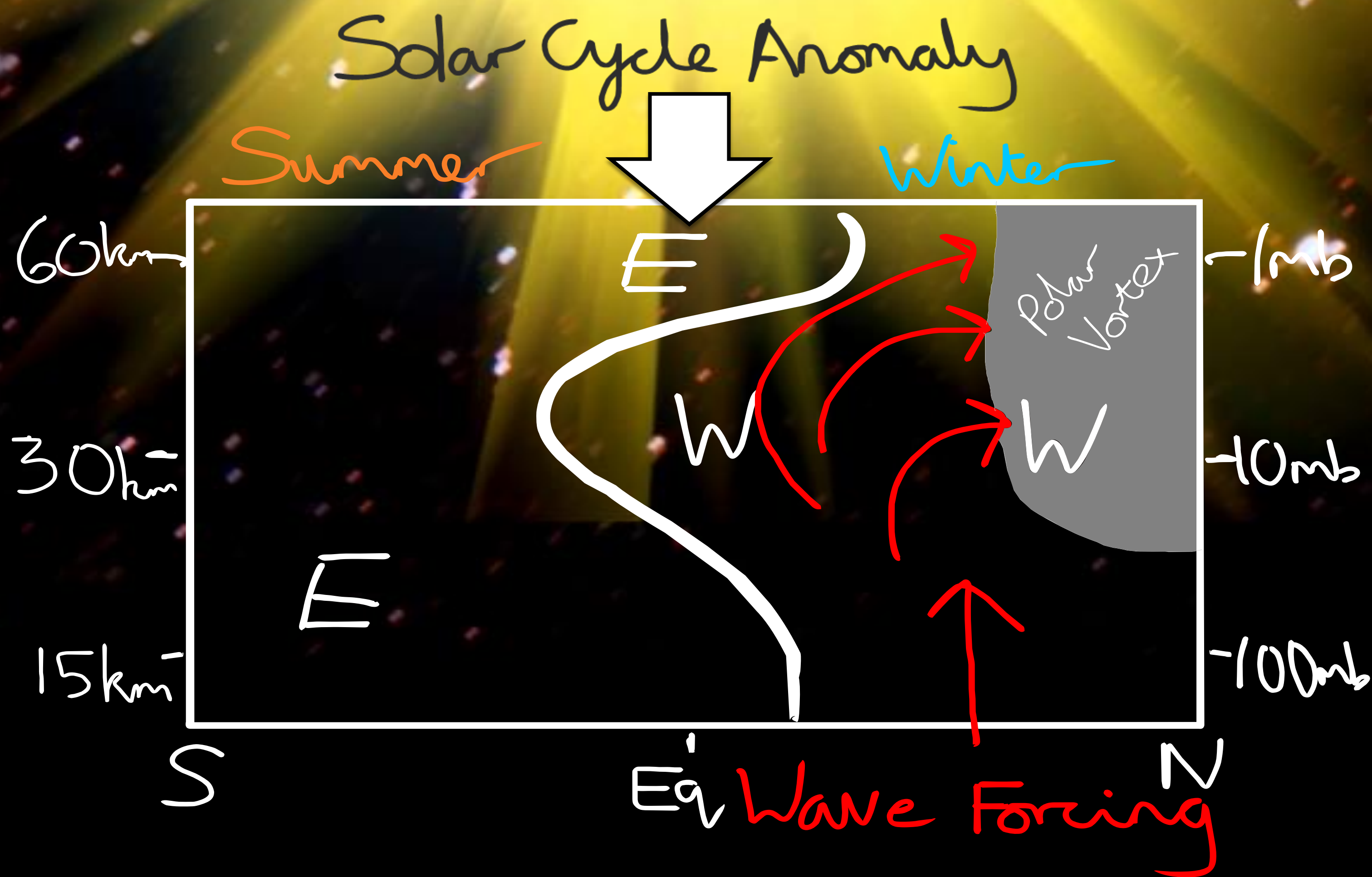


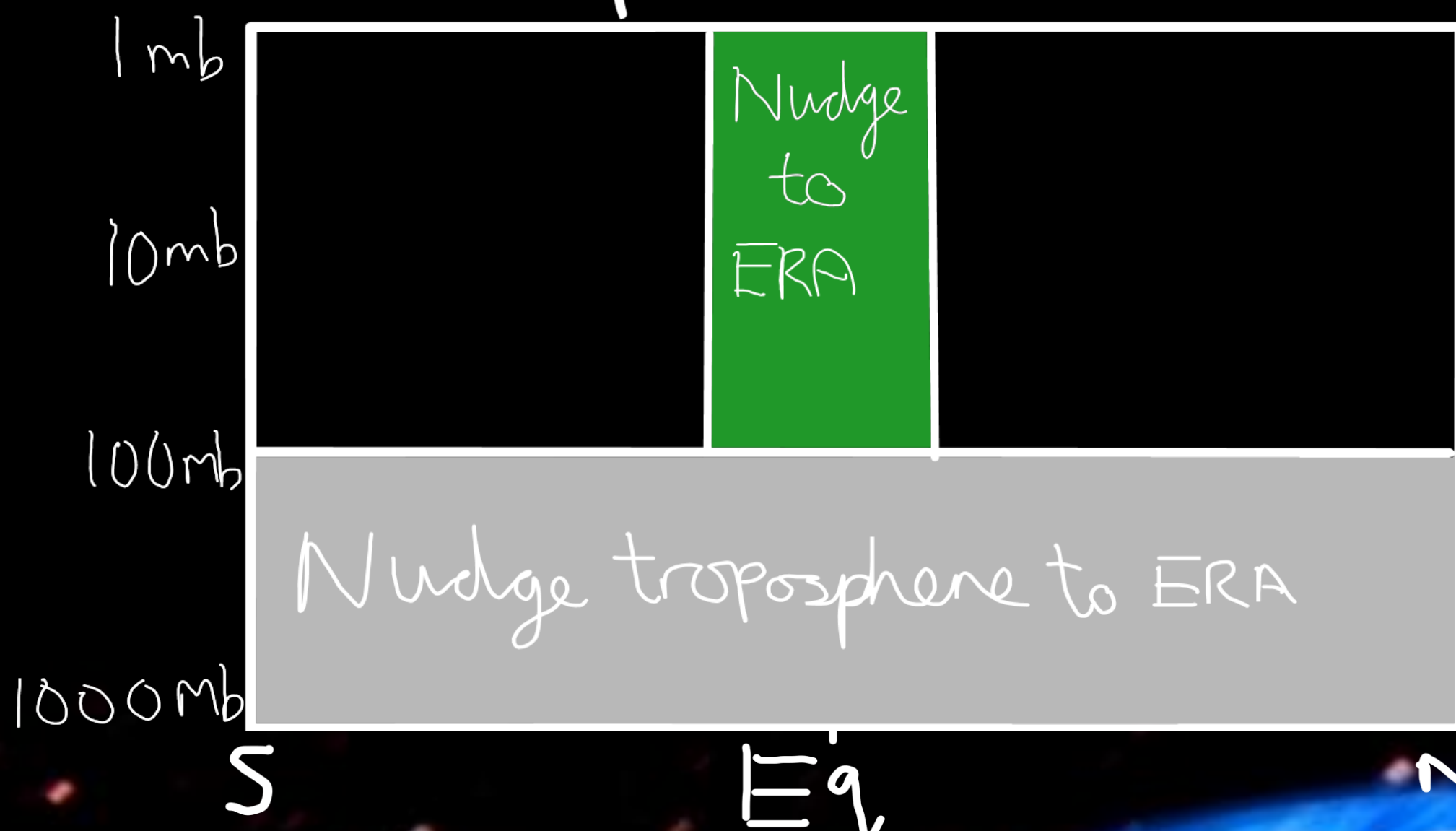
The 11-year solar cycle - Climate Influencer



Abstract: The 11-year solar cycle in the sun's output impacts winter surface climate of Northern Europe. I am using model experiments to try to understand this impact and improve predictions of winter climate.

Current experiment: Investigating the polar vortex response	
Background	Experiment Setup
<ul style="list-style-type: none"> The polar vortex is a strong westerly jet that forms around the winter pole in the stratosphere This jet is sensitive to atmospheric waves that form from flow over mountains, and propagate upwards These planetary waves act to weaken the vortex, which leads to weaker winter circulation near the surface However, these waves are only able to propagate if the background winds are from the west At solar minimum, an easterly wind anomaly forms over the equator in the upper stratosphere As the waves cannot propagate here as easily, on average more are deflected towards the pole, and the polar vortex However, observations of the upper stratosphere typically have poor vertical resolution, so this anomaly can be missed, making it harder for models to simulate SSWs 	<ul style="list-style-type: none"> Hypothesis: Nudging to higher vertical resolution data in the upper stratosphere will improve the model's ability to simulate the occurrence of stratospheric warmings Using 50-ensemble HadGEM3 UM10.3 GA7.0 N96 AMIP setup Running for winter 2008/9 in which there was a major SSW Control experiment: Nudging to ERA-I in the troposphere, no nudging in the stratosphere Experiment 1: Nudge additionally to ERA-I in the equatorial stratosphere Experiment 2: Nudge to MERRA2 in the equatorial strat. MERRA2 assimilates limb-sounder temperatures above 5mb ERA-I only assimilates nadir-sounder radiances Crucially the limb sounder has a higher vertical resolution If our hypothesis is correct, more ensemble members of experiment 2 will simulate a stratospheric warming

Experiment 1



Experiment 2

