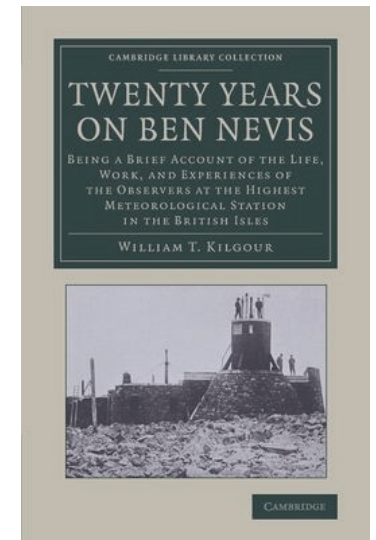
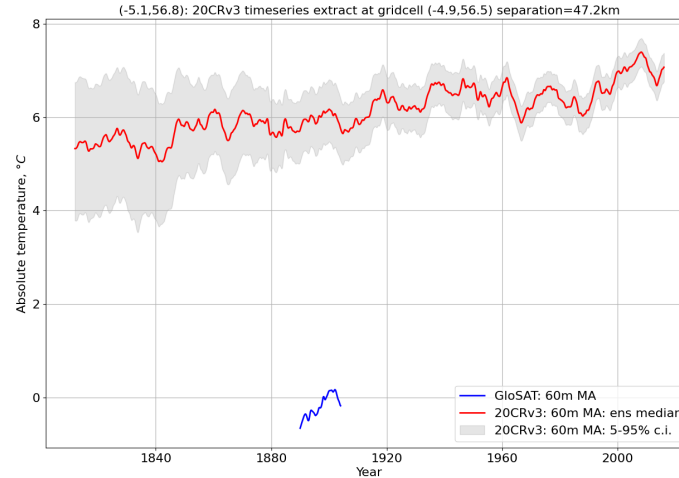
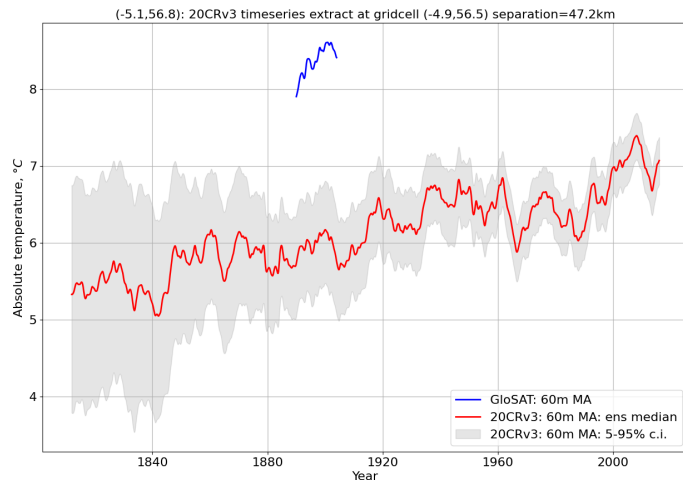
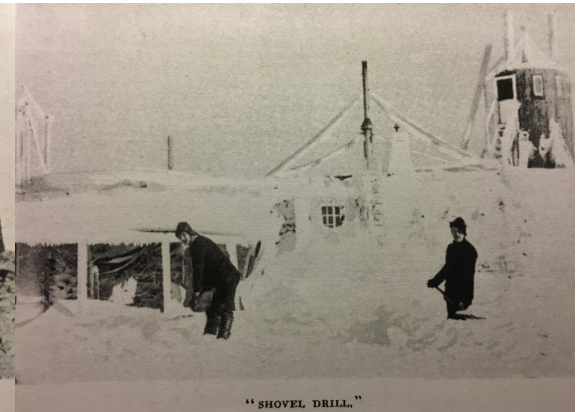


How good is 20th Century Reanalysis at recreating observations during the Ulysses Storm >100 years ago ?

Michael Taylor
CRU/ENV

Parallel Observations during 'Twenty years on Ben Nevis'

1884-1904 twinned measurements at Fort William and at the Ben Nevis Observatory



Ulysses Storm: 27th of February 1903

And they still took measurements!

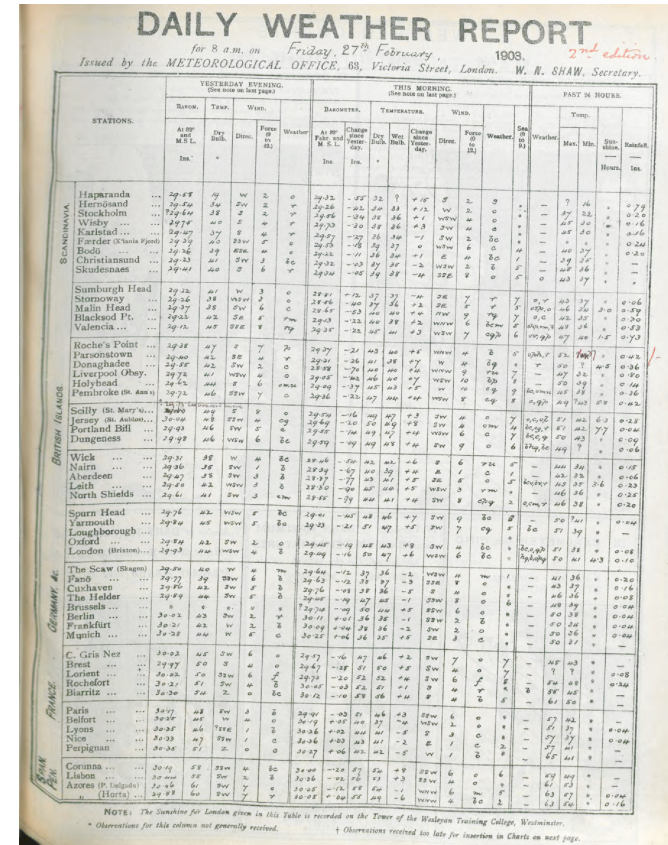
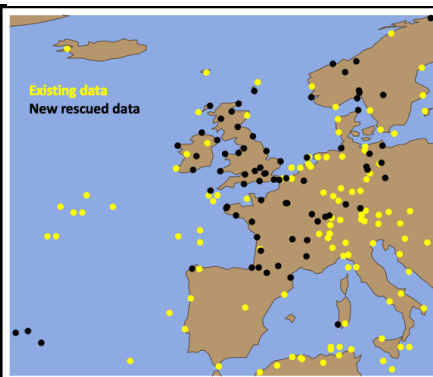
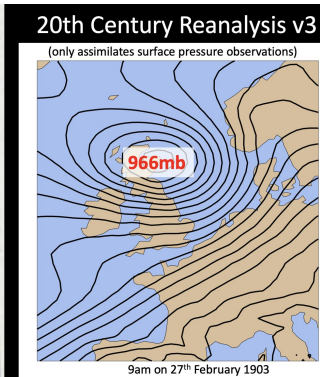
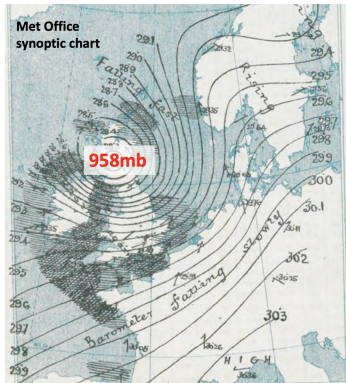
The period 18th-27th February 1903 was a very stormy one with depressions from the Atlantic passing close-by the west coast of Ireland in a north easterly direction. The storm on the night of 26th-27th February was probably the most severe one to affect Ireland since “The Night of the Big Wind”. It was reported that 2,000 trees were uprooted on an estate near Birr and 4,000 on an estate in Kilkenny. In the Phoenix Park, Dublin the storm uprooted a large number of trees (chiefly elms) estimated at 1,000 to 3,000, in different accounts. In parts of the country it was reported that whole woods were laid low. Damage to roofs, chimneys and whole buildings was correspondingly great.

Quotes from Ulysses referring to the storm: - O yes, J.J. O'Molloy said eagerly. Lady Dudley was walking home through the park to see all the trees that were blown down by that cyclone last year and thought she'd buy a view of Dublin." (U7.700)

There was indeed a great storm on February 27th 1903. In Phoenix Park, this PC states, 2948 trees were blown down.



Wikipedia

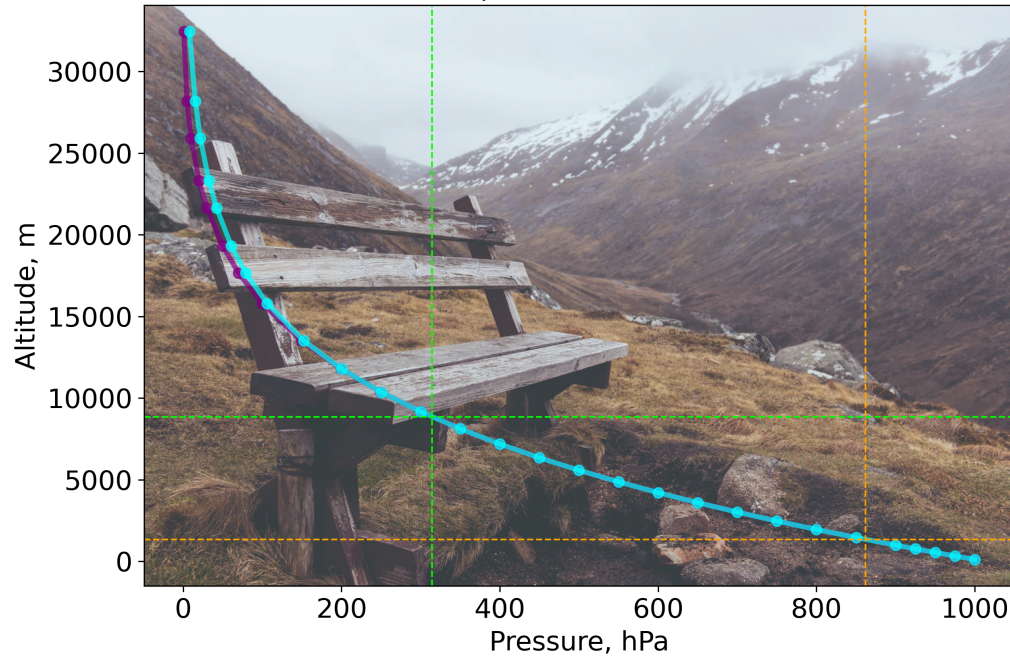


Ed Hawkins

Temperature on pressure levels at altitude

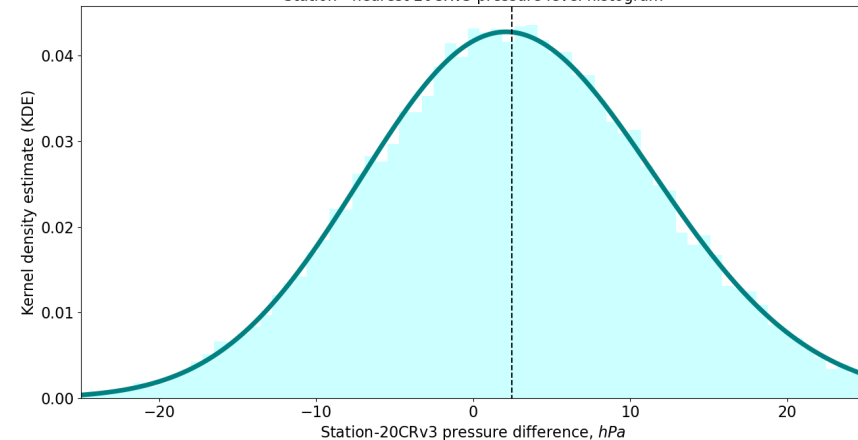
The case for using reanalysis at 850hPa

20CRv3 pressure altitude curve



- ISA conversion
- NIST conversion
- Ben Nevis: 1345m, 861.7hPa
- Mt. Everest: 8848m, 314.3hPa

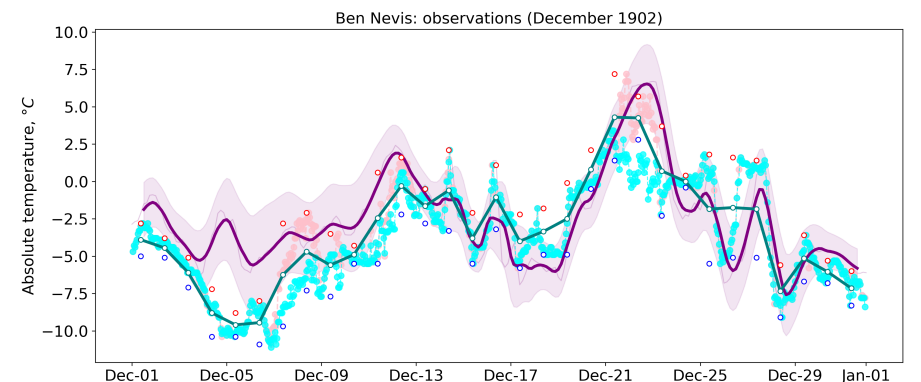
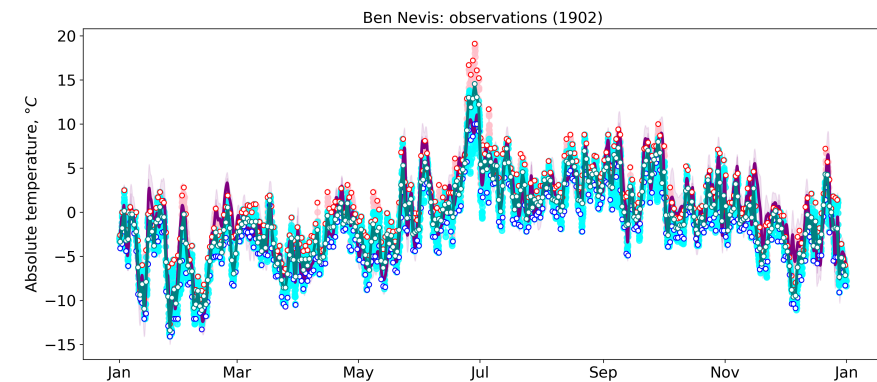
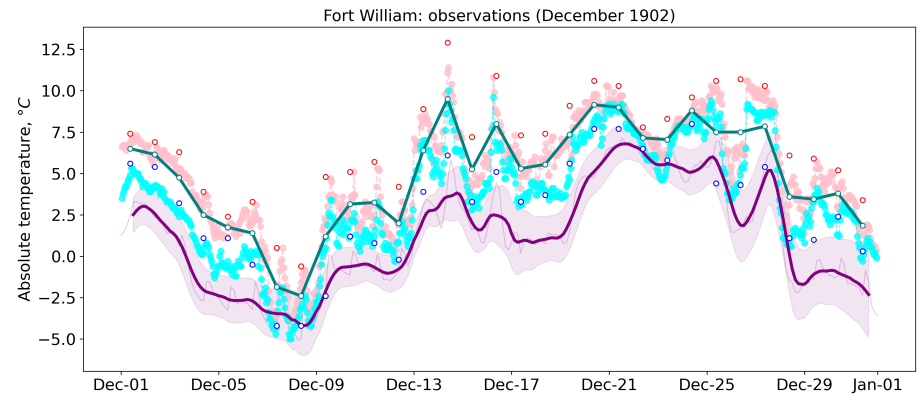
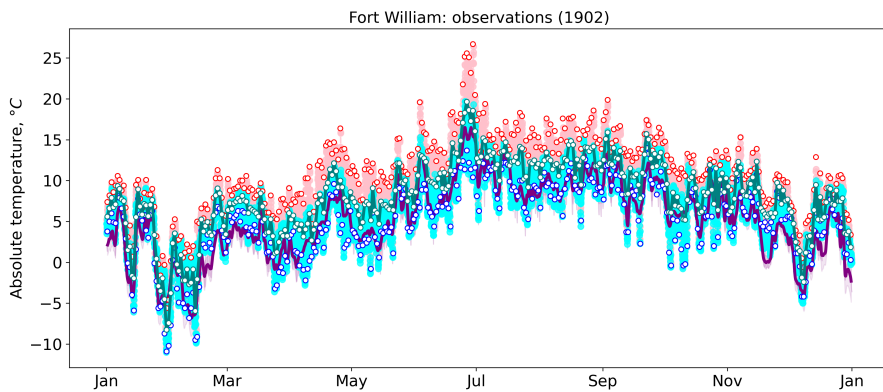
Station - nearest 20CRv3 pressure level histogram



- Γ fit: ($\alpha = 306.44$, $\text{loc} = -160.86$, $\text{scale} = 0.53$)
- Γ fit: median bias = 2.474hPa
- Γ fit (draws): $n = 23510$

Observation versus Reanalysis at 2m and at 850hPa

The observations versus 20CRv3 at the pressure altitude match quite well

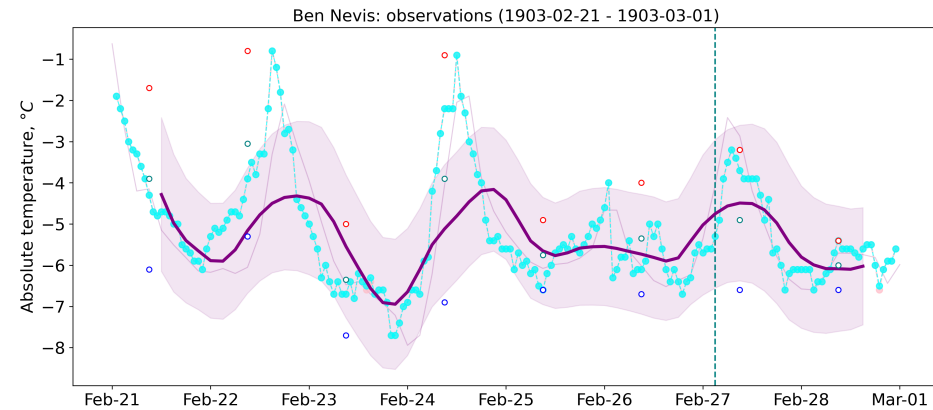
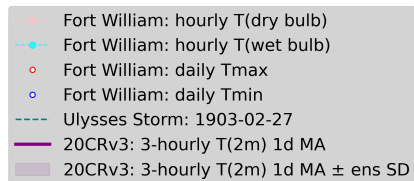
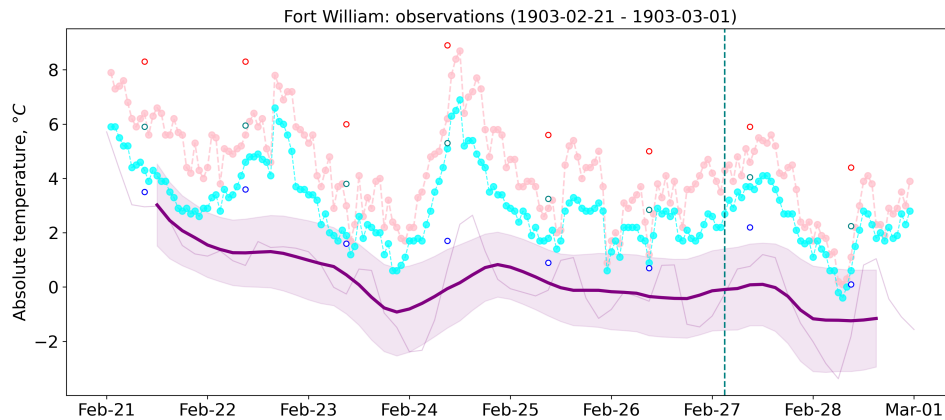


- Ben Nevis: hourly T(dry bulb)
 - Ben Nevis: hourly T(wet bulb)
 - Ben Nevis: daily Tmax
 - Ben Nevis: daily Tmin
 - Ben Nevis: daily Tmean=(Tn+Tx)/2
 - 20CRv3: 3-hourly T(850hPa) 1d MA
 - 20CRv3: 3-hourly T(850hPa) 1d MA \pm ens SD

- Ben Nevis: hourly T(dry bulb)
 - Ben Nevis: hourly T(wet bulb)
 - Ben Nevis: daily Tmax
 - Ben Nevis: daily Tmin
 - Ben Nevis: daily Tmean=(Tn+Tx)/2
 - 20CRv3: 3-hourly T(850hPa) 1d MA
 - 20CRv3: 3-hourly T(850hPa) 1d MA \pm ens SD

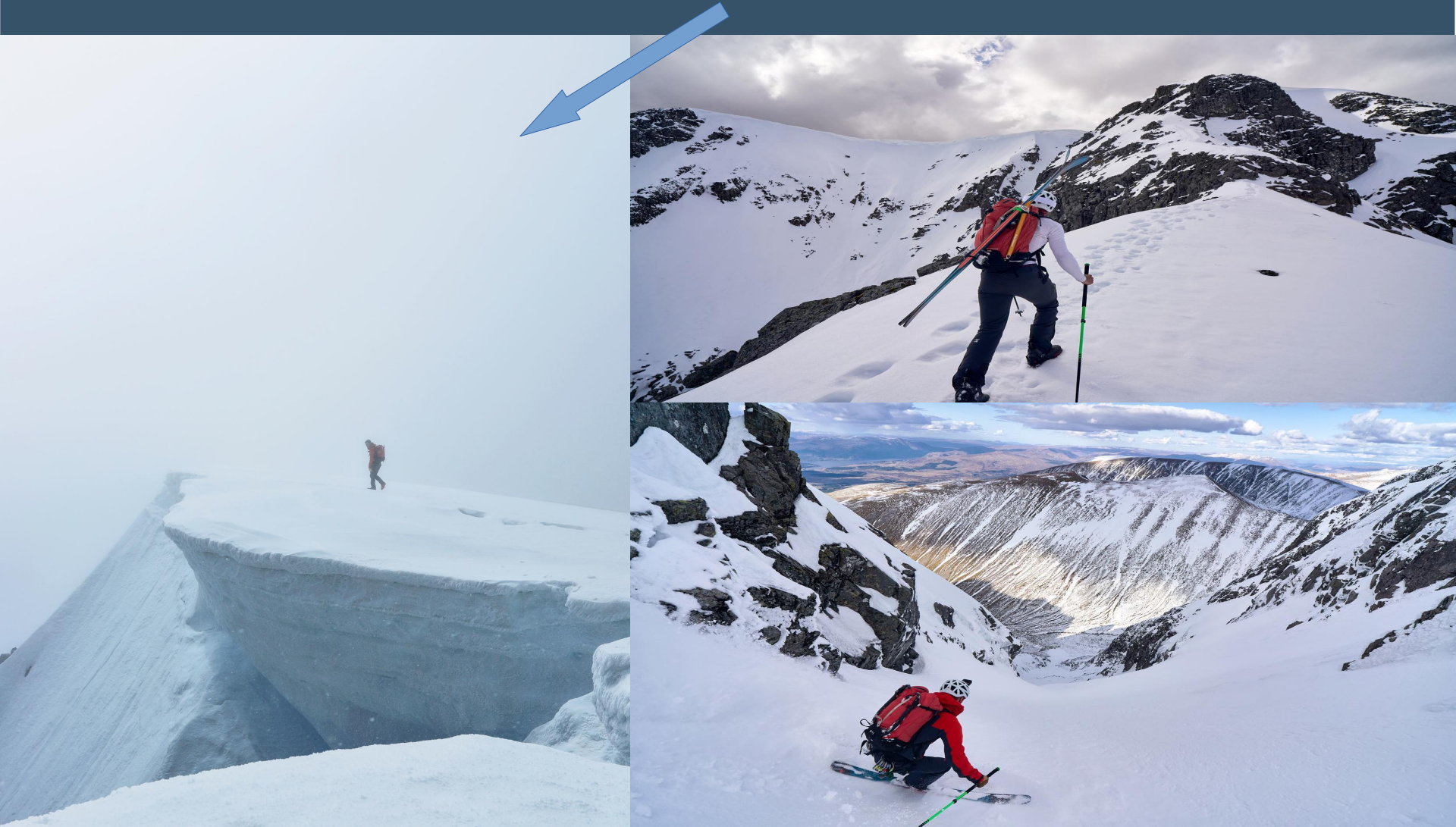
What about the Ulysses Storm?

This is a tough one for the reanalysis! But some sign of baroclinic waves ?



Ben Nevis continues to inspire – here's Iain Innes

He climbs up and skis down Ben Nevis (this is yesterday)!



Many thanks

Observations

From Ed Hawkins and Stephen Burt, University of Reading with data rescued by citizen science on Zooniverse

NOAA / PSL

20CRv3 3-hourly t2m and t(hPa) 1836-2015:

https://portal.neresc.gov/project/20C_Reanalysis/

Codebase:

<https://github.com/patternizer/glosat-station-pressure-altitude>

<https://github.com/patternizer/glosat-weathermen> (not public yet)