4nse ISSUE 2 June 2018

Newsletter

Open Environmental Monitoring: data for all

What's Inside

Welcome again...

...to the second edition of the *4onse* Newsletter. What happened in the meantime?

The picture above shows the very first weather station based on open hard- and software assembled by the 4onse staff in Lugano, Switzerland. On the next pages the continuous progress of the development will be presented.

Analysis of four times Open, Non-conventional, Sustainable and Effective monitoring systems
a project fund within the Research for Development program with decision IZ07Z0_160906 / 1

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Chapter 1

First prototypes assembled at SUPSI

After designing and testing all the parts on the table, the first prototypes of a weather station has been assembled by the Lugano staff and fixed for the first tests outside the building (left picture).
Shortly afterwards, the first usable Printed Circuit Board (PCB) arrived from Sri Lanka and was tested assembling another prototype of weather station. Both types of weather stations, called *4onse-mod* (modular) and *4onse-pcb* (PCB based) have their own characteristics.

The three weather stations at SUPSI, from left to right: the official cantonal weather station *Trevano*, *4onse-pcb* and *4onse-mod*.

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Chapter 2

One idea – two systems

Getting out the best of a research project sometimes means to develop more than one solution. Keeping this in mind, the 4onse team decided to develop the two already mentioned solutions of a modular device and a PCB based one. Besides comparing the obtained data of both systems, it is essential to evaluate the problem of long term functionality and maintenance of such kind of weather station, especially under extreme weather conditions. Also a long distance between the maintenance facility and the single stations should be considered.

4onse-mod station tested in the field

Advantages:

- Modular solution more flexible
- Common materials (screws, boxes, Plexiglass board, etc.)
- Easy to replaceable components

Disadvantages:

- More time to build
- Connections by wires
- More space required

Interior of the *4onse-pcb*

Pros:

- PCB based
- Easy to install
- Less space required

Cons:

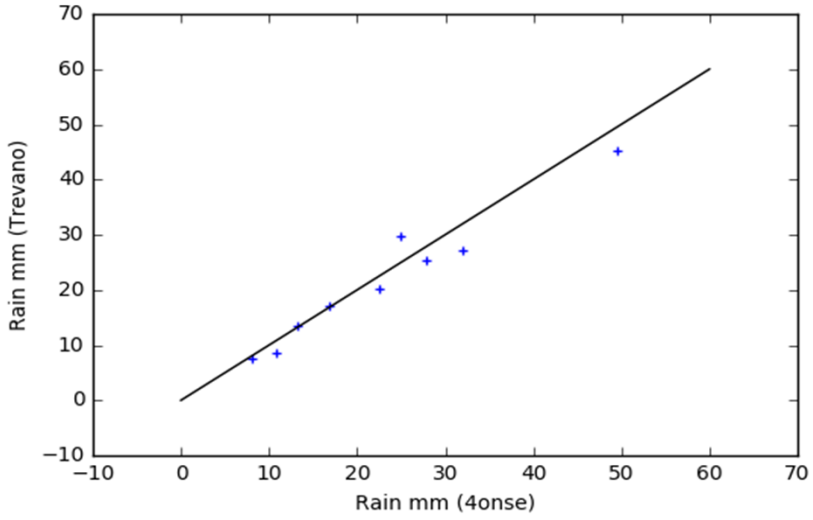
- Changing components difficult
- PCB not widely available
- Higher cost

Chapter 2

One idea – two systems

System comparison

The tree systems (*Trevano, 4onse-mod* and *4onse-pcb*) were compared with each other. The 4onse-mod prototype was evaluated at the Institute of Space Technology in Islamabad (Pakistan) since February 2018, at the University of Moratuwa in Colombo (Sri Lanka) since November 2017 and at the SUPSI Campus Trevano in Canobbio Switzerland) since July 2017. The 4onse-pcb prototype was tested at the University of Moratuwa since October 2017 and at the SUPSI since January 2018.

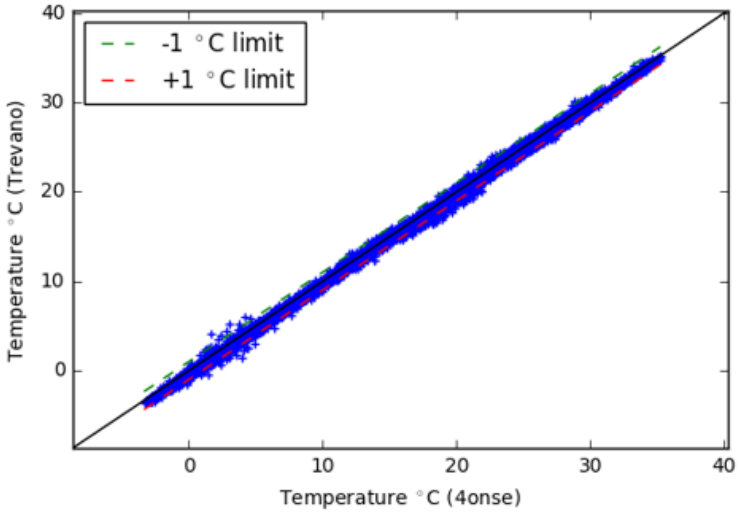


The comparison of rainfall between the *Trevano* and *4onse-mod* station shows a good agreement between both.

4onse-mod rain gauge

Also regarding the temperature, both systems agree within an acceptable limit.

4onse-mod pressure and humidity gauge

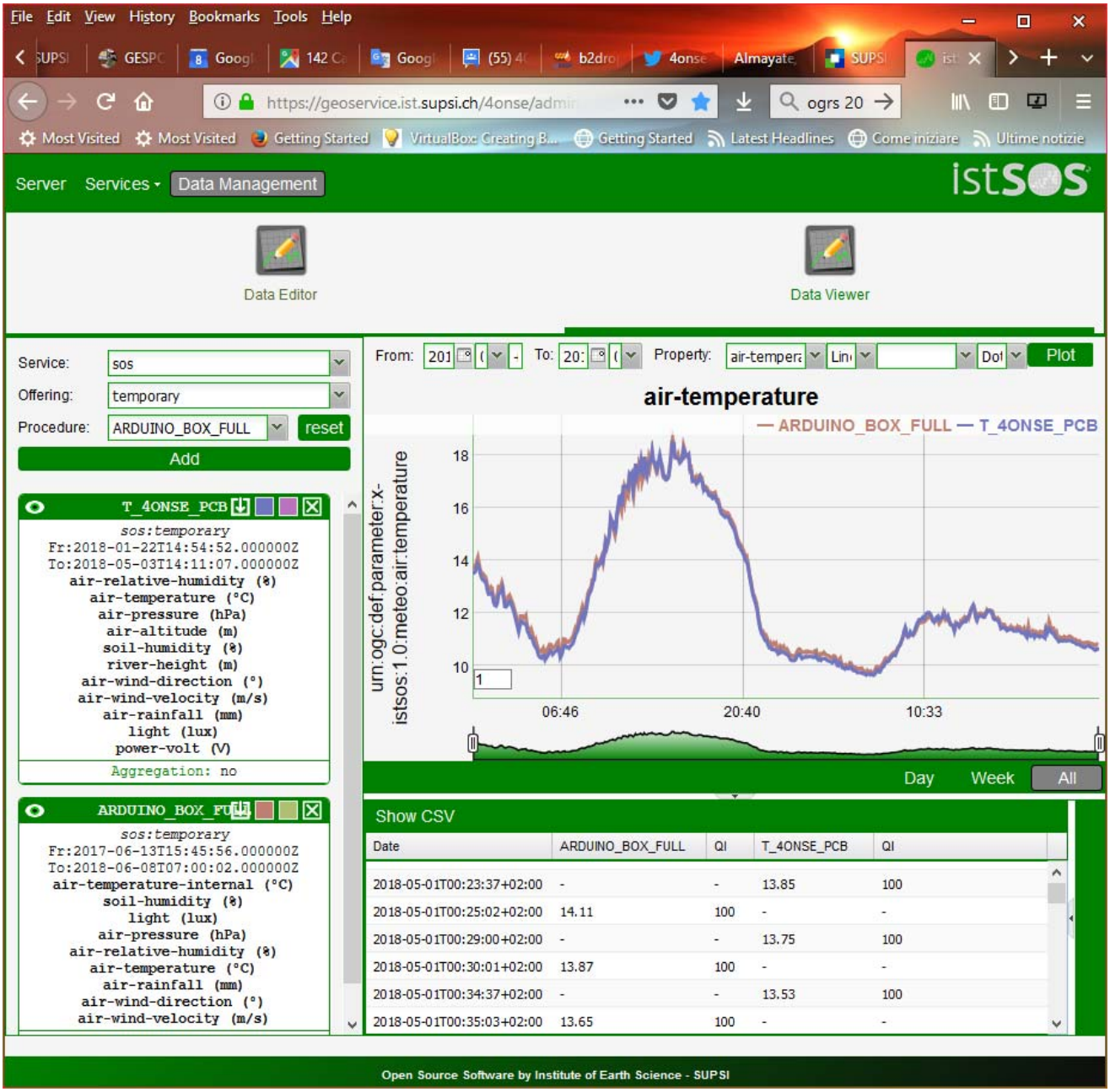


Chapter 2

One idea – two systems

System comparison

The istSOS data management console shows the air-temperature comparison of the *4onse-mod* (ARDUINO_BOX_FULL) and *4onse-pcb* station in Lugano – Trevano.



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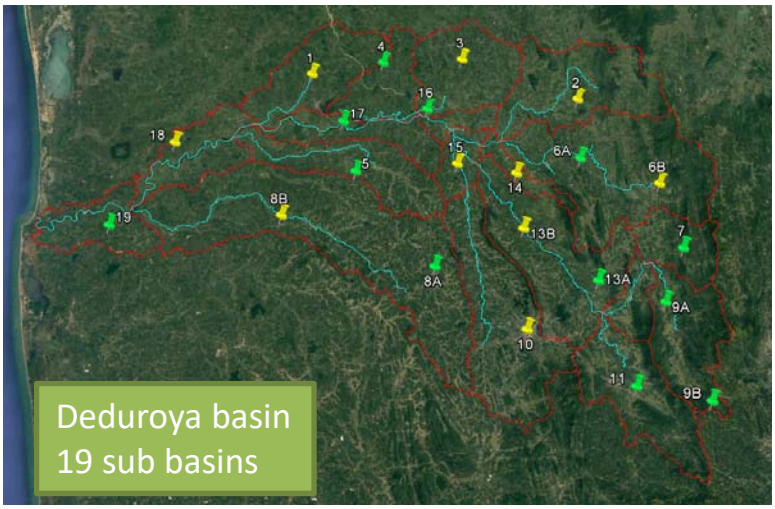
Chapter 3

Deployment

Shortly after the successful testing of both prototypes the deployment in Sri Lanka and Pakistan started. Up to now 15 out of 30 were distributed in the *Deduroya* Basin with it's 19 sub basins.



Deduroya basin
19 sub basins

Map of the selected area in the northern part of Sri Lanka which is affected by heavy rain events during the wet season and therefor contains a tank system to mitigate the flood risk. The dots show the position of the weather stations. Once the network of the 30 stations is stable enough, the data collected will be a valuable input to study and develop hydrological models to support the decision makers.

Data communication

Simultaneously, the communication and service layers of the monitoring system were implemented and tested to address the project requirements (e.g. secure communication, fast data transmission, use of the SOS standard, etc.). The communication layer takes advantage of the GPRS 2G communication which is the media used to send light HTTPS requests to the server. Since istSOS is fully SOS OGC compliant and proved to be good solution in managing the hydro-meteorological weather station network of the Canton Ticino, it was chosen as main software for the data warehouse (service layer) to receive requests from the 4onse stations and archive data which are then completely sharable using the SOS capabilities. To improve the reliability of data acquisition a new method for fast insertion has been developed. All measurements are stored on the local SD card in a staging area. In case of communication failure data can be restored later.

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Upcoming Events

17-19 Jul 2018	**Foss4G Europe, Guimarães, Portugal** Massimiliano Cannata presents: The analysis and deployment of a fully open monitoring system in the Sri Lankan Deduroya basin: the 4onse project
29-31 Aug 2018	**Foss4G 2018, Dar es Salaam, Tanzania** Milan Antonovic: News about istSOS3
3–7 Sep 2018	**EMS Annual Meeting 2018, Budapest, Hungary** Daniele Strigaro will give a talk about Evaluation of Open, Reproducible, Low-cost and Non-conventional Weather monitoring System
9-11 Oct 2018	**OGRS 2018, Canobbio, Switzerland** The 5th Open Source Geospatial Research and Education Symposium will be held at SUPSI, Canobbio-Lugano, Switzerland. Please have a look at: http://2018.ogrs-community.org/
2-5 Dec 2018	**Foss4G Asia 2018, Moratuwa, Sri Lanka** Massimiliano Cannata: Current status and new developments of the *4onse* project.

Past Events

18-22 Jul 2017	**FOSS4G-Europe 2017 conference, Paris** D. Strigaro talked about the extension of the scalability of istSOS within the *4onse* project.
12-14 Oct 2017	**14th International Congress of Asian Planning Schools Association** Dr. Emeshi Warusavitharana presented 4onse within the framework of the main theme: Reshaping Urban and Rural Development Through Planning under Sub-Theme 5: Smart/Intelligence.
16-19 Oct 2017	**3rd Scientific Meeting in Sri Lanka** This meeting was dedicated to plan the system deployment and knowledge transfer and stakeholder training on case study location in Deduru Oya Basin.