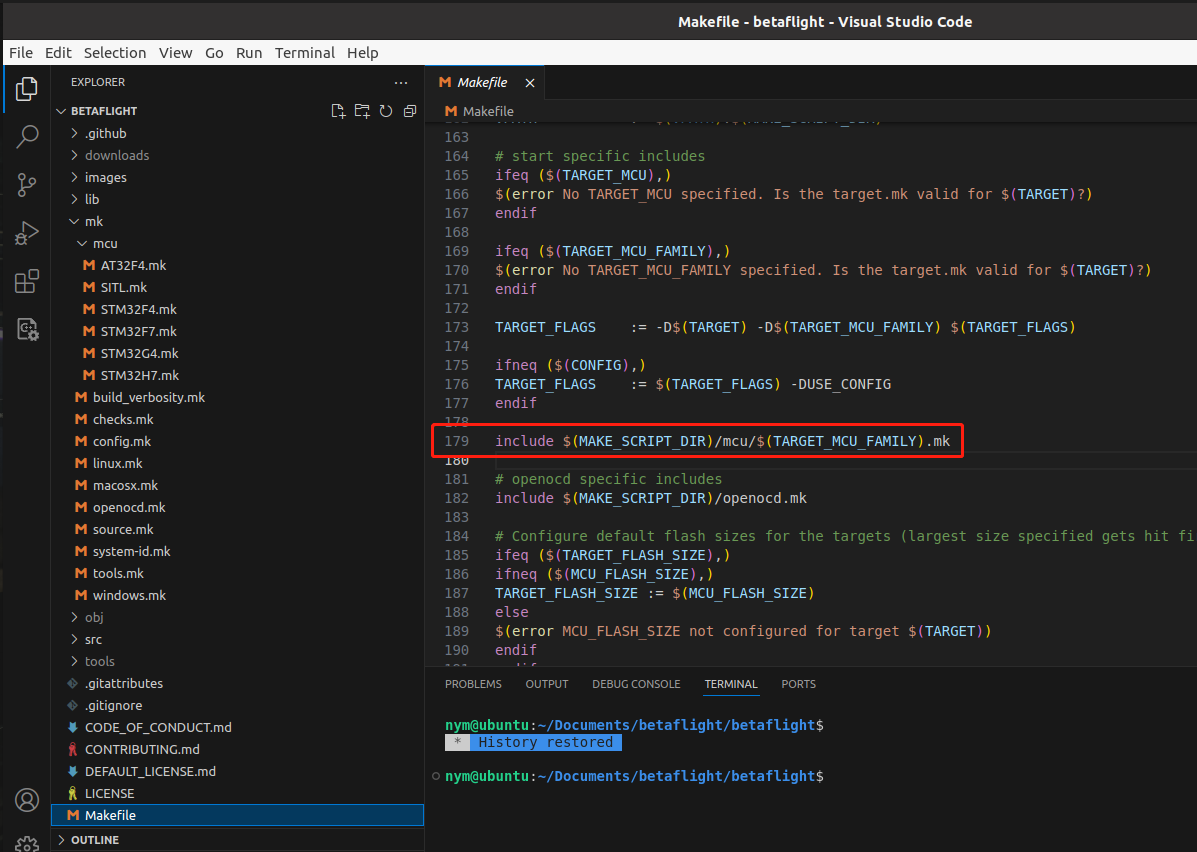
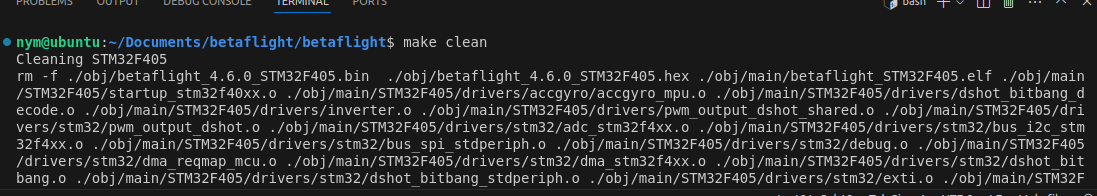
Betaflight 编译makefile文件

**主makefile文件里面有汇总需要运行的.mk文件(即所有的makefile文件)**

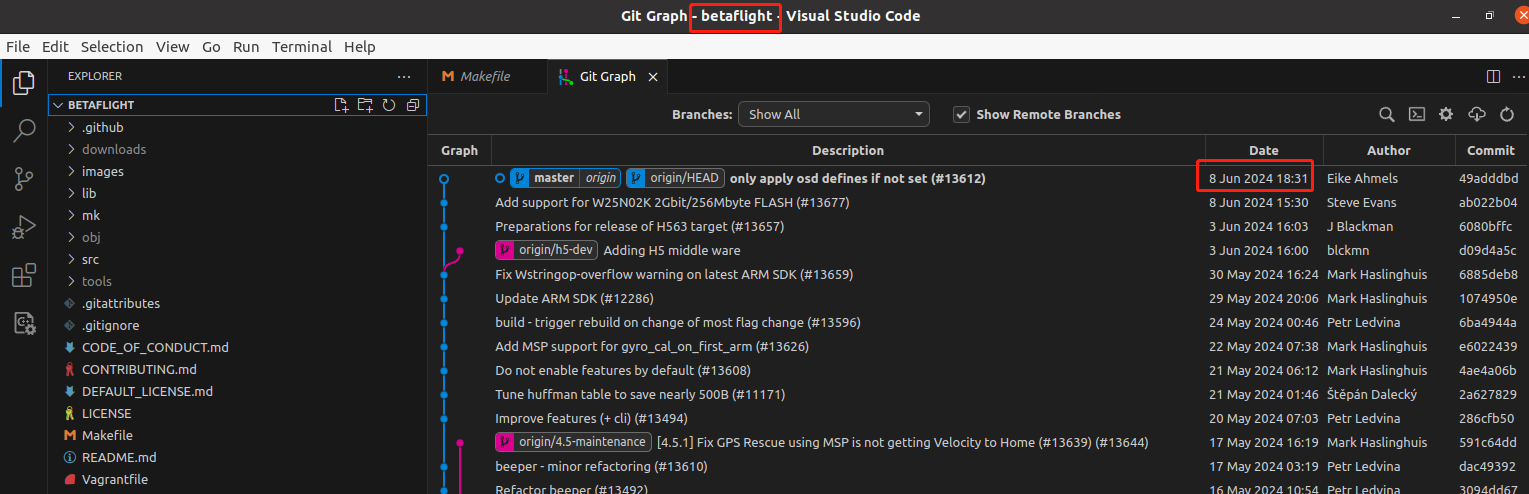


**Makefile控制编译的所有.c文件**

先make clean，把编译的文件清掉：



再编译，编译的是这个版本的betaflight：



nym@ubuntu:~/Documents/betaflight/betaflight$ make TARGET=STM32F405 DEBUG=INFO

make -j ./obj/betaflight\_4.6.0\_STM32F405.hex

make[1]: Entering directory '/home/nym/Documents/betaflight/betaflight'

EF HASH -> ./obj/main/STM32F405/.efhash\_e6ff2cfe9c0fb8981809703bd7a45612

%% (speed optimised) ./src/main/drivers/accgyro/accgyro\_mpu.c

%% startup\_stm32f40xx.s

%% (optimised) ./src/main/drivers/dshot\_bitbang\_decode.c

%% (size optimised) ./src/main/drivers/inverter.c

%% (speed optimised) ./src/main/drivers/pwm\_output\_dshot\_shared.c

%% (optimised) ./src/main/drivers/stm32/pwm\_output\_dshot.c

%% (optimised) ./src/main/drivers/stm32/adc\_stm32f4xx.c

%% (optimised) ./src/main/drivers/stm32/bus\_i2c\_stm32f4xx.c

%% (optimised) ./src/main/drivers/stm32/bus\_spi\_stdperiph.c

%% (optimised) ./src/main/drivers/stm32/debug.c

%% (optimised) ./src/main/drivers/stm32/dma\_reqmap\_mcu.c

%% (optimised) ./src/main/drivers/stm32/dma\_stm32f4xx.c

%% (optimised) ./src/main/drivers/stm32/dshot\_bitbang.c

%% (optimised) ./src/main/drivers/stm32/dshot\_bitbang\_stdperiph.c

%% (optimised) ./src/main/drivers/stm32/exti.c

%% (optimised) ./src/main/drivers/stm32/io\_stm32.c

%% (optimised) ./src/main/drivers/stm32/light\_ws2811strip\_stdperiph.c

%% (optimised) ./src/main/drivers/stm32/persistent.c

%% (optimised) ./src/main/drivers/stm32/pwm\_output.c

%% (optimised) ./src/main/drivers/stm32/rcc\_stm32.c

%% (optimised) ./src/main/drivers/stm32/sdio\_f4xx.c

%% (optimised) ./src/main/drivers/stm32/serial\_uart\_stdperiph.c

%% (optimised) ./src/main/drivers/stm32/serial\_uart\_stm32f4xx.c

%% (optimised) ./src/main/drivers/stm32/system\_stm32f4xx.c

%% (optimised) ./src/main/drivers/stm32/timer\_stdperiph.c

%% (optimised) ./src/main/drivers/stm32/timer\_stm32f4xx.c

%% (optimised) ./src/main/drivers/stm32/transponder\_ir\_io\_stdperiph.c

%% (optimised) ./src/main/drivers/stm32/usbd\_msc\_desc.c

%% (optimised) ./src/main/drivers/stm32/camera\_control.c

%% (optimised) ./src/main/startup/system\_stm32f4xx.c

%% arm\_bitreversal2.S

%% (optimised) ./src/main/drivers/flash.c

%% (optimised) ./src/main/drivers/flash\_m25p16.c

%% (optimised) ./src/main/drivers/flash\_w25n.c

%% (optimised) ./src/main/drivers/flash\_w25q128fv.c

%% (optimised) ./src/main/drivers/flash\_w25m.c

%% (optimised) ./src/main/io/flashfs.c

%% (optimised) ./src/main/drivers/usb\_msc\_common.c

%% (optimised) ./src/main/drivers/stm32/usb\_msc\_f4xx.c

%% (optimised) ./src/main/msc/usbd\_storage.c

%% (optimised) ./src/main/msc/usbd\_storage\_emfat.c

%% (optimised) ./src/main/msc/emfat.c

%% (optimised) ./src/main/msc/emfat\_file.c

%% (optimised) ./src/main/msc/usbd\_storage\_sd\_spi.c

%% (optimised) ./src/main/msc/usbd\_storage\_sdio.c

%% (optimised) ./src/main/drivers/sdcard.c

%% (optimised) ./src/main/drivers/sdcard\_spi.c

%% (optimised) ./src/main/drivers/sdcard\_sdio\_baremetal.c

%% (optimised) ./src/main/drivers/sdcard\_standard.c

%% (optimised) ./src/main/io/asyncfatfs/asyncfatfs.c

%% (optimised) ./src/main/io/asyncfatfs/fat\_standard.c

%% (optimised) ./src/main/build/build\_config.c

%% (optimised) ./src/main/build/debug.c

%% (optimised) ./src/main/build/debug\_pin.c

%% (optimised) ./src/main/build/version.c

%% (size optimised) ./src/main/main.c

%% (optimised) ./src/main/pg/motor.c

%% (optimised) ./src/main/pg/rcdevice.c

%% (optimised) ./src/main/pg/pin\_pull\_up\_down.c

%% (optimised) ./src/main/pg/stats.c

%% (optimised) ./src/main/pg/bus\_i2c.c

%% (optimised) ./src/main/pg/timerio.c

%% (optimised) ./src/main/pg/gyrodev.c

%% (optimised) ./src/main/pg/dyn\_notch.c

%% (optimised) ./src/main/pg/pinio.c

%% (optimised) ./src/main/pg/max7456.c

%% (optimised) ./src/main/pg/scheduler.c

%% (optimised) ./src/main/pg/rpm\_filter.c

%% (optimised) ./src/main/pg/vtx\_io.c

%% (optimised) ./src/main/pg/board.c

%% (optimised) ./src/main/pg/pg.c

%% (optimised) ./src/main/pg/usb.c

%% (optimised) ./src/main/pg/dashboard.c

%% (optimised) ./src/main/pg/displayport\_profiles.c

%% (optimised) ./src/main/pg/rx.c

%% (optimised) ./src/main/pg/rx\_spi.c

%% (optimised) ./src/main/pg/timerup.c

%% (optimised) ./src/main/pg/mco.c

%% (optimised) ./src/main/pg/gps.c

%% (optimised) ./src/main/pg/beeper\_dev.c

%% (optimised) ./src/main/pg/vtx\_table.c

%% (optimised) ./src/main/pg/gps\_rescue.c

%% (optimised) ./src/main/pg/bus\_spi.c

%% (optimised) ./src/main/pg/flash.c

%% (optimised) ./src/main/pg/rx\_pwm.c

%% (optimised) ./src/main/pg/sdio.c

%% (optimised) ./src/main/pg/beeper.c

%% (optimised) ./src/main/pg/bus\_quadspi.c

%% (optimised) ./src/main/pg/rx\_spi\_cc2500.c

%% (optimised) ./src/main/pg/vcd.c

%% (optimised) ./src/main/pg/gps\_lap\_timer.c

%% (optimised) ./src/main/pg/rx\_spi\_expresslrs.c

%% (optimised) ./src/main/pg/msp.c

%% (optimised) ./src/main/pg/piniobox.c

%% (optimised) ./src/main/pg/sdcard.c

%% (optimised) ./src/main/pg/serial\_uart.c

%% (optimised) ./src/main/pg/adc.c

%% (speed optimised) ./src/main/common/maths.c

%% (optimised) ./src/main/common/bitarray.c

%% (optimised) ./src/main/common/strtol.c

%% (optimised) ./src/main/common/crc.c

%% (optimised) ./src/main/common/huffman.c

%% (optimised) ./src/main/common/time.c

%% (optimised) ./src/main/common/uvarint.c

%% (speed optimised) ./src/main/common/typeconversion.c

%% (optimised) ./src/main/common/string\_light.c

%% (optimised) ./src/main/common/huffman\_table.c

%% (speed optimised) ./src/main/common/encoding.c

%% (optimised) ./src/main/common/printf\_serial.c

%% (speed optimised) ./src/main/common/filter.c

%% (speed optimised) ./src/main/common/sdft.c

%% (optimised) ./src/main/common/sensor\_alignment.c

%% (optimised) ./src/main/common/explog\_approx.c

%% (optimised) ./src/main/common/gps\_conversion.c

%% (optimised) ./src/main/common/streambuf.c

%% (speed optimised) ./src/main/common/stopwatch.c

%% (optimised) ./src/main/common/printf.c

%% (optimised) ./src/main/common/colorconversion.c

%% (size optimised) ./src/main/config/config\_eeprom.c

%% (size optimised) ./src/main/config/simplified\_tuning.c

%% (optimised) ./src/main/config/config.c

%% (size optimised) ./src/main/config/config\_streamer.c

%% (size optimised) ./src/main/config/feature.c

%% (size optimised) ./src/main/cli/cli.c

%% (size optimised) ./src/main/cli/settings.c

%% (speed optimised) ./src/main/drivers/adc.c

%% (optimised) ./src/main/drivers/dshot.c

%% (optimised) ./src/main/drivers/dshot\_dpwm.c

%% (optimised) ./src/main/drivers/dshot\_command.c

%% (speed optimised) ./src/main/drivers/buf\_writer.c

%% (speed optimised) ./src/main/drivers/bus.c

%% (size optimised) ./src/main/drivers/bus\_i2c\_config.c

%% (optimised) ./src/main/drivers/bus\_i2c\_busdev.c

%% (optimised) ./src/main/drivers/bus\_i2c\_utils.c

%% (optimised) ./src/main/drivers/bus\_i2c\_soft.c

%% (optimised) ./src/main/drivers/bus\_octospi.c

%% (speed optimised) ./src/main/drivers/bus\_quadspi.c

%% (speed optimised) ./src/main/drivers/bus\_spi.c

%% (size optimised) ./src/main/drivers/bus\_spi\_config.c

%% (size optimised) ./src/main/drivers/bus\_spi\_pinconfig.c

%% (optimised) ./src/main/drivers/display.c

%% (optimised) ./src/main/drivers/buttons.c

%% (optimised) ./src/main/drivers/display\_canvas.c

%% (optimised) ./src/main/drivers/dma\_common.c

%% (speed optimised) ./src/main/drivers/io.c

%% (optimised) ./src/main/drivers/light\_led.c

%% (optimised) ./src/main/drivers/mco.c

%% (optimised) ./src/main/drivers/motor.c

%% (optimised) ./src/main/drivers/pinio.c

%% (optimised) ./src/main/drivers/pin\_pull\_up\_down.c

%% (optimised) ./src/main/drivers/resource.c

%% (speed optimised) ./src/main/drivers/serial.c

%% (size optimised) ./src/main/drivers/serial\_pinconfig.c

%% (speed optimised) ./src/main/drivers/serial\_uart.c

%% (size optimised) ./src/main/drivers/serial\_uart\_pinconfig.c

%% (optimised) ./src/main/drivers/sound\_beeper.c

%% (optimised) ./src/main/drivers/stack\_check.c

%% (speed optimised) ./src/main/drivers/system.c

%% (optimised) ./src/main/drivers/timer\_common.c

%% (optimised) ./src/main/drivers/transponder\_ir\_arcitimer.c

%% (optimised) ./src/main/drivers/transponder\_ir\_ilap.c

%% (optimised) ./src/main/drivers/transponder\_ir\_erlt.c

%% (size optimised) ./src/main/fc/board\_info.c

%% (optimised) ./src/main/fc/dispatch.c

%% (optimised) ./src/main/fc/hardfaults.c

%% (speed optimised) ./src/main/fc/tasks.c

%% (speed optimised) ./src/main/fc/runtime\_config.c

%% (optimised) ./src/main/fc/stats.c

%% (optimised) ./src/main/io/beeper.c

%% (optimised) ./src/main/io/piniobox.c

%% (size optimised) ./src/main/io/serial.c

%% (optimised) ./src/main/io/smartaudio\_protocol.c

%% (optimised) ./src/main/io/statusindicator.c

%% (optimised) ./src/main/io/tramp\_protocol.c

%% (size optimised) ./src/main/io/transponder\_ir.c

%% (size optimised) ./src/main/io/usb\_cdc\_hid.c

%% (optimised) ./src/main/io/usb\_msc.c

%% (optimised) ./src/main/msp/msp.c

%% (optimised) ./src/main/msp/msp\_box.c

%% (optimised) ./src/main/msp/msp\_build\_info.c

%% (size optimised) ./src/main/msp/msp\_serial.c

%% (speed optimised) ./src/main/scheduler/scheduler.c

%% (optimised) ./src/main/sensors/adcinternal.c

%% (optimised) ./src/main/sensors/battery.c

%% (optimised) ./src/main/sensors/current.c

%% (optimised) ./src/main/sensors/voltage.c

%% (optimised) ./src/main/target/config\_helper.c

%% (size optimised) ./src/main/fc/init.c

%% (optimised) ./src/main/fc/controlrate\_profile.c

%% (optimised) ./src/main/drivers/accgyro/gyro\_sync.c

%% (optimised) ./src/main/drivers/rx/rx\_spi.c

%% (optimised) ./src/main/drivers/rx/rx\_xn297.c

%% (optimised) ./src/main/drivers/rx/rx\_pwm.c

%% (optimised) ./src/main/drivers/serial\_softserial.c

%% (speed optimised) ./src/main/fc/core.c

%% (speed optimised) ./src/main/fc/rc.c

%% (optimised) ./src/main/fc/rc\_adjustments.c

%% (speed optimised) ./src/main/fc/rc\_controls.c

%% (optimised) ./src/main/fc/rc\_modes.c

%% (optimised) ./src/main/flight/position.c

%% (optimised) ./src/main/flight/failsafe.c

%% (optimised) ./src/main/flight/gps\_rescue.c

%% (optimised) ./src/main/fc/gps\_lap\_timer.c

%% (speed optimised) ./src/main/flight/dyn\_notch\_filter.c

%% (speed optimised) ./src/main/flight/imu.c

%% (speed optimised) ./src/main/flight/mixer.c

%% (size optimised) ./src/main/flight/mixer\_init.c

%% (optimised) ./src/main/flight/mixer\_tricopter.c

%% (speed optimised) ./src/main/flight/pid.c

%% (size optimised) ./src/main/flight/pid\_init.c

%% (speed optimised) ./src/main/flight/rpm\_filter.c

%% (optimised) ./src/main/flight/servos.c

%% (optimised) ./src/main/flight/servos\_tricopter.c

%% (size optimised) ./src/main/io/serial\_4way\_avrootloader.c

%% (size optimised) ./src/main/io/serial\_4way.c

%% (size optimised) ./src/main/io/serial\_4way\_stk500v2.c

%% (speed optimised) ./src/main/rx/ibus.c

%% (optimised) ./src/main/rx/jetiexbus.c

%% (optimised) ./src/main/rx/msp.c

%% (optimised) ./src/main/rx/pwm.c

%% (speed optimised) ./src/main/rx/frsky\_crc.c

%% (speed optimised) ./src/main/rx/rc\_stats.c

%% (speed optimised) ./src/main/rx/rx.c

%% (size optimised) ./src/main/rx/rx\_bind.c

%% (speed optimised) ./src/main/rx/rx\_spi.c

%% (optimised) ./src/main/rx/rx\_spi\_common.c

%% (speed optimised) ./src/main/rx/crsf.c

%% (optimised) ./src/main/rx/ghst.c

%% (speed optimised) ./src/main/rx/sbus.c

%% (speed optimised) ./src/main/rx/sbus\_channels.c

%% (speed optimised) ./src/main/rx/spektrum.c

%% (speed optimised) ./src/main/rx/srxl2.c

%% (size optimised) ./src/main/io/spektrum\_vtx\_control.c

%% (optimised) ./src/main/io/spektrum\_rssi.c

%% (speed optimised) ./src/main/rx/sumd.c

%% (optimised) ./src/main/rx/sumh.c

%% (speed optimised) ./src/main/rx/xbus.c

%% (speed optimised) ./src/main/rx/fport.c

%% (optimised) ./src/main/rx/msp\_override.c

%% (speed optimised) ./src/main/sensors/acceleration.c

%% (size optimised) ./src/main/sensors/acceleration\_init.c

%% (speed optimised) ./src/main/sensors/boardalignment.c

%% (optimised) ./src/main/sensors/compass.c

%% (speed optimised) ./src/main/sensors/gyro.c

%% (size optimised) ./src/main/sensors/gyro\_init.c

%% (optimised) ./src/main/sensors/initialisation.c

%% (optimised) ./src/main/blackbox/blackbox.c

%% (optimised) ./src/main/blackbox/blackbox\_encoding.c

%% (optimised) ./src/main/blackbox/blackbox\_io.c

%% (size optimised) ./src/main/cms/cms.c

%% (size optimised) ./src/main/cms/cms\_menu\_blackbox.c

%% (size optimised) ./src/main/cms/cms\_menu\_failsafe.c

%% (size optimised) ./src/main/cms/cms\_menu\_firmware.c

%% (size optimised) ./src/main/cms/cms\_menu\_gps\_rescue.c

%% (size optimised) ./src/main/cms/cms\_menu\_gps\_lap\_timer.c

%% (size optimised) ./src/main/cms/cms\_menu\_imu.c

%% (size optimised) ./src/main/cms/cms\_menu\_ledstrip.c

%% (size optimised) ./src/main/cms/cms\_menu\_main.c

%% (size optimised) ./src/main/cms/cms\_menu\_misc.c

%% (size optimised) ./src/main/cms/cms\_menu\_osd.c

%% (size optimised) ./src/main/cms/cms\_menu\_power.c

%% (size optimised) ./src/main/cms/cms\_menu\_saveexit.c

%% (size optimised) ./src/main/cms/cms\_menu\_vtx\_common.c

%% (size optimised) ./src/main/cms/cms\_menu\_vtx\_rtc6705.c

%% (size optimised) ./src/main/cms/cms\_menu\_vtx\_smartaudio.c

%% (size optimised) ./src/main/cms/cms\_menu\_vtx\_tramp.c

%% (size optimised) ./src/main/cms/cms\_menu\_persistent\_stats.c

%% (size optimised) ./src/main/cms/cms\_menu\_rpm\_limit.c

%% (size optimised) ./src/main/cms/cms\_menu\_quick.c

%% (size optimised) ./src/main/drivers/display\_ug2864hsweg01.c

%% (size optimised) ./src/main/drivers/light\_ws2811strip.c

%% (optimised) ./src/main/drivers/rangefinder/rangefinder\_hcsr04.c

%% (optimised) ./src/main/drivers/rangefinder/rangefinder\_lidartf.c

%% (size optimised) ./src/main/drivers/serial\_escserial.c

%% (size optimised) ./src/main/drivers/vtx\_common.c

%% (optimised) ./src/main/drivers/vtx\_table.c

%% (size optimised) ./src/main/io/dashboard.c

%% (optimised) ./src/main/io/displayport\_frsky\_osd.c

%% (optimised) ./src/main/io/displayport\_max7456.c

%% (optimised) ./src/main/io/displayport\_msp.c

%% (optimised) ./src/main/io/displayport\_oled.c

%% (optimised) ./src/main/io/displayport\_srxl.c

%% (optimised) ./src/main/io/displayport\_crsf.c

%% (optimised) ./src/main/io/displayport\_hott.c

%% (optimised) ./src/main/io/frsky\_osd.c

%% (optimised) ./src/main/io/rcdevice\_cam.c

%% (optimised) ./src/main/io/rcdevice.c

%% (optimised) ./src/main/io/gps.c

%% (optimised) ./src/main/io/ledstrip.c

%% (optimised) ./src/main/io/pidaudio.c

%% (size optimised) ./src/main/osd/osd.c

%% (size optimised) ./src/main/osd/osd\_elements.c

%% (size optimised) ./src/main/osd/osd\_warnings.c

%% (optimised) ./src/main/sensors/barometer.c

%% (optimised) ./src/main/sensors/rangefinder.c

%% (optimised) ./src/main/telemetry/telemetry.c

%% (optimised) ./src/main/telemetry/crsf.c

%% (optimised) ./src/main/telemetry/ghst.c

%% (optimised) ./src/main/telemetry/srxl.c

%% (optimised) ./src/main/telemetry/frsky\_hub.c

%% (optimised) ./src/main/telemetry/hott.c

%% (optimised) ./src/main/telemetry/jetiexbus.c

%% (optimised) ./src/main/telemetry/smartport.c

%% (optimised) ./src/main/telemetry/ltm.c

%% (optimised) ./src/main/telemetry/mavlink.c

%% (optimised) ./src/main/telemetry/msp\_shared.c

%% (optimised) ./src/main/telemetry/ibus.c

%% (optimised) ./src/main/telemetry/ibus\_shared.c

%% (optimised) ./src/main/sensors/esc\_sensor.c

%% (size optimised) ./src/main/io/vtx.c

%% (size optimised) ./src/main/io/vtx\_rtc6705.c

%% (size optimised) ./src/main/io/vtx\_smartaudio.c

%% (size optimised) ./src/main/io/vtx\_tramp.c

%% (size optimised) ./src/main/io/vtx\_control.c

%% (size optimised) ./src/main/io/vtx\_msp.c

%% (size optimised) ./src/main/cms/cms\_menu\_vtx\_msp.c

%% (size optimised) ./src/main/drivers/accgyro/accgyro\_spi\_lsm6dso\_init.c

%% (size optimised) ./src/main/drivers/accgyro/accgyro\_spi\_icm20689.c

%% (size optimised) ./src/main/drivers/accgyro/accgyro\_mpu6050.c

%% (speed optimised) ./src/main/drivers/accgyro/accgyro\_spi\_lsm6dso.c

%% (speed optimised) ./src/main/drivers/accgyro/accgyro\_mpu3050.c

%% (optimised) ./src/main/drivers/accgyro/accgyro\_spi\_icm20649.c

%% (optimised) ./src/main/drivers/accgyro/accgyro\_spi\_lsm6dsv16x.c

%% (optimised) ./src/main/drivers/accgyro/accgyro\_spi\_l3gd20.c

%% (optimised) ./src/main/drivers/accgyro/accgyro\_virtual.c

%% (size optimised) ./src/main/drivers/accgyro/accgyro\_spi\_icm426xx.c

%% (speed optimised) ./src/main/drivers/accgyro/accgyro\_spi\_bmi270.c

%% (size optimised) ./src/main/drivers/accgyro/accgyro\_spi\_mpu6500.c

%% (size optimised) ./src/main/drivers/accgyro/accgyro\_spi\_mpu9250.c

%% (speed optimised) ./src/main/drivers/accgyro/accgyro\_spi\_bmi160.c

%% (size optimised) ./src/main/drivers/accgyro/accgyro\_spi\_mpu6000.c

%% (size optimised) ./src/main/drivers/accgyro/accgyro\_mpu6500.c

%% (optimised) lib/main/BoschSensortec/BMI270-Sensor-API/bmi270\_maximum\_fifo.c

%% (size optimised) ./src/main/drivers/barometer/barometer\_bmp085.c

%% (optimised) ./src/main/drivers/barometer/barometer\_virtual.c

%% (size optimised) ./src/main/drivers/barometer/barometer\_ms5611.c

%% (optimised) ./src/main/drivers/barometer/barometer\_lps22df.c

%% (size optimised) ./src/main/drivers/barometer/barometer\_qmp6988.c

%% (size optimised) ./src/main/drivers/barometer/barometer\_2smpb\_02b.c

%% (optimised) ./src/main/drivers/barometer/barometer\_dps310.c

%% (size optimised) ./src/main/drivers/barometer/barometer\_lps.c

%% (optimised) ./src/main/drivers/barometer/barometer\_bmp388.c

%% (size optimised) ./src/main/drivers/barometer/barometer\_bmp280.c

%% (optimised) ./src/main/drivers/compass/compass\_mpu925x\_ak8963.c

%% (size optimised) ./src/main/drivers/compass/compass\_lis3mdl.c

%% (size optimised) ./src/main/drivers/compass/compass\_ak8963.c

%% (size optimised) ./src/main/drivers/compass/compass\_ak8975.c

%% (size optimised) ./src/main/drivers/compass/compass\_hmc5883l.c

%% (optimised) ./src/main/drivers/compass/compass\_virtual.c

%% (size optimised) ./src/main/drivers/compass/compass\_lis2mdl.c

%% (size optimised) ./src/main/drivers/compass/compass\_ist8310.c

%% (size optimised) ./src/main/drivers/compass/compass\_qmc5883l.c

%% (speed optimised) ./src/main/drivers/max7456.c

%% (size optimised) ./src/main/drivers/vtx\_rtc6705.c

%% (size optimised) ./src/main/drivers/vtx\_rtc6705\_soft\_spi.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_rcc.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_gpio.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_tim.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_wwdg.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_exti.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_adc.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_dcmi.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_flash.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_dfsdm.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_dma.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_dac.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_rtc.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_pwr.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_i2c.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_iwdg.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_ltdc.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/misc.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_sdio.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_syscfg.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_fsmc.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_usart.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_rng.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_dma2d.c

%% (optimised) ./lib/main/STM32F4/Drivers/STM32F4xx\_StdPeriph\_Driver/src/stm32f4xx\_spi.c

%% (optimised) ./lib/main/STM32\_USB\_OTG\_Driver/src/usb\_dcd\_int.c

%% (optimised) ./lib/main/STM32\_USB\_OTG\_Driver/src/usb\_core.c

%% (optimised) ./lib/main/STM32\_USB\_OTG\_Driver/src/usb\_dcd.c

%% (optimised) ./lib/main/STM32\_USB\_Device\_Library/Core/src/usbd\_req.c

%% (optimised) ./lib/main/STM32\_USB\_Device\_Library/Core/src/usbd\_core.c

%% (optimised) ./lib/main/STM32\_USB\_Device\_Library/Core/src/usbd\_ioreq.c

%% (optimised) ./lib/main/STM32\_USB\_Device\_Library/Class/cdc/src/usbd\_cdc\_core.c

%% (optimised) ./lib/main/STM32\_USB\_Device\_Library/Class/hid/src/usbd\_hid\_core.c

%% (optimised) ./lib/main/STM32\_USB\_Device\_Library/Class/hid\_cdc\_wrapper/src/usbd\_hid\_cdc\_wrapper.c

%% (optimised) ./lib/main/STM32\_USB\_Device\_Library/Class/msc/src/usbd\_msc\_core.c

%% (optimised) ./lib/main/STM32\_USB\_Device\_Library/Class/msc/src/usbd\_msc\_bot.c

%% (optimised) ./lib/main/STM32\_USB\_Device\_Library/Class/msc/src/usbd\_msc\_data.c

%% (optimised) ./lib/main/STM32\_USB\_Device\_Library/Class/msc/src/usbd\_msc\_scsi.c

%% (optimised) ./src/main/rx/cc2500\_common.c

%% (optimised) ./src/main/rx/cc2500\_frsky\_shared.c

%% (optimised) ./src/main/rx/cc2500\_frsky\_d.c

%% (optimised) ./src/main/rx/cc2500\_frsky\_x.c

%% (optimised) ./src/main/rx/cc2500\_sfhss.c

%% (optimised) ./src/main/rx/cc2500\_redpine.c

%% (optimised) ./src/main/rx/a7105\_flysky.c

%% (optimised) ./src/main/rx/cyrf6936\_spektrum.c

%% (optimised) ./src/main/drivers/rx/expresslrs\_driver.c

%% (optimised) ./src/main/rx/expresslrs.c

%% (optimised) ./src/main/rx/expresslrs\_common.c

%% (optimised) ./src/main/rx/expresslrs\_telemetry.c

%% (optimised) ./src/main/drivers/rx/rx\_cc2500.c

%% (optimised) ./src/main/drivers/rx/rx\_a7105.c

%% (optimised) ./src/main/drivers/rx/rx\_cyrf6936.c

%% (optimised) ./src/main/drivers/rx/rx\_sx127x.c

%% (optimised) ./src/main/drivers/rx/rx\_sx1280.c

%% (optimised) ./src/main/drivers/stm32/vcpf4/stm32f4xx\_it.c

%% (optimised) ./src/main/drivers/stm32/vcpf4/usb\_bsp.c

%% (optimised) ./src/main/drivers/stm32/vcpf4/usbd\_desc.c

%% (optimised) ./src/main/drivers/stm32/vcpf4/usbd\_usr.c

%% (optimised) ./src/main/drivers/stm32/vcpf4/usb\_cdc\_hid.c

%% (optimised) ./src/main/drivers/stm32/vcpf4/usbd\_cdc\_vcp.c

%% (optimised) ./src/main/drivers/stm32/serial\_usb\_vcp.c

%% (optimised) ./src/main/drivers/usb\_io.c

%% (size optimised) lib/main/google/olc/olc.c

Linking STM32F405

Memory region Used Size Region Size %age Used

FLASH: 392 B 16 KB 2.39%

FLASH\_CONFIG: 0 GB 16 KB 0.00%

FLASH1: 558413 B 992 KB 54.97%

SYSTEM\_MEMORY: 0 GB 29 KB 0.00%

RAM: 99112 B 128 KB 75.62%

CCM: 15156 B 64 KB 23.13%

BACKUP\_SRAM: 0 GB 4 KB 0.00%

MEMORY\_B1: 0 GB 0 GB

text data bss dec hex filename

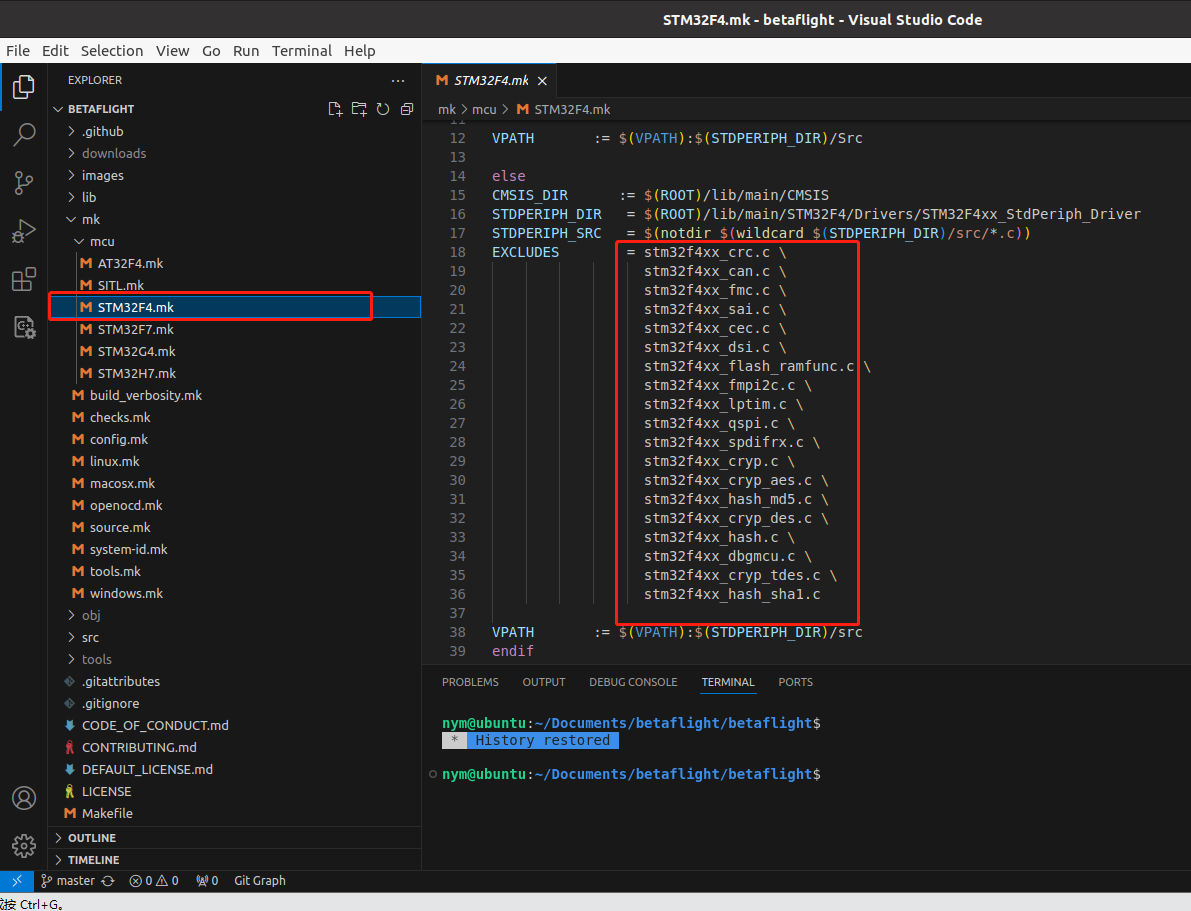
551337 7468 106408 665213 a267d ./obj/main/betaflight\_STM32F405.elf

Creating HEX ./obj/betaflight\_4.6.0\_STM32F405.hex

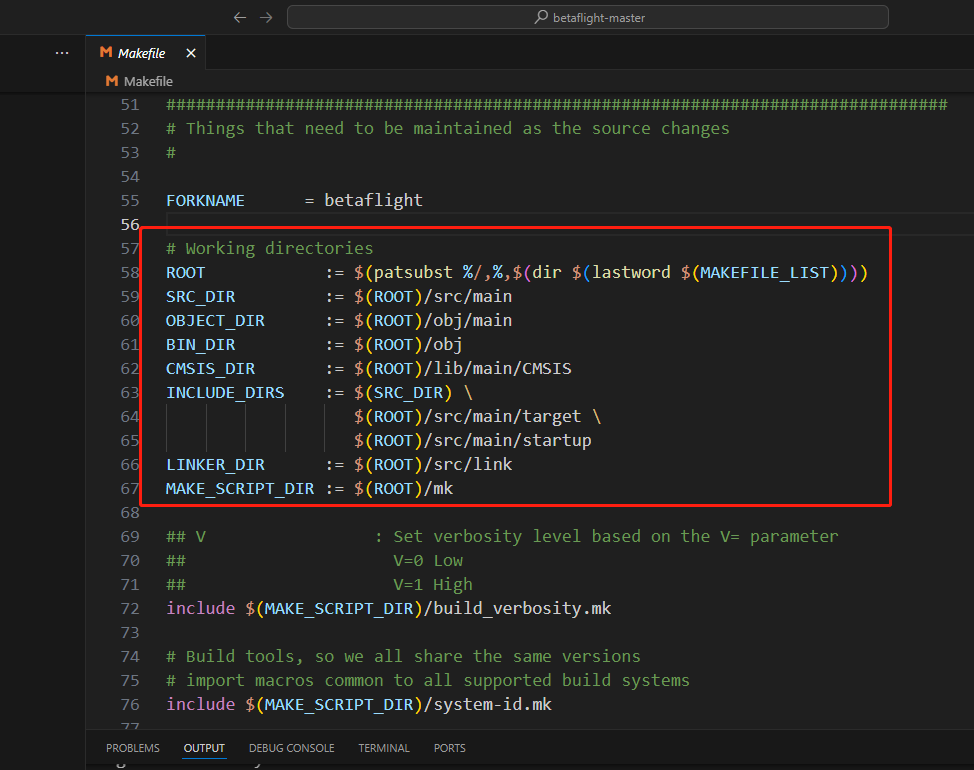
make[1]: Leaving directory '/home/nym/Documents/betaflight/betaflight'

**一共差不多编译了10+38\*9+22=374个.c文件。**

STM32F4.mk



**Makefile调用的所有.mk文件**



# 路径表示

ROOT            = 初始路径

SRC\_DIR         = /src/main

OBJECT\_DIR      = /obj/main

BIN\_DIR         = /obj

CMSIS\_DIR       = /lib/main/CMSIS

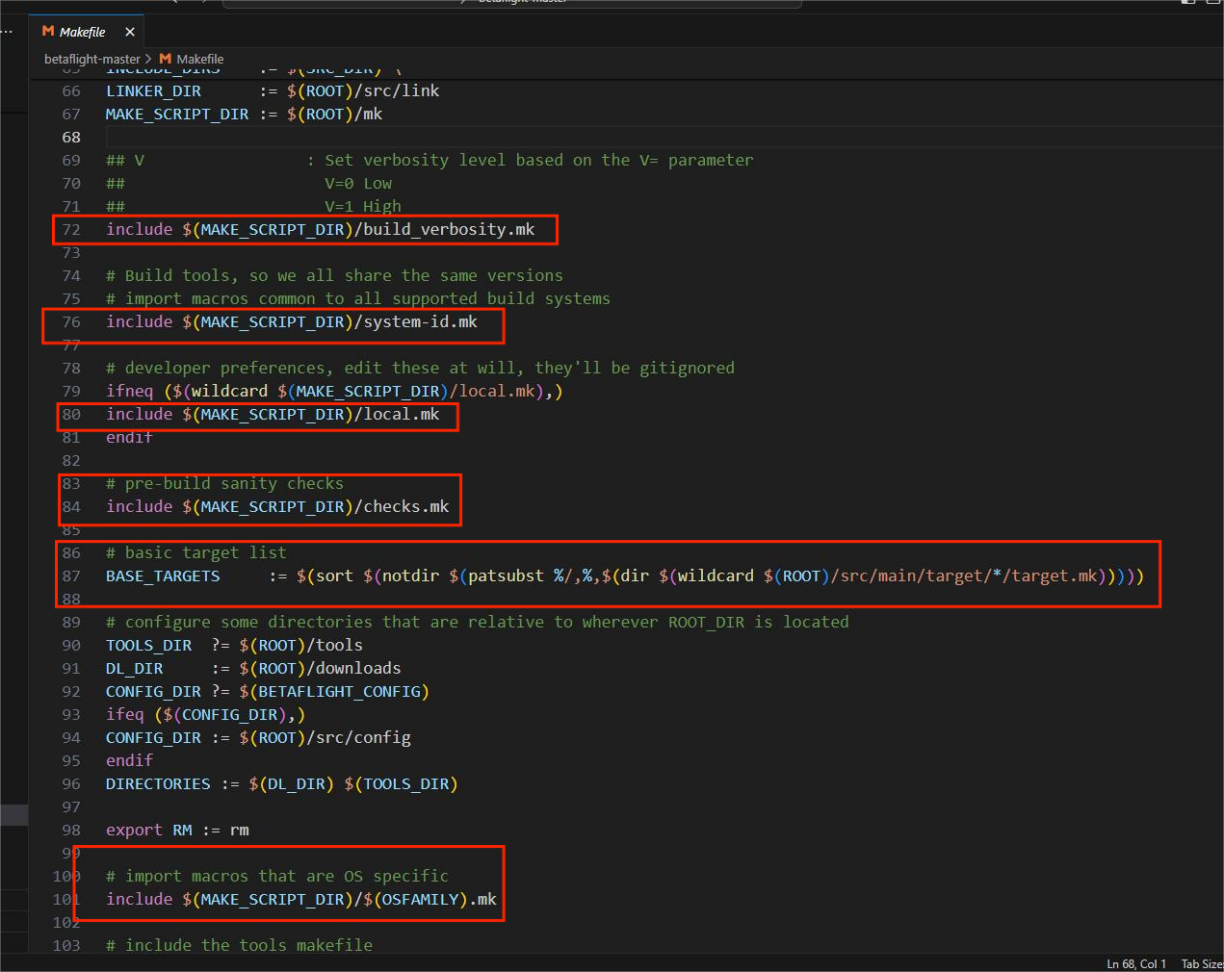
INCLUDE\_DIRS    = /src/main \

                  /src/main/target \

                  /src/main/startup

LINKER\_DIR      = /src/link

MAKE\_SCRIPT\_DIR = /mk



# 路径表示

/mk/build\_verbosity

/mk/system-id.mk

/mk/checks.mk

/mk/checks.mk

/mk/linux

# Linux

ifeq ($(UNAME), Linux)

  OSFAMILY := linux

endif

include $(MAKE\_SCRIPT\_DIR)/tools.mk

/mk/tools.mk

include $(MAKE\_SCRIPT\_DIR)/config.mk

/mk/tools.mk/config.mk

include $(ROOT)/src/main/target/$(TARGET)/target.mk

/src/main/target/STM32F405/target.mk

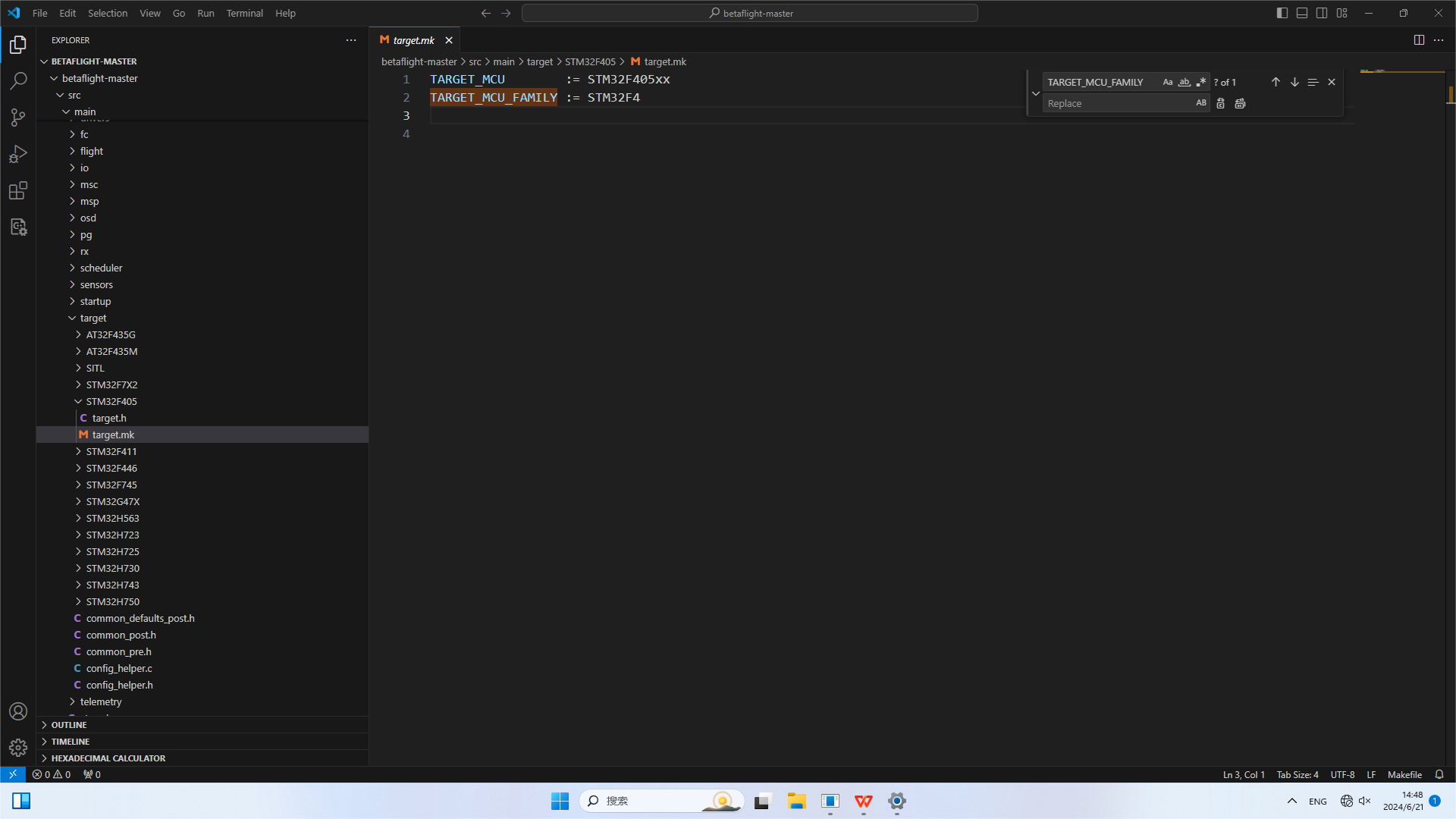
include $(MAKE\_SCRIPT\_DIR)/mcu/$(TARGET\_MCU\_FAMILY).mk

/mk/mcu/STM32F4.mk

include $(MAKE\_SCRIPT\_DIR)/openocd.mk

/mk/openocd.mk

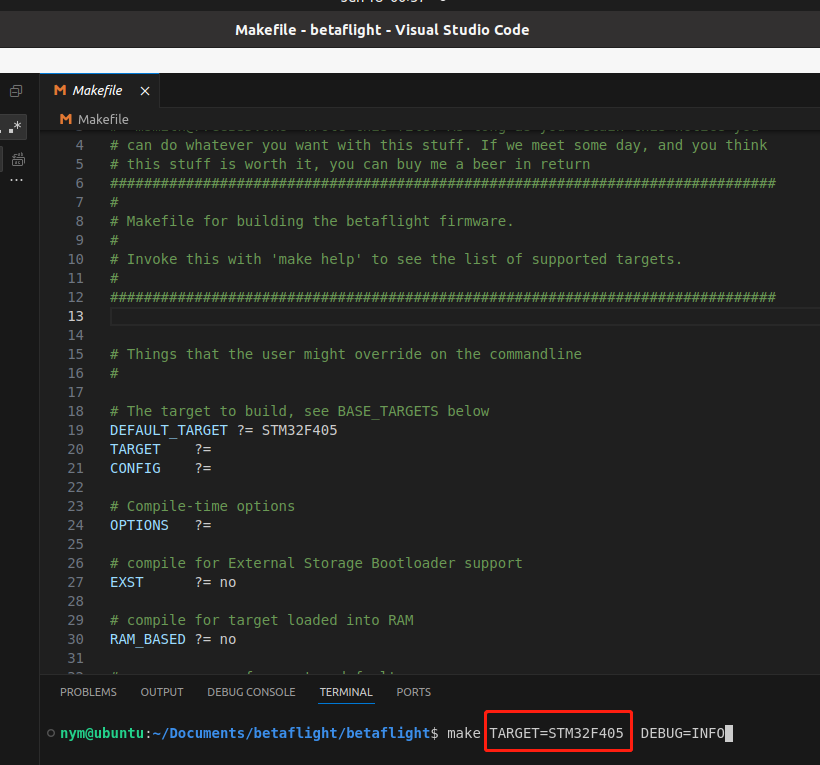
**其中**$(TARGET\_MCU\_FAMILY): 即$(TARGET\_MCU\_FAMILY)=STM32F4



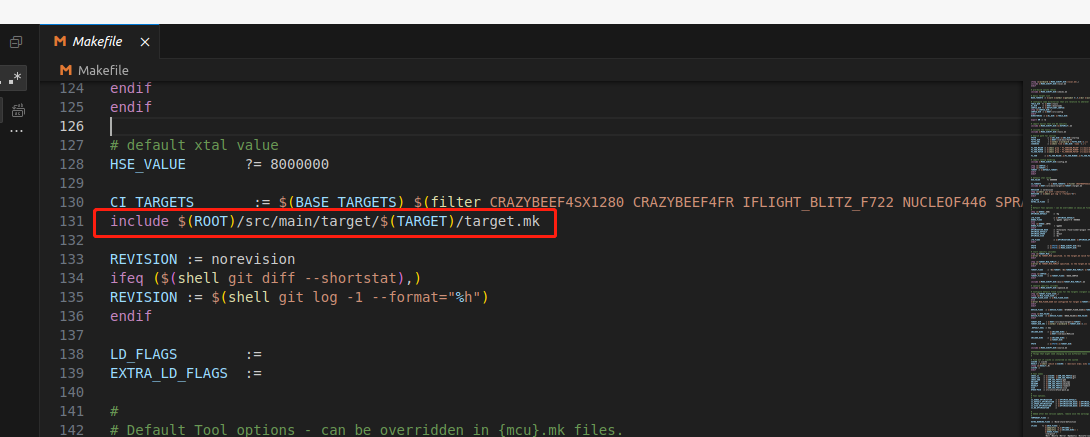
**Makefile文件命令解读**

**$**

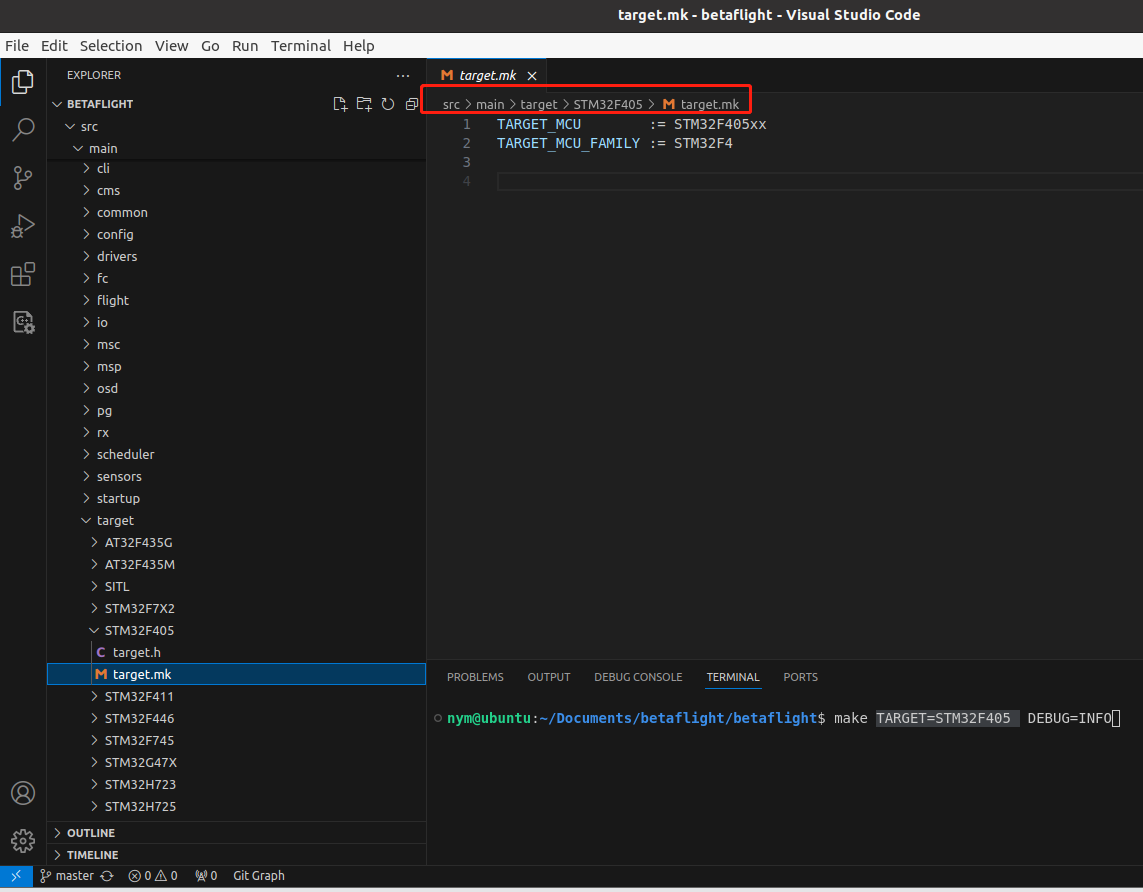
首先命令先让**TARGET**=STM32F405



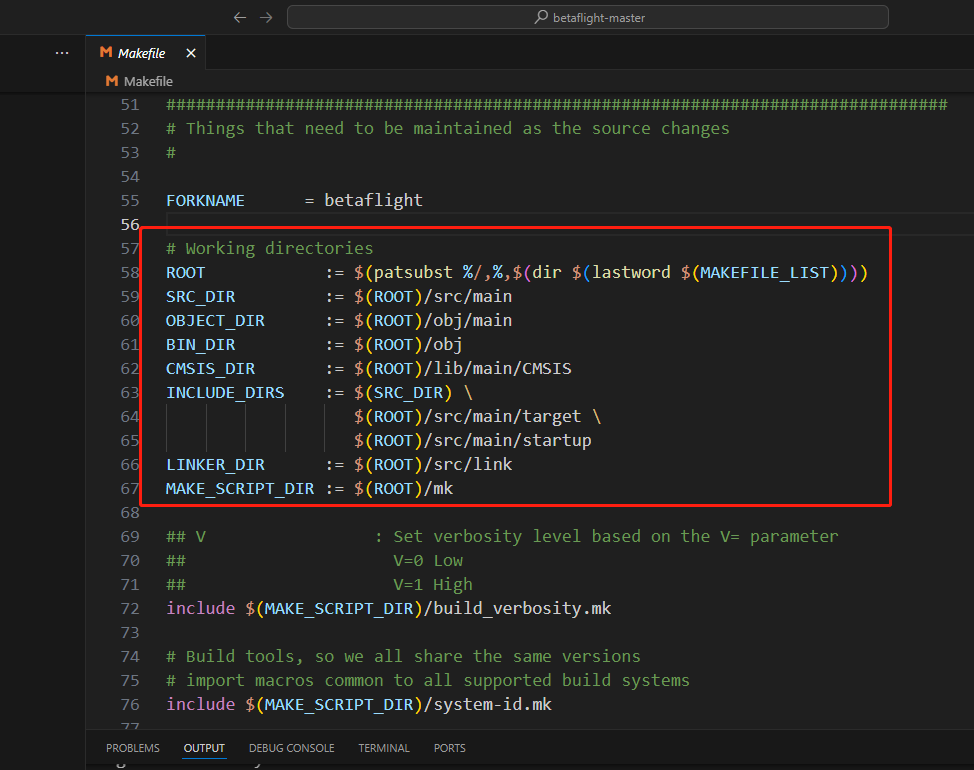
这里的$(TARGET)就等于STM32F405 了：



所以上面的命令就把路径src/main/target/STM32F405$/target.mk文件包含进来编译了；



**用各种变量名称代替路径：**



# 路径表示

ROOT            = 初始路径

SRC\_DIR         = /src/main

OBJECT\_DIR      = /obj/main

BIN\_DIR         = /obj

CMSIS\_DIR       = /lib/main/CMSIS

INCLUDE\_DIRS    = /src/main \

                  /src/main/target \

                  /src/main/startup

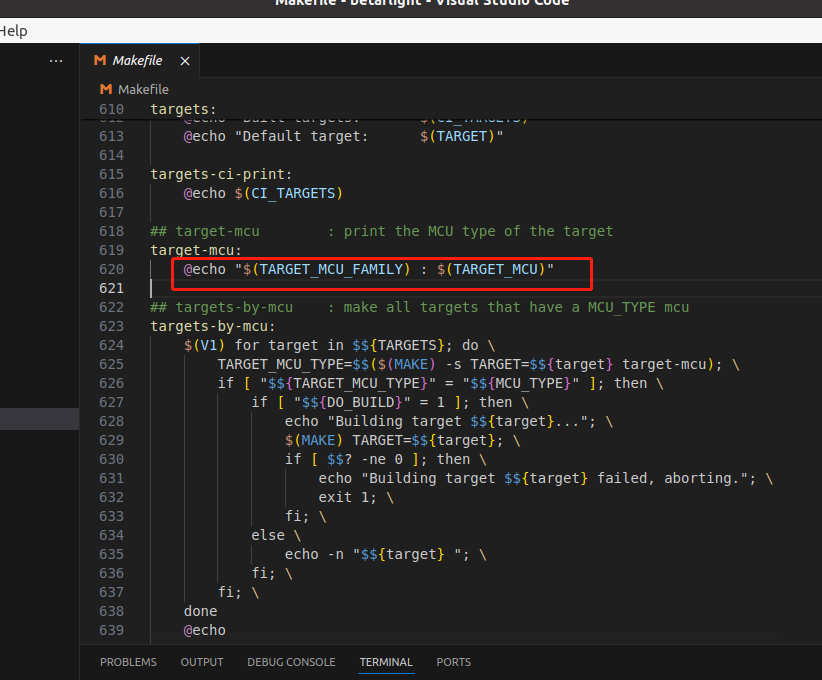
LINKER\_DIR      = /src/link

MAKE\_SCRIPT\_DIR = /mk

**@echo**

下面命令就是

target-mcu=$(TARGET\_MCU\_FAMILY) : $(TARGET\_MCU)

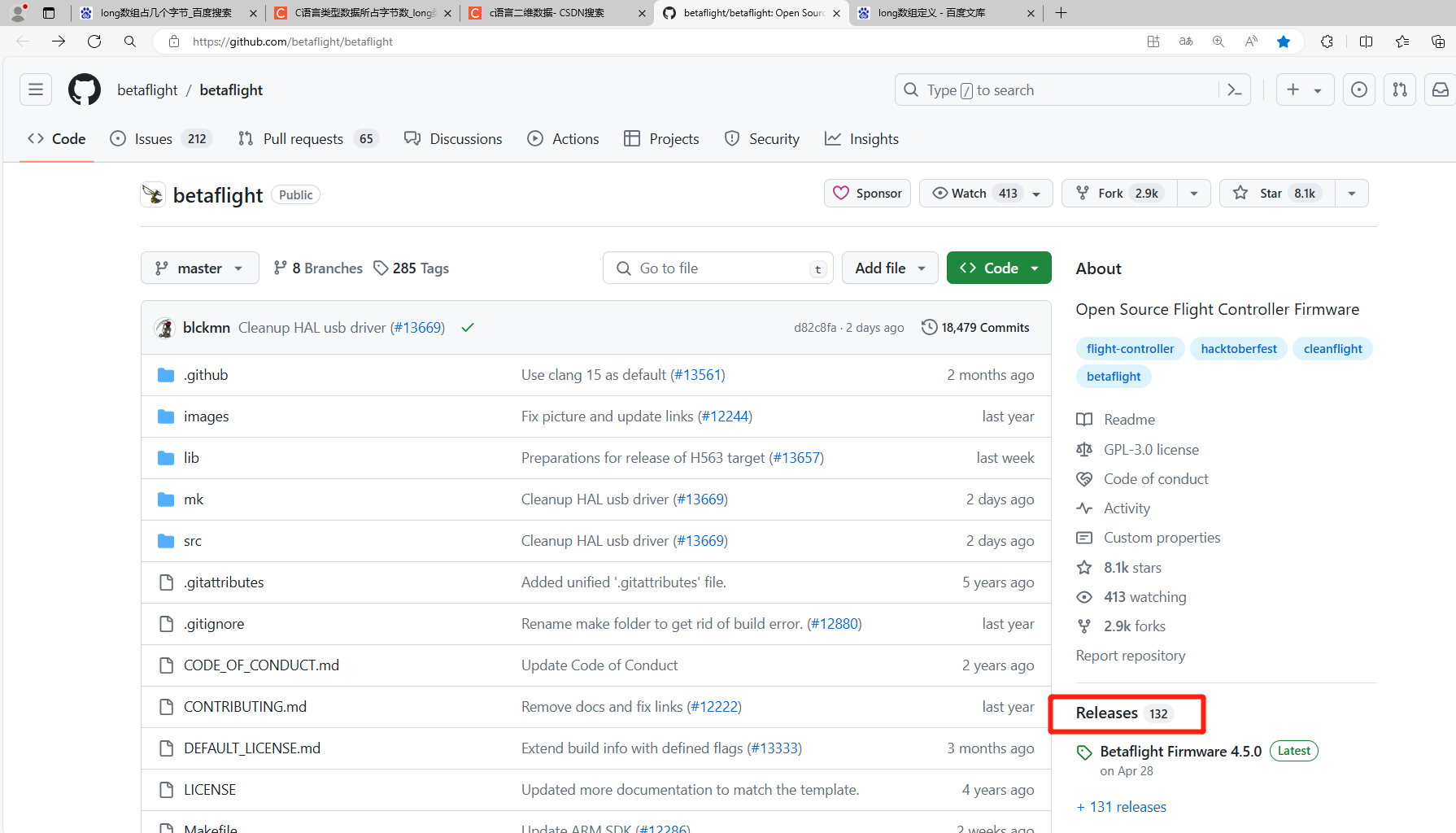


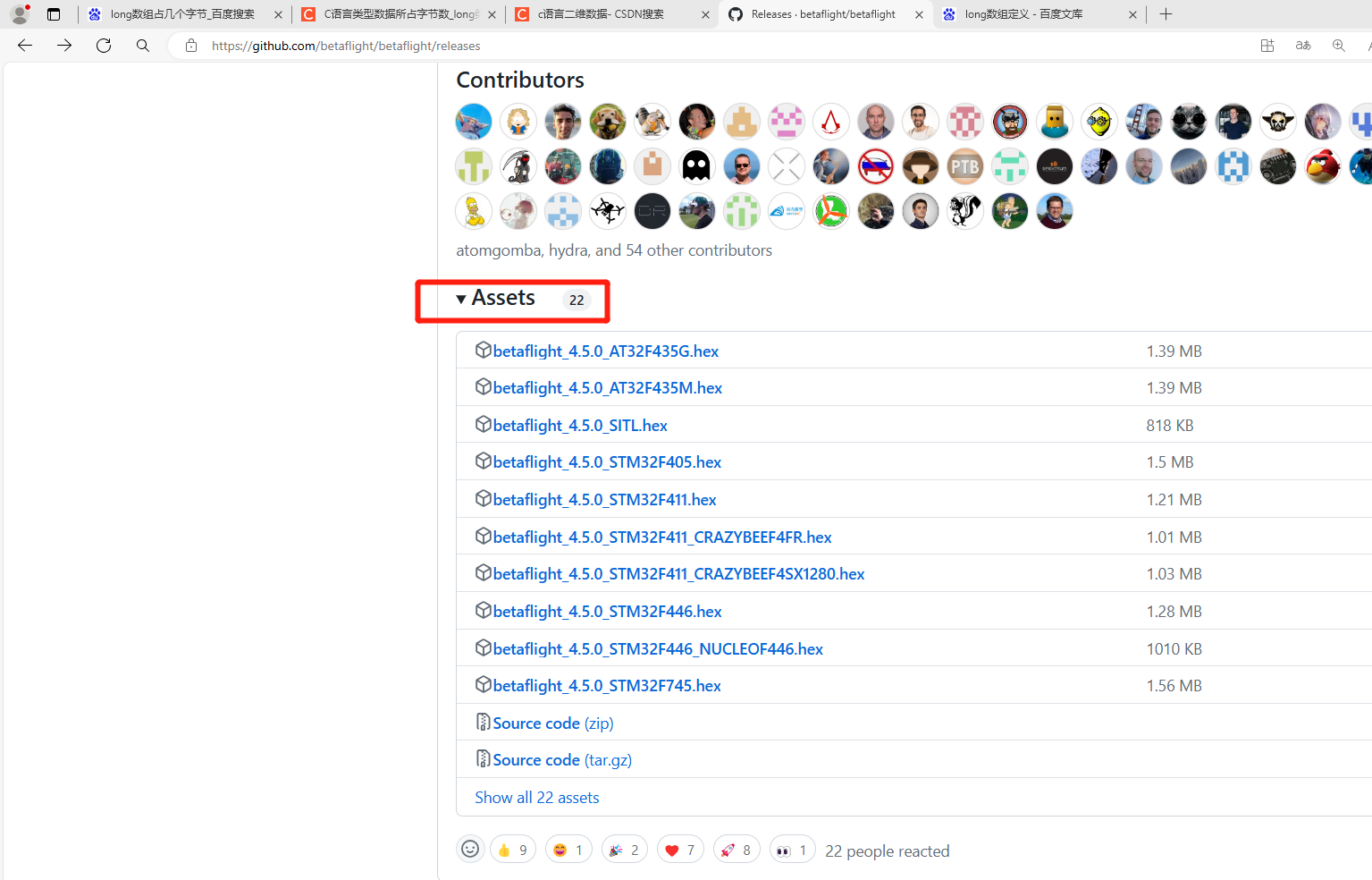


**网上发布的编译好的固件**

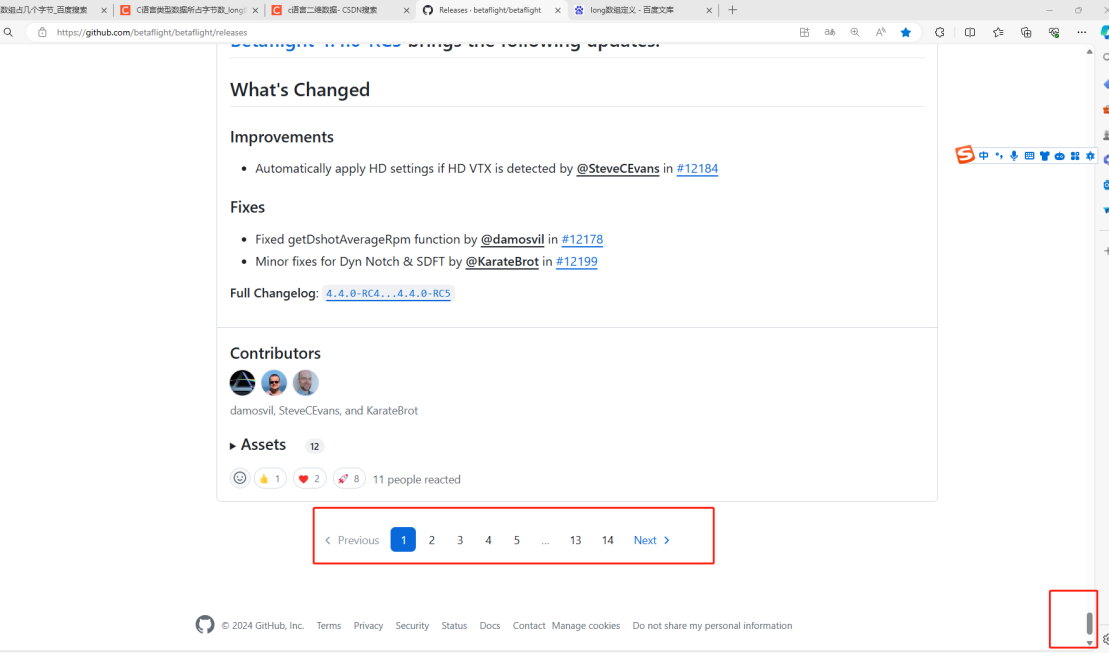
[Releases · betaflight/betaflight (github.com)](https://github.com/betaflight/betaflight/releases)

在[Releases 132](https://github.com/betaflight/betaflight/releases)



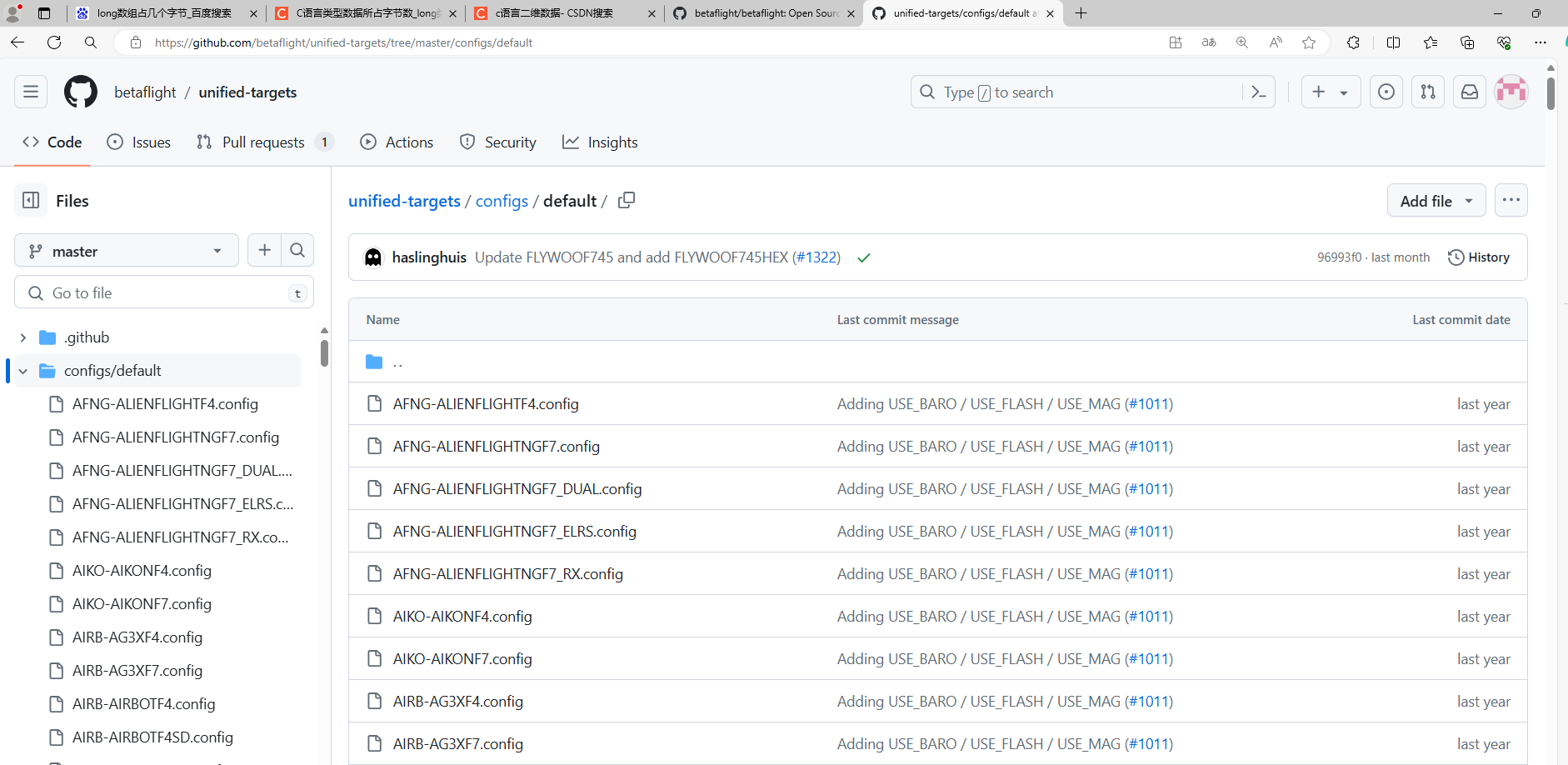


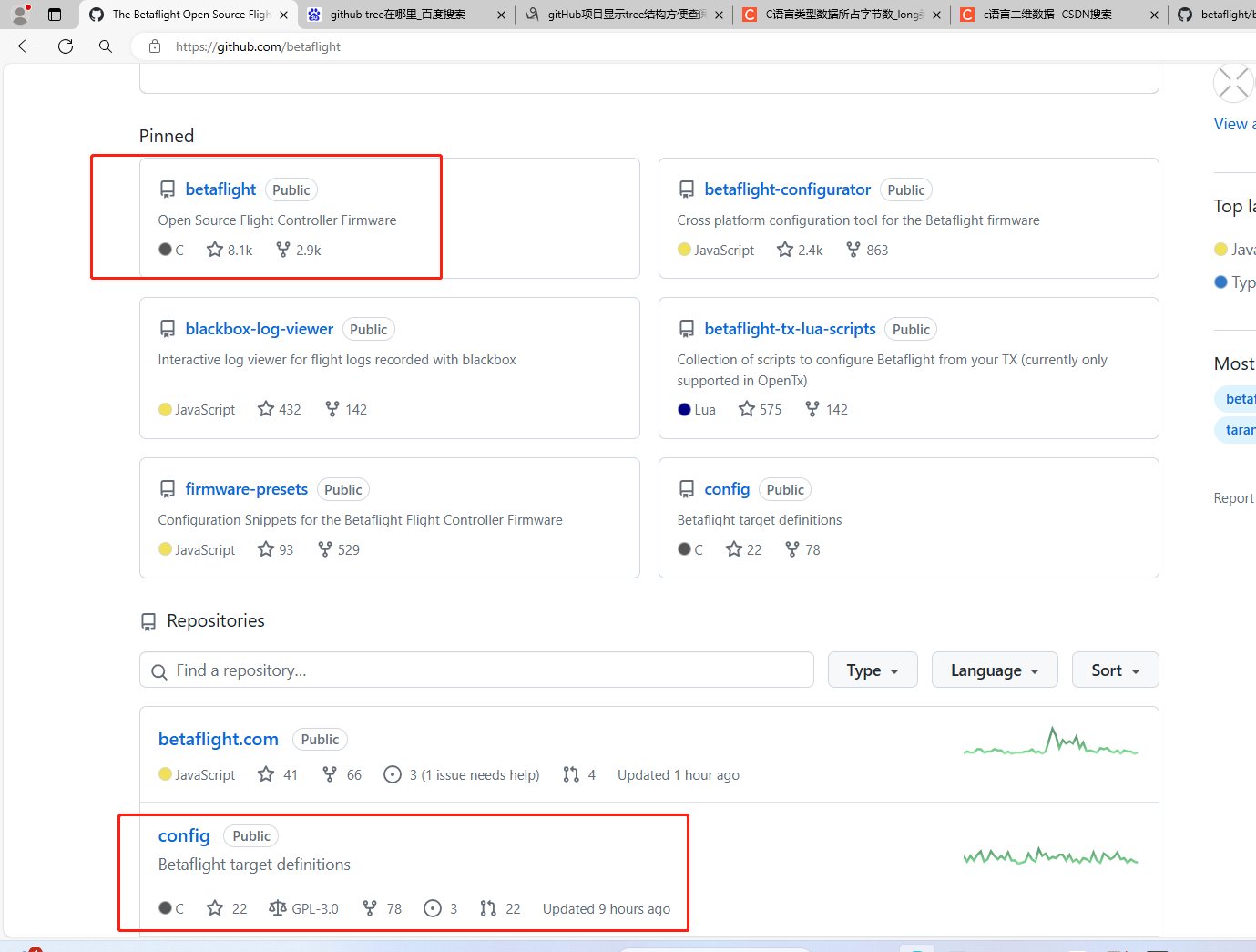
拉到最下面还有历史发布的其他版本：



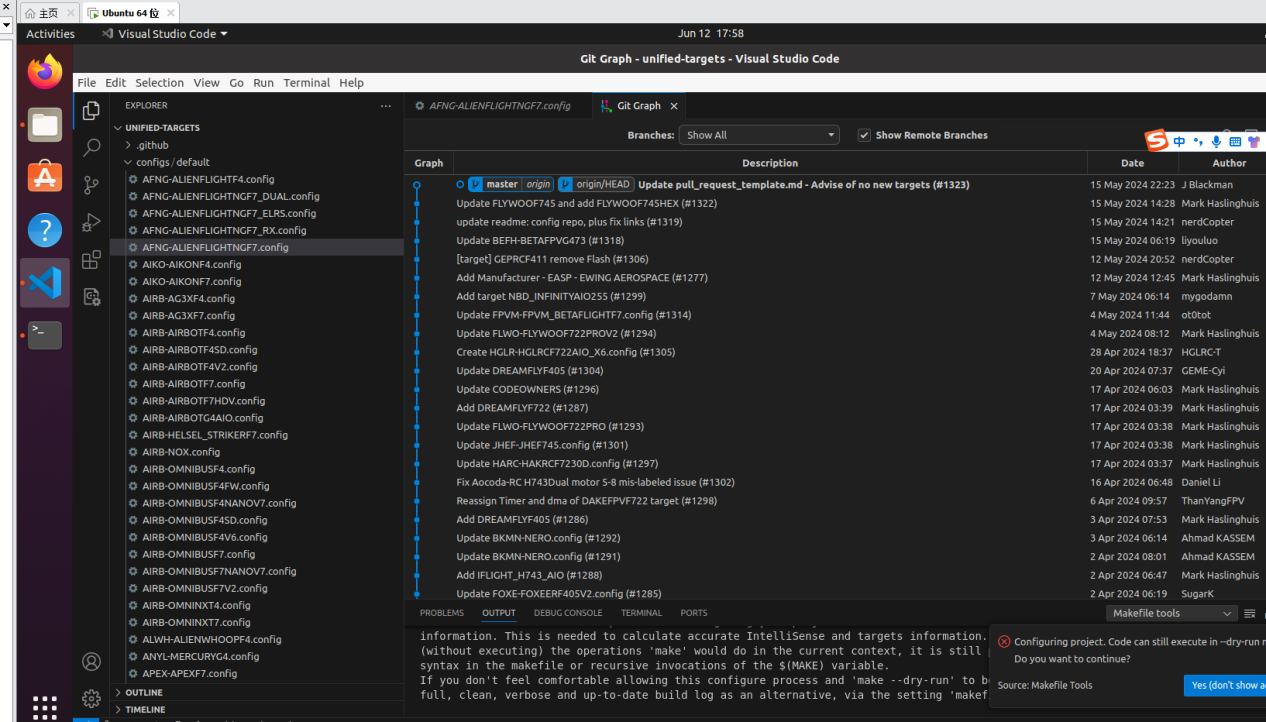
Config 配置文件

[unified-targets/configs/default at master · betaflight/unified-targets (github.com)](https://github.com/betaflight/unified-targets/tree/master/configs/default)





把它git clone下来可以看到历史版本：



安装开发环境或ubuntu遇到的问题

make arm\_sdk\_install

nym@ubuntu:~/Documents/betaflight/betaflight$ make arm\_sdk\_install

mkdir -p tools

mkdir -p downloads

/bin/sh: 1: curl: not found

make: \*\*\* [mk/tools.mk:68: downloads/arm-gnu-toolchain-13.2.rel1-x86\_64-arm-none-eabi.tar.xz?rev=e434b9ea4afc4ed7998329566b764309&hash=CA590209F5774EE1C96E6450E14A3E26] Error 127



sudo apt-get update

sudo apt-get install curl