

## FYS4630 - Oppgaver til 8. november 2006

1) problem 9.5 page 374-375

2) A spectrophotometer aboard a satellite is used to determine the surface albedo  $A_g$ . The spectrometer measures the intensity in the nadir direction ( $\mu = 1.0$ ) in the UV and visible part of the spectrum. Assume that the solar zenith angle is  $60^\circ$  ( $\mu_0 = 0.5$ ). Use DISORT to show that it is difficult to determine surface albedo variations with the spectrometer if clouds are present.

In your clear-sky simulations assume a three layer atmosphere with optical depth 0.1 in each layer. Further, assume Rayleigh scattering ( $\chi_0 = 1.0$  and  $\chi_2 = 0.1$ ).

To simulate cloudy conditions replace the second layer with a cloud with optical depth 100 and asymmetry factor 0.85.

Use surface albedo values of 0.05 and 0.7 to simulate bare ground and snow cover.

Assume conservative scattering in all layers in all cases.

Note: In the main program (testdis1.f) *usrang* must be set to *true*, *onlyfl* must be set to *false*.

It is difficult to measure variations in the ozone concentration (and other trace gases) in the troposphere (below about 10 km) with an UV/visible spectrometer aboard a satellite even if the atmosphere is clear. Why?