Extraterrestrial solar radiation

The extraterrestrial solar radiation can be estimated from simple geometric relationships. The distance between the sun and the earth d_{se} is needed. The formula for the extraterrestrial incoming radiation S_{ext} reads:

$$ S_{ex} = 15.392*d_{se} * (\omega_s * sin(\phi)*sin(\delta)+cos(\phi)*cos(\delta)*sin(\omega_s))$$

The result is in mm/day of water that can be evaporated with the corresponding amount of energy. ϕ is the latitude.

extraterrestrial-radiation.py

```
from pylab import *
from numpy import *
def extraterrestrialradiation(latitude,J):
    ds=0.4093*sin(2*pi/365*J-1.405)      # to be replaced by class
    sha=arccos(-tan(latitude)*tan(ds))   # to be replaced by class
    dse=1+0.033*cos(2*pi/365*J)
Sext=15.392*dse*(sha*sin(latitude)*sin(ds)+cos(latitude)*cos(ds)*sin(sh
a))
    return Sext
latitude=31
J=arange(1,365,1)
plot(J,extraterrestrialradiation(latitude,J))
ytext = ylabel('extraterrestrial radiation in mm/day')
xtext = xlabel('Julian day')
show()
```