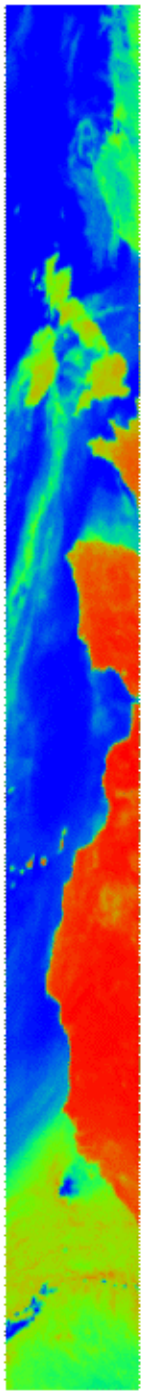
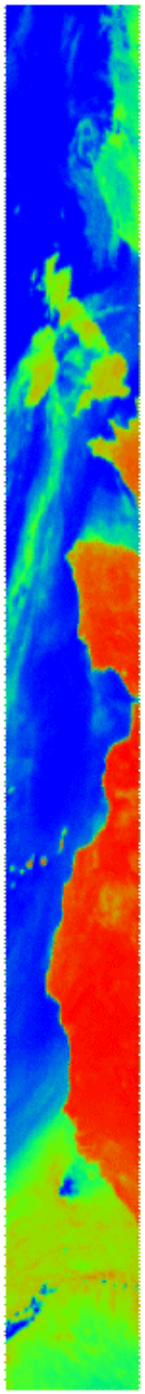


United Kingdoms Provisional Interest/Role in GPM

Dr Chris Kidd

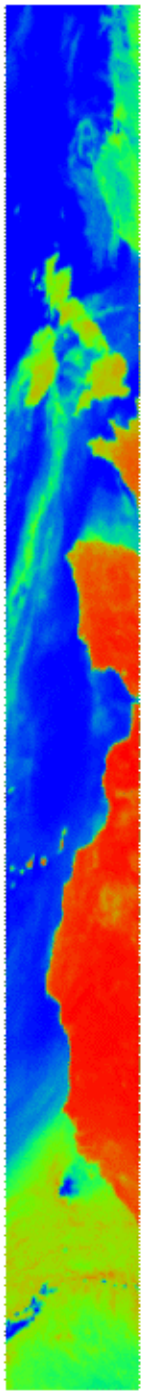
University of Birmingham

C.Kidd@bham.ac.uk



Uk Groups

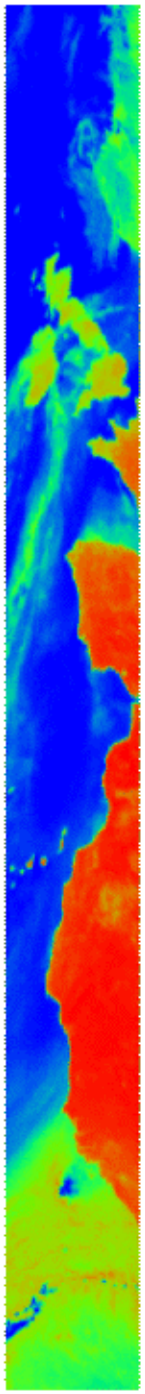
- Meteorological Office
- MoD/DERA
- Rutherford/Appleton Laboratory
- University of Reading
- University of Birmingham
- University of Essex
- +?



Key Areas

- Support European & International GPM activities through:

- Hardware, including contributions in technology
- Scientific research - algorithms/techniques
- Scientific activities - validation sites and other data
- Software/data analysis

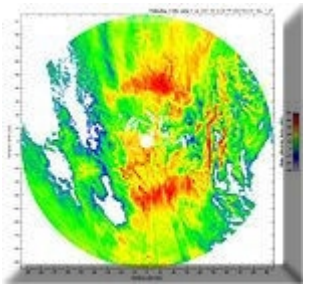


Ground Validation

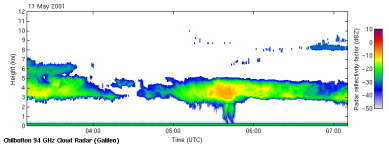
- Chilbolton Radar (John Goddard) -

  25m steerable 3GHz

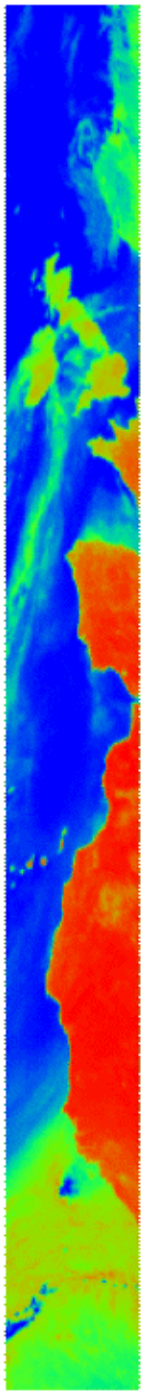
  dual polarised doppler radar



- 94GHz cloud radar



- *Surface data sets - radar, gauge, lightning network*
- *Met.Office flights*
- *Possible northern field site experiment - cold season?*

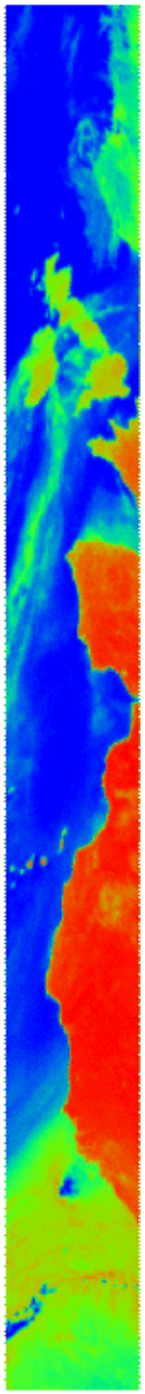


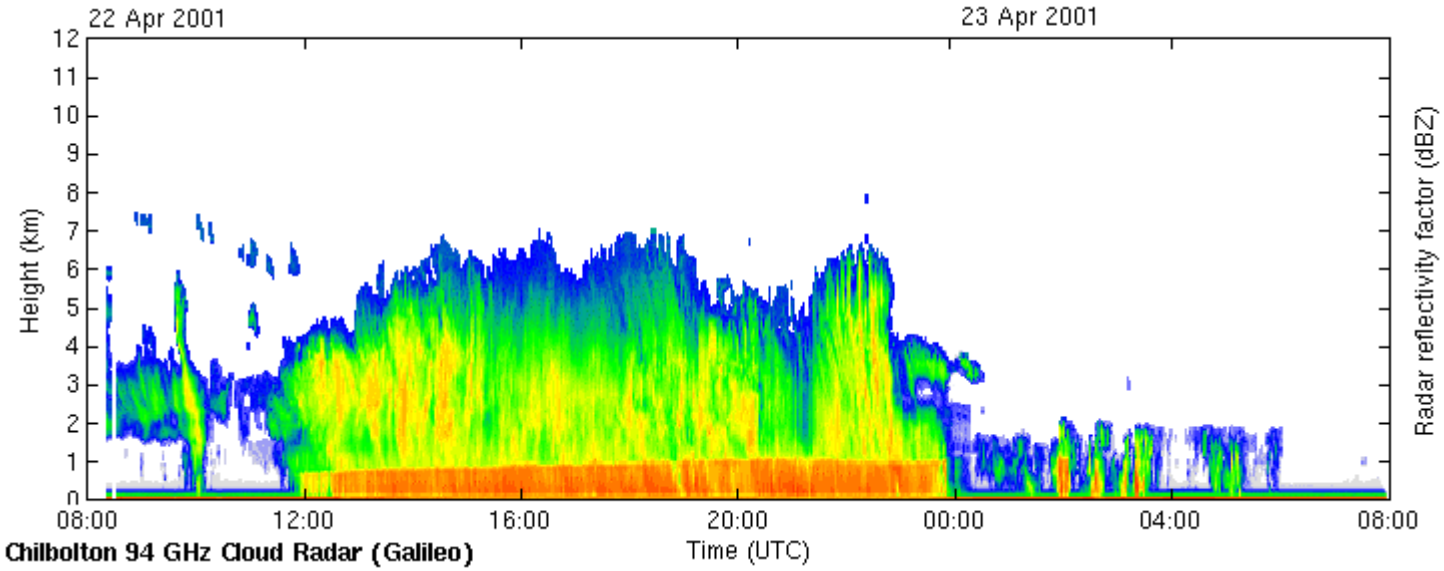
Key Issues

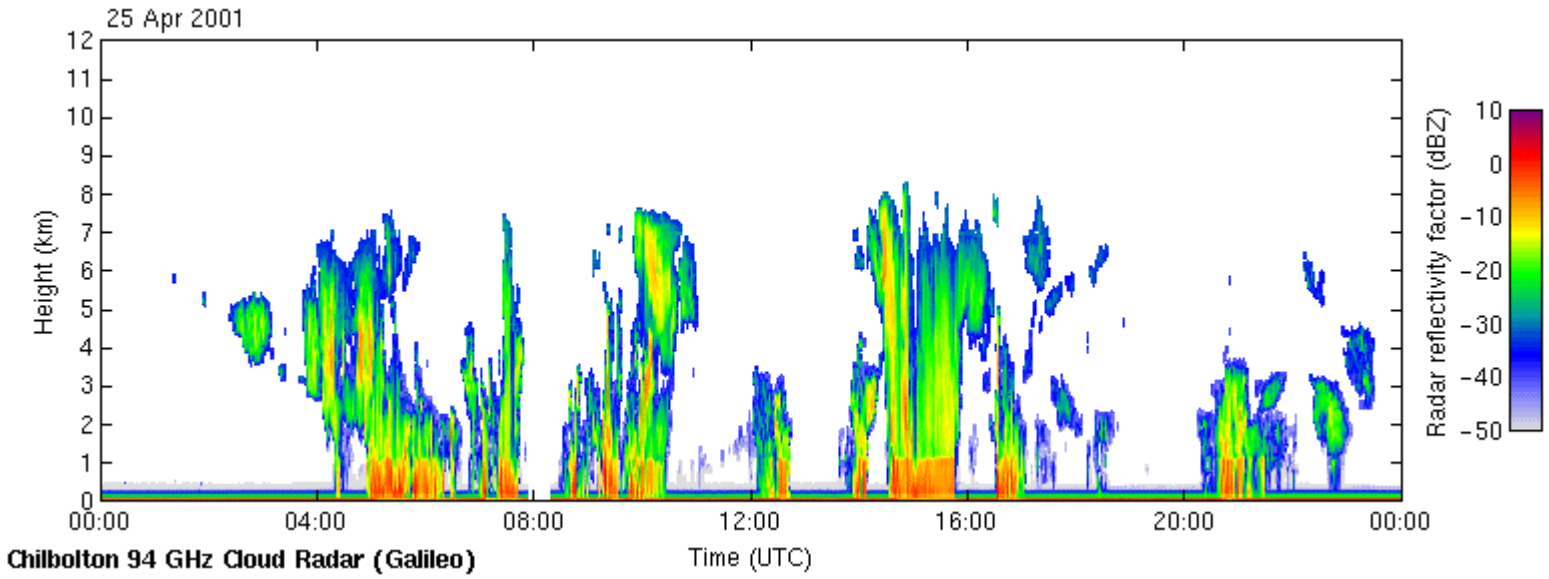
Perhaps above all, it is a **Global** Precipitation Mission, but:

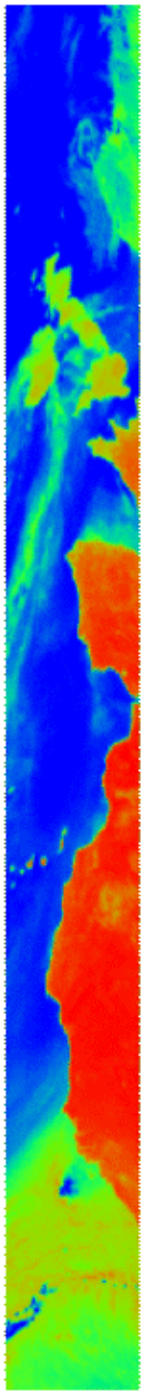
- **Light rainfall** - particularly stratus/warm rain situations (from < 1km all liquid to >9km all frozen)
- A **variety** of precipitating situations
- **Snowfall** - identification and quantification?
- Retrievals over **cold & damp surfaces**

We have a reasonable idea of how much it rains in the tropics (40N-40S), but the mid- to high-latituides is going to be more challenging

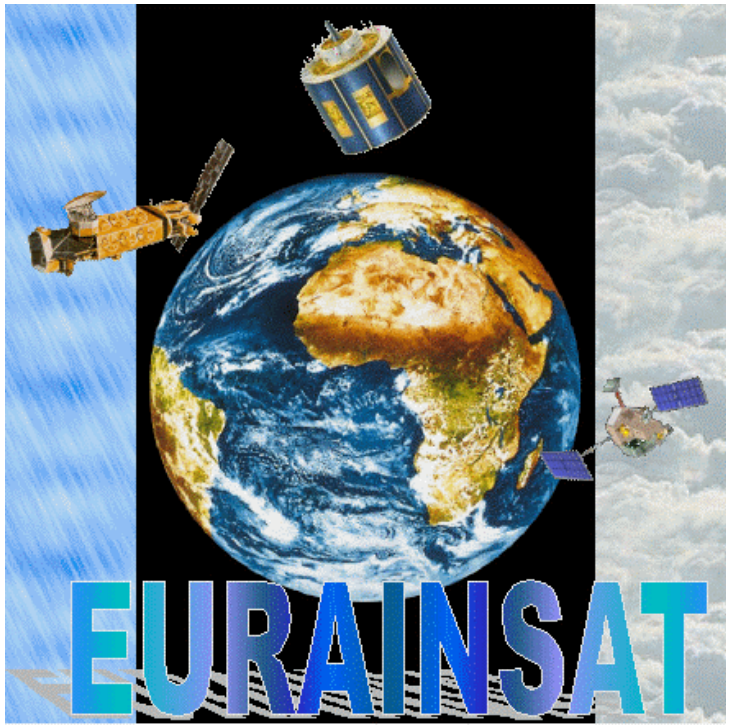



22 Apr 2001
23 Apr 2001
Height (km)
Radar reflectivity factor (dBZ)
08:00
12:00
16:00
20:00
00:00
04:00
08:00
Time (UTC)
Chilbolton 94 GHz Cloud Radar (Galileo)


25 Apr 2001
Height (km)
Radar reflectivity factor (dBZ)
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time (UTC)
Chilbolton 94 GHz Cloud Radar (Galileo)



And finally, a word from my sponsers!



European satellite rainfall analysis and monitoring at the geostationary scale

A shared-cost project (contract EVG1-2000-00030) co-funded by the Research DG of the European Commission within the RTD activities of a generic nature of the Environment and Sustainable Development sub-programme (5th Framework Programme)

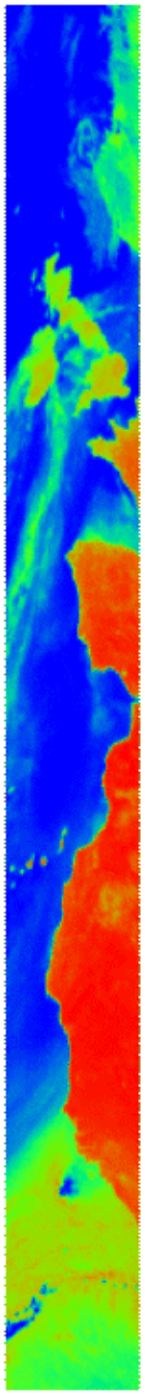


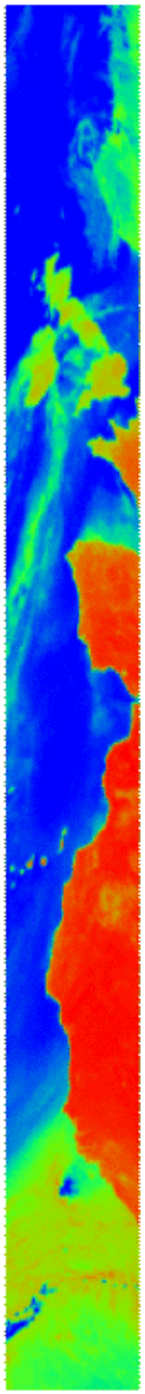
Table 1. Distributions of rainfall intensities during the TOGA-COARE AIP-3 study:

Occurances: All data, radar 0.0 –100.0 km

-rate (mm/hr)	gprof	ba3	bax	nmi	radar	gpi	gpifr
0.0 - 0.0	47185	39635	42468	46424	41314	45394	43031
0.0 - 0.125	7	1527	4066	0	4458	0	0
.125 - 0.25	263	1259	1423	459	1581	0	0
0.25 - 0.5	939	1949	1416	1849	1601	0	776
0.5 - 1.0	1263	2453	1428	1553	1492	0	1255
1.0 - 2.0	1034	2466	1181	1105	1316	0	1447
2.0 - 4.0	1202	2194	807	996	830	8467	7352
4.0 - 8.0	1016	1641	480	671	518	0	0
8.0 - 16.0	650	454	224	368	207	0	0
16.0 - 32.0	131	4	71	144	66	0	0
32.0 +	1	0	18	13	17	0	0

Accumulations (%): All data, radar 0.0 – 100.0 km

-rate (mm/hr)	gprof	ba3	bax	nmi	radar	gpi	gpifr
0.0 - 0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.0 - 0.125	0.00	0.36	1.43	0.00	1.50	0.00	0.00
.125 - 0.25	0.26	0.89	1.99	0.59	2.12	0.00	0.00
0.25 - 0.5	1.58	2.76	3.86	3.88	4.27	0.00	1.01
0.5 - 1.0	4.23	6.84	7.67	6.24	7.90	0.00	4.11
1.0 - 2.0	6.78	13.51	12.59	9.02	13.71	0.00	9.75
2.0 - 4.0	16.26	23.86	16.89	16.03	16.98	100.0	85.13
4.0 - 8.0	25.74	34.02	19.91	20.90	21.27	0.00	0.00
8.0 - 16.0	32.76	17.52	18.31	23.27	16.27	0.00	0.00
16.0 - 32.0	12.22	0.26	10.82	17.52	9.82	0.00	0.00
32.0 +	0.16	0.00	6.54	2.55	6.17	0.00	0.00



Meteorology at Birmingham

John Thornes

Atmospheric management & impacts

Glenn McGregor

Tropical and air pollution climatology, energy budgets

Xiaoming Cai

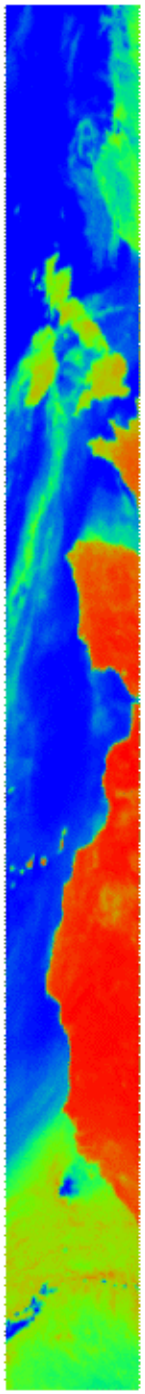
Boundary-layer modelling; computational fluid dynamics

Chris Kidd

Remote sensing, satellite meteorology

Dom Kniveton, 1PD + 0.4RA

+40 staff, 15PDs, 50PhDs, 30MSc + 900UGs + l job...



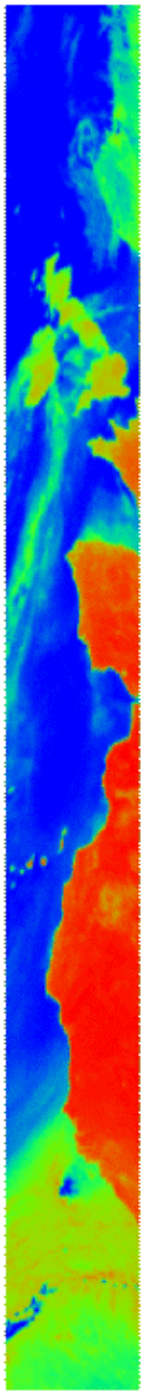
IR vs PMW

AIP-3 results:

20 algorithms with IR contribution

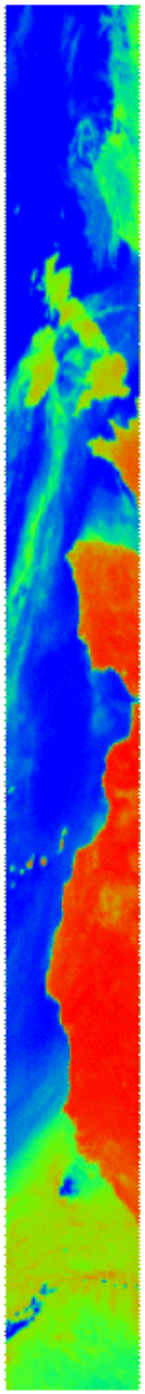
29 SSM/I - only algorithms

- Instantaneous: 0.5 correlation threshold
  No IR algorithms vs all PMW algorithms
- Monthly results: 0.9 correlation threshold
  17/20 IR algorithms vs 9/29 PMW algorithms
- PMW algorithms do best instaneously, & IR at longer timescales - not necessarily ideal



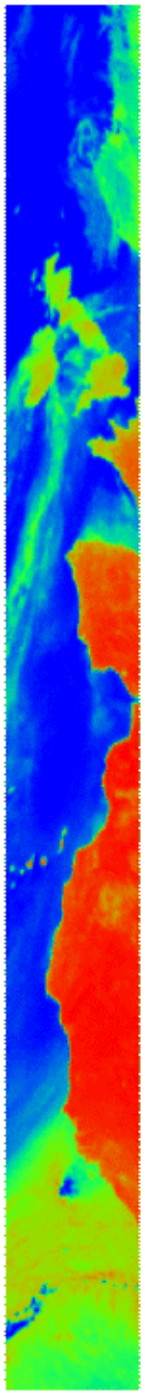
Why IR-PMW algorithms?

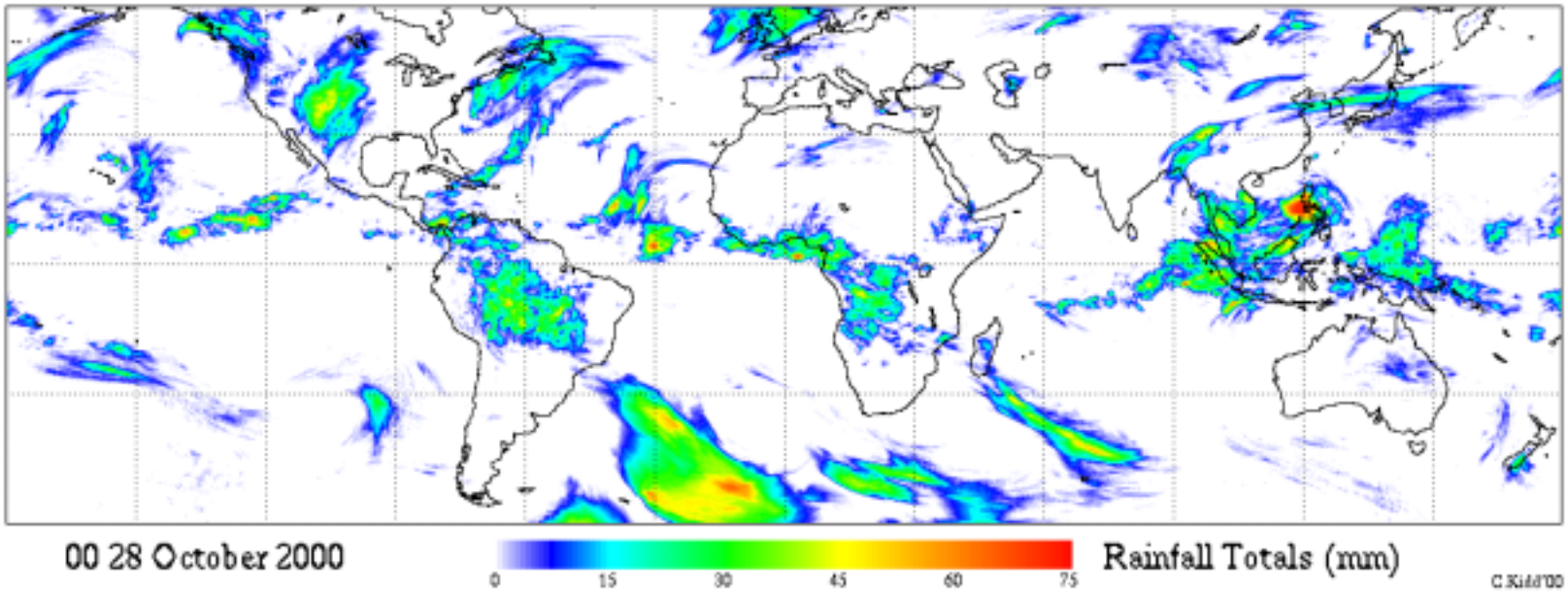
- Take PMW instantaneous accuracy and apply it to the temporal sampling of IR data
- BUT - GPM will solve that?
- GPM at 3 hourly intervals will improve the position, but not the data gaps

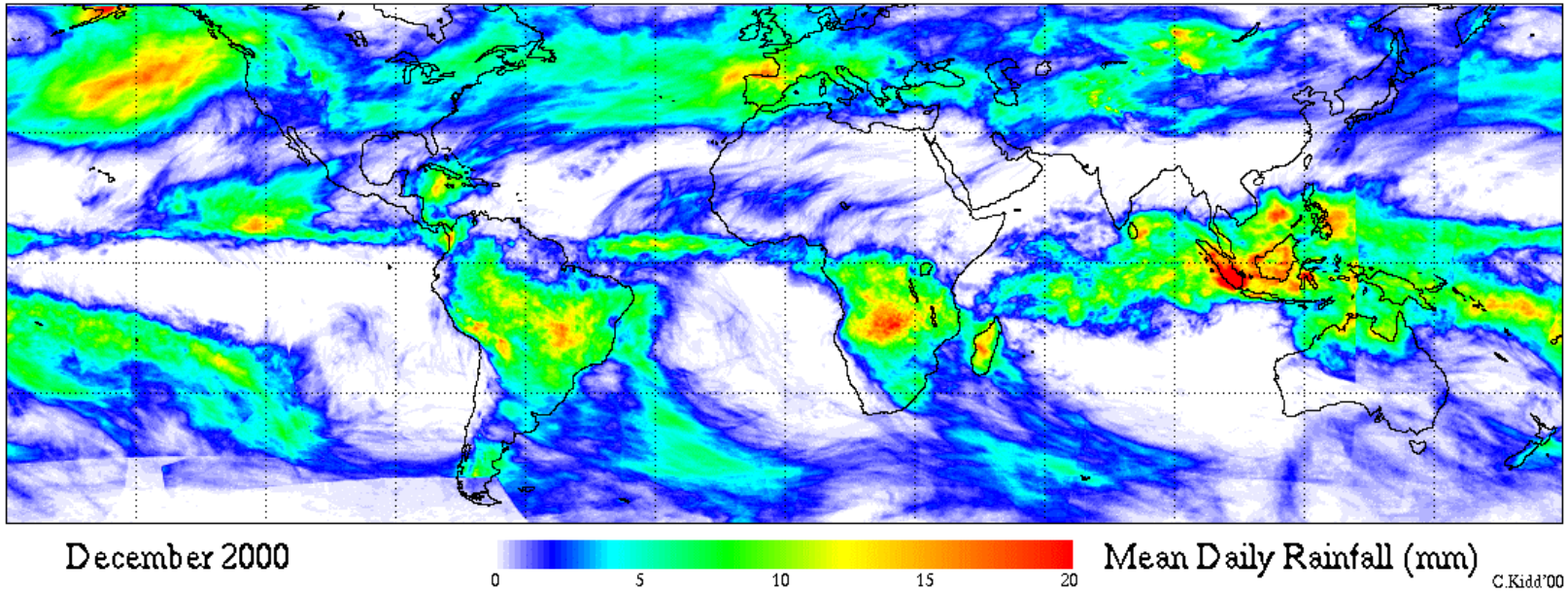


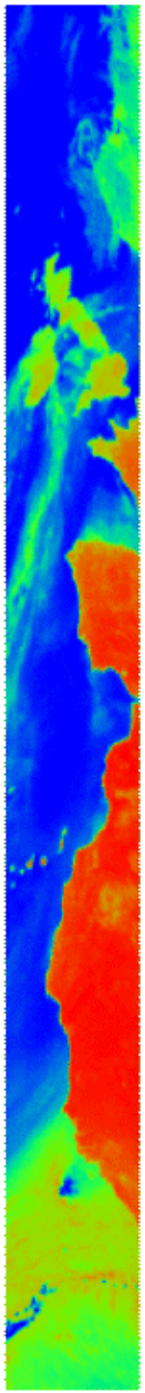
IR-PMW techniques

- Adjustment of IR products by PMW products
- Calibration of IR temperatures by PMW derived estimates
- *Advection of PMW estimates by Vis/IR development and movement*
- *Inclusion of model data to improve Vis/IR ‘rain potential’ classification*

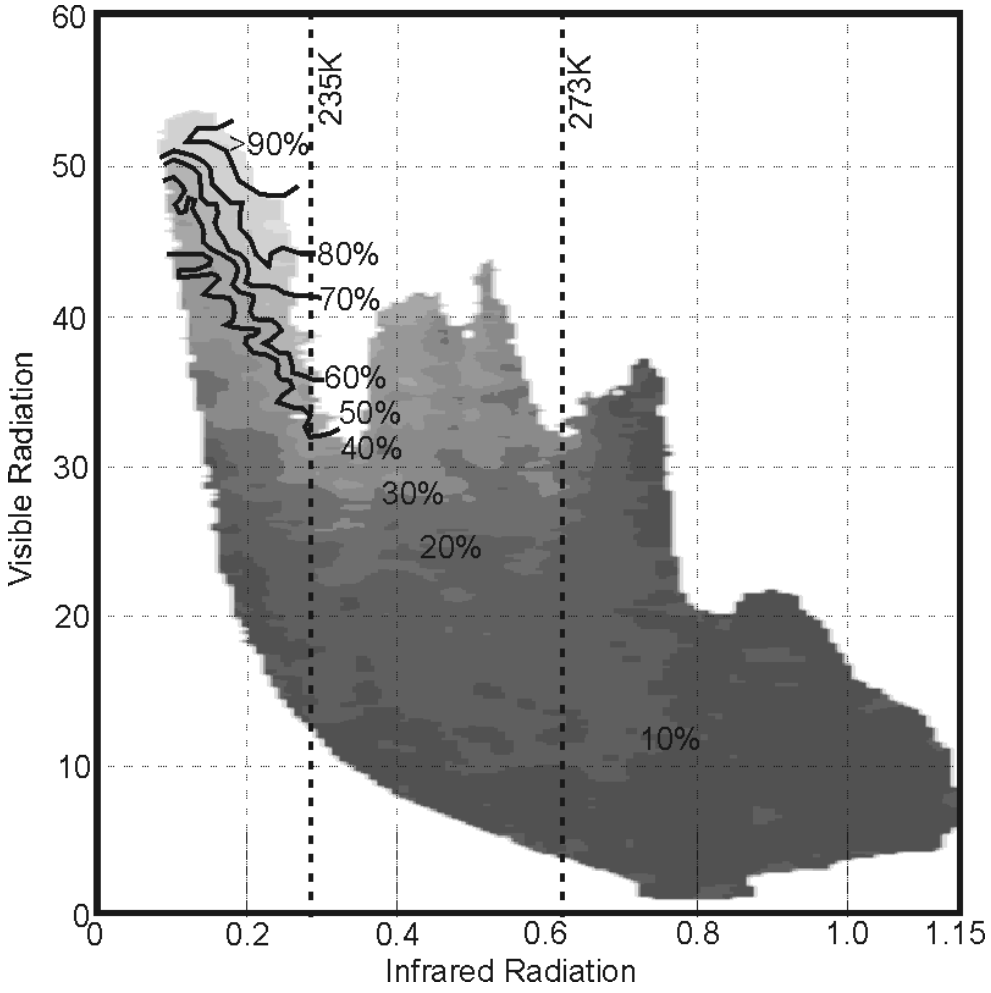


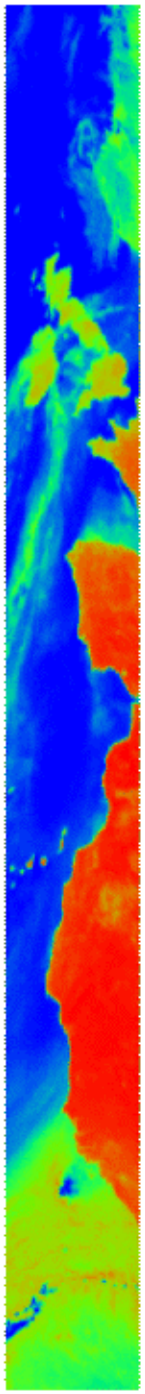

00 28 October 2000
0
15
30
45
60
75
Rainfall Totals (mm)
C.Kidd'00


December 2000
0
5
10
15
20
Mean Daily Rainfall (mm)
C.Kidd'00



PR vs IR

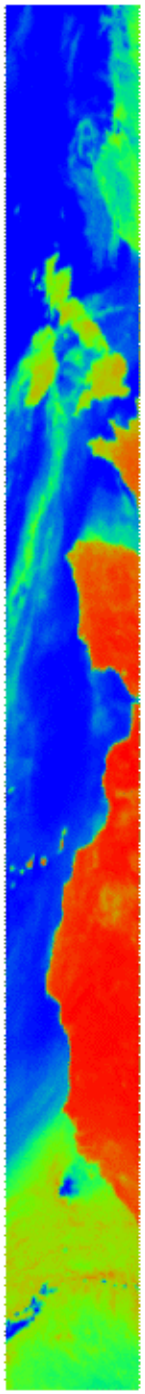

60
50
40
30
20
10
0
0
0.2
0.4
0.6
0.8
1.0
1.15
Visible Radiation
Infrared Radiation
235K
273K
90%
80%
70%
60%
50%
40%
30%
20%
10%

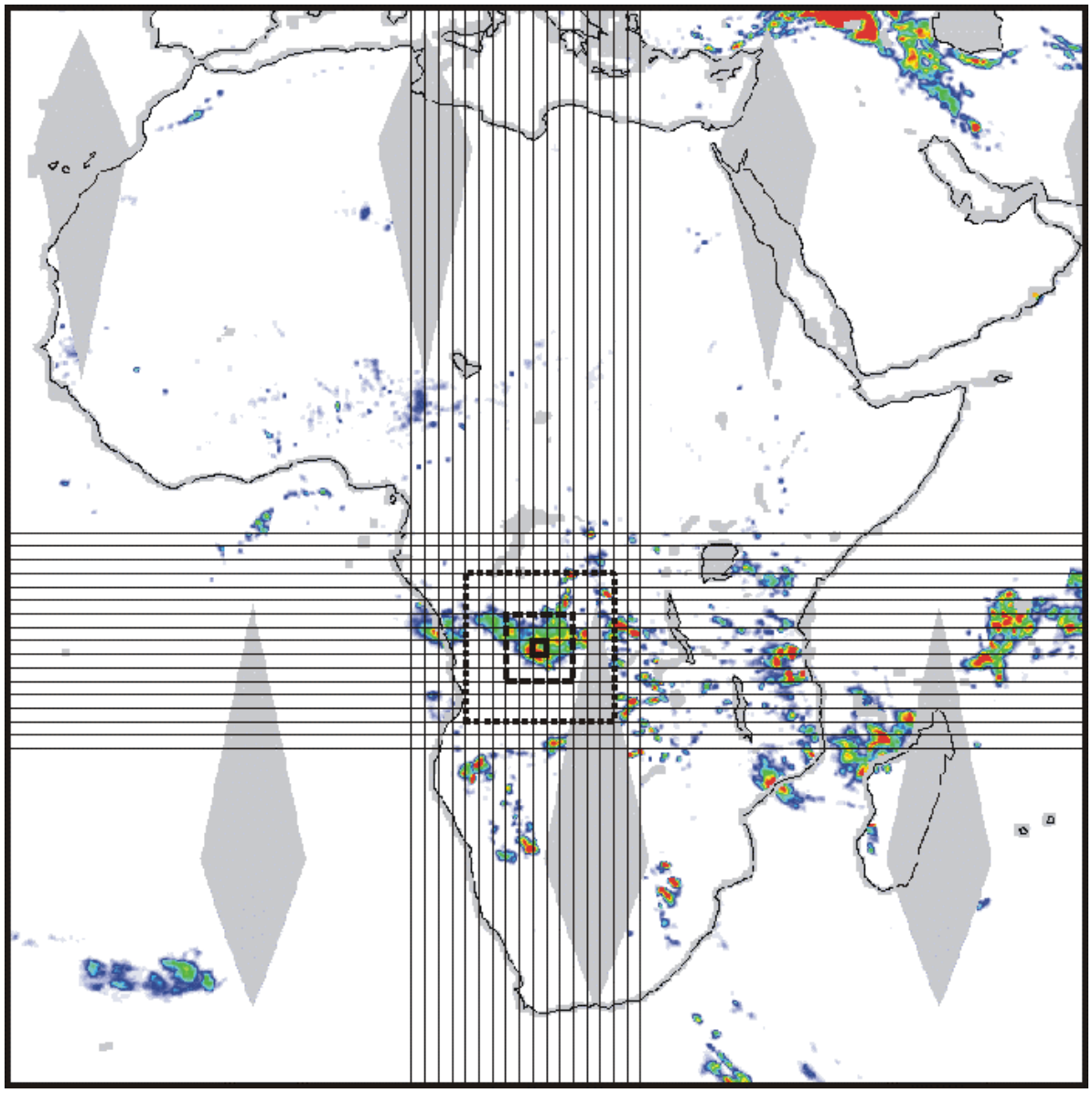


Key Issues

- Temporal sampling requirements
  (what period is needed to collect the data?)
- Spatial sampling requirements
  (what size of area is representative?)
- Absolute accuracy of PMW algorithm
- Accuracy of Vis/IR rainfall potential

	gpf	ba3	nmi	gpi	irgpf	irba3	irnmi	irrad
Full resolution	0.36	0.45	0.45	0.20	0.27	0.32	0.30	0.30
0.5°x0.5°	0.52	0.60	0.59	0.32	0.35	0.43	0.38	0.41
1.5°x1.5°	0.75	0.81	0.84	0.61	0.59	0.68	0.68	0.74





1 degree

30 minute

matched

histogram

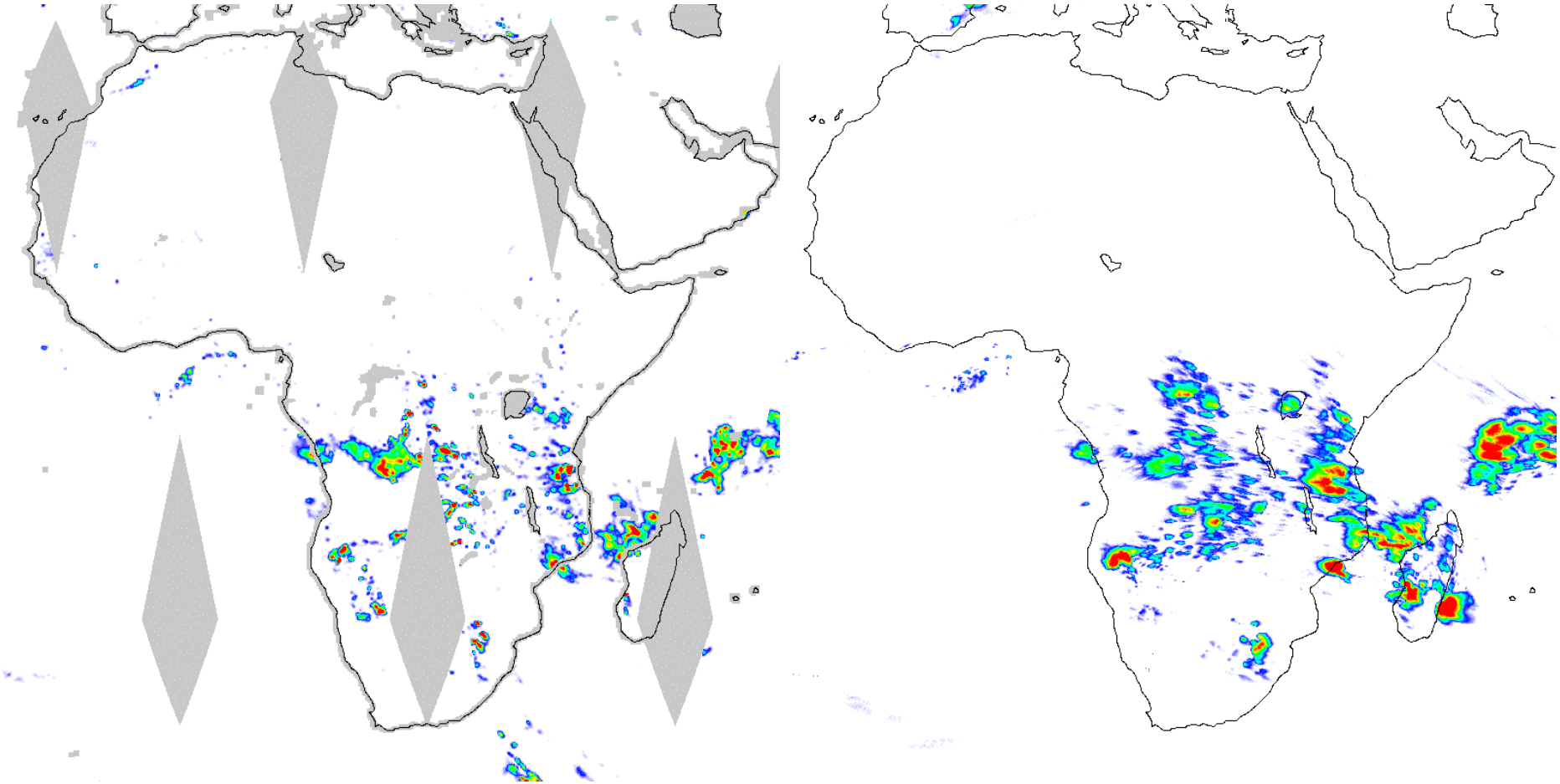
database

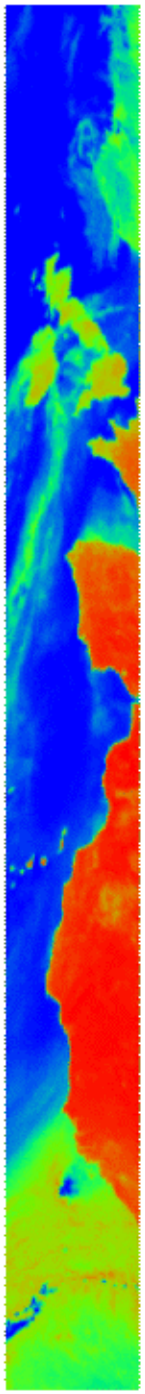
80°x80°

6/5/01

GPM: UoM 2001

SSM/I vs IR : 24 January 2001





Partner Interaction

Key requirements:

- Improved ‘rainfall potential’ derived from Vis/IR radiances
- Improved passive microwave algorithms - low rainrates included, please!