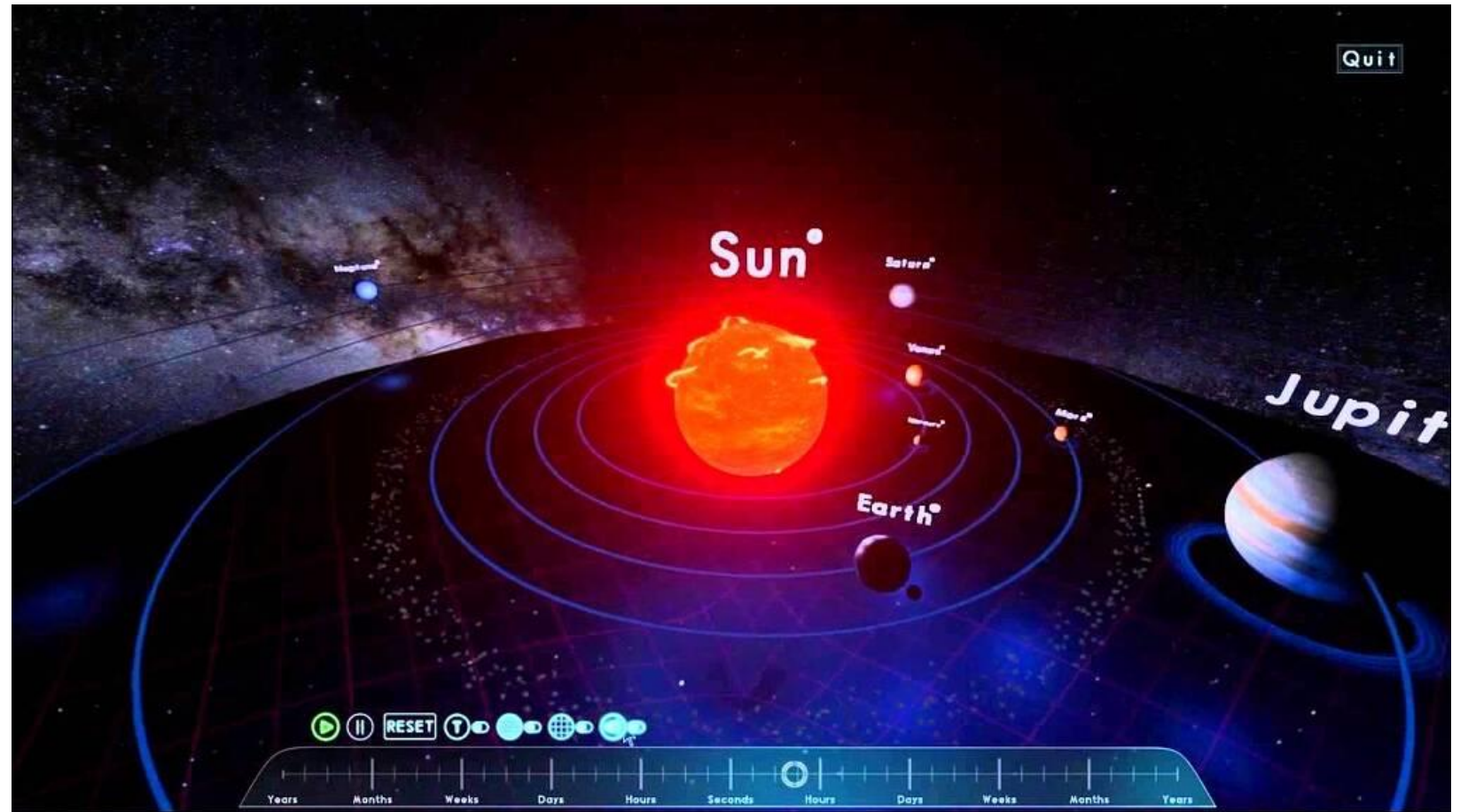


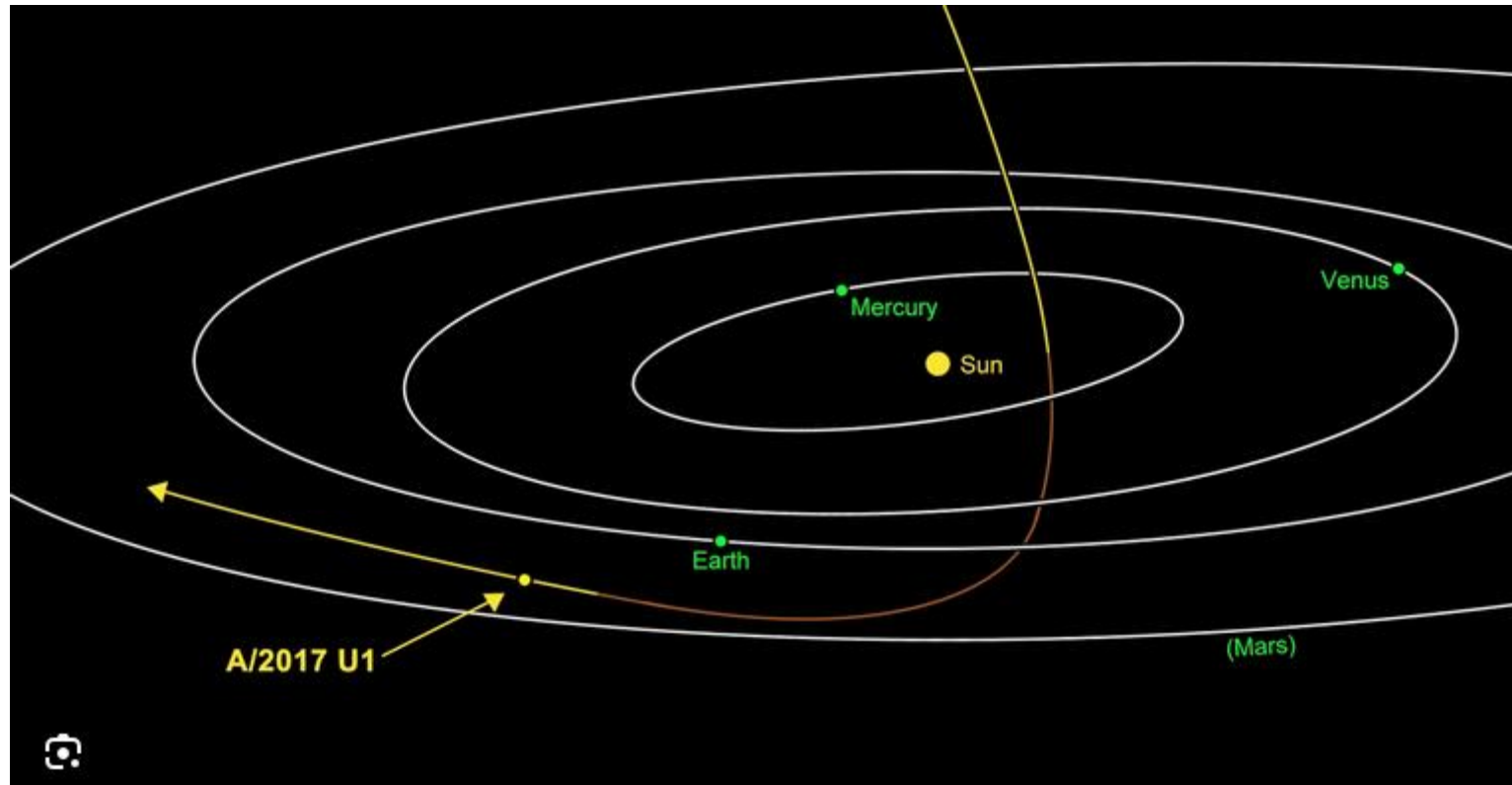
# Trabalho: Sistema Solar

- Use dados reais para desenhar o sistema solar
- Coloque um shader animado no sol como o da figura ao lado
- Coloque um outro shader de sua escolha, por exemplo, rastro de um asteroide
  - <https://www.shadertoy.com/>
- Faça uma barra de play com tempo real como na figura



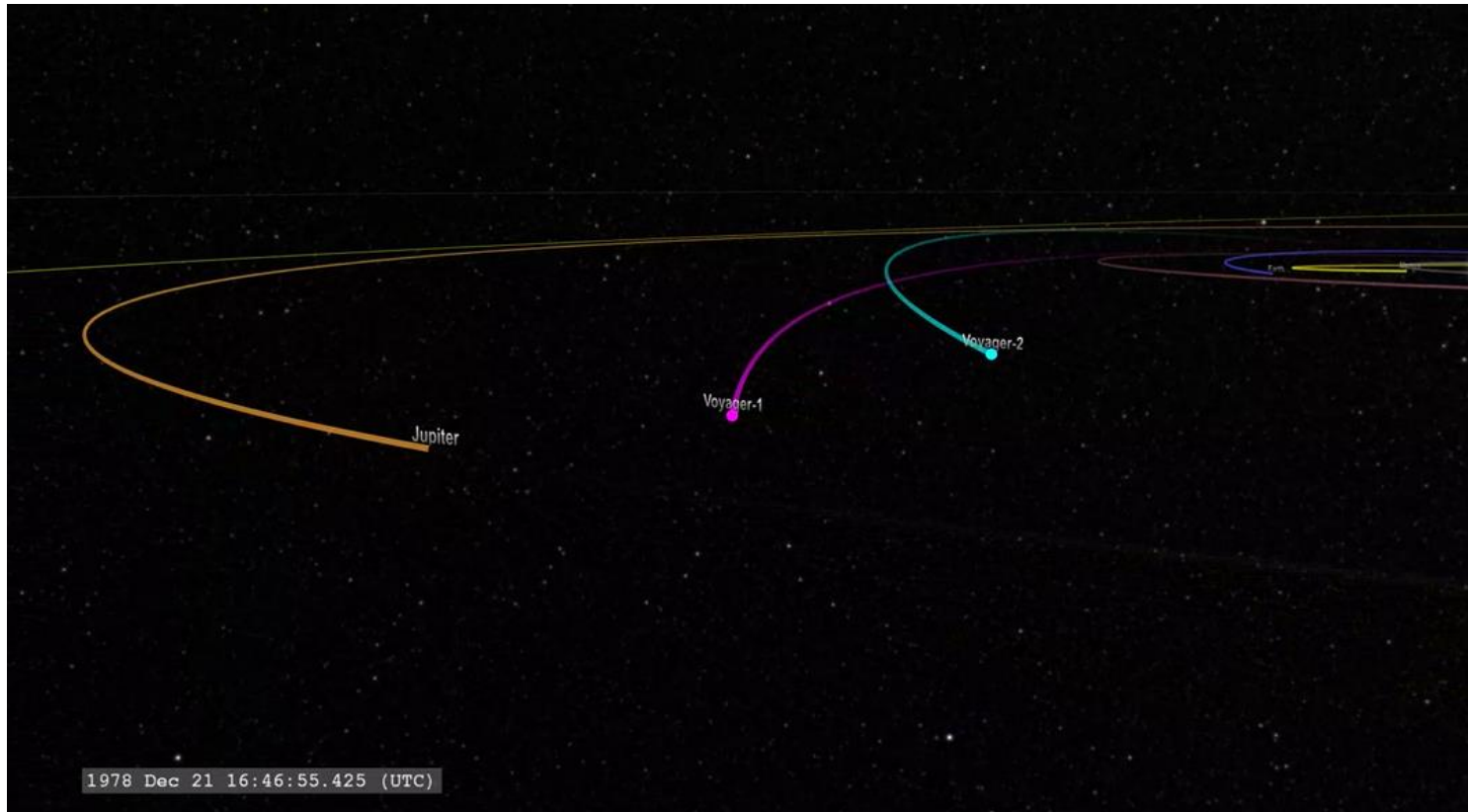
# Asteroides, satélites, etc

- Escolha pelo menos outros 3 objetos que não são planetas e colete dados reais deles para definir suas rotas, tamanhos, etc
- Desenhe as rotas



# Play

- Faça uma animação como a que está em <https://svs.gsfc.nasa.gov/4139/>



# Dados

- Sugestões:
  - <https://nssdc.gsfc.nasa.gov/planetary/factsheet/>
  - <https://omniweb.gsfc.nasa.gov/coho/helios/heli.html>

**Select activity**  
☒ List data ☐ Create file ☐ Time series plot ☐ XYZ-trajectories( plot, listing)

**Select object:**

**Select Output coordinate system:**

**Select resolution:** ☒ Hourly ☐ Daily (equal hourly values for hour=0 )

**Select Data precision:** (decimal places for AU)

**Select Time Span:** Start year:  Start day:  Stop year:  Stop day:

**Optional: Name of additional S/C or object 2\*:**

\*In this case the difference of between coordinates of main and additional objects will be calculated

Output data will be calculated for **Equinox Epoch:** "Mean of date"

## Input parameters

start\_year= 2023, start\_day= 001, stop\_year= 2023, stop\_day= 365  
coordinate= Heliographic\_inertial, resolution= Hourly, equinox= Mean of date

YEAR	DAY	HR	RAD_AU	HGI_LAT	HGI_LON
2023	1	0	0.9830	-2.971	24.035
2023	1	1	0.9830	-2.976	24.078
2023	1	2	0.9830	-2.980	24.120
2023	1	3	0.9830	-2.985	24.162
2023	1	4	0.9830	-2.990	24.204
2023	1	5	0.9830	-2.995	24.247
2023	1	6	0.9830	-3.000	24.289
2023	1	7	0.9830	-3.005	24.331
2023	1	8	0.9830	-3.010	24.373
2023	1	9	0.9830	-3.015	24.416
2023	1	10	0.9830	-3.020	24.458
2023	1	11	0.9830	-3.024	24.500
2023	1	12	0.9830	-3.029	24.542
2023	1	13	0.9830	-3.034	24.585
2023	1	14	0.9830	-3.039	24.627
2023	1	15	0.9830	-3.044	24.669
2023	1	16	0.9830	-3.049	24.711
2023	1	17	0.9830	-3.054	24.754
2023	1	18	0.9830	-3.058	24.796
2023	1	19	0.9830	-3.063	24.838
2023	1	20	0.9830	-3.068	24.880
2023	1	21	0.9830	-3.073	24.923
2023	1	22	0.9830	-3.078	24.965
2023	1	23	0.9830	-3.083	25.007
2023	2	0	0.9830	-3.088	25.049
2023	2	1	0.9830	-3.092	25.092
2023	2	2	0.9830	-3.097	25.134
2023	2	3	0.9830	-3.102	25.176
2023	2	4	0.9830	-3.107	25.218
2023	2	5	0.9830	-3.112	25.261
2023	2	6	0.9830	-3.117	25.303

# Implementação

- Só usar código usado em:
  - <https://webgl2fundamentals.org/>
  - <https://twgljs.org/>
- Dicas:
  - <https://webgl2fundamentals.org/webgl/lessons/webgl-setup-and-installation.html>
  - <https://webgl2fundamentals.org/webgl/lessons/webgl-precision-issues.html>
    - Precisão numérica, algo que para grandes escalas como o sistema solar é preciso considerar
  - <https://webgl2fundamentals.org/webgl/lessons/webgl-shadertoy.html>
  - <https://webgl2fundamentals.org/webgl/lessons/webgl-scene-graph.html>