

Conclusions

- The ERS1/ERS2 wind product will be reprocessed over their entire life span
- Two datasets for ERS are available, ASPS and BUFR operational data. They partly overlap and partly complement each other.
- Corrections were applied for level1b (operational BUFR data), noise floor, offset and NOC/cone metrics. These are extended to ASPS.
- Analysis of the derived wind product shows that they have similar quality, so both can be used.
- Time series show daily and seasonal variations in the wind speed bias, but they appear to be very stable over the long term.

Outlook

- Usage of ERS-ASCAT Cone Metrics corrections instead of NOC corrections
- This will give a consistent time series independent of NWP winds
- ERS has lower incidence angles than ASCAT
- For the low incidence angles CM corrections can be complemented with NOC (double difference) corrections