

# Characterization of the bi-directional reflectance of Antarctic surface for the inter-calibration and validation of satellite remote sensing products

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# Gonio RAdiometric Spectrometer System

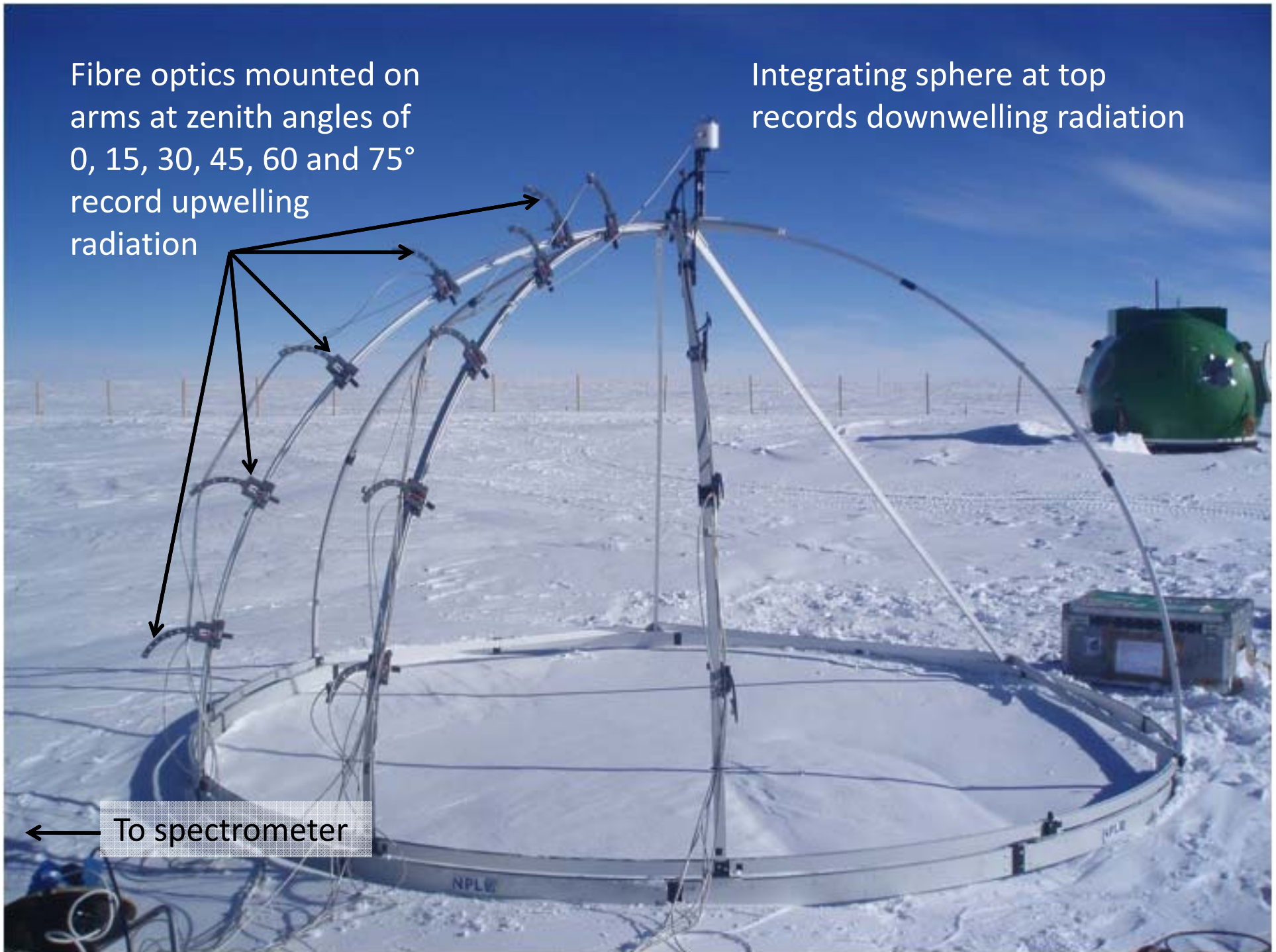


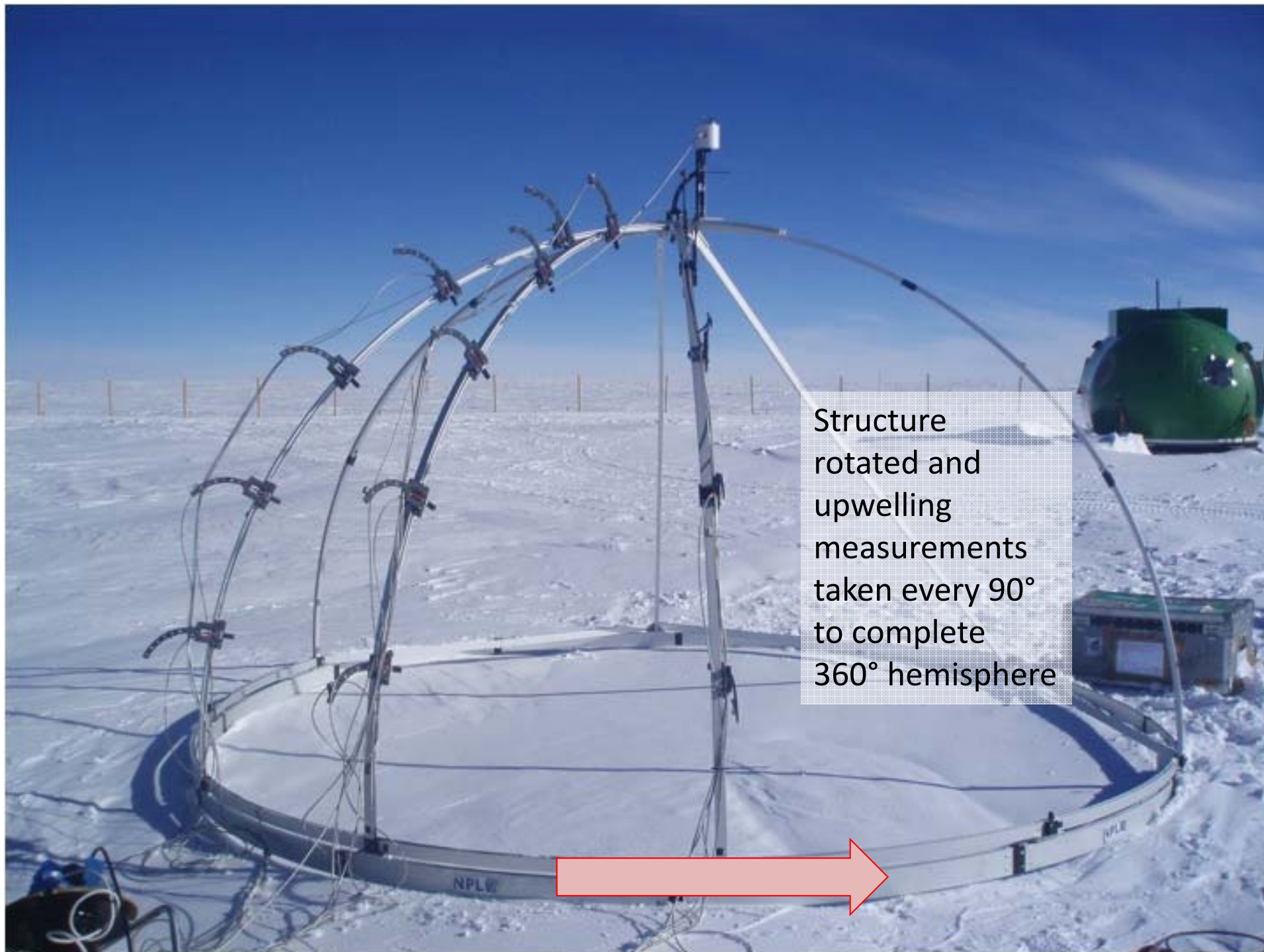


Fibre optics mounted on  
arms at zenith angles of  
0, 15, 30, 45, 60 and 75°  
record upwelling  
radiation

Integrating sphere at top  
records downwelling radiation

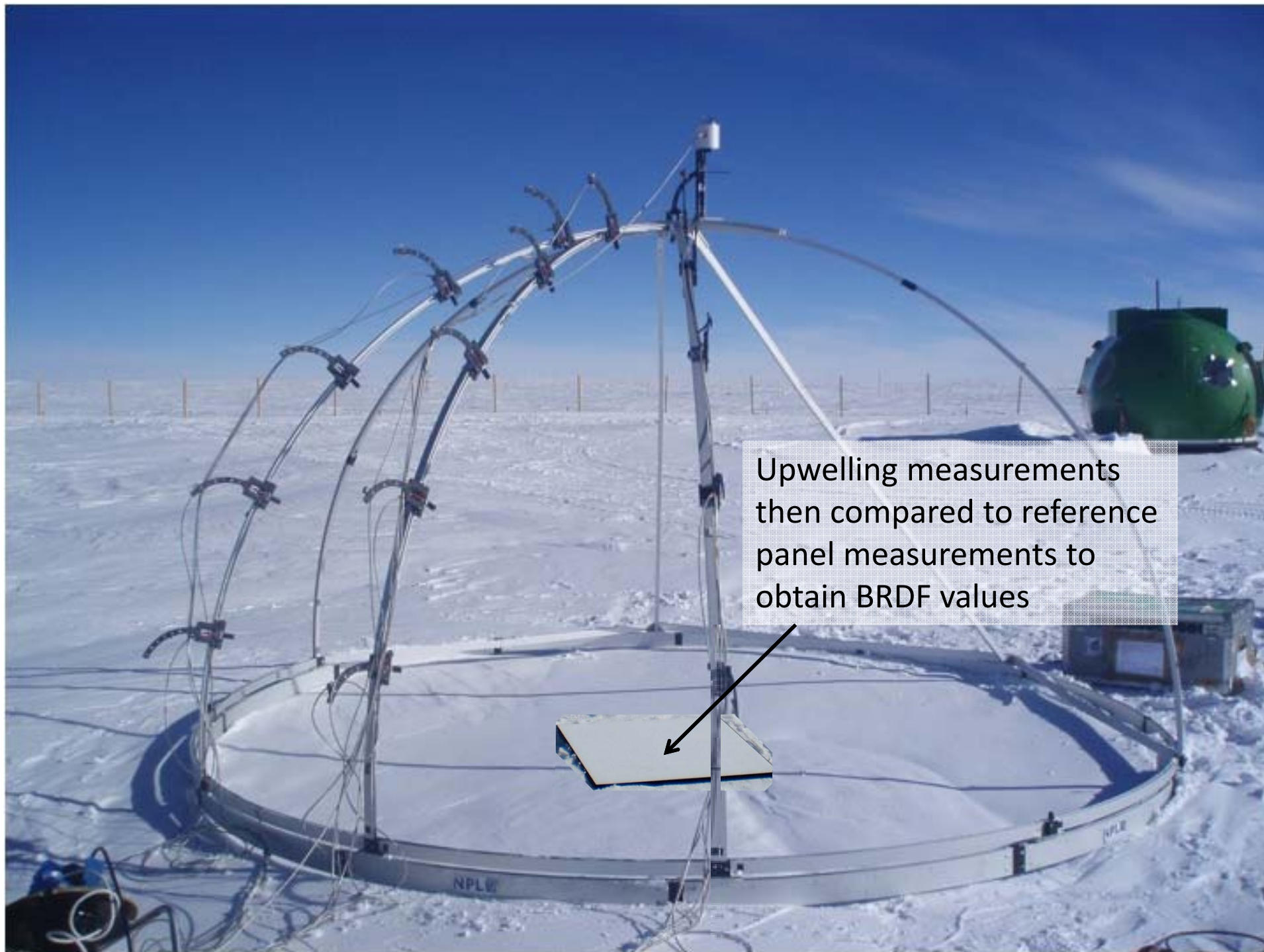
To spectrometer





Structure  
rotated and  
upwelling  
measurements  
taken every  $90^\circ$   
to complete  
 $360^\circ$  hemisphere

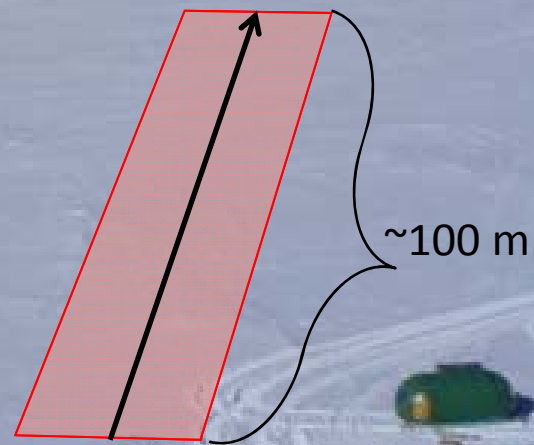




Upwelling measurements  
then compared to reference  
panel measurements to  
obtain BRDF values

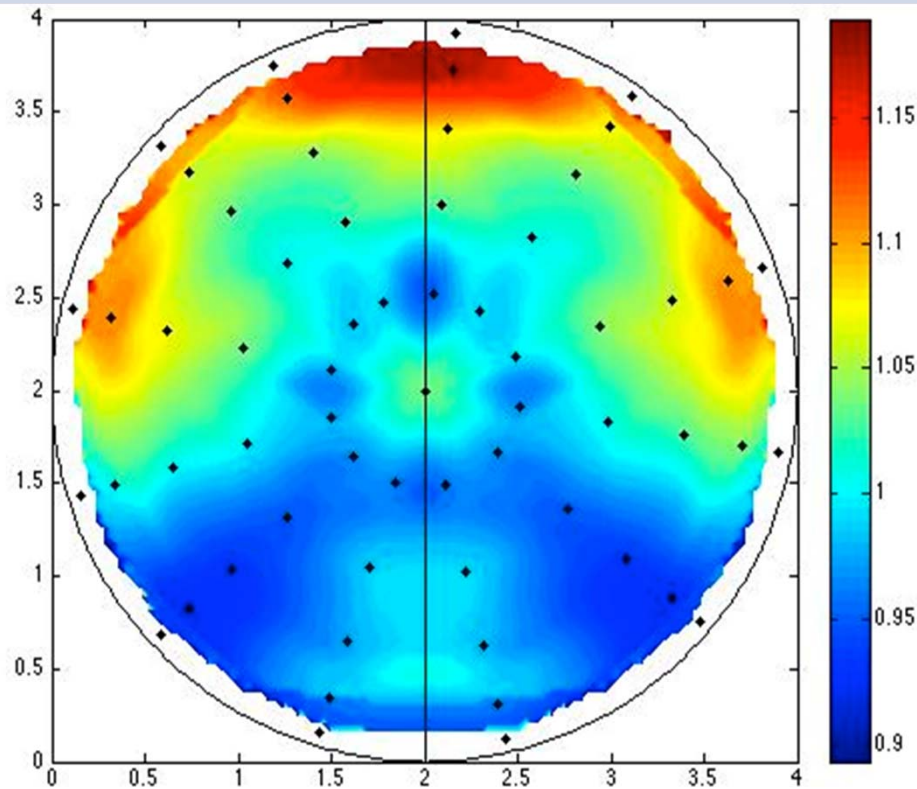
## Measurement location

BRDF measurements of the surface taken every ~10 m at suitable sites along section shown



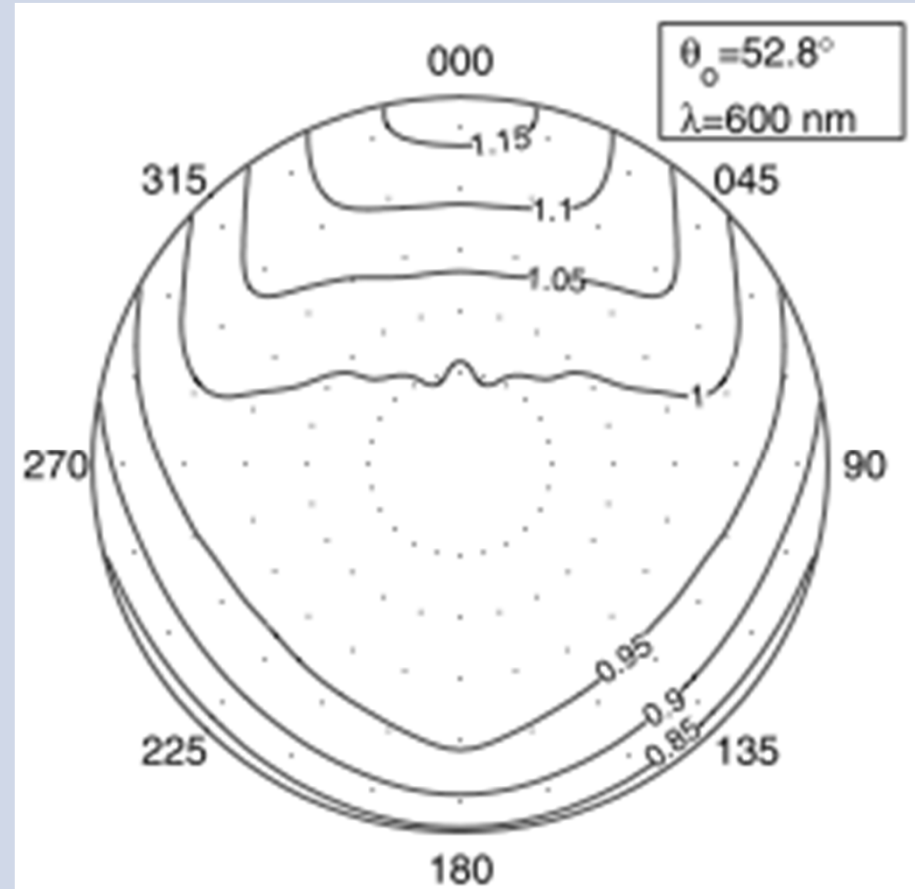
## Comparison of our average measurements to previous Dome C measurements

Average of our BRDF measurements from all locations



Measurements at 600 nm  
SZA: 52–63°  
Sun at base

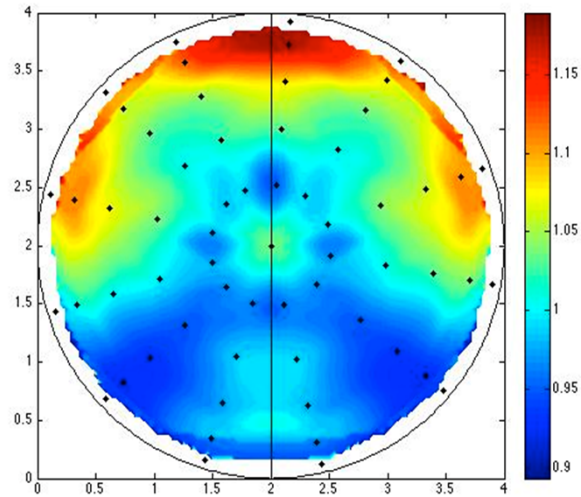
Example from Hudson *et al.* (2006) of BRDF recorded from top of a 32m tower at Dome C



Measurements at 600 nm  
SZA 52.8°  
Sun at base

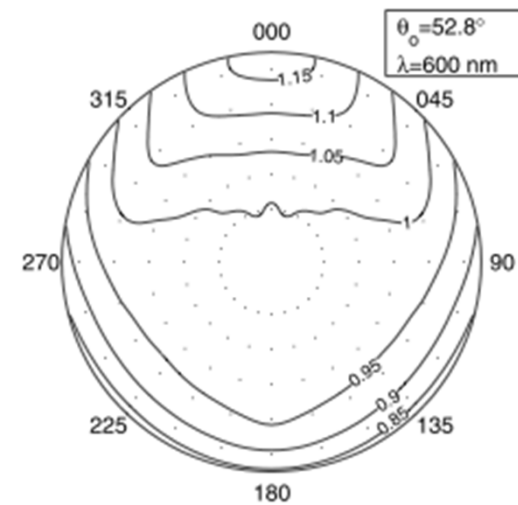
# Comparison of average measurements to other snow measurements

Average of our BRDF measurements from all locations



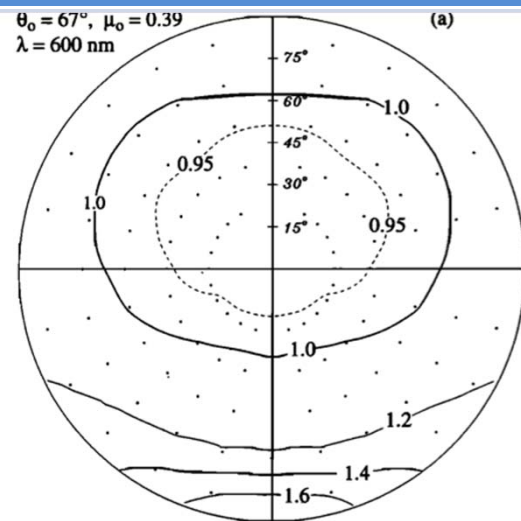
600 nm  
SZA: 53–60°  
Sun at base

Example from Hudson *et al.* (2006) of BRDF recorded at Dome C



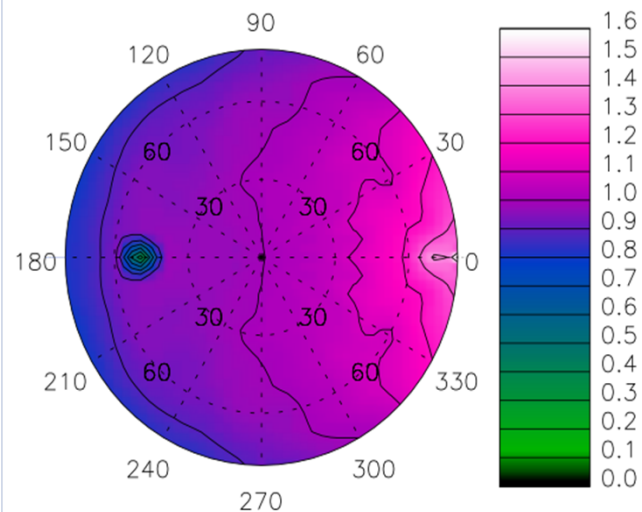
600 nm  
SZA: 52.8°  
Sun at base

Example from Warren *et al.* (1998) of BRDF measurements from South Pole station



600 nm  
SZA: 67°  
Sun at top

Example from Painter (2002) of BRDF of snow on Mammouth Mountain, California

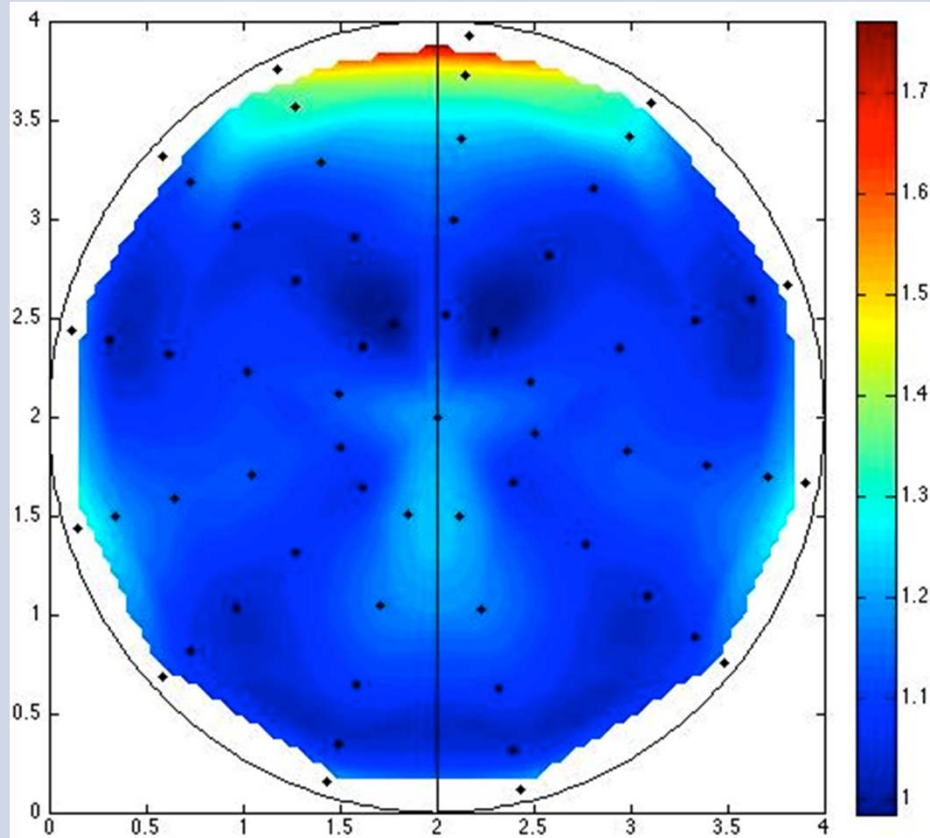


550 nm  
SZA: 47°  
Sun on left



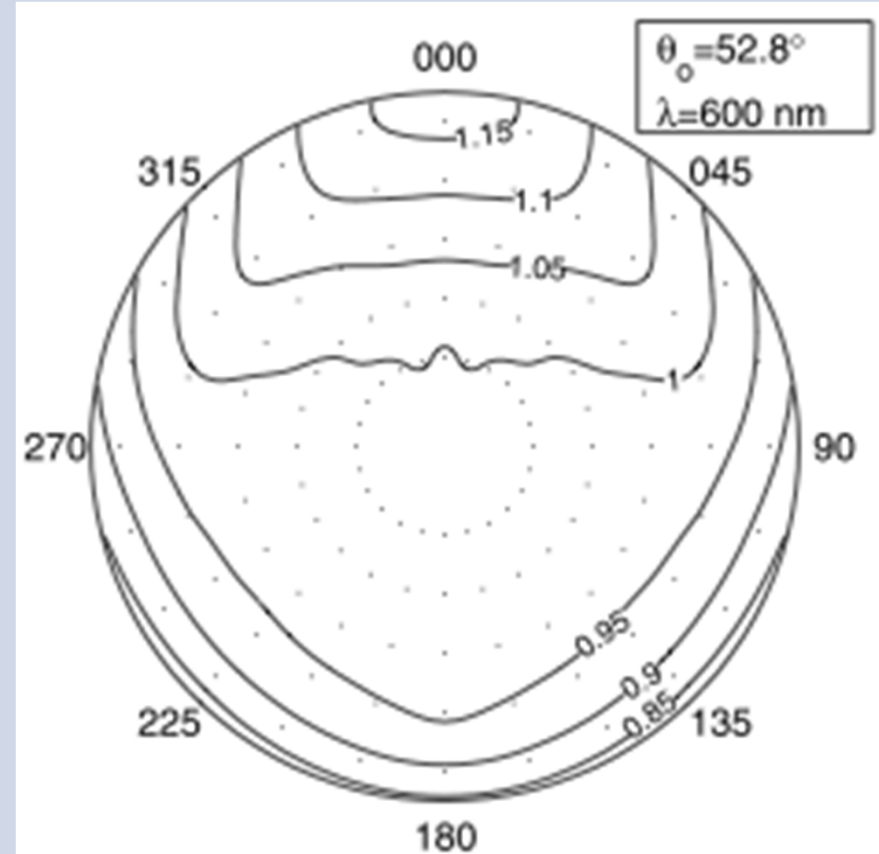
# Comparison of a typical measurement to previous Dome C measurements

Example of our BRDF measurements from Dome C



Measurements at 600 nm  
SZA: 62°  
Sun at base

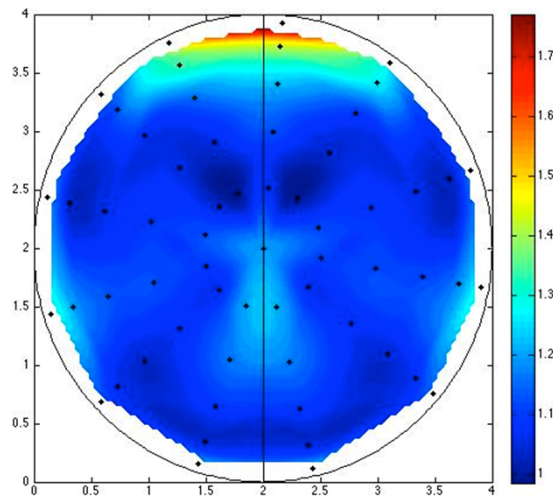
Example from Hudson *et al.* (2006) of BRDF recorded from top of a 32 m tower at Dome C



Measurements at 600 nm  
SZA 52.8°  
Sun at base

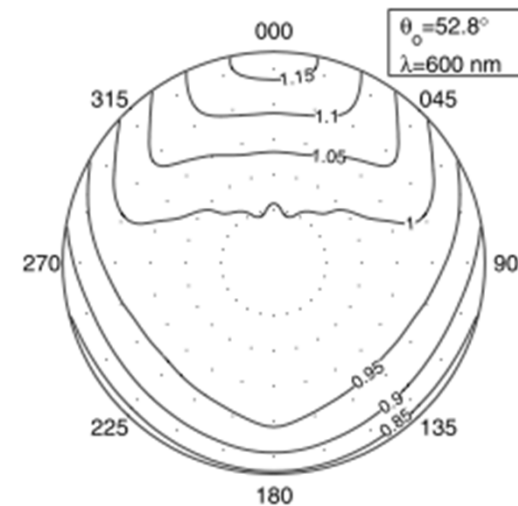
# Comparison of typical measurements to other snow measurements

Example of our BRDF measurements from Dome C



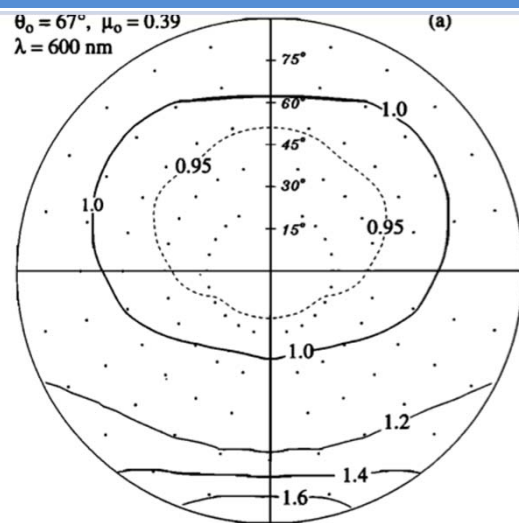
600 nm  
SZA: 62°  
Sun at base

Example from Hudson *et al.* (2006) of BRDF recorded at Dome C



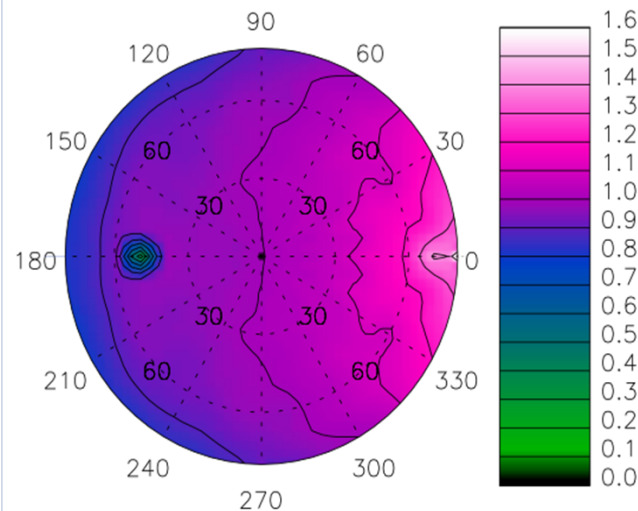
600 nm  
SZA: 52.8°  
Sun at base

Example from Warren *et al* (1998) of BRDF measurements from South Pole station



600 nm  
SZA: 67°  
Sun at top

Example from Painter (2002) of BRDF of snow on Mammoth Mountain, California

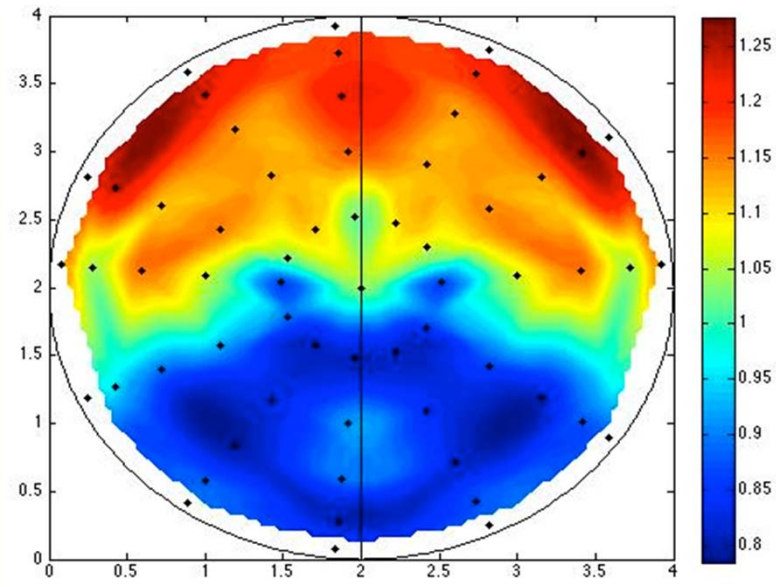


550 nm  
SZA: 47°  
Sun on left

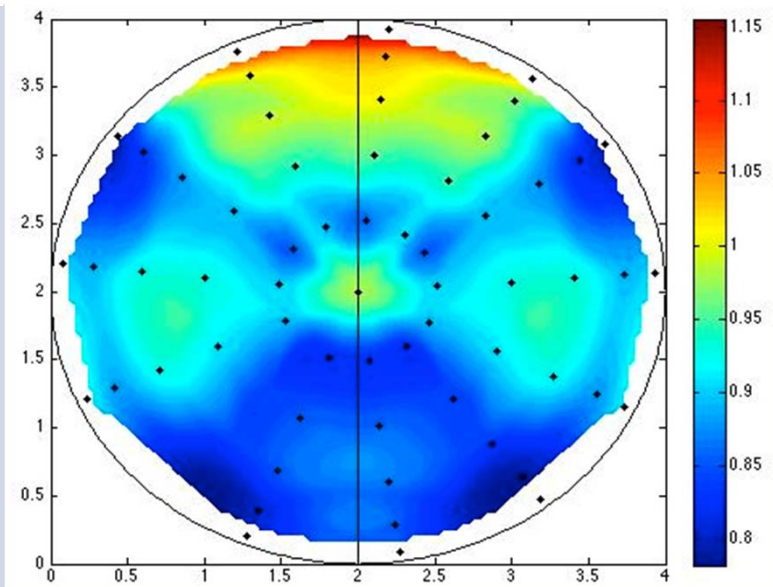


# Variation within our measurements

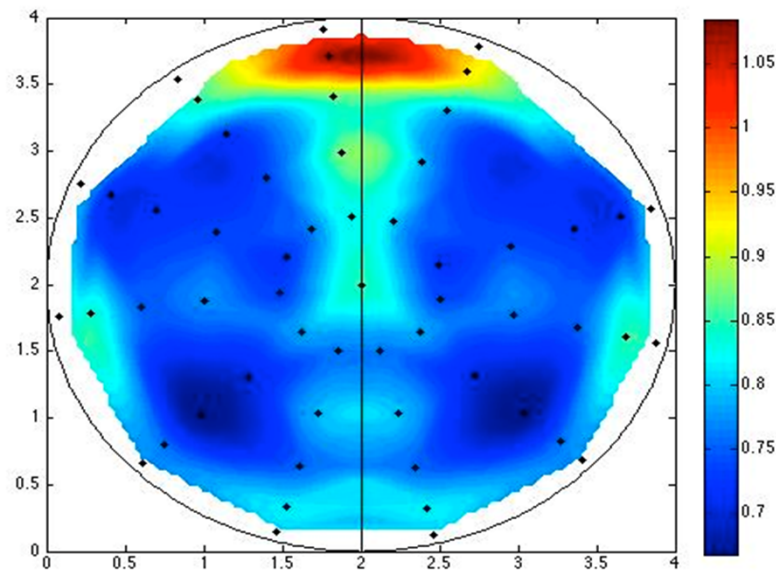
Site 4



Site 5



Site 8



Site 9

