GLOBTEMPERATURE UNCERTAINTIES

LEVEL-2 HARMONISED FORMAT (LST)

Dimensions	Name			
	time			
	nj			
	ni			
Variables	**Name**	**Dimensions**	**Units**	**Comment**
	jul_date	time	days	reference time at start of datafile in seconds Julian Date
	lat	nj, ni	degrees_north	Pixel centre latitude in decimal degrees north
	lon	nj, ni	degrees_east	Pixel centre longitude in decimal degrees east
	dtime	nj, ni	seconds	time difference from reference time in seconds
	LST	nj, ni	K	LST
	LST_uncertainty	**nj, ni**	**K**	**total LST uncertainty**
	QC	nj, ni	unitless	Quality control flags (see Table)
	satze	nj, ni	degree	satellite zenith viewing angle
	sataz	nj, ni	degree	satellite azimuth angle

LEVEL-2 HARMONISED FORMAT (AUX)

Dimensions	Name			
	channel			
	nj			
	ni			
	ch_length			
Variables	**Name**	**Dimensions**	**Units**	**Comment**
	channel	ch_length, channel	unitless	channel description
	emis	channel, nj, ni	unitless	channel emissivity
	lcc	nj, ni	unitless	land cover classification (biome)
	fv	nj, ni	unitless	fractional vegetation cover
	tcwv	nj, ni	kg m^{-2}	total column water vapour
	NDVI	nj, ni	unitless	normalised difference vegetation index
	solze	nj, ni	degree	solar zenith angle
	solaz	nj, ni	degree	solar azimuth angle
	lwm	nj, ni	unitless	land-water mask
	LST_unc_noise	**nj, ni**	**K**	**radiometric noise**
	LST_unc_atm	**nj, ni**	**K**	**uncertainty due to atmospheric effects**
	LST_unc_sfc	**nj, ni**	**K**	**uncertainty due to surface effects**
	LST_unc_geo	**nj, ni**	**K**	**uncertainty in geolocation**
	LST_unc_dlst	**nj, ni**	**K**	**uncertainty in model fitting**
	t2m	nj, ni	K	corresponding 2m air temperature from reanalysis
	sh2m	nj, ni	unitless	corresponding 2m specific humidity from reanalysis
	ws2m	nj, ni	m s^{-1}	corresponding 2m wind speed from reanalysis
	albedo	nj, ni	unitless	albedo
	elevation	nj, ni	m	elevation of land surface

AATSR PIXEL UNCERTAINTIES

Radiometric noise

$$S^2_{noise} = \left(\frac{\partial F}{\partial T_{11}}\right)^2 e^2_{T_{11}} + \left(\frac{\partial F}{\partial T_{12}}\right)^2 e^2_{T_{12}}$$

$e_{T_{11}} = NE\Delta T_{11}$ = 0.05 K

$e_{T_{12}} = NE\Delta T_{12}$ = 0.05 K

Surface

$$S^2_{sfc} = \left(\frac{\partial F}{\partial f}\right)^2 e^2_f$$

e_f = uncertainty due to fractional vegetation cover

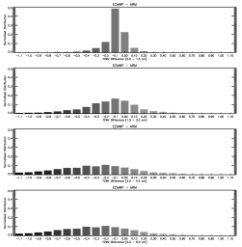
e_f values from fcover dataset

Atmosphere

$$S^2_{atm} = \left(\frac{\partial F}{\partial pw}\right)^2 e^2_{pw}$$

e_{pw} = uncertainty due to water vapour

ERA-Interim compared with ARM station data



Geolocation

$$S^2_{\hat{\beta}} = E\left[\left(F(\hat{\beta}) - F(\beta)\right)^2 |\omega\right] = \sum_j \left(F(\hat{\beta}) - F(\beta)\right)^2 P(\hat{\omega} \in \omega)$$

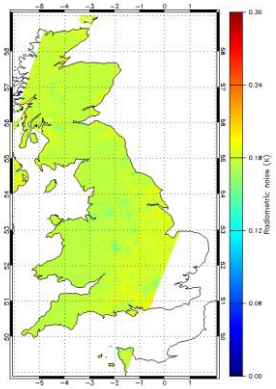
Geolocation of the image data may be up to 0.5 km away from the 'true' instrument pixel coordinates

Estimate the probability that the underlying biome is correctly assigned using inverse distance weighting within each 3 x 3 pixels

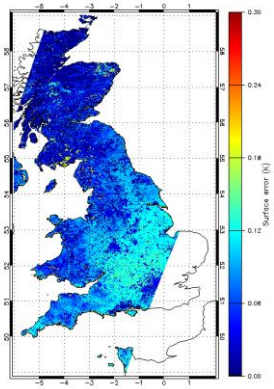
Model fitting

For each biome-diurnal condition the set of retrieval coefficients is derived by minimizing the model fitting error (*ΔLST)*

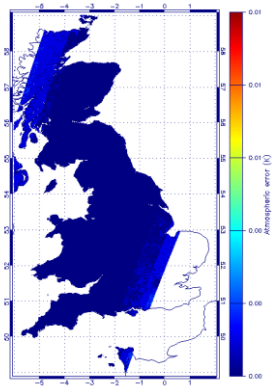
GLOBTEMPERATURE AATSR PIXEL UNCERTAINTIES



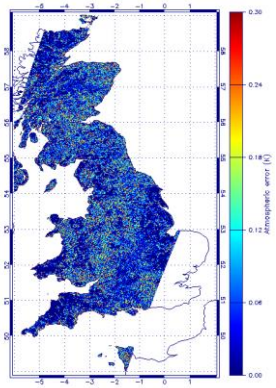
Radiometric noise



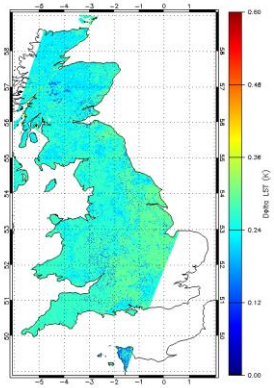
Surface component



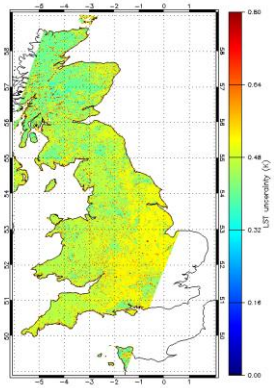
Atmosphere



Geolocation



Model fitting



Total

LEVEL-3 HARMONISED FORMAT (LST)

Dimensions	Name			
	time			
	lat			
	lon			
Variables	**Name**	**Dimensions**	**Units**	**Comment**
	time	Time	unitless	Diurnal index; day should have the value 0, night should have the value 1
	lat	lat	degrees_north	Grid cell centre latitude in decimal degrees north
	lon	lon	degrees_east	Grid cell centre longitude in decimal degrees east
	LST	time, lat, lon	K	Mean LST of the grid cell from cloud cleared input pixels
	LST_uncertainty	time, lat, lon	**K**	**Grid cell LST uncertainty**
	n	time, lat, lon	unitless	the total number of equivalent whole pixels assigned to the grid cell in the production of the averaged dataQuality control flags (see Table)
	ncld	time, lat, lon	unitless	the total number of equivalent whole pixels assigned to the grid cell in the production of the averaged data that are identified as cloud contaminated by the product's cloud clearing algorithm
	LST_variance	time, lat, lon	K	variance of the LST observations used in the average for the grid cell
	satze	time, lat, lon	degree	Mean satellite zenith viewing angle for the grid cell
	sataz	time, lat, lon	degree	Mean satellite azimuth angle for the grid cell

LEVEL-3 HARMONISED FORMAT (AUX)

Dimensions	Name			
	time			
	channel			
	lat			
	lon			
	ch_length			
Variables	**Name**	**Dimensions**	**Units**	**Comment**
	channel	ch_length, channel	unitless	channel description
	emis	channel, time, lat, lon	unitless	channel emissivity
	lcc	time, lat, lon	unitless	land cover classification (biome)
	fv	time, lat, lon	unitless	fractional vegetation cover
	tcwv	time, lat, lon	kg m^{-2}	total column water vapour
	NDVI	time, lat, lon	unitless	normalised difference vegetation index
	solze	time, lat, lon	degree	solar zenith angle
	solaz	time, lat, lon	degree	solar azimuth angle
	lwm	lat, lon	unitless	land-water mask (proportion of land)
	LST_unc_noise	**time, lat, lon**	**K**	**Random uncertainty**
	LST_unc_sync	**time, lat, lon**	**K**	**Synoptically correlated uncertainty**
	LST_unc_smpl	**time, lat, lon**	**K**	**Sampling uncertainty**
	t2m	time, lat, lon	K	corresponding 2m air temperature from reanalysis
	sh2m	time, lat, lon	unitless	corresponding 2m specific humidity from reanalysis
	ws2m	time, lat, lon	m s^{-1}	corresponding 2m wind speed from reanalysis
	albedo	time, lat, lon	unitless	albedo
	elevation	lat, lon	m	elevation of land surface