Status of maps reconstruction

COST 726 MCM10

El Arenosillo, April 10-11, 2008
The map reconstruction is pursued in two different ways:

1. By spatially interpolating UV reconstructions from global radiation data at stations

2. By using ERA40 data (CMF and snow/ice)
Reconstruction by interpolation:

No new maps since Davos

The full WRDC global radiation data are available since next week

Thanks to Anatoly and Anders
Use of ERA40 data

The maps are obtained by direct modelling of the cloudless surface UV, on which the cloud modification factor is then applied

The resulting maps have a spatial resolution of 0.05 x 0.05 deg., even if the ERA40 data are at 1 x 1 deg. resolution

Because the process is also using the 1984-2003 JRC METEOSAT derived UV climatology, the covered area is the common part of the two data sets
A first test version of the full time series of ERA40-derived maps has been produced.

In this version the cloudless calculation is performed with:

- the “COST” ozone data set
- a climatological visibility
- a UV surface albedo constructed with ERA40 snow depth and sea ice fraction data (still problematic!)
- altitude is from the GTOPO30 DEM of USGS
The ERA40 CMFs (which are for global radiation) have been brutally “calibrated” against the CMF drawn from the satellite climatology for the erythemal radiation (at the 0.05 deg. spatial resolution of the satellite derived maps)

The calibration factor (calf) is itself a map and has been computed for each day of the year using a 10 days running average, i.e. each calibration coefficient is the mean of ~ 200 ratios

The reconstructed map is then simply obtained by applying the “calibrated” ERA40 CMF to the cloudless map:

$$UV_{\text{rec}}(\text{diy},\text{lat},\text{lon}) = \text{calf}(\text{diy},\text{lat},\text{lon}) \cdot \text{CMF}(\text{diy},\text{lat},\text{lon}) \cdot \text{CloudlessUV}(\text{diy},\text{lat},\text{lon})$$
Example: daily erythemal map in July

Erythemal daily dose, July 21 2000, ERA40_v01

Erythemal daily dose, July 21 2000, METEOSAT derived
Example: daily erythemal map in March
Example: monthly erythemal map - July

Average erythemal daily dose, July 2000, ERA40_v01

Average erythemal daily dose, July 2000, METEOSAT derived
Example: monthly erythemal map – March

Average erythemal daily dose, March 2000, ERA40_v01

Average erythemal daily dose, March 2000, METEOSAT derived
Variability in March 1958-2002

DEVIATION OF THE MONTHLY AVERAGED ERYTHEMAL DAILY DOSE WITH RESPECT TO THE 1958–2002 MEAN (MARCH)

Difference with respect to multi-year mean [%]
Example of time series at stations

- Bergen
- Potsdam
- Davos
- Thessaloniki
How to assess the results?

Comparison with ground data: Erythemal UV daily doses in Ispra 1991-2002

**ERA40 v01**

**METEOSAT derived**
How to assess the results?

Comparison with ground data: Erythema UV monthly averaged daily doses in Ispra 1992-2002

ERA40 v01

METEOSAT derived
July

Comparison with METEOSAT derived maps

DEVIATION OF THE MONTHLY AVERAGED ERYTHEMAL DAILY DOSE WITH RESPECT TO THE 1984–2002 MEAN (JULY)

ERA40 METEOSAT I, the deviation is with respect to each data set mean

Difference with respect to multi-year mean [%]
March

Deviation of the Monthly Averaged Erythemal Daily Dose with Respect to the 1984–2002 Mean (March)

ERA40 METEOSAT I, the deviation is with respect to each data set mean.
Next Steps

ERA40

- Implement the aerosol model decided in Munich (the new LUT has already been generated)
- Substitute the MODIS/AERONET AOT climatology to the visibility climatology
- Improve the ERA40 derived UV surface albedo
- Output several wavelengths in addition to erythemal

Interpolation

- Generate the maps using the full WRDC station data