GMOS N&S longslit reduction
German Gimeno, Jan 2014

This simple pipeline consists of three iraf cl scripts that use mainly the Gemini iraf package together with standard iraf tasks and some common unix commands. The user is assumed to have basic iraf knowledge and some familiarity with the gemini-gmos package.

The only prerequisite is that all the necessary files (bias, flats, arcs, N&S darks and science) are located together in a common directory (it’s best to have one directory per target). Here is a brief explanation of what the scripts do.

**Step 1**
When running it for the first time, just type at the iraf prompt:

```
 ecl> cl < red_sci_01.cl
```

as you would do for any cl script. If you are an experience iraf user and/or you are familiar with cl scripts, you may want to have a look at the code.

This first script will perform all the pre-reduction: will combine the individual biases into a mast bias; will reduce the flats (N&S flats need a particular treatment), will calibrate the arcs, will build the master N&S dark frame from the individual N&S darks, and will subtract the Dark from the N&S science frame(s). Will also perform a first cosmic rays cleaning (a better one will be done at step 2).

It is possible that the script crashes (e.g. problems with header keywords, etc.). If it crashes for example, just before reducing the arcs, but the bias, dark and flats were processed ok, you don't need to re-run the whole script. Just comment out the gbias, gsflat and gnsdark lines (by placing a # at the beginning of the line), save and run the script again.

**Step 2**
```
 ecl> cl < red_sci_02.cl
```

This will perform the rest of the 2-D frames that is wavelength-dependent: will flat-field the science data, do the mosaicing, the wavelength calibration of the science spectra, and the sky subtraction, as well as a second cosmic ray cleaning.

In the snapshot below you can see, from left to right, the raw science frame, the flat-fielded frame and the flat-fielded cr-cleaned frame.

![Snapshot of raw science frame, flat-fielded frame, and cr-cleaned frame](image)

The following two are the sky-subtracted spectrum, an the cr-cleaned sky-subtracted frame. The last one is the output of red_sci_02.

```
 ecl> cl < red_sci_03.cl
```

This perform the extraction of 1-D spectra from the reduced 2-D frames of the previous step. The first extraction is done interactively by default, so you need to take actions here. Most of the times, you will only need to hit “enter” and “q”.

It finishes by plotting the final combined spectrums per wavelength.