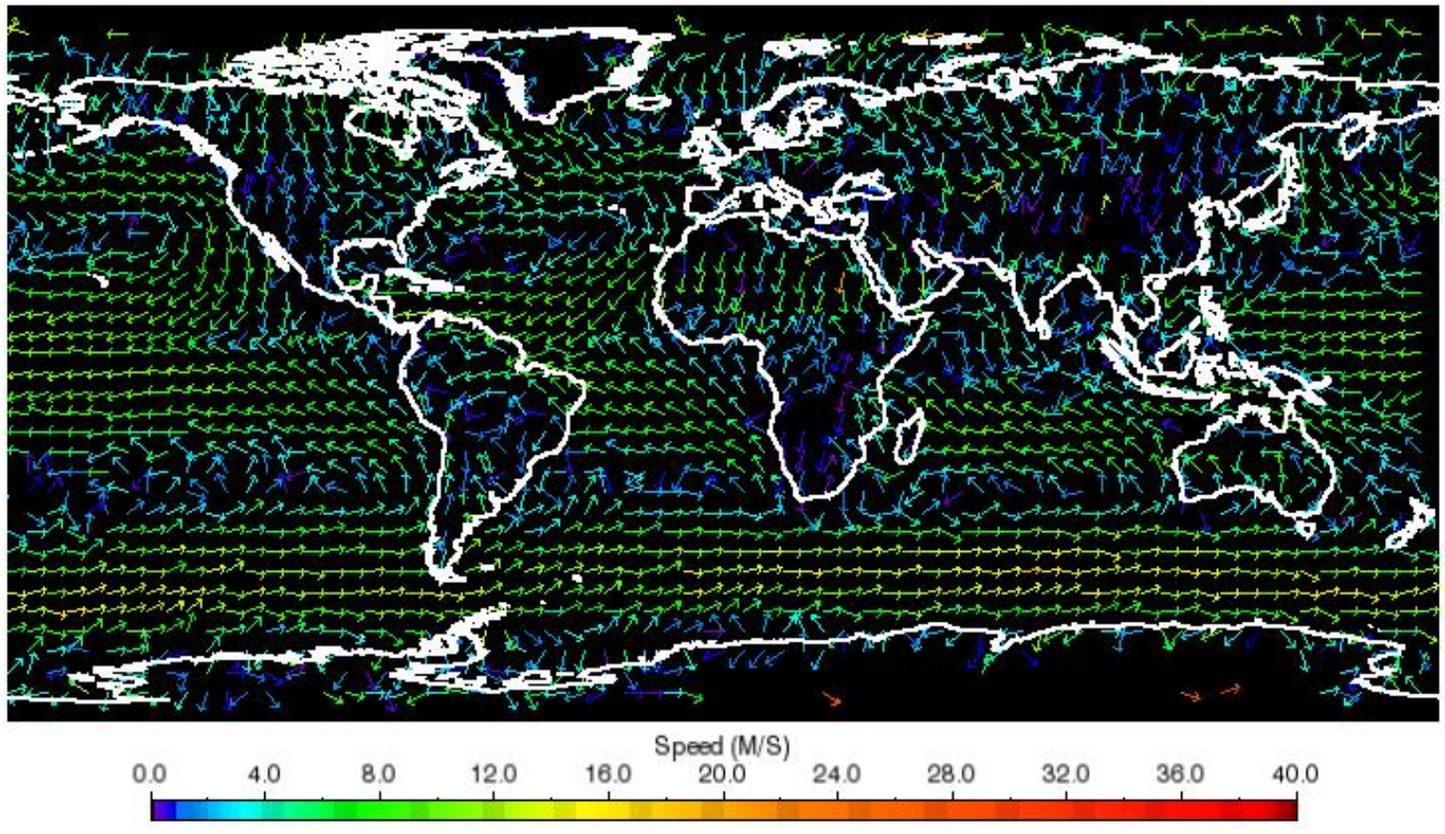
MISR Winds

Roger Davies

MISR low-level winds, annual 2008



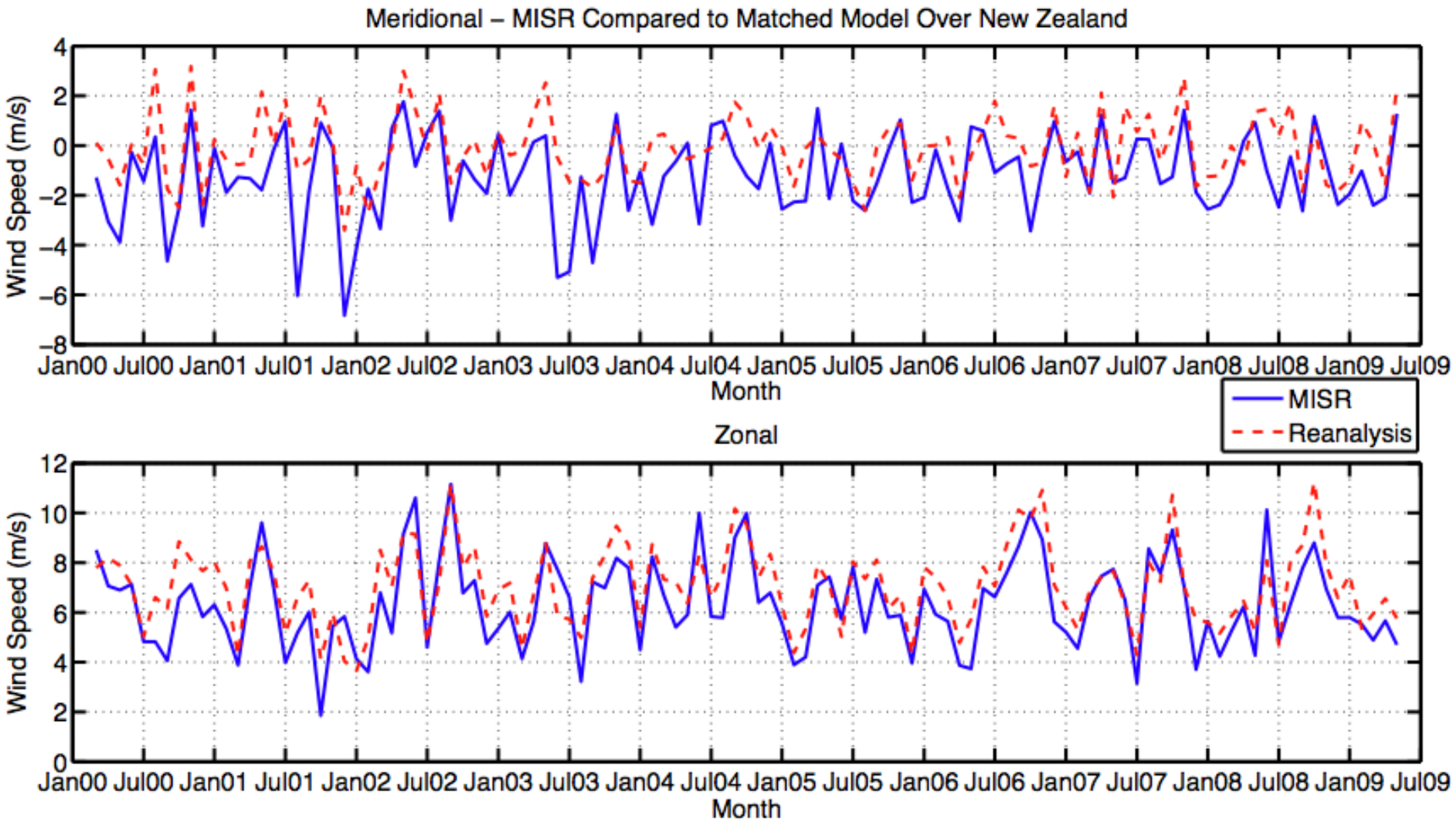
a retrospective

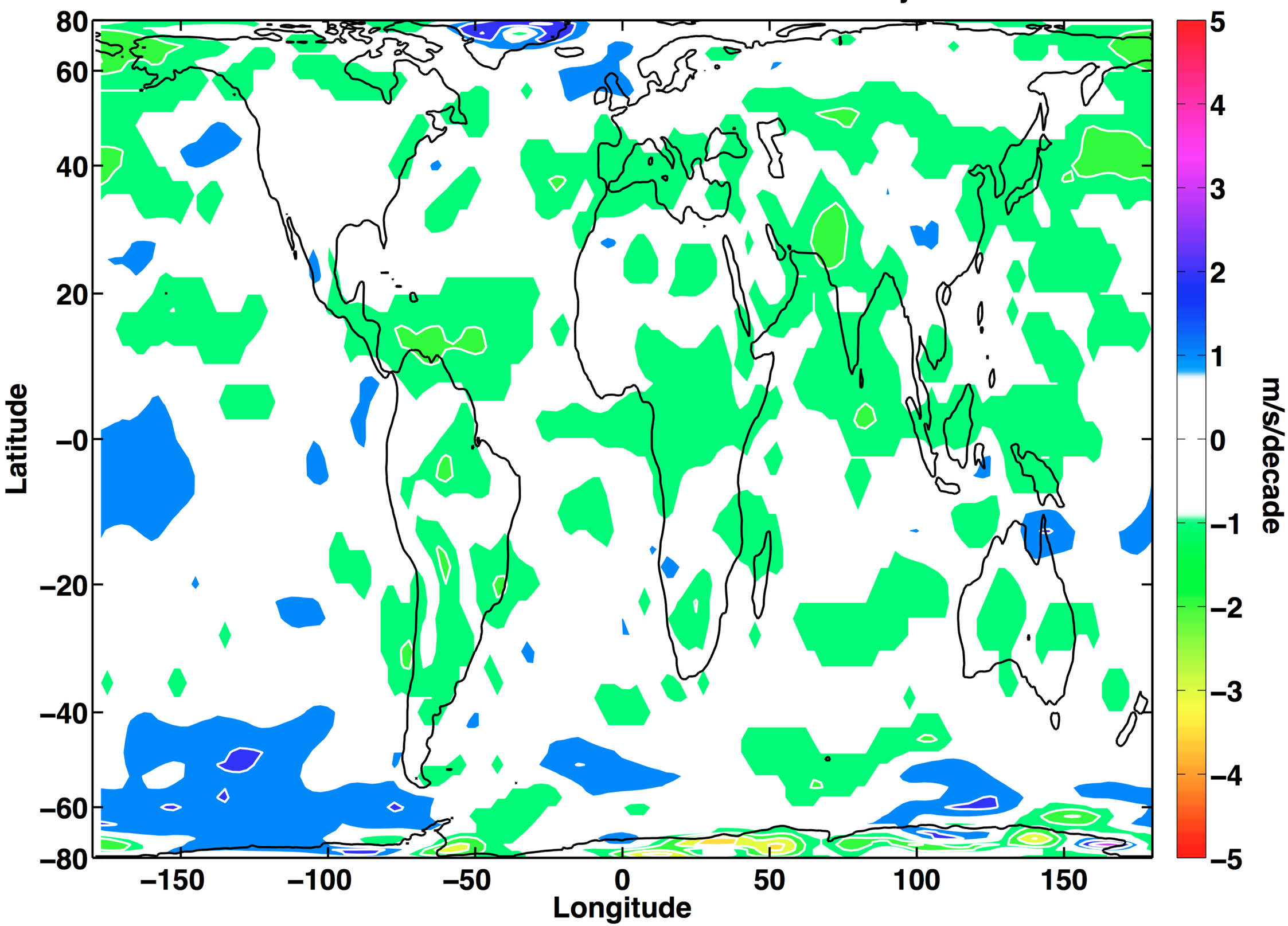
- we really just wanted albedos from multi-angle measurements
  - *but these measurements must be co-registered to the same dynamic reference height*
- so we had to get dynamic cloud-top heights
  - *but it takes 7 minutes to measure all angles, and clouds move*
- so we had to unscramble the along-track cloud motion from height parallax
- Horváth and Davies 2001 showed how to do this
- since then there has been 10+ years of improved algorithms
  - and over a decade of measurements

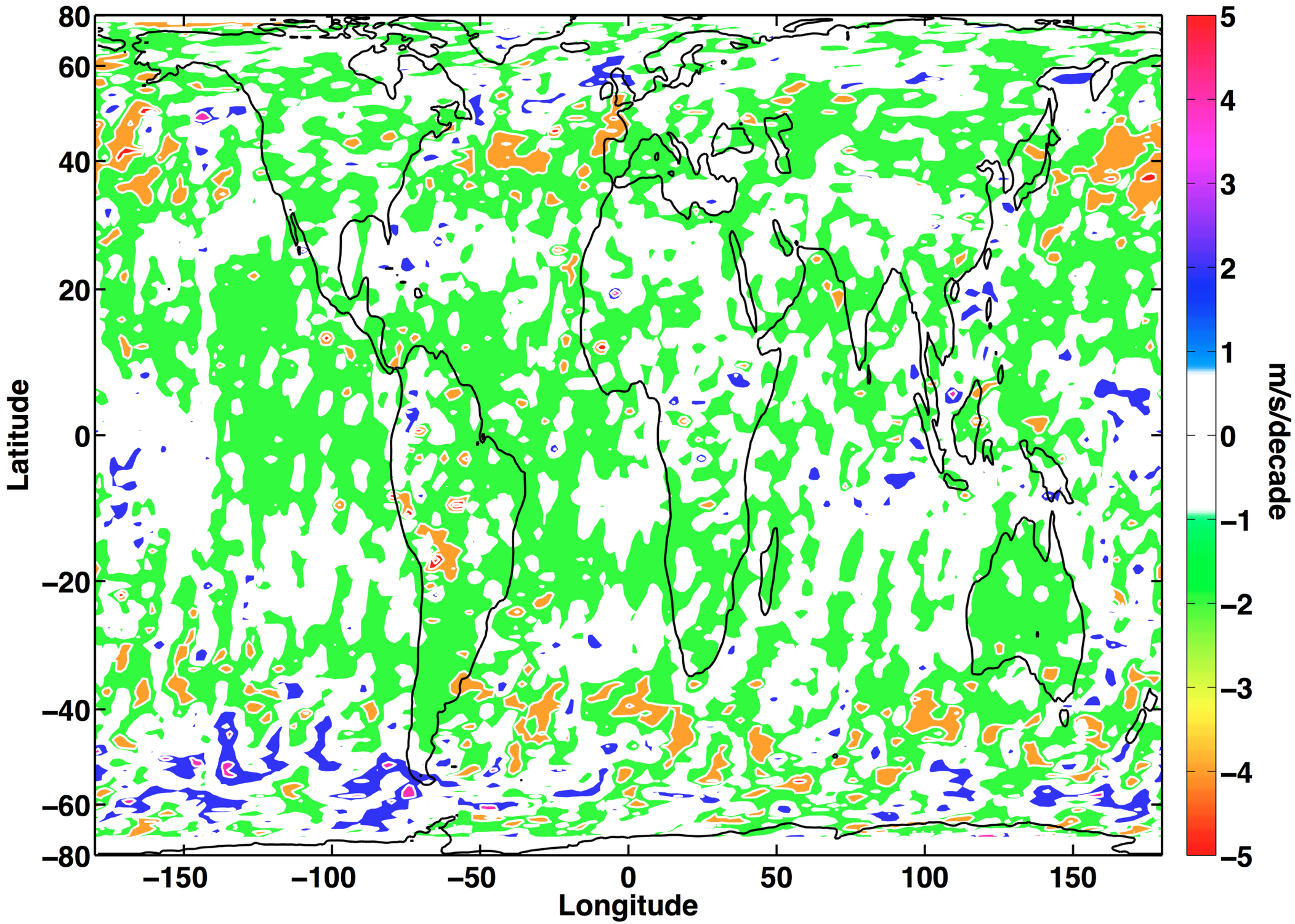
Terra/MISR: 10-year Climate Data Records

- cloud-top heights (from March/2000)
  - cloud fraction by height
  - at 1.1 km
- height-resolved cloud motion vectors (from March/2000)
  - at 70.4 km
- top-of-atmosphere albedos (from May/2000)
  - spectral, equivalent broadband, local, restrictive or expansive too
  - at 35 km
- summarized into 140x300 km blocks, ≈140blocks/orbit, ≈420 orbits/month

New Zealand Average Winds Over Ten Years




10–Year Trends in Scalar Wind from Reanalysis
Latitude
80
60
40
20
–0
–20
–40
–60
–80
–150
–100
–50
0
50
100
150
Longitude
5
4
3
2
1
0
–1
–2
–3
–4
–5
m/s/decade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−2
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−4
−5
m/s/decade

retrospective summary

- the global fluctuation analysis seems to be useful as is, and of interest to climate change studies
  - MISR and reanalysis generally agree on the decadal changes, with MISR showing more regional detail
  - a lower background wind speed (-1 m/s/decade) is a reasonable consequence of polar warming
  - with less surface wind over ocean, expect higher Bowen ratios
  - the decrease is greater (up to -4 m/s/decade in North Pacific)
  - an increase 2-3 m/s/decade in Southern Oceans
    - The seasonal Antarctic sea ice is exanding, which seems to be the cause of this.

prospective

- Improved algorithms
  - Horvath, Muller, Moroney
- Reprocessing with new algorithms
- Near real time prospects
  - For discussion