Teaching Astronomy with Python
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Interactive python notebook activities for students!

I am a teacher in the UK using coding activities in my Astronomy instruction. I have made 14 activities in python for my students on various topics in astronomy. The activities are:

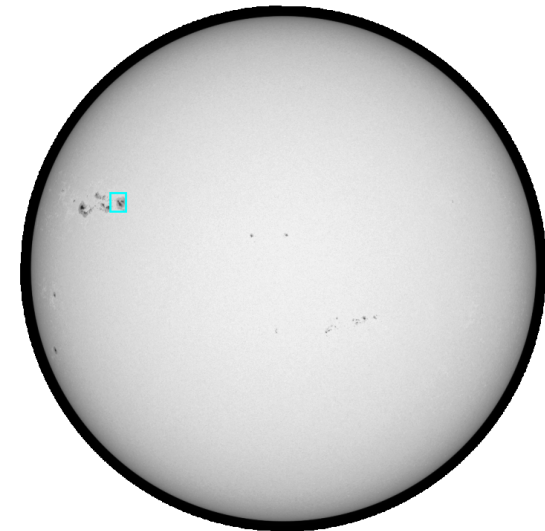**Online** – suitable for virtual learning!

Free – completely open source

Skills based – students learn how to code

Interactive – widgets allow for interaction

Data driven – bringing astronomical data into the classroom

These activities take 1.5 – 2 hours to complete and you can find them on my GitHub – github.com/astroDimitrios/Astronomy/tree/master/Code

In the AstPy-6 Sunspots activity students track sunspots in Solar Dynamics Observatory images and use them to calculate the rotation period of the sun.

```python
# the first circle will block out the inner part of the second creating a ring

for i in range(len(names)):
    # add the first white circle with a radius from inner
    # remember to take one from z after the add_artist() call
    # Your code here:
    circle = Circle((0, 0), inner[i], color='w', zorder=z, ec='None')
    ax.add_artist(circle)
    z -= 1
    # add the second coloured ring circle (pick a colour!)
    # remember to take one from z after the add_artist() call
    # Your code here:
    circle = Circle((0, 0), outer[i], color='goldenrod', zorder=z, alpha=alphas[i], ec='None')
    ax.add_artist(circle)
    z -=1
    # fix name locations
    # Get the middle of each ring and plot the name there as text
    tx = (outer[i]-inner[i])/2 + inner[i]
    if names[i] == 'E': # this fixes the position of E - you can leave this as is
        tx = 215000
    ax.text(tx, 0, names[i], fontsize=10, color='dimgray', zorder=32, ha='center', va='center')

fig
```

Out[6]:

Part of the activity AstPy-14 Planetary Rings is shown on the left.

In this acitivty students plot the rings of Saturn and its inner moons. They then calculate the Roche limit for certain moons.
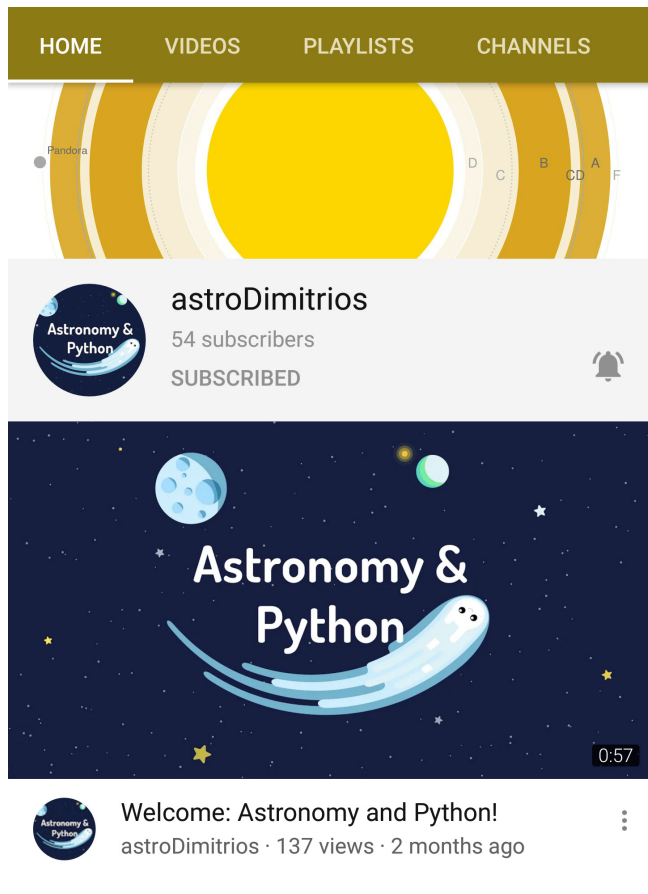
Each activity starts with an **Aim** and a section for **Predictions** that the students make.

Students then complete each small code block to visualise the data or perform a calculation.

At the end of an activity there are challenges and references/further reading.

All the notebooks can be run using Jupyter at **jupyter.org/try** or you can explore them all using my **binder**:

bit.ly/2F8idKf

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Answers are provided in the teacher version of the activity. I am currently making tutorial videos to go on my YouTube channel.

What I'm working on now:

- More activities planned!
- Adding answer spaces for students
- Adding difficulty ratings
- Adding contents/navigation to the notebooks

We need you!

Are you interested in using interactive python notebooks in your classroom? Get in contact. It would be great to make this more of a community project.

What you could do:

- Test activities
- Make new activities
- Translate activities
- Help make videos
- Maintain the special coding challenge!

Earth
compositional
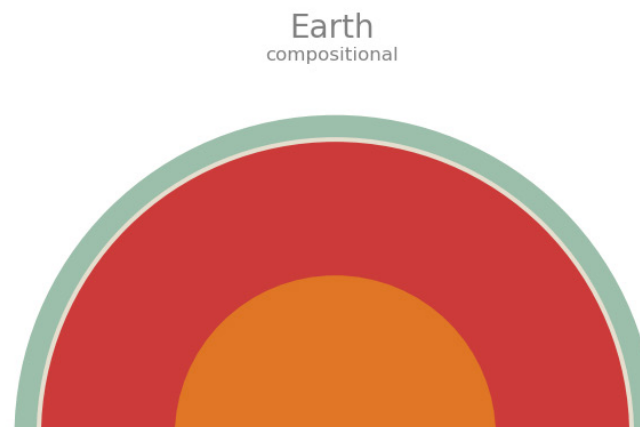
Images
Top: astroDimitrios YouTube channel
Bottom: Compositional layers of the Earth made using the AstPy-9 Planetary Interiors activity.