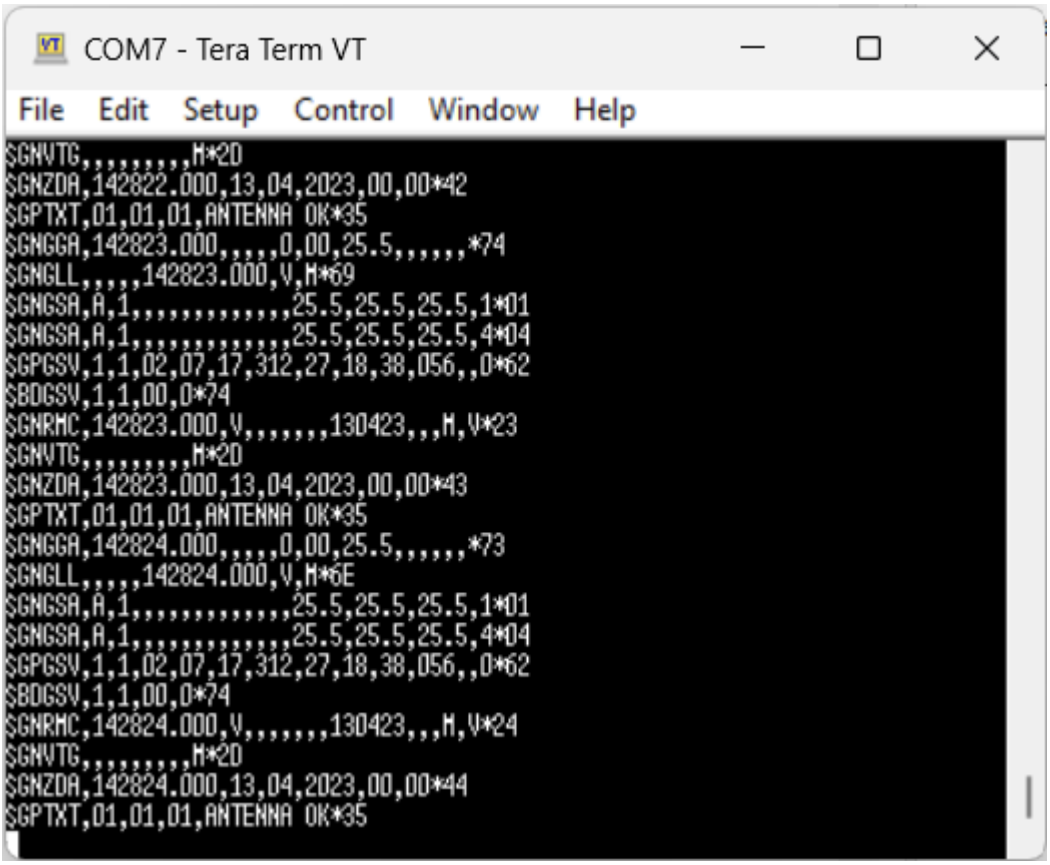
Test du module GPS sur carte STM32

Test sur la carte STM32 F7 DISCO

Pour avancer sans le matériel :

1) Envoyer un message normé la norme GPS avec le STM32.
2) Recevoir ce message avec la Pi
3) Déchiffrer et afficher ce message

Norme de communication utilisée par le GPS : NMEA0183 → NMEA 0183 - Wikipedia
Nom du module : ATGM336H-5N → ATGM336H-5N
Baud rate from GPS to STM32 : 9600
Baud rate from STM32 to computer : 115200
Power : 5V

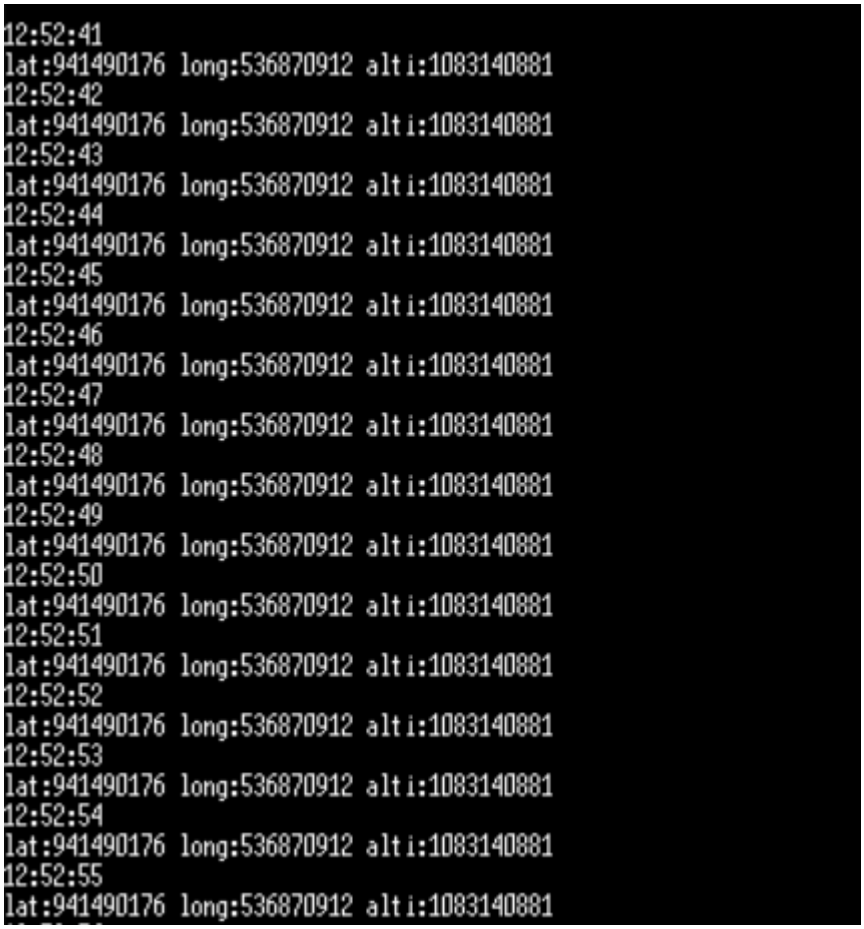


In order to configure the STM32F746NG, we checked the user manual to see where are the RX and TX pins for UART.

	TIM3_CH1	PB4	D3	4	CN4 digital
	-	PG6	D2	3	
	USART6_TX	PC6	D1	2	
	USART6_RX	PC7	D0	1	

Above, we can see that we use the PC6 and PC7 pins. Don't forget to cross the RX and TX wires !
Let's try to decode the output of the GPS. First I'll extract the most useful informations out of a diaporama found on the internet.

First test of teacher's code :



Problem : i don't know the signification of those numbers.
Note that latitude and longitude are both 9-digit numbers while altitude is a 10-digit number.
According to the afore mentionned diaporama :

GGA Sentence Format

$GPGGA,092204.999,4250.5589,S,14718.5084,E,1,04,24.4,19.7,M,,,,0000*1F

Field	Example	Comments
Sentence ID	$GPGGA	
UTC Time	092204.999	hhmmss.sss
Latitude	4250.5589	ddmm.mmmm
N/S Indicator	S	N = North, S = South
Longitude	14718.5084	dddmm.mmmm
E/W Indicator	E	E = East, W = West
Position Fix	1	0 = Invalid, 1 = Valid SPS, 2 = Valid DGPS, 3 = Valid PPS
Satellites Used	04	Satellites being used (0-12)
HDOP	24.4	Horizontal dilution of precision
Altitude	19.7	Altitude (WGS-84 ellipsoid)
Altitude Units	M	M= Meters
Geoid Separation		Geoid separation (WGS-84 ellipsoid)
Seperation Units		M= Meters
Time since DGPS		in seconds
DGPS Station ID		
Checksum	*1F	always begin with *

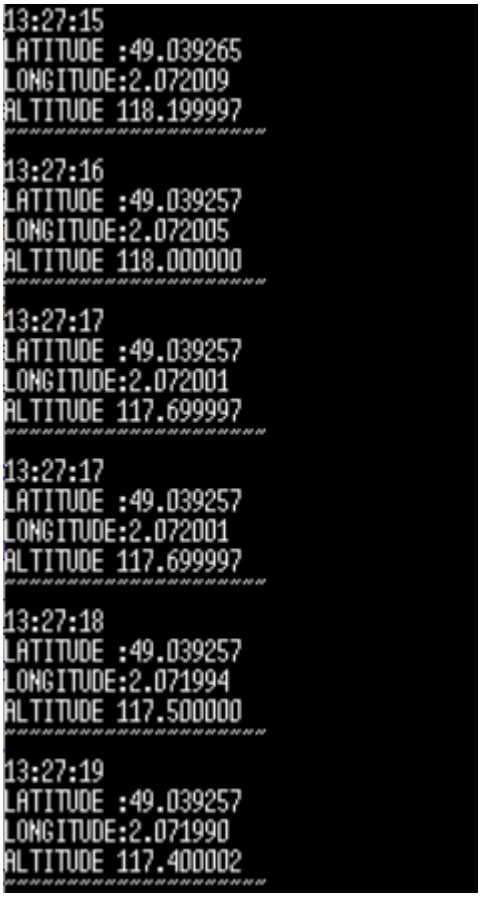
We can see that latitude and longitude are in the format dddmm.mmmm.
dd means degrees
mm.mmm means minutes

Below the structure implemented to parse data from the gps :

```
typedef struct
{
  gnss_valid_t    valid;
  uint8_t         satellite;
  uint8_t         time_h;
  uint8_t         time_m;
  uint8_t         time_s;
  uint8_t         date_y;
  uint8_t         date_m;
  uint8_t         date_d;
  float           latitude_tmp;
  float           longitude_tmp;
  float           latitude_deg;
  float           longitude_deg;
  float           precision_m;
  float           altitude_m;
  float           speed_knots;
  float           course_deg;

} gnss_t;
```

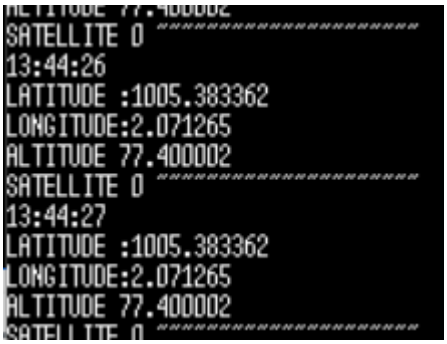
After being outside for quite some time, the gps signal was found :



It corresponds to the localization of Cergy :

Latitude de Cergy	49.035617
Longitude de Cergy	2.060325

The altitude is also in the expected range (min 20m max 130m).



The function that is supposed to tell us the satellite number does not seem to work.

Test sur la carte STM32 Nucleo

Les pins RX et TX pins sur la STM32 Nucleo sont :

PA2	I/O	FT_a	-	TIM2_CH3, USART2_TX, LPUART1_TX, QUADSPI_BK1_NCS, TIM15_CH1, EVENTOUT
PA3	I/O	TT_a	-	TIM2_CH4, USART2_RX, LPUART1_RX, QUADSPI_CLK, TIM15_CH2, EVENTOUT

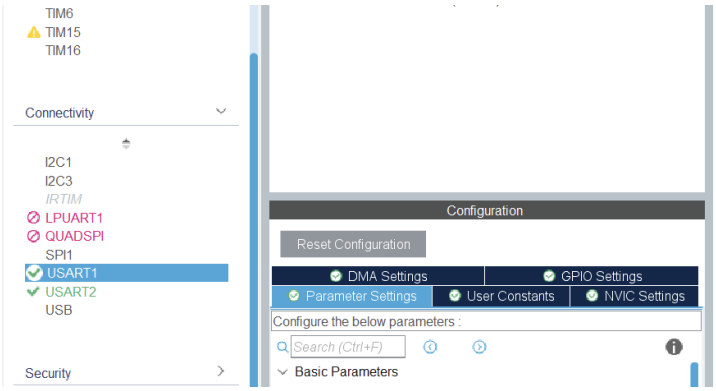
Donc les pins RX et TX sont :

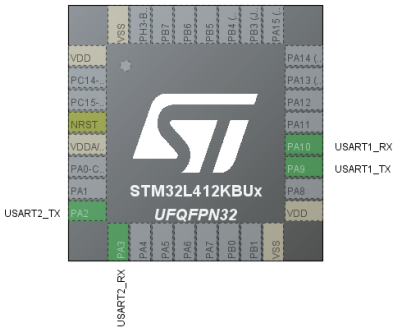
- TX = PA2 = 10ème pin de CN4
- RX = PA3 = 9ème pin de CN4

Les pins 5V et GND sont :

- 5V = 4ème pin de CN4
- GND = 2ème pin de CN4

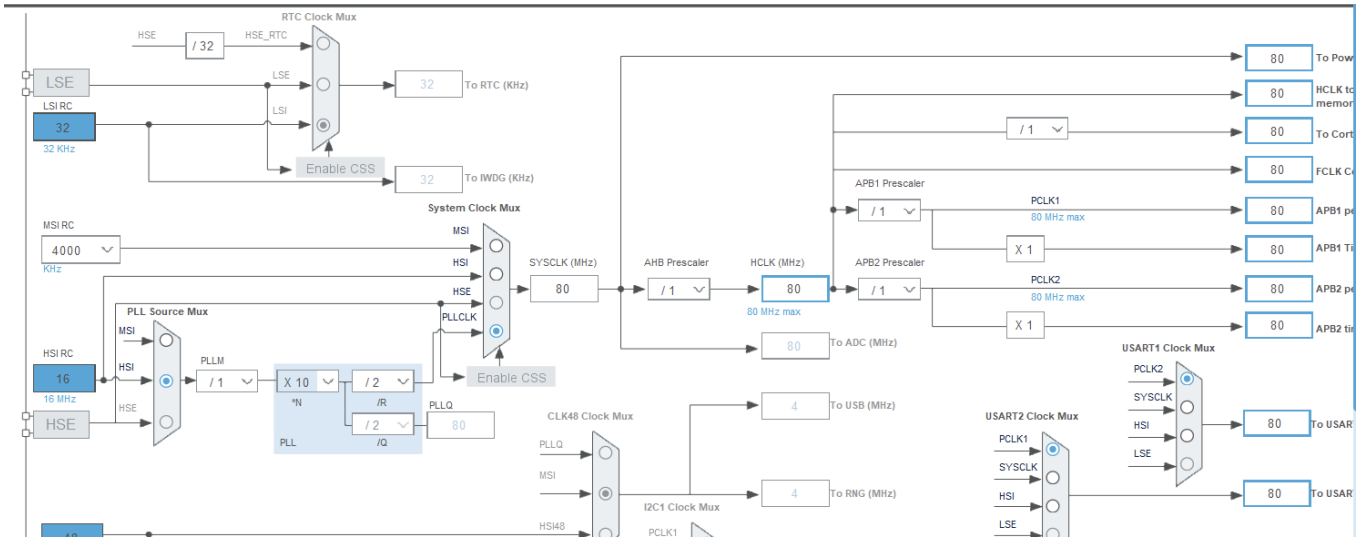
On peut aussi le voir sur le .ioc :





On va utiliser l'usart1 pour communiquer avec le PC.

Voici comment on définit la fréquence de l'horloge :


RTC Clock Mux
HSE
/ 32
HSE_RTC
LSE
LSI RC
32
32 KHz
LSE
LSI
32
To RTC (KHz)
Enable CSS
32
To IWDG (KHz)
System Clock Mux
MSI RC
4000
KHz
MSI
HSI
HSE
PLLCLK
SYSCLK (MHz)
80
AHB Prescaler
/ 1
HCLK (MHz)
80
80 MHz max
APB1 Prescaler
/ 1
PCLK1
80 MHz max
X 1
APB2 Prescaler
/ 1
PCLK2
80 MHz max
X 1
80
To ADC (MHz)
PLL Source Mux
MSI
HSI
HSE
HSI RC
16
16 MHz
HSE
PLLM
/ 1
X 10
*N
/ 2
/R
/ 2
/Q
PLL
PLLQ
80
Enable CSS
CLK48 Clock Mux
PLLQ
MSI
HSI48
4
To USB (MHz)
4
To RNG (MHz)
I2C1 Clock Mux
PCLK1
USART1 Clock Mux
PCLK2
SYSCLK
HSI
LSE
USART2 Clock Mux
PCLK1
SYSCLK
HSI
LSE
80
80
80
80
80
80
80
80
80
80
80
To Pow
HCLK to
memor
To Cort
FCLK C
APB1 pe
APB1 Ti
APB2 pe
APB2 ti
To USAR
To USAR