UNIVERSITY OF EXETER

Other things you might want to know about Isca (ICTP day 2)

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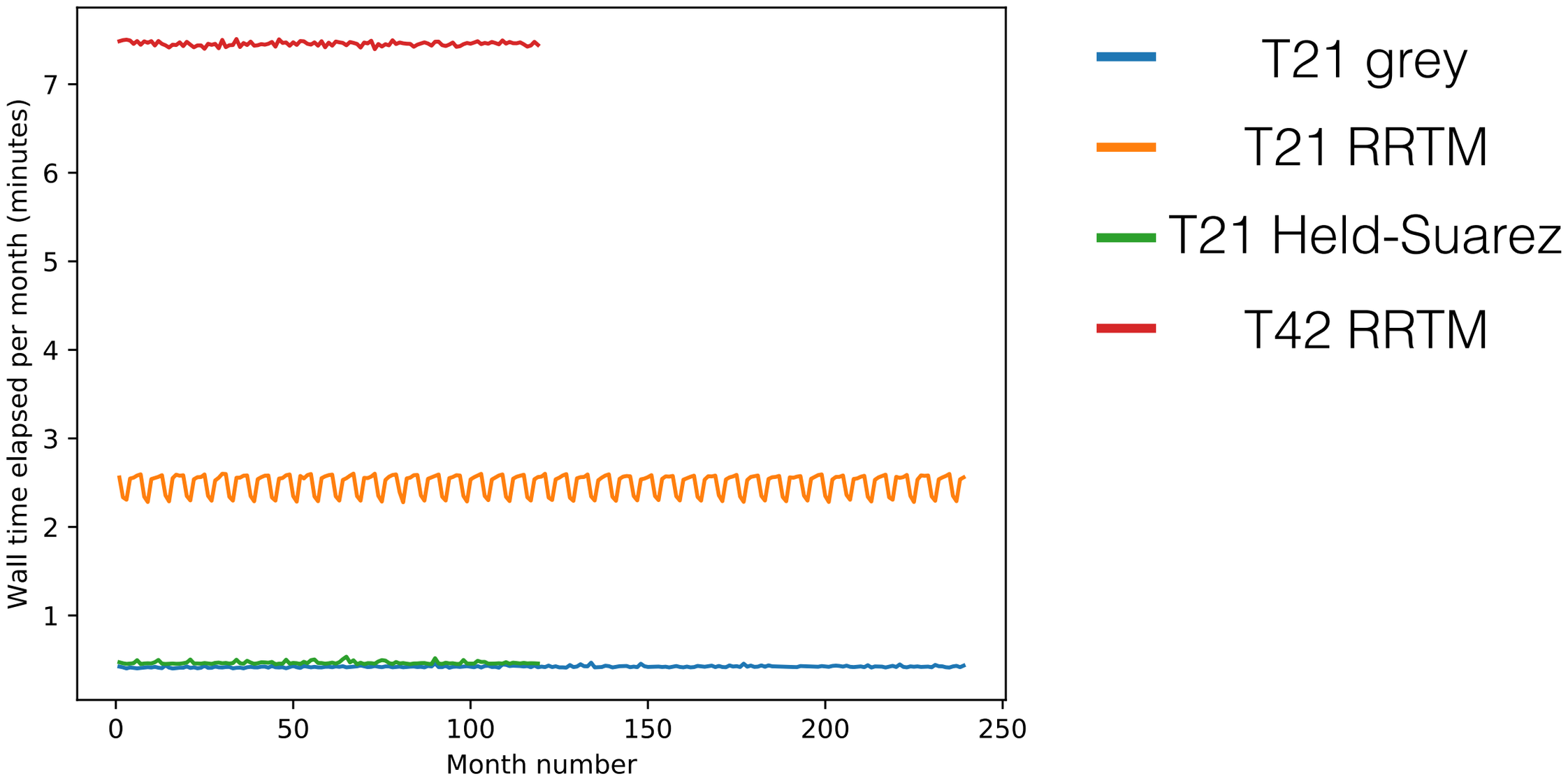
Isca

Some little things

- In the **submission** scripts, there is an option to provide an email address.
    - Argo will email you when the job starts and when it finishes (can be useful)
- I have added the lecture notes from yesterday to the ictp-isca-workshop-2018 repository. Download it from GitHub if you like.
- **How long will the model take to run my experiment?**
- **How do I know whether I have seasons or not?**
- **How do I know whether it's an aquaplanet or not?**
    - **How do I add land?**

- **How long will the model take to run my experiment?**



lsca/src/extra/python/scripts/modified_time_script.py

Add your experiment folder names to the ‘exp_dir_list’ near the bottom of the script, then run with python.

- **How do I know whether I have seasons or not?**

Example experiments:

- Project 1 - Seasons
- Project 2 - No seasons
- Project 3 - No seasons
- Project 4 - Seasons
- Project 5 - No seasons
- Project 6 - Seasons
- Project 7 - No seasons
- Project P1 - No seasons
- Project P2 - No seasons

```
'rrtm_radiation_nml': {
    'do_read_ozone':True,
    'ozone_file':'ozone_1990',
    'solr_cnst': 1360., #s set
    'dt_rad': 4320, #Use 4320
    'solday':90,
},
```

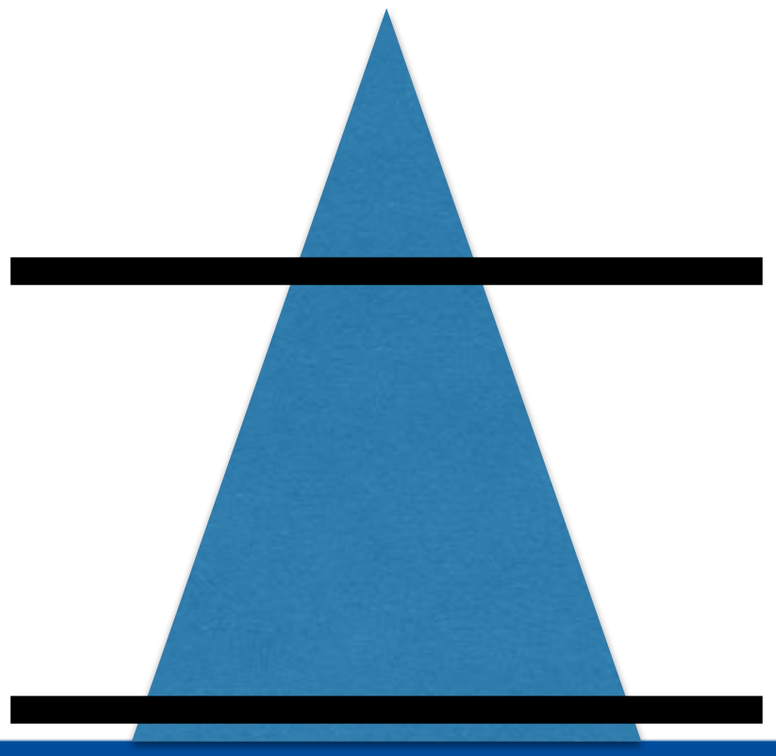
- If solday=90 is set, then it tells the radiation to run day 90 insolation every day (equinox)
- Same in grey and RRTM namelists
- If solday is not set, then you'll have seasons
- To add seasons, remove the solday namelist entry

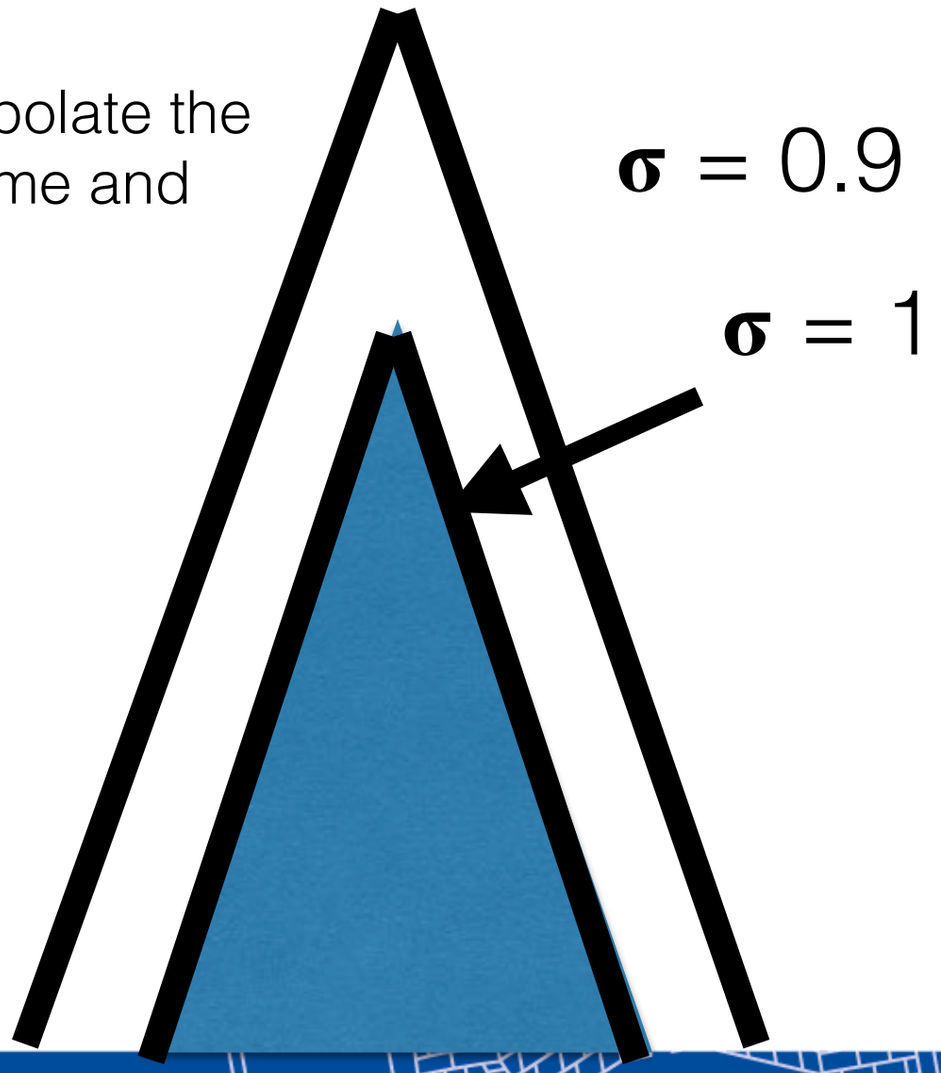
- **How do I know whether it's an aquaplanet or not?**
  - By default, Isca has no land - is an aquaplanet
  - In the mixed_layer.f90 `land_option='none'` is default
- **How do I add land?**
  - Look at e.g. project 3, as it has land
  - Step 1: Add a land mask to the 'input_files' list near the top of your run script
  - Step 2: Include the namelist entries with 'land' in the name in the relevant namelists
    - 3 in 'idealized_moist_phys_nml', 3 in 'mixed_layer_nml'
  - Step 3: add 'ocean_topog_smoothing':0.8 to 'spectral_dynamics_nml'
  - Step 4: Add the 'spectral_init_cond_nml' namelist as part of your namelist (this will add topography to the model)

- The factors that set the land-sea contrast are:
    - ‘land_roughness_prefactor’ - how much rougher is the land than the ocean?
    - ‘land_h_capacity_prefactor’ - how much lower is the land’s heat capacity than the ocean?
    - ‘land_albedo_prefactor’ - how much greater is the land albedo than the ocean albedo?
- The real-world land masks are provided in the Isca repo in Isca/input/land_masks
- If you want to make idealised land / topography - talk to me and I’ll show you how.

What about the output?

- The atmospheric output data is provided on so-called '**sigma levels**' (terrain-following coordinates)
- **σ = atmospheric_pressure / surface_pressure**
- On an **aquaplanet**, there's very little difference
- Makes a big difference with topography…
- If your simulation has topography, you'll need to interpolate the data onto pressure levels before analysing it - talk to me and I'll show you how.





A quick note on q-fluxes

- The evolution equation for the mixed-layer temperature is the following:

$$C_{\mathrm{m}} \frac{\partial T}{\partial t} = \mathrm{SW} + \mathrm{LW} - \mathrm{sensible} - \mathrm{latent} + \nabla \cdot \boldsymbol{Q}$$

- In ‘mixed_layer.f90’ this looks like:

```
corrected_flux = - net_surf_sw_down - surf_lw_down + alpha_t * CP_AIR + alpha_lw - ocean_qflux
```

- So `ocean_qflux` actually corresponds to $\nabla \cdot \boldsymbol{Q}$

- So your `ocean_qflux` field should **integrate to zero over the globe**, because the area integral of a divergence is zero

- The q-flux input files I have given you will integrate to zero

- But **be careful if you add land that this remains true**, otherwise you’ll have a net source or sink of energy in the mixed-layer.