Nearby physical examples of solar system forces on the 100kg man

We can estimate these solar system forces compared to the change in weight this person feels. Consider the extra weight certain objects made from pieces of paper will make. We will use as a standard the weight of standard printer paper, 8.5"x11".

800 sheets of printer paper weigh about 9.25lb. This corresponds to 4196g = 4.196kg

Thus each sheet has a mass of 4196g/800sheets = 5.24g/sheet
The area in cm^2 is 8.5"x11"*(2.54cm/in)2 = 603cm^2 thus

areal density $\rho = 5.24g/(603cm^2) = 8.69 \times 10^{-3}\ g/cm^2 = 8.69 \times 10^{-6} kg/cm^2$

Since we want to compare forces here on earth we can convert the areal density in weight/cm^2

We use 9.8m/s^2 for the acceleration at the surface to obtain the weight/cm^2 to N/cm^2.

Weight density, $\rho_N = 9.8*8.69 \times 10^{-6} kg/cm^2 = 8.52 \times 10^{-5}\ N/cm^2$

force = Area*ρ_N , so Area = force/ρ_N

Object	Force in Newtons	Area of paper in cm^2	example
earth	979.9 N	1.15×10^7	19064 sheets of paper
sun	0.59N	6928	11.5 sheets of paper
moon	3.32×10^{-3} N	39	6.2 x 6.2 cm^2
Jupiter	3.12×10^{-5} N	0.38	6.2 x 6.2 mm^2
Venus	1.84×10^{-5} N	0.22	4.7 x 4.7 mm^2
mosquito	2.45×10^{-5} N	0.3	5.5 x 5.5 mm^2

You can cut the pieces of paper to these sizes in order to get a physical feel for the effects of the solar system on our 100kg man. So the force of the moon on the 100kg man is about the same as carrying an extra sheet of paper of size 6cm x 6.5cm in his pockets.

If your mass is M then the forces and the areas for you are adjusted to

F(M) = (M/100kg) F(100kg). , 1kg weighs 2.205 lb

For example, if your mass is 50kg your weight is 110.3 lbs, the force from the sun on you is

Fsun(50kg) = (50kg/100kg)*0.59N = 0.285N