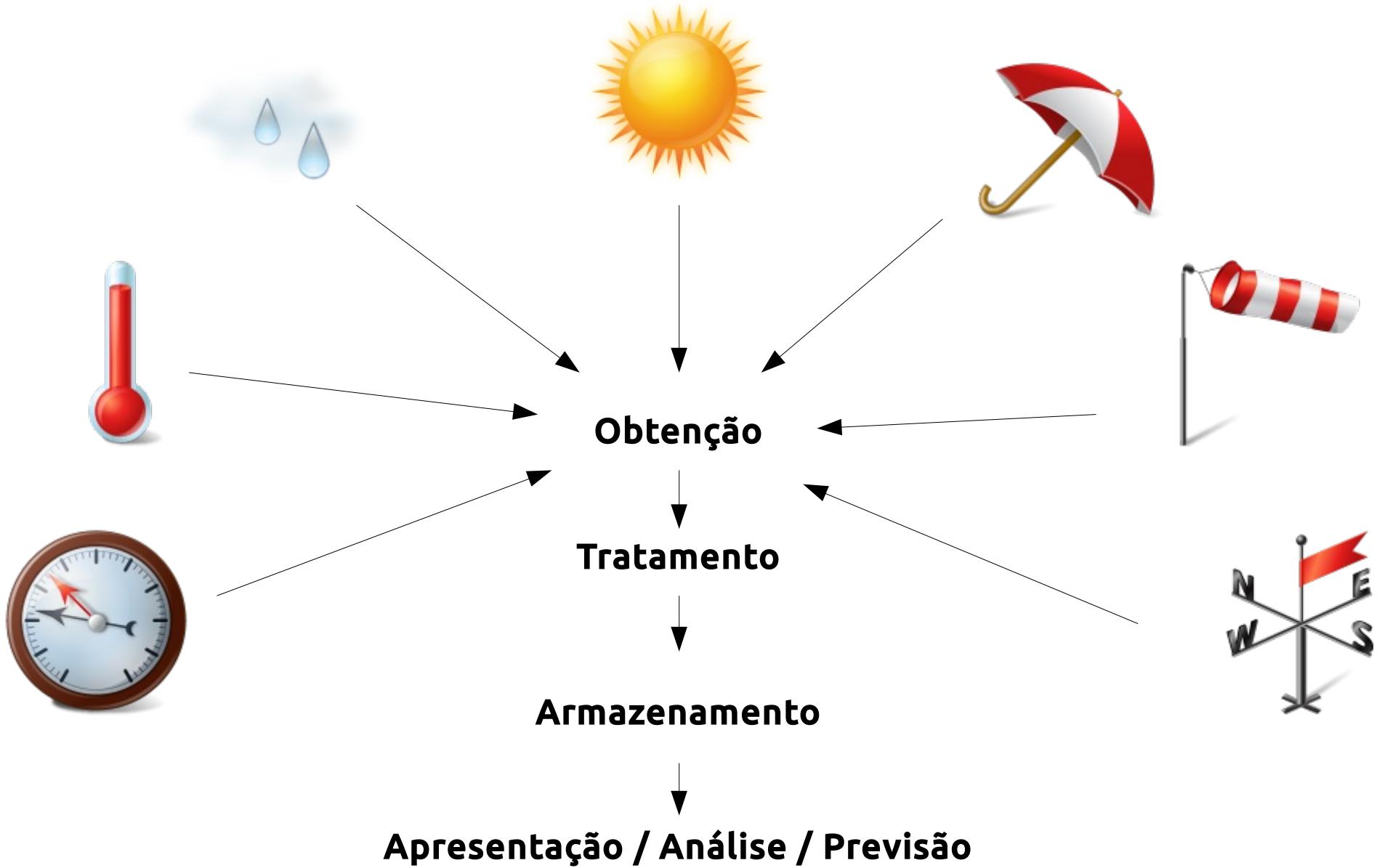


# **Rede de Estações Meteorológicas usando Arduino**

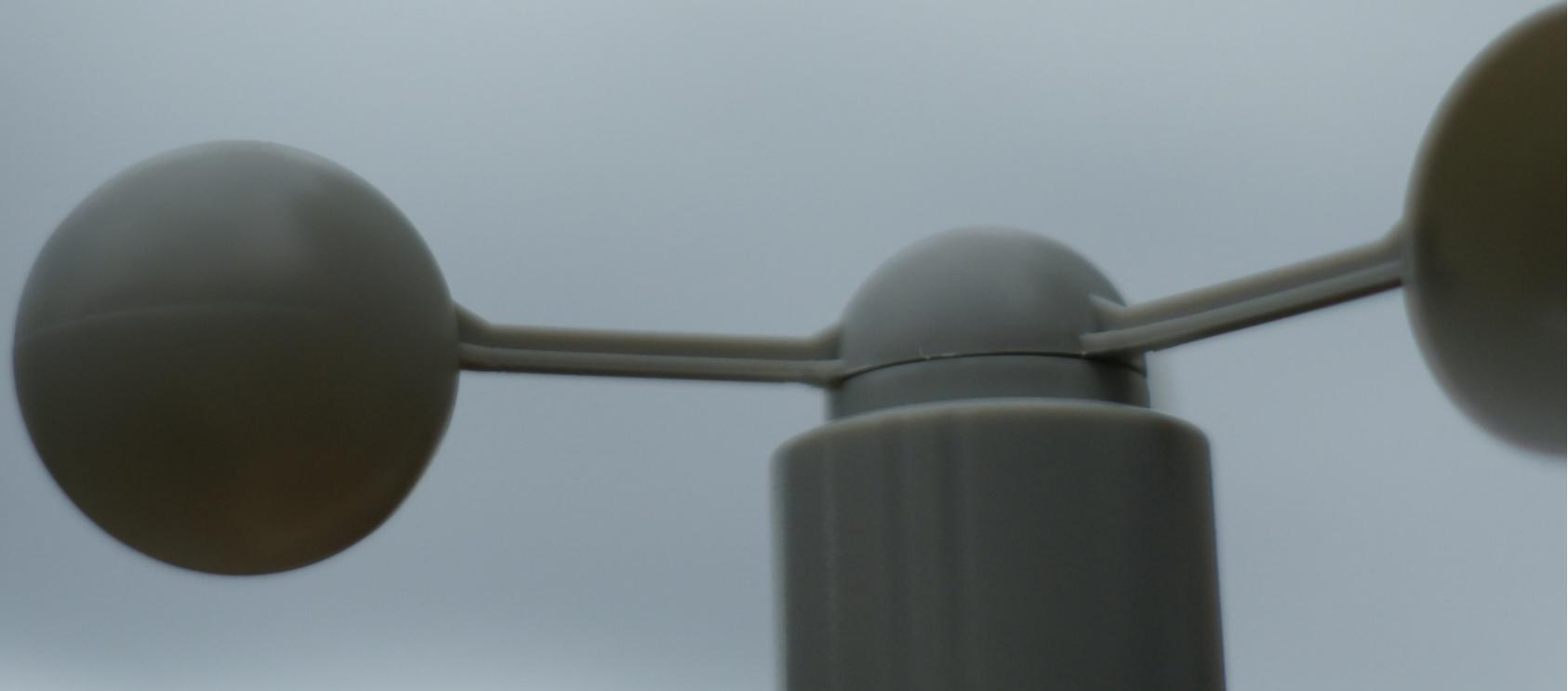
**Saulo Matté Madalozzo**  
**Orientador: Alexandre Adário**

**2013 - Ciência da Computação - URI Erechim**

# Estação Meteorológica



# **Sistemas existentes**



# INMET

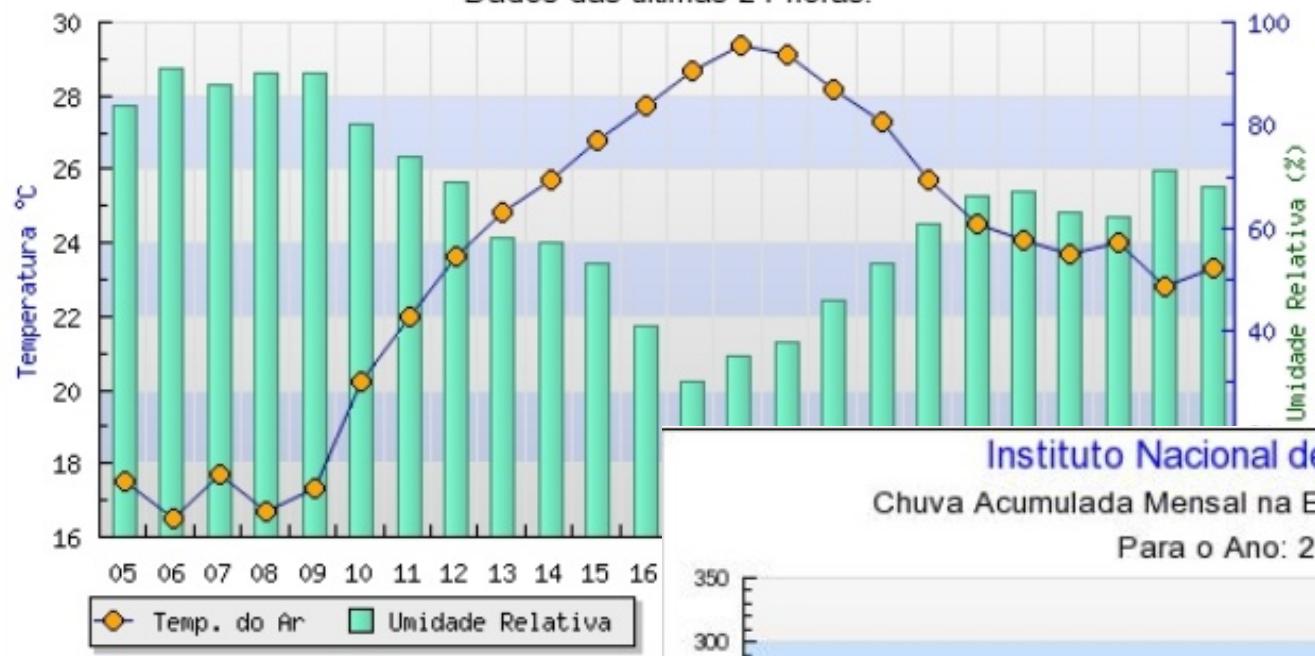


Fonte: [inmet.gov.br](http://inmet.gov.br)

# Instituto Nacional de Meteorologia - INMET

Temperaturas e Umid. Relativa do Ar na Estação Automática: ERECHIM (RS)

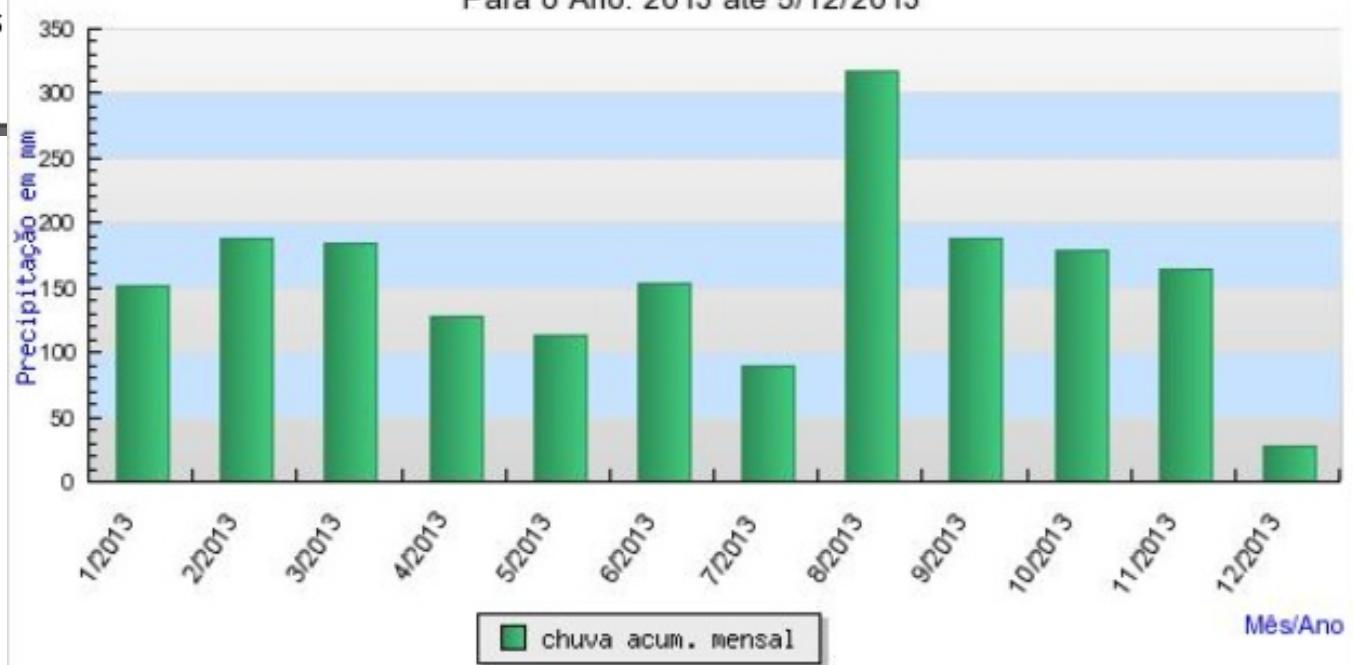
Dados das últimas 24 horas.



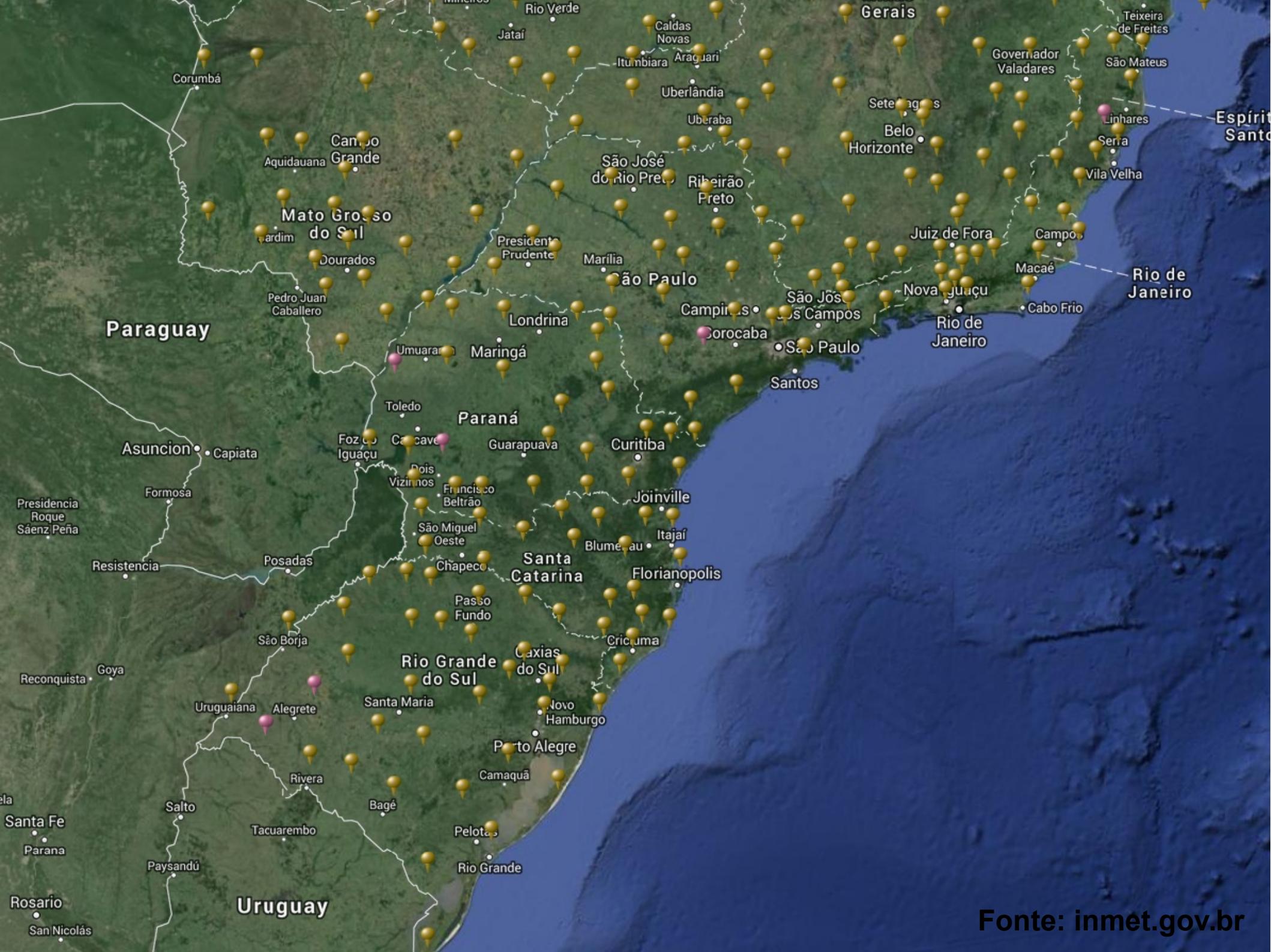
# Instituto Nacional de Meteorologia - INMET

Chuva Acumulada Mensal na Estação Automática: ERECHIM (RS)

Para o Ano: 2013 até 5/12/2013



Fonte: [inmet.gov.br](http://inmet.gov.br)



Fonte: [inmet.gov.br](http://inmet.gov.br)

# RBS



Fonte: [davisnet.com](http://davisnet.com)

# Erechim

Estação Meteorológica atualizada em **05/12/2013 02:00**. Dados acumulados a partir das oh.

Temperatura atual

**22.1°C**

 Confira a previsão do tempo em Erechim

Sensação Térmica

**22.1°C**

Índice de calor

**22.1°C**

Máxima do dia

**↑ 23.9°C**

às 00:00

Mínima do dia

**↓ 22.1°C**

às 02:00

Vento



Amanhecer: 06h29m

Pôr do sol: 20h10m

18.8°C

Ponto de orvalho:

Velocidade  
0.0Km/h

Precipitação

Hoje: 0.0 mm

Umidade

Atual: 82%  
Máx: 82%  
Mín: 70%

Pressão

Atual: 998.7 mBar  
Máx: 999.5 mBar  
Mín: 998.6 mBar

Máxima rajada do dia

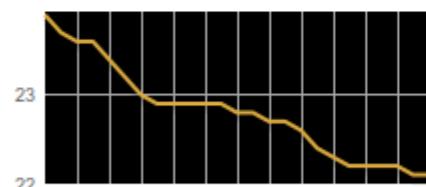
12.9 Km/h às 00:50

Fase da Lua

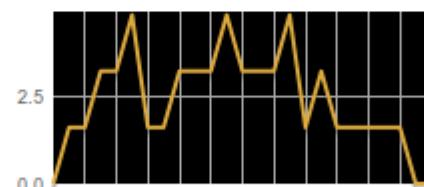


Lua Nova

Temperatura (°C)



Velocidade média do vento (km/h)



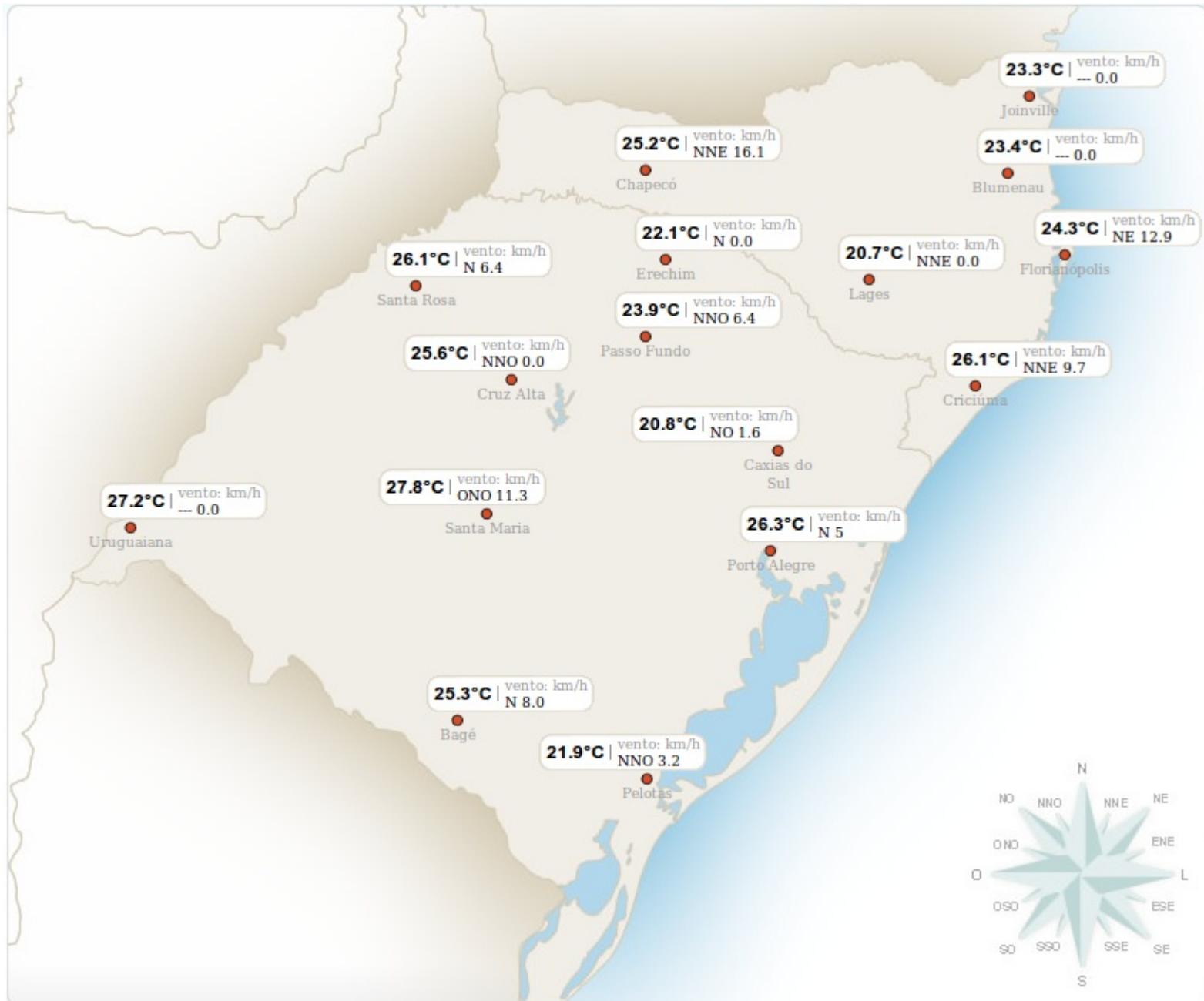
Passe o mouse na linha laranja para ver os dados do gráfico.

Localização da estação

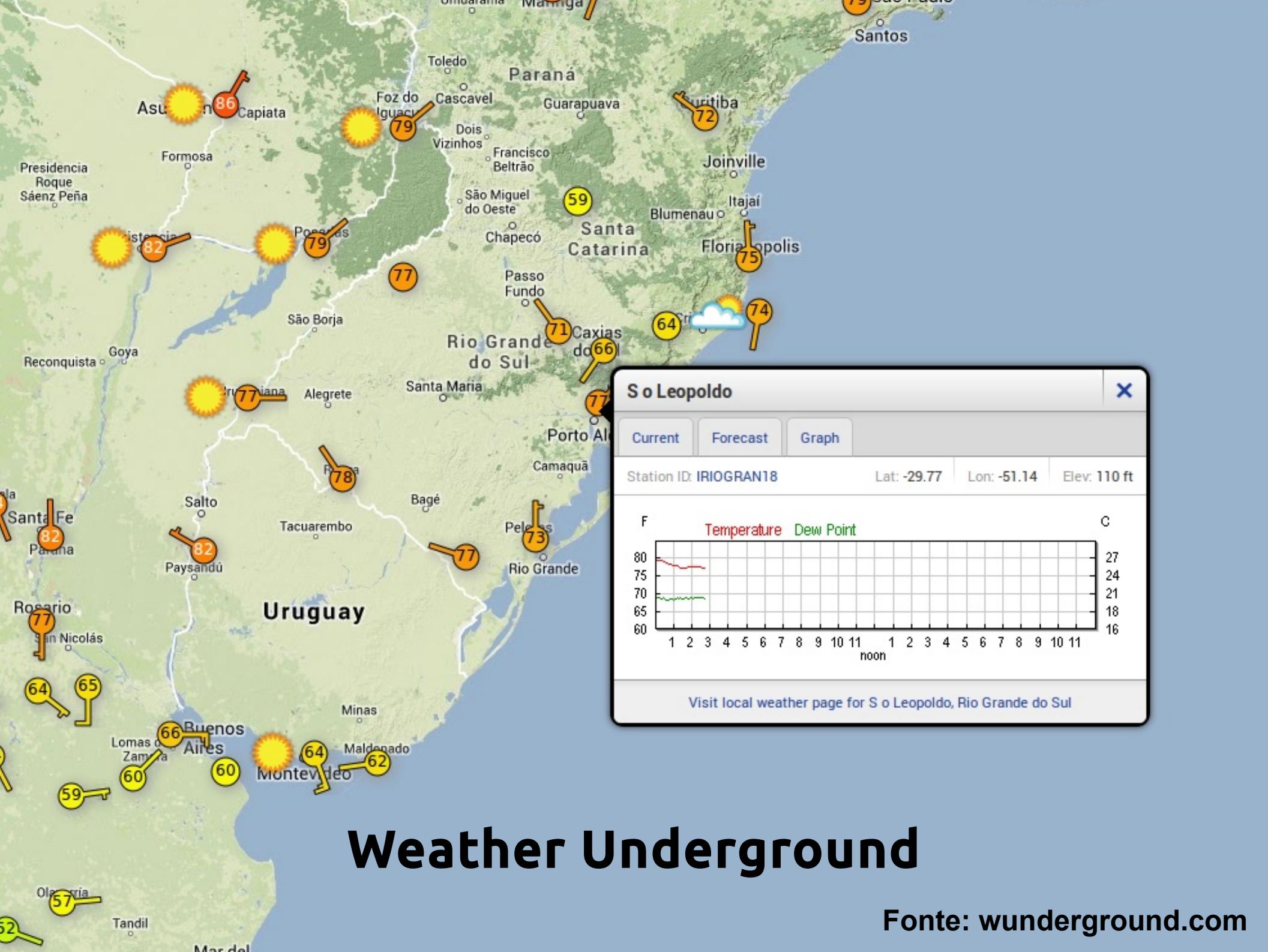
Rua Soledade, 277, Centro, Erechim, RS  
Latitude: -27° 38' 03" | Longitude: -52° 16' 26"

[Veja aqui a foto da estação](#)

Fonte: [clicrbs.com.br](http://clicrbs.com.br)



Fonte: [clicrbs.com.br](http://clicrbs.com.br)



# Arduino



**Open Source**  
**Multiplataforma**  
**Hardware barato**  
**Placas de expansão**  
**USB**



# Arduino Uno

16 MHz

32 KB Flash

2 KB RAM

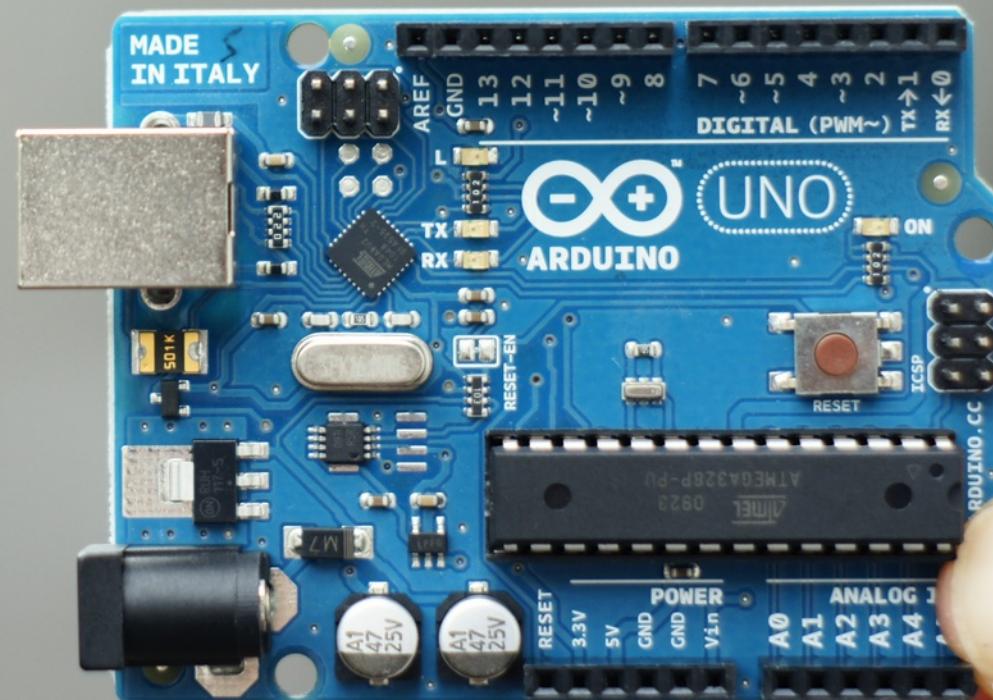
1 KB ROM

14 I/O

6 PWM

6 Entradas

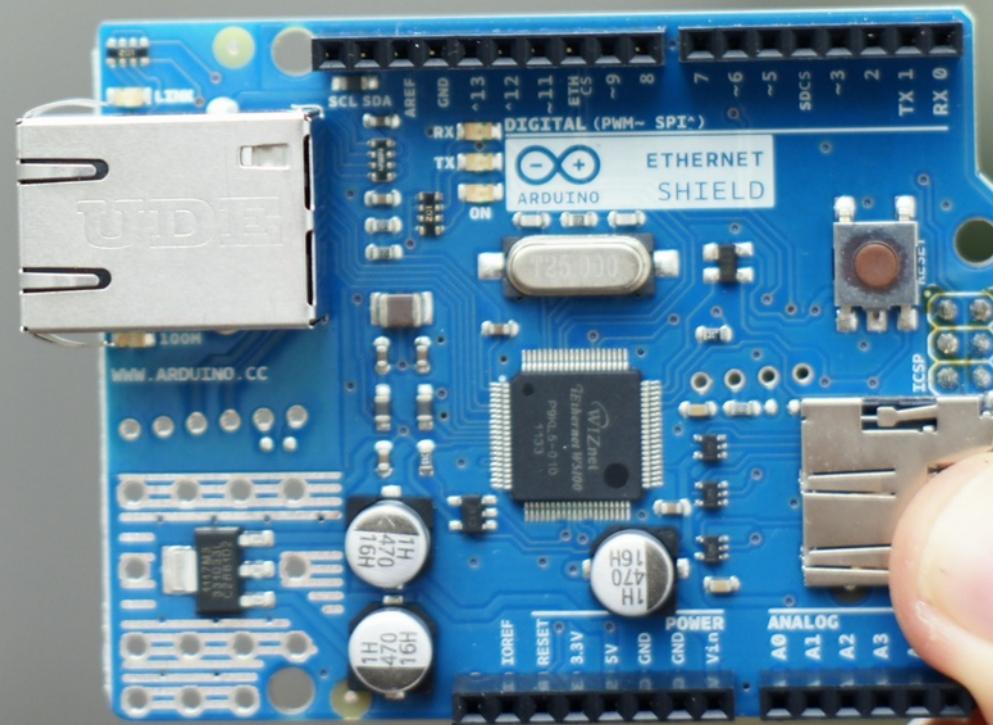
analógicas



# Ethernet Shield

10/100 Mb/s

Cartão Micro-SD



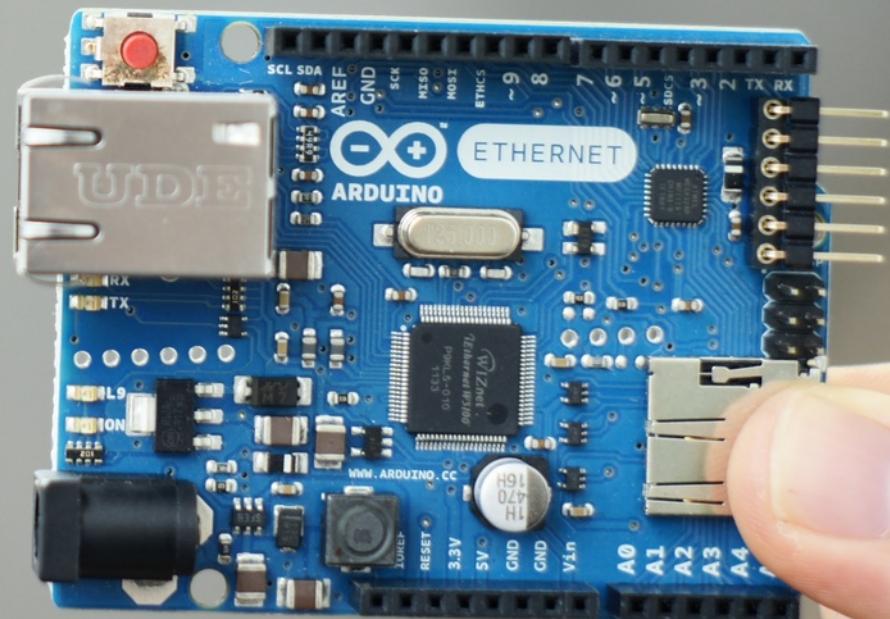
# Arduino Ethernet

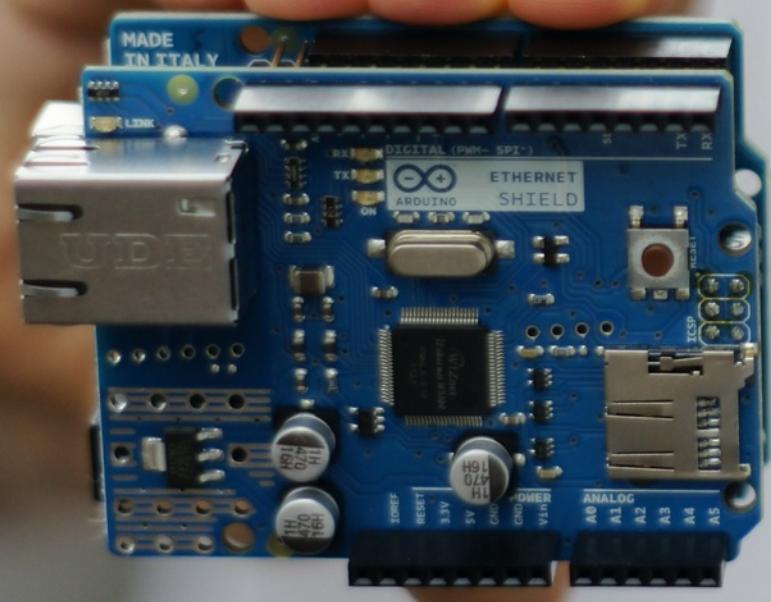


# Arduino Ethernet

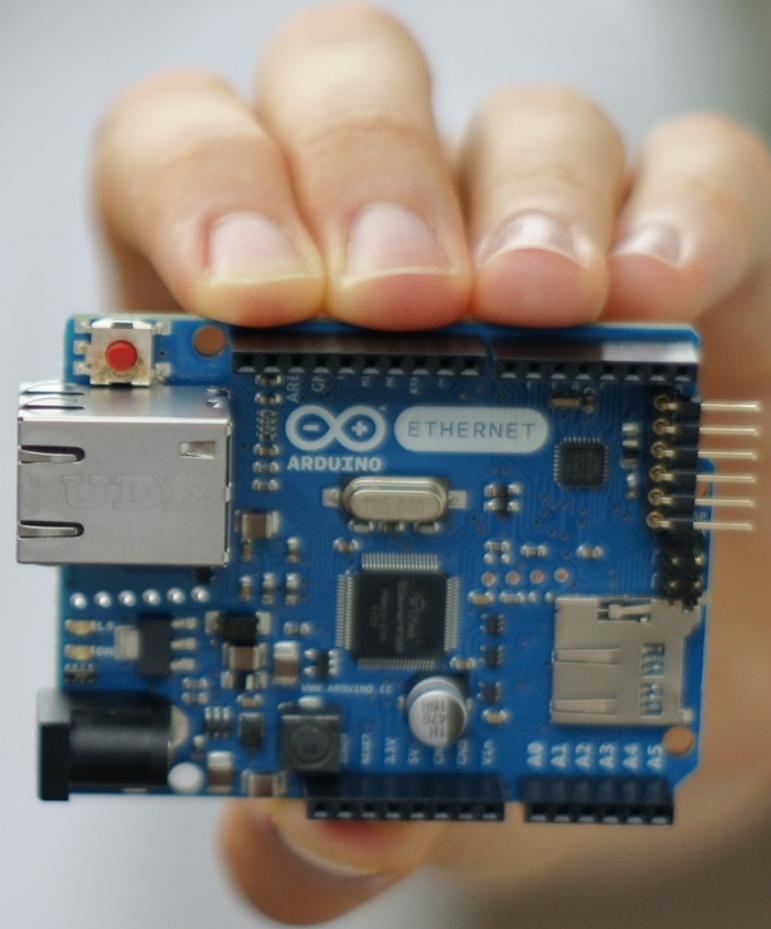
Arduino Uno +  
Ethernet Shield

Precisa FTDI



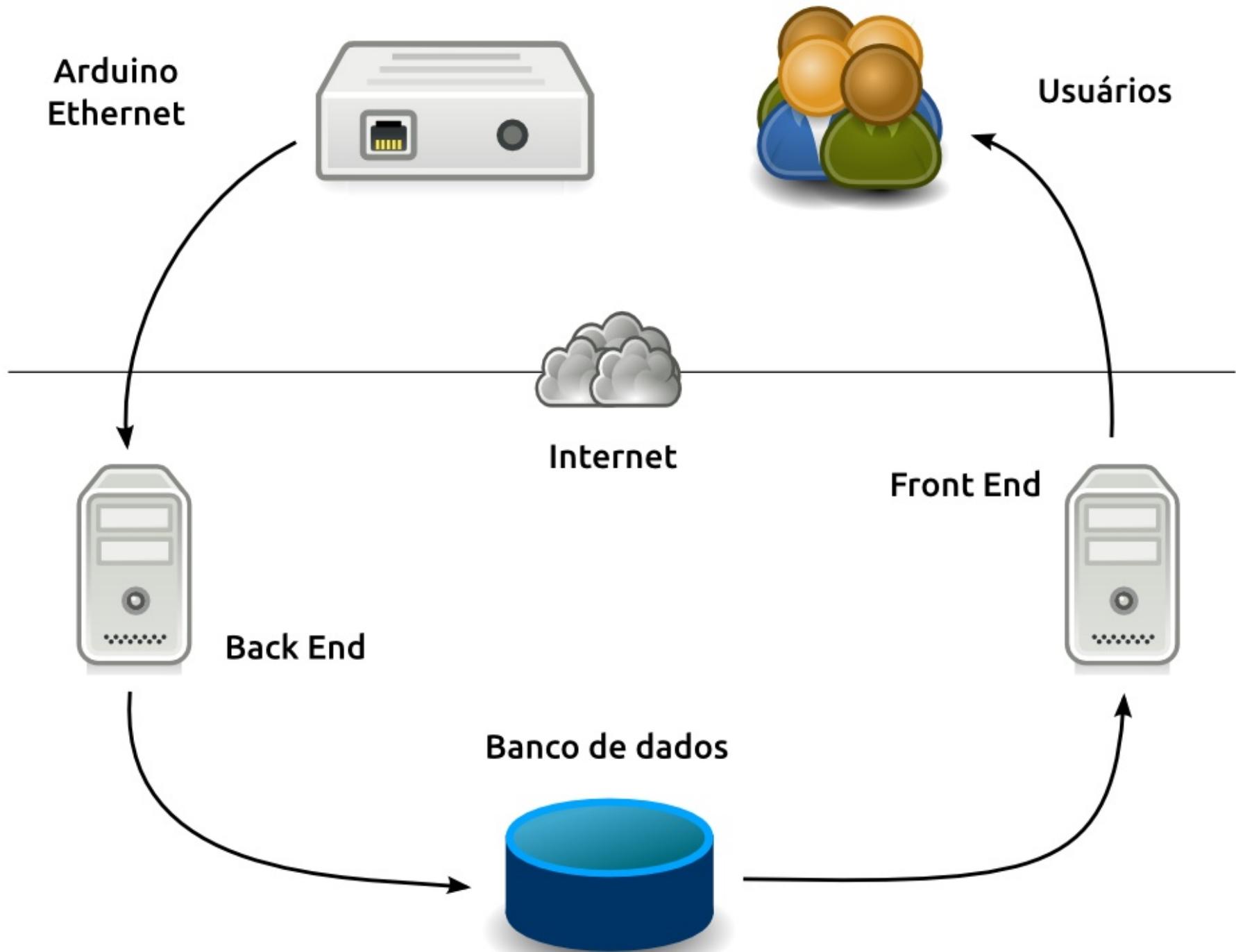


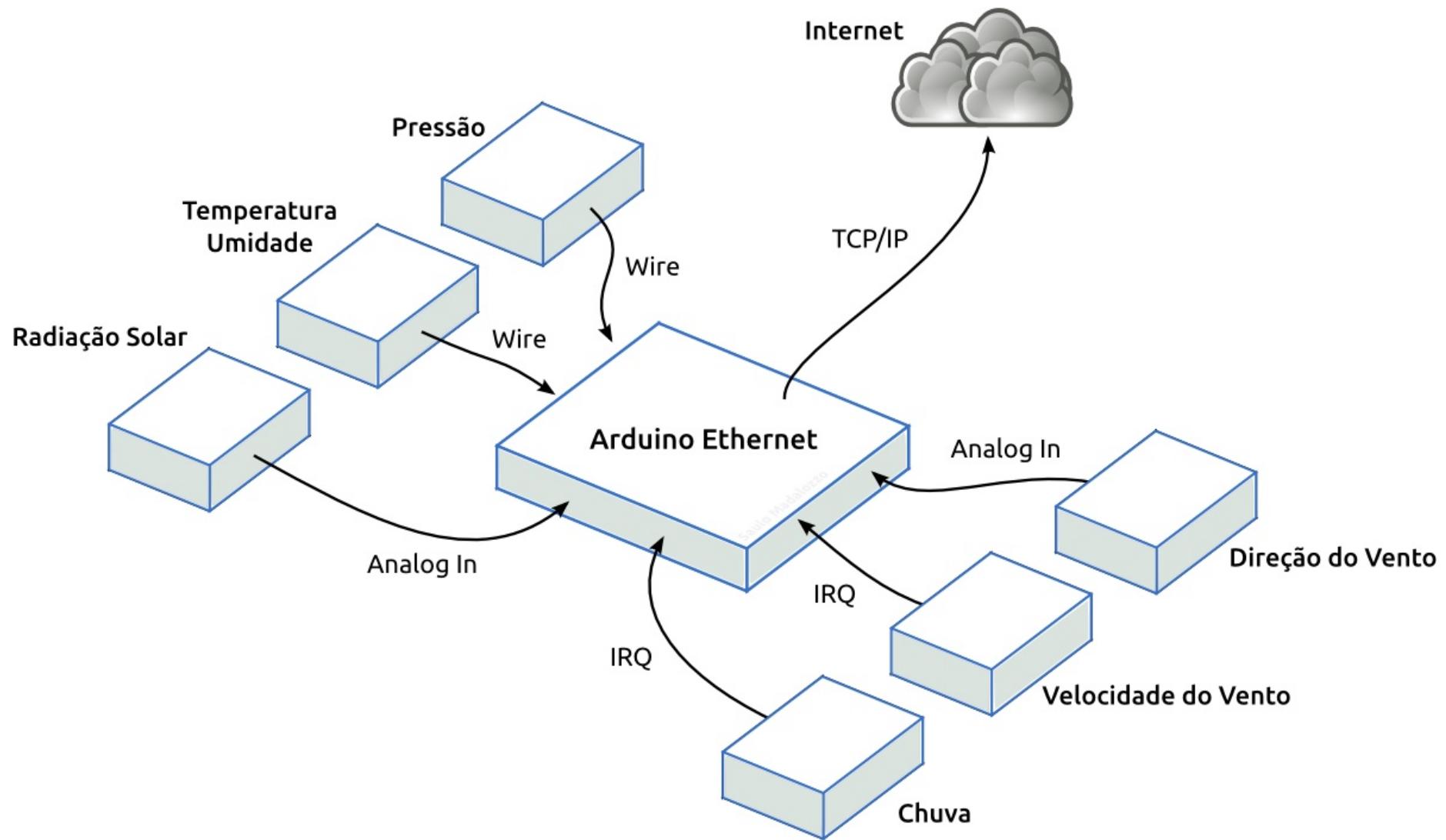
Arduino Uno  
+  
Ethernet Shield



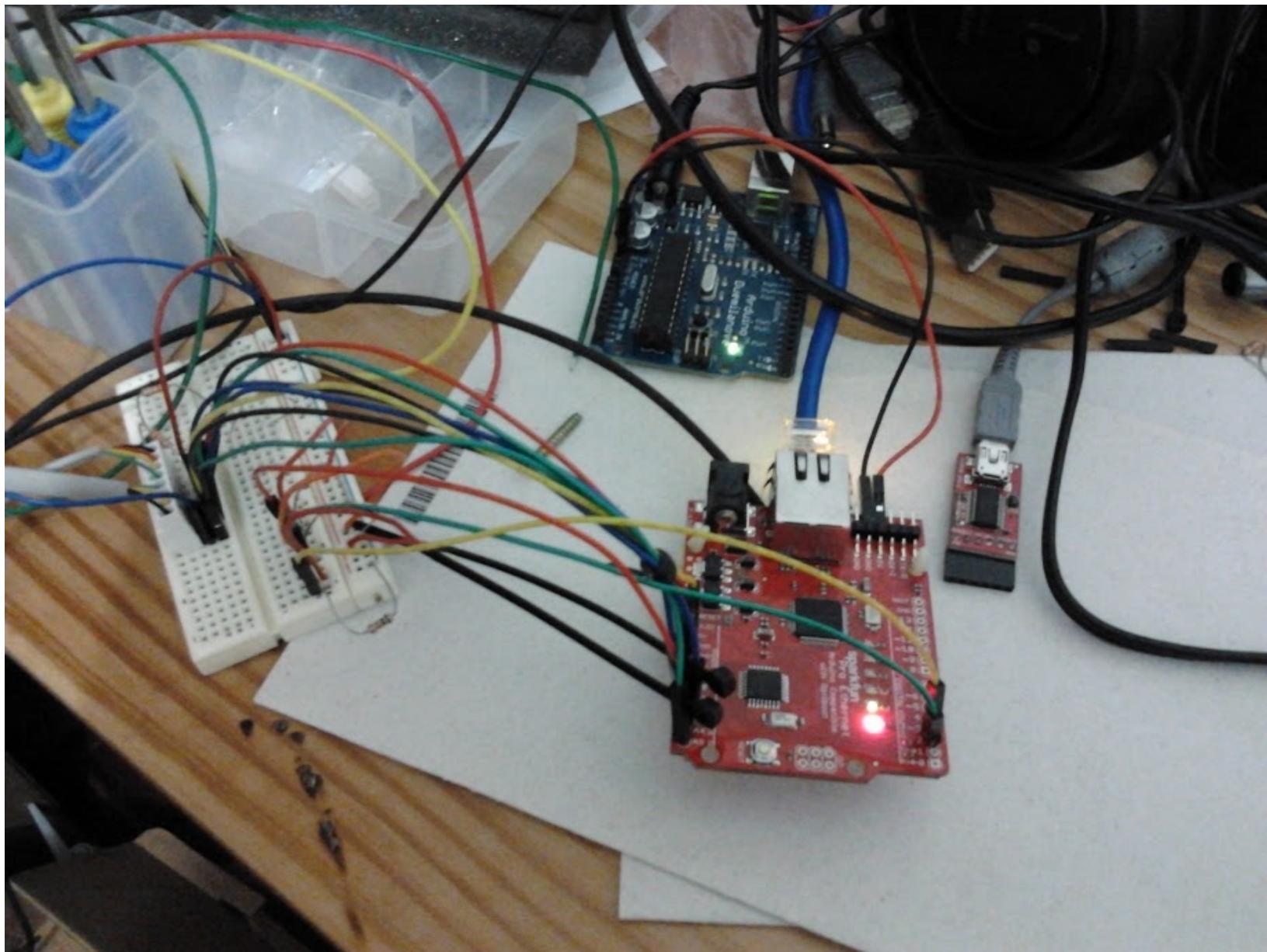
Arduino Ethernet







# Protoboard

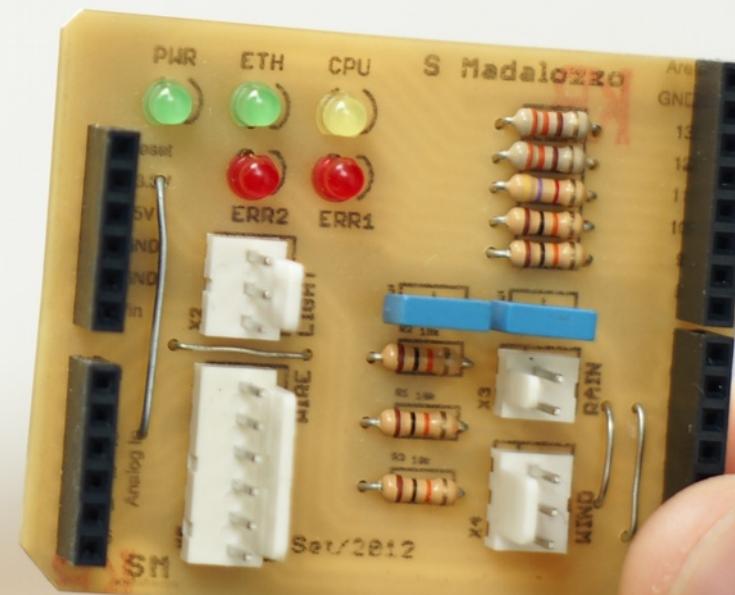


# Protoshield



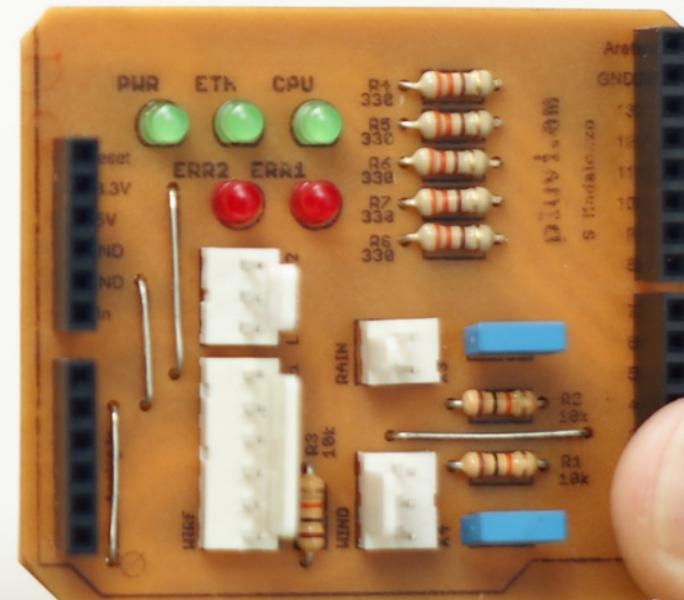
# 1º Shield

Conectores para os sensores  
Leds



# 2º Shield

Conectores para os sensores  
Leds ( funcionando! )



# Temperatura e Umidade

Temperatura

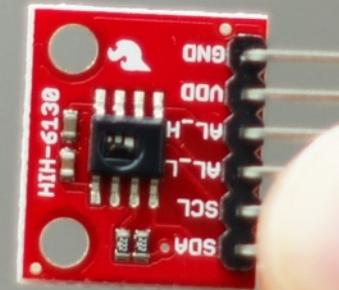
Precisão 0.5°C

Resolução 0.06°C

Umidade

Precisão 3%

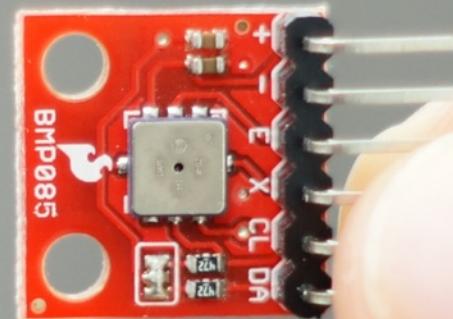
Resolução 0.08%



# Pressão

Precisão 1hPa

Resolução 0.01hPa



# Luminosidade

Analógico

Difícil de calibrar



# Pluviômetro

0.3 mm / pulso

Utiliza uma IRQ



# Anemoscópio

16 direções possíveis

Pontos cardeais, colaterais  
e subcolaterais



# Anemômetro

2.4 km/h / pulso/s

Utiliza uma IRQ





```
pluviam humidityAndTemp pressure rain timeCalc web wind

/* This file is part of the Pluviam Firmware */

/*
-----
* "THE BEER-WARE LICENSE" (Revision 42):
* <saulo.zz@gmail.com> wrote this file. As long as you retain this notice you
* can do whatever you want with this stuff. If we meet some day, and you think
* this stuff is worth it, you can buy me a beer (or a wine) in return.
* Saulo Matte Madalozzo
* -----
*/

// created by Saulo Matte Madalozzo (saulo.zz@gmail.com) Oct, 2011
// modified by Saulo Matte Madalozzo (saulo.zz@gmail.com) Oct, 2013

#include <SPI.h>
#include <Ethernet.h>
EthernetClient client;

byte mac[] = {0x90, 0xA2, 0xDA, 0x0D, 0x73, 0x31}; //uri1
byte ip[] = {10, 0, 0, 221};
#define CONNECT_DATA    "GET http://localhost/pluvi.am/pluvi.am/s01/tcc.php?cd=j7x8q&pw=nMNe6pRt9aXX2fcU&tk=WtDQRGgZ" //uri1

//byte mac[] = {0x90, 0xA2, 0xDA, 0x0D, 0xD6, 0xF4}; //uri2
//byte ip[] = {10, 0, 0, 222};
//#define CONNECT_DATA    "GET http://localhost/pluvi.am/pluvi.am/s01/tcc.php?cd=gi5ak&pw=E9gr8K6Ca3KJU6bc&tk=pdoARmeo" //uri2

#define SERVER_ADDR      "10.0.0.105"

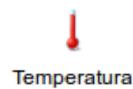
void startConnection(){
  // start the Ethernet connection:
  Ethernet.begin(mac, ip);
  /*if (Ethernet.begin(mac, ip) == 0) { //dhcp
    Serial.println("Failed to configure Ethernet using DHCP");
  }
}
```

# Estação Meteorológica Automática Experimental - Erechim RS

Localização: 27°38'45,5"S 52°16'19,1"W Altitude:664m | [Ver fotos](#)

Curtir  723

Última atualização: 2013-12-04 01:12



Temperatura

**20** °C



Umidade

**75.7** %



Pressão

**1010.9** hPa



Radiação solar

**0** w/m<sup>2</sup>



Vento

**3.2** km/h **W**

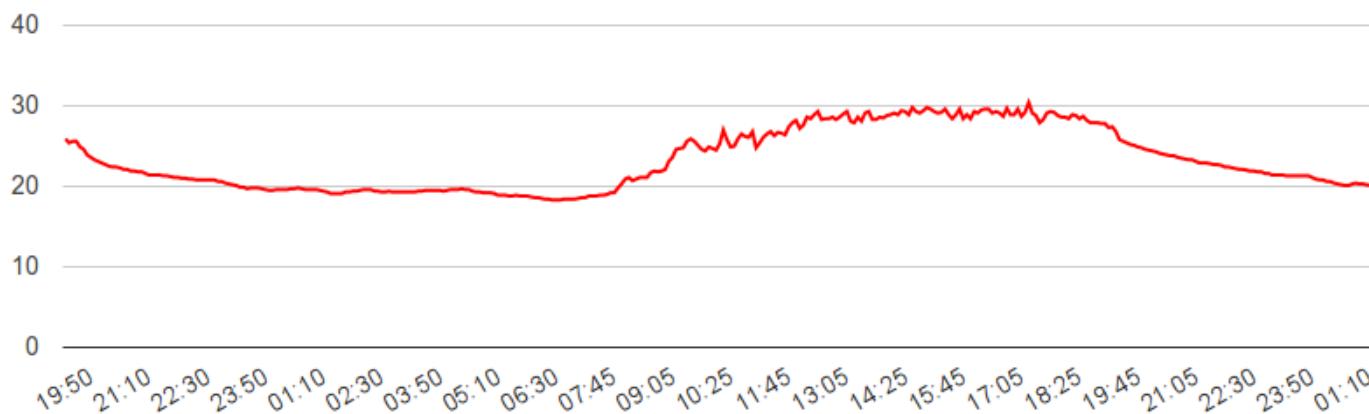


Chuva Hoje

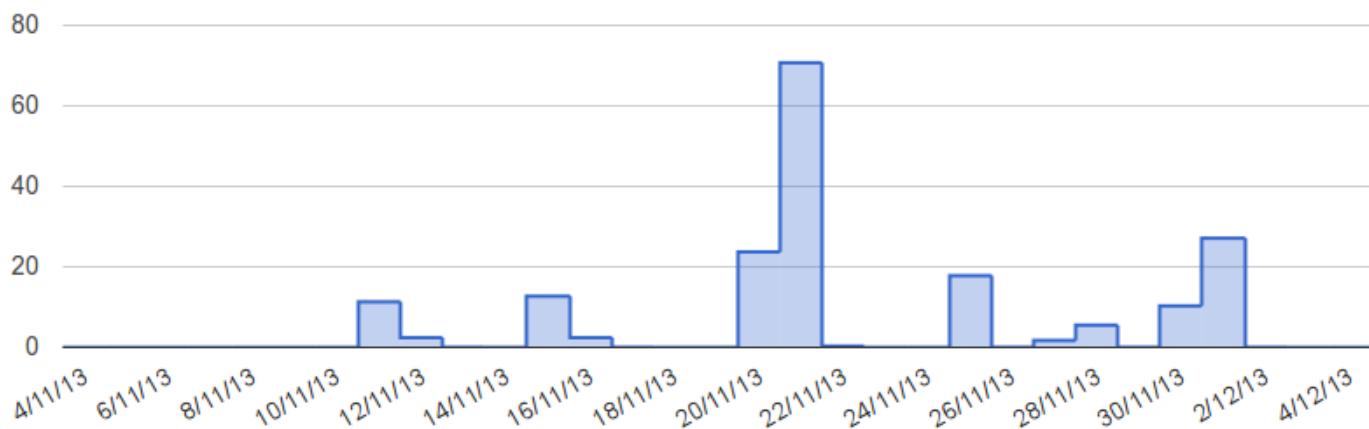
**0** mm

Passe o cursor sobre as linhas para visualizar os dados

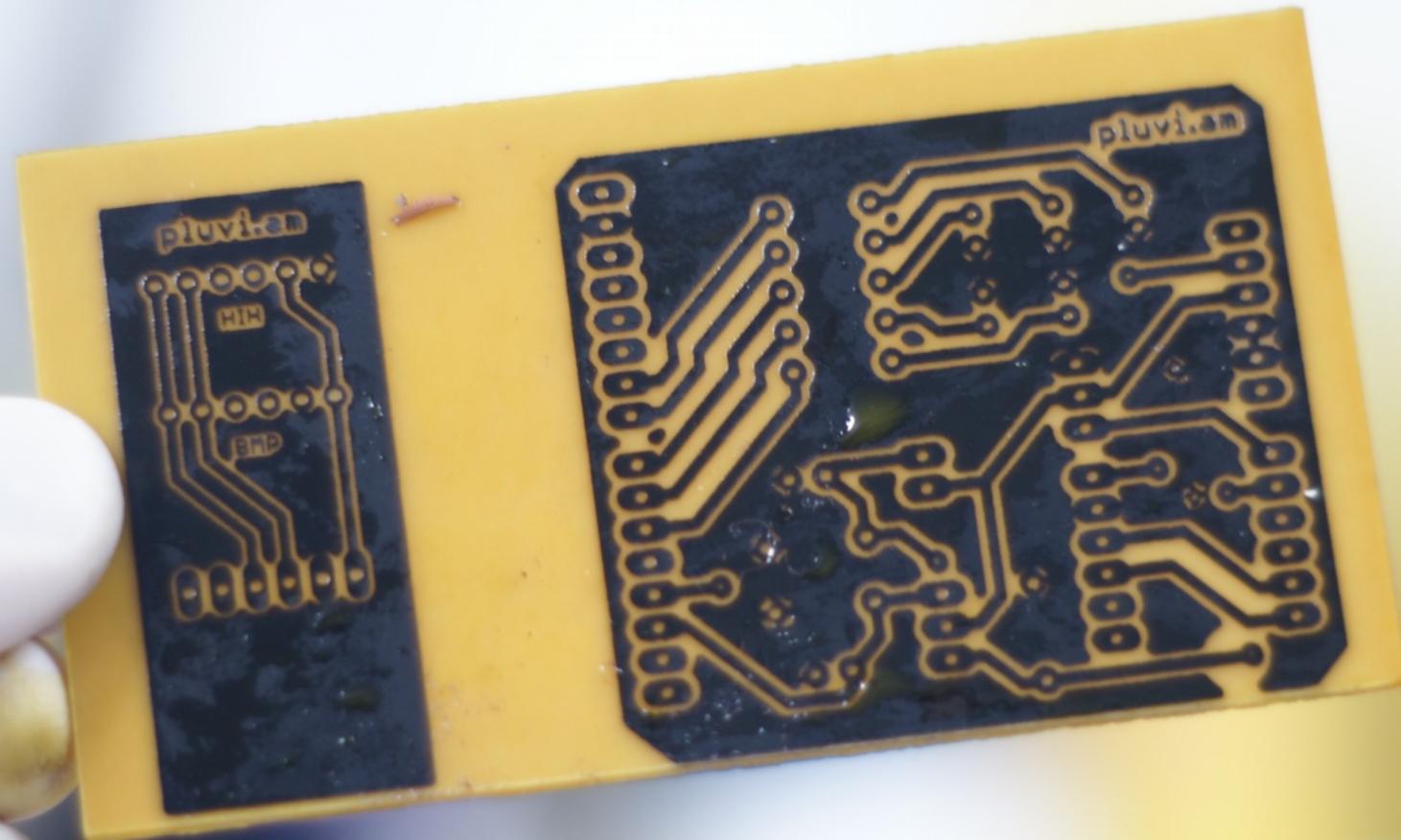
Temperatura - °C

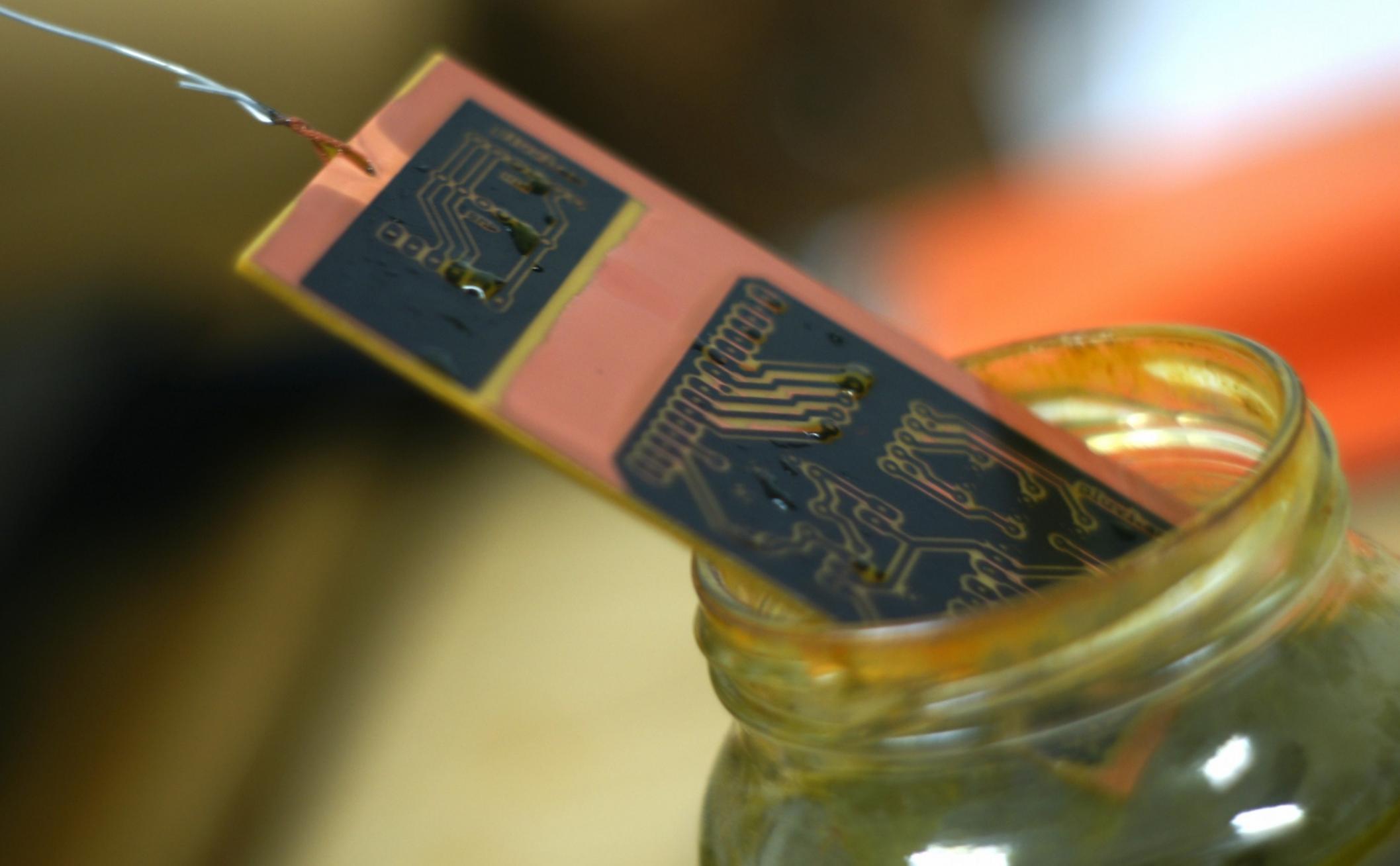


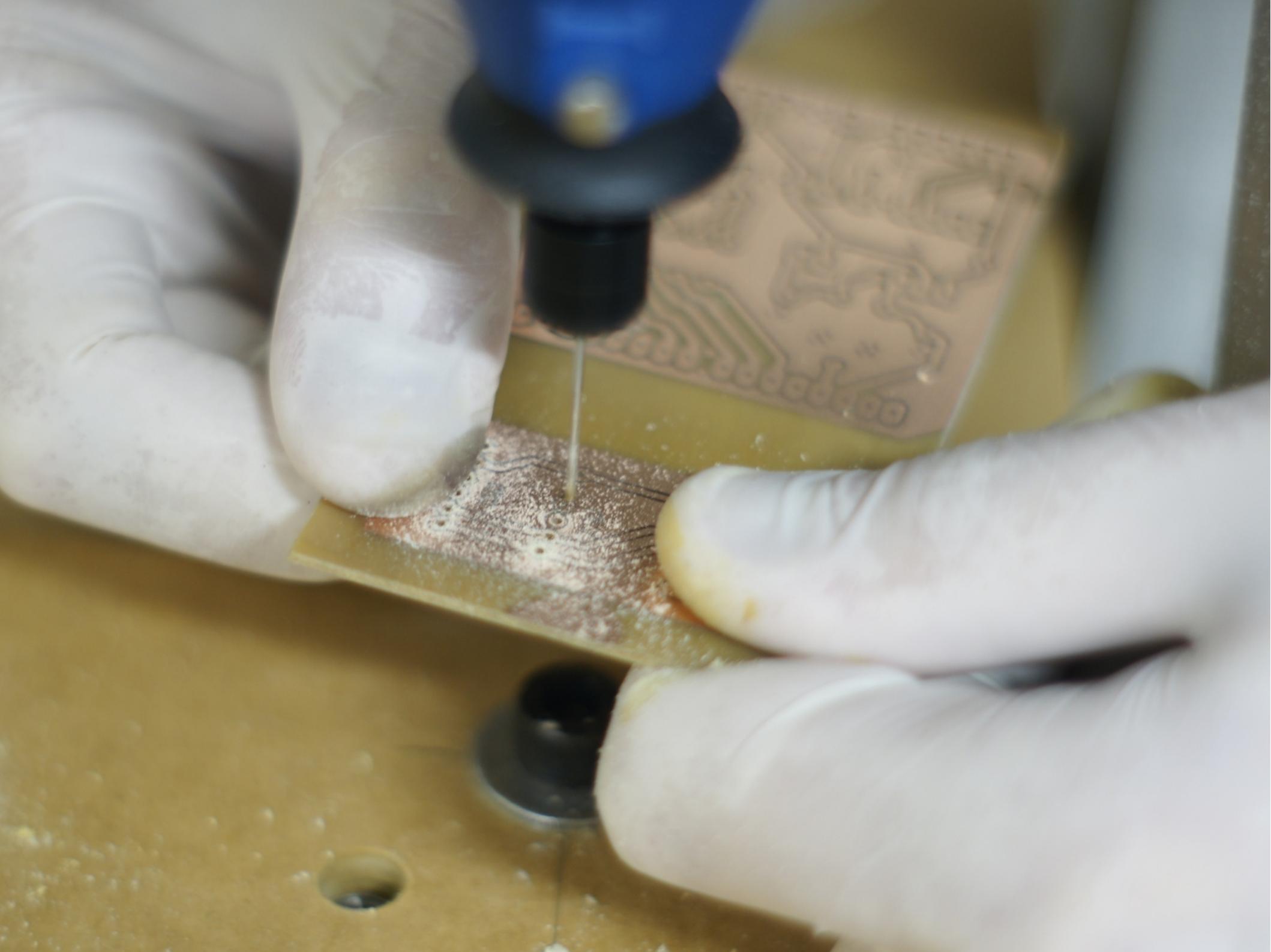
Chuva acumulada por dia (Últimos 30 dias) - mm

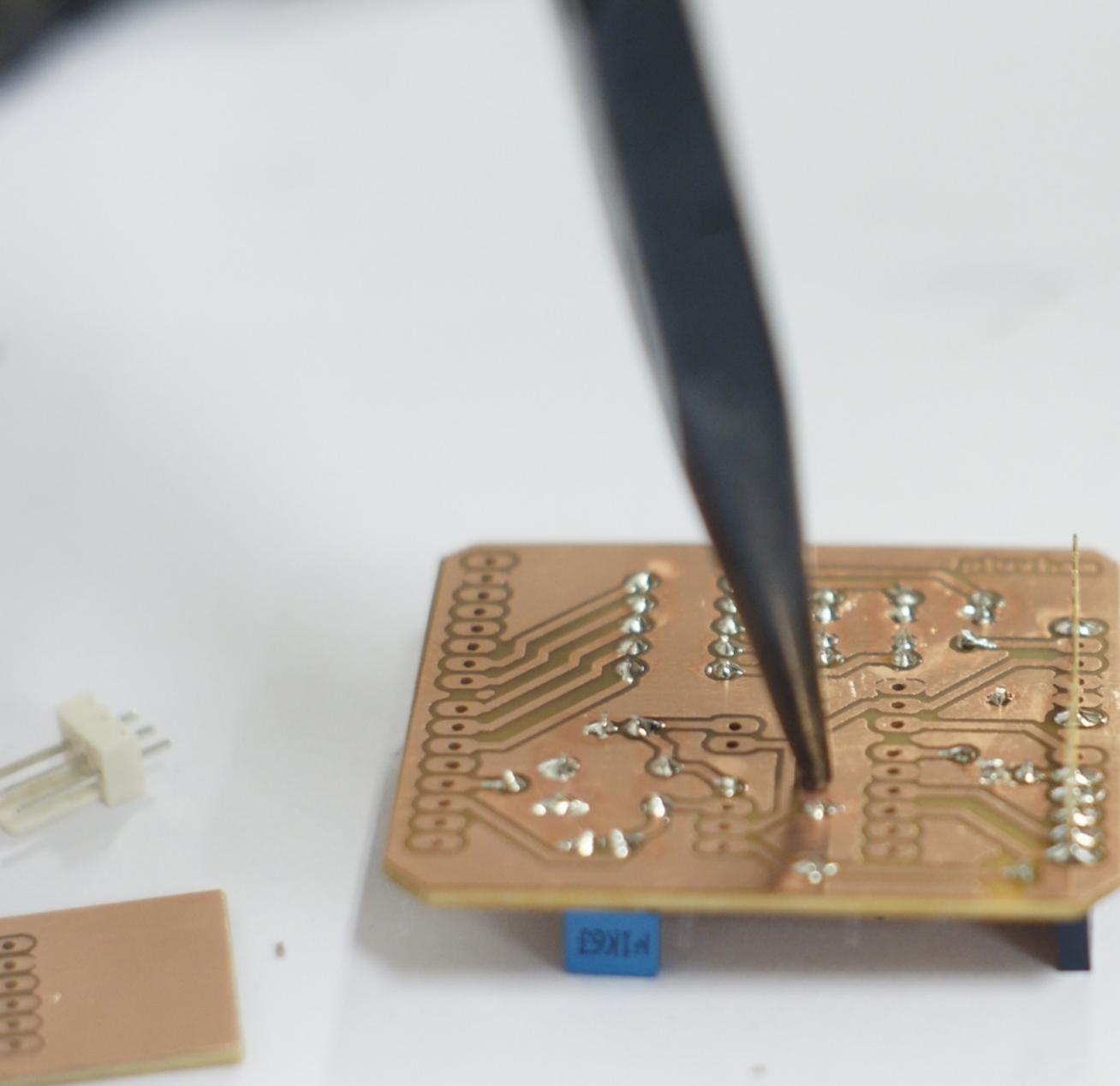


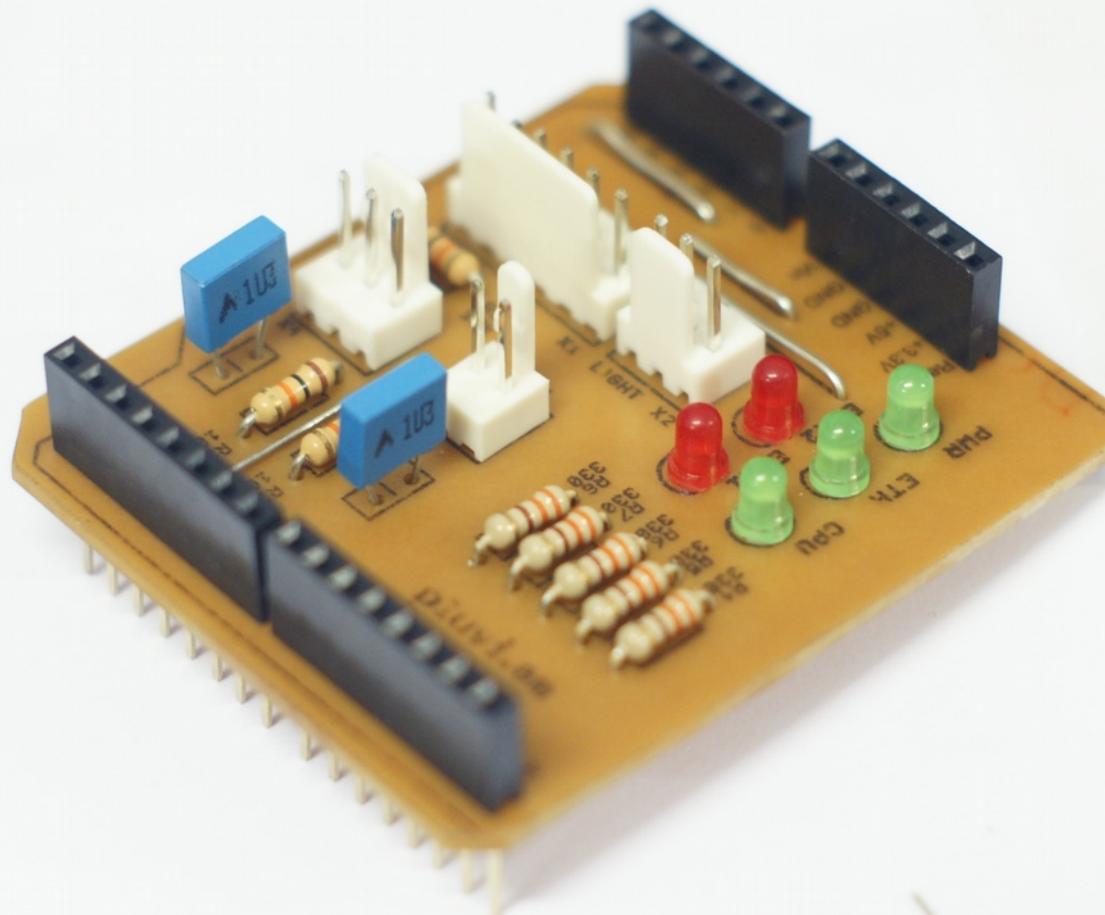
# Imagens adicionais

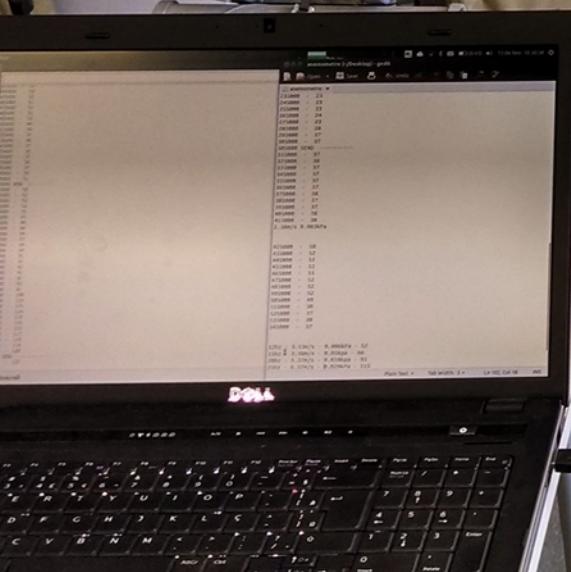
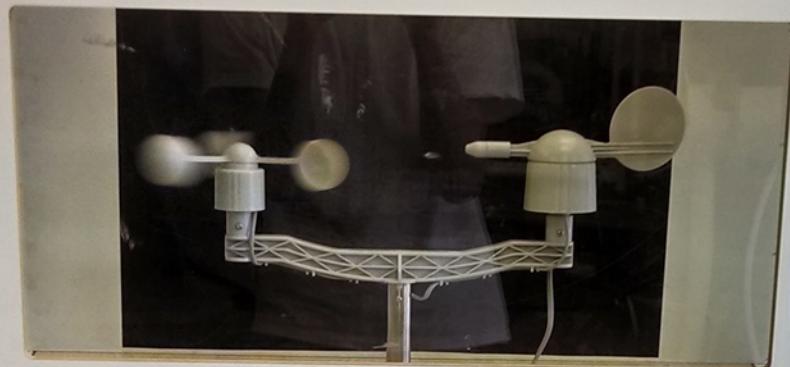




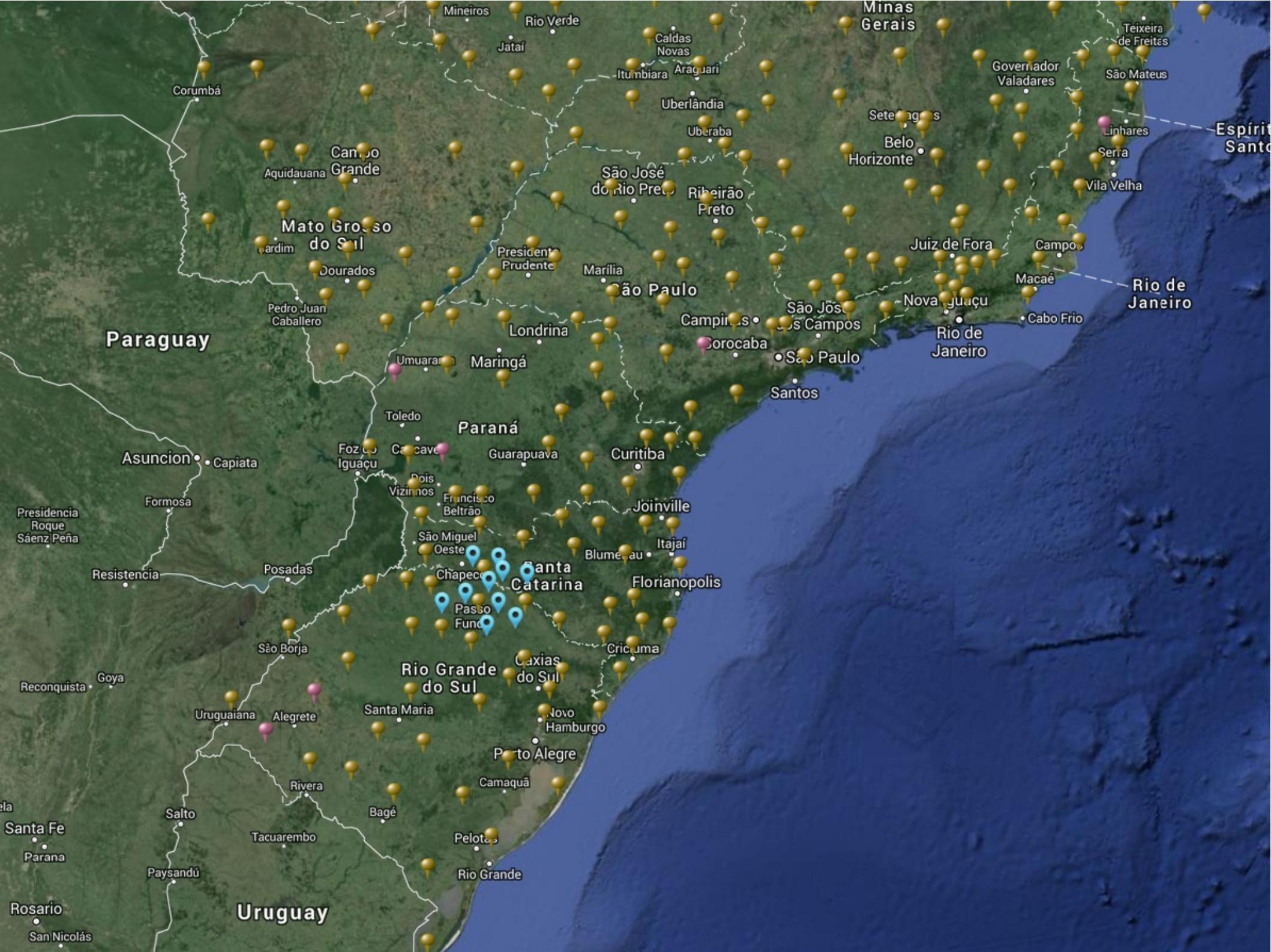


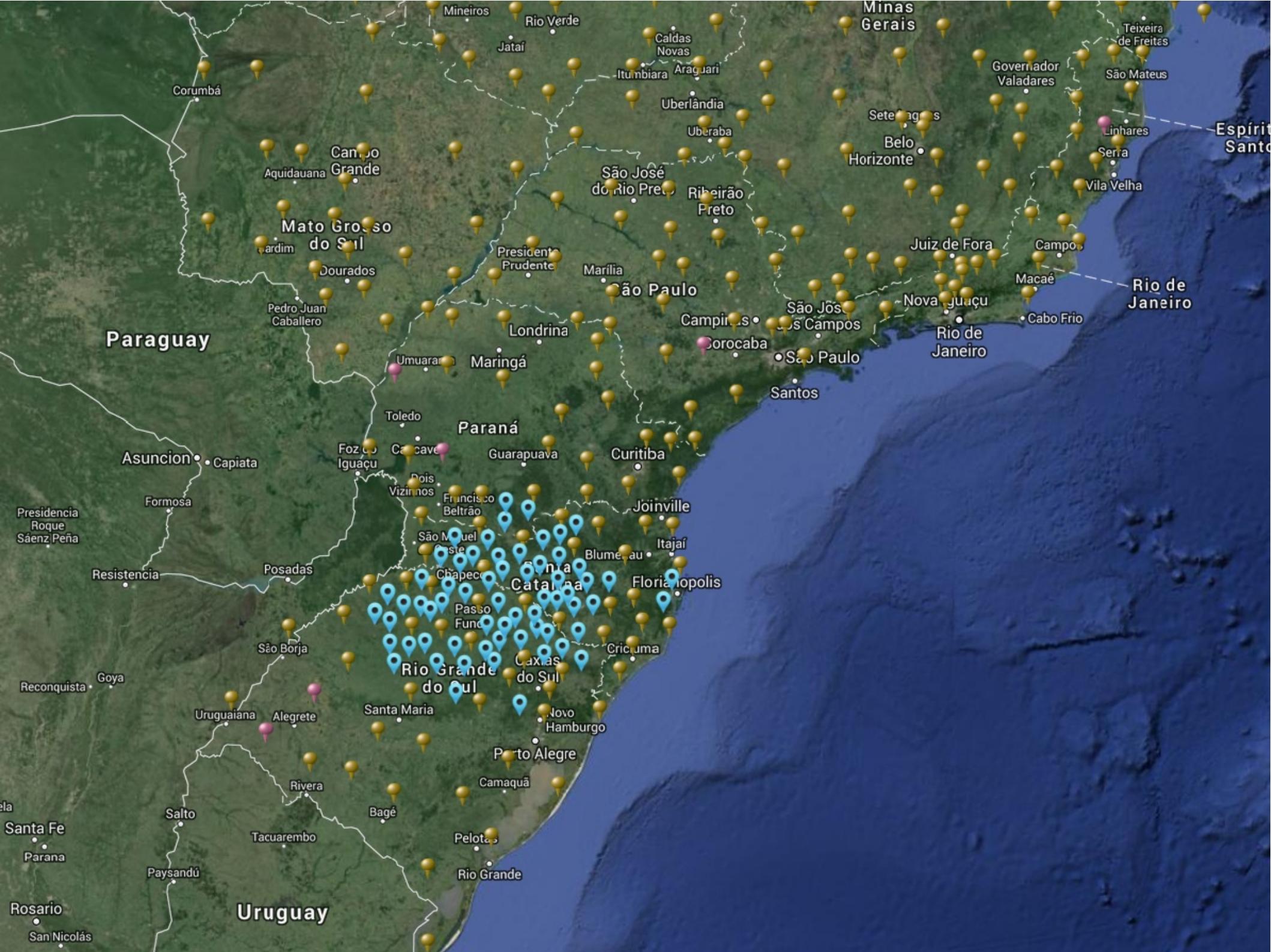


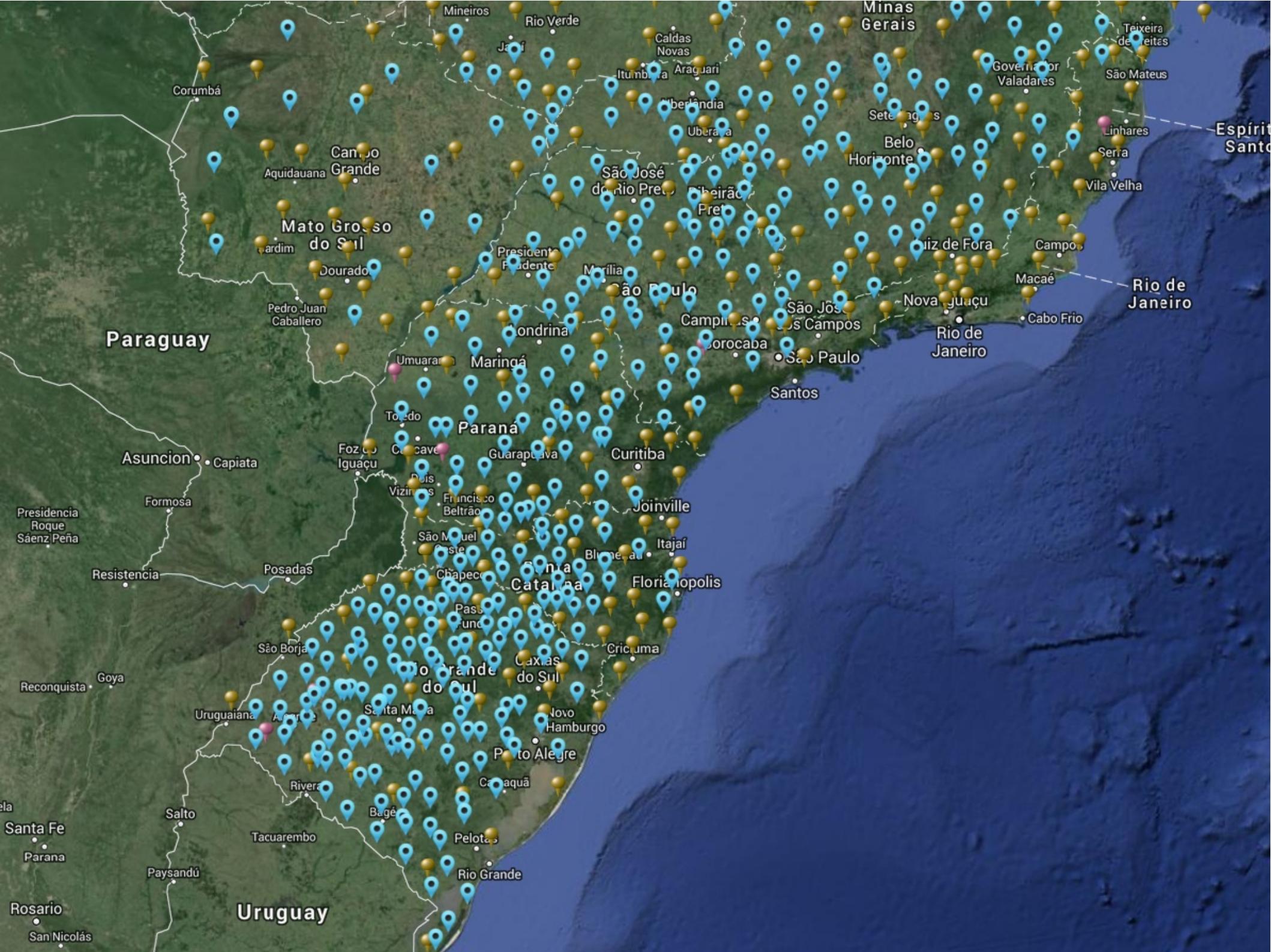


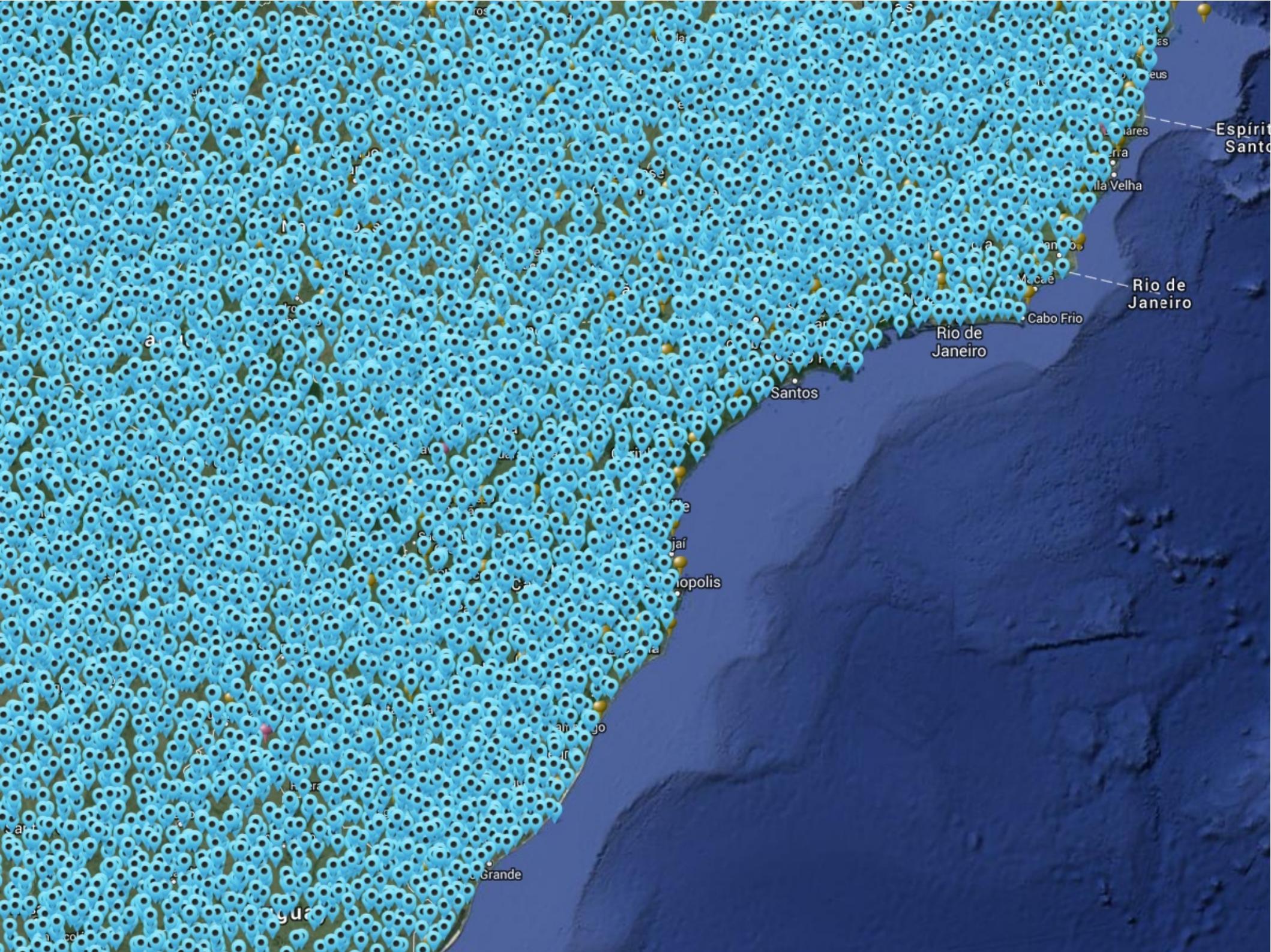














**Saulo Matté Madalozzo - 2013**