

A NEW ICOS CLASS 1 STATION AT CNR-IMAA: A PROMISING HUB FOR THE SYNERGISTIC INVESTIGATION OF GREENHOUSE GASES AND ATMOSPHERIC AEROSOL

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Overview

At the Istituto di Metodologie per l'Analisi Ambientale of the Italian National Research Council (CNR-IMAA) is currently in progress the implementation of an ICOS-compliant Class 1 atmosphere station, forecasted to be operative within the first half of 2024. The station will be located in Tito Scalo (Southern Italy, 40.60° N, 15.72° E, 760 m asl), in a plain surrounded by low mountains (below 1100 m above sea level), less than 150 km from the West, South and East coasts. It is characterized by a typical mountain weather strongly influenced by Mediterranean atmospheric circulation, resulting in generally dry, hot summers and cold winters. Due to its location, the new Class 1 station represents a crucial step forward in the strengthening of the ICOS atmosphere network in the Mediterranean basin.



Ongoing works: basement of the 100 m tower of the new ICOS Class 1 atmosphere station

Location of the ACTRIS and ICOS sites within the area of Tito Scalo



Current ICOS atmosphere network in Europe with the location of the new site at Tito Scalo



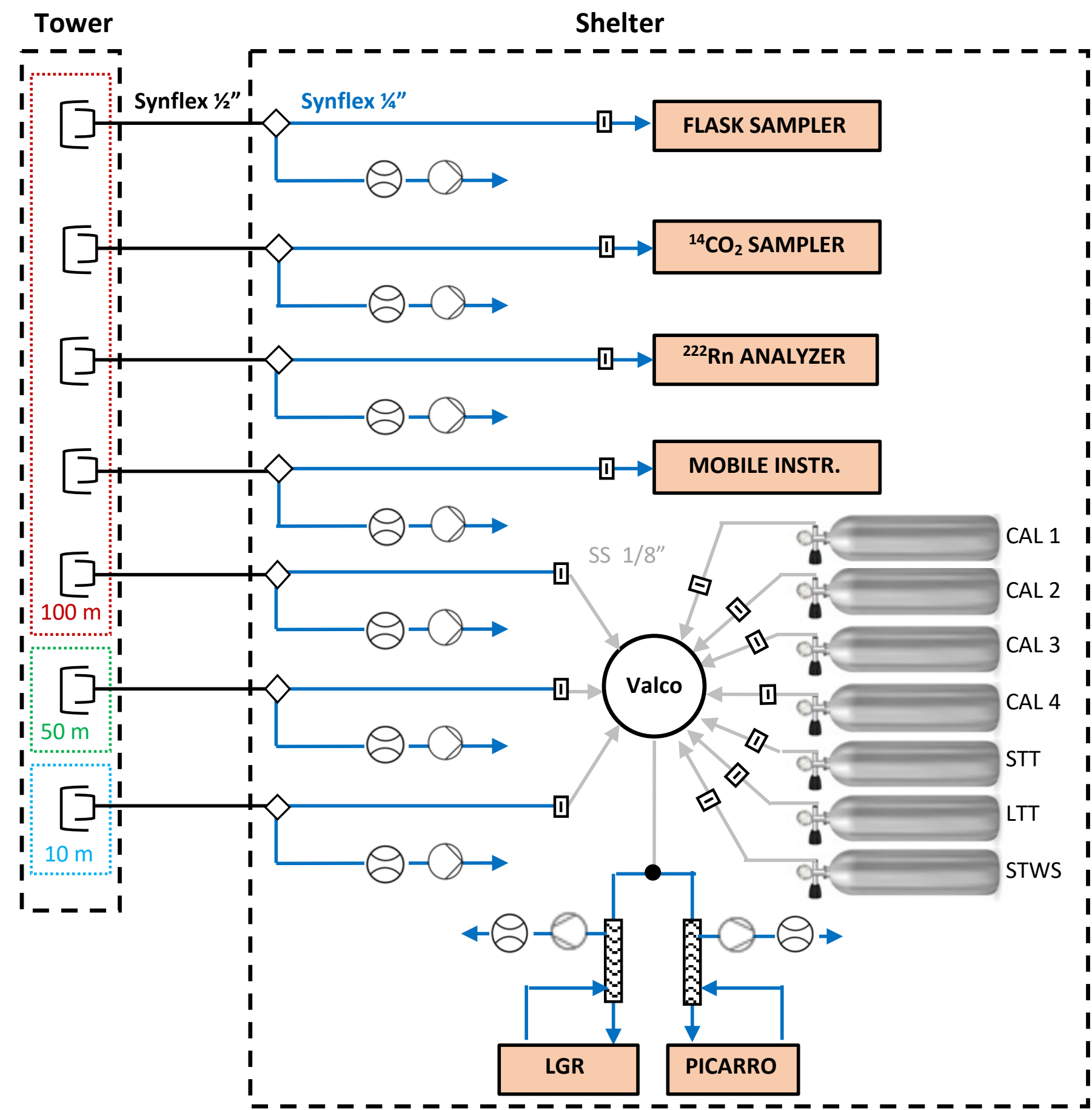
Synergies with ACTRIS

Station outline

The ICOS station consists of a 100 m tower with three sampling levels (100, 50, and 10 m, each one with its own meteorological station) and a ceilometer at the basement. The annexed shelter is equipped with the continuous analyzers (PICARRO, LGR, ²²²Rn analyzer) and the gas samplers (automatic flask sampler, Heidelberg CO₂ sampler for radiocarbon analysis).

The new ICOS station will be established 1.4 km away from the ACTRIS site (Aerosol, Clouds and Trace Gases Research Infrastructure) operative at the CNR-IMAA, thus enabling the remarkable opportunity of synergistic investigation of greenhouse gases (GHGs) and atmospheric aerosol at the local scale. Herein are reported two circumstances for potential synergistic investigation:

- **local wildfire (summer):** the characterization of smoke carried out mainly with lidar and aethalometer measurements is complemented by the determination of CO, CO₂, and CH₄ molar fractions by means of PICARRO, providing valuable information about the progress of the spreading fire (e.g., the CO/CO₂ ratio and the modified combustion efficiency, MCE¹); the ¹⁴CO₂ fraction in the atmosphere is expected to raise in response to the massive injection in the atmosphere of carbon dioxide coming from the biomass burning
- **wintertime campaign:** air quality in the surrounding area is dominated by anthropogenic emissions, with a prevalence of those related to the residential heating (wood burning + fossil fuel); the source apportionment of the aerosols carried at out with the aethalometer and the OC/EC analysis is complemented by the radiocarbon analysis at the level of the isotopologue ¹⁴CO₂, sampled and quantified within the ICOS research infrastructure.



Essential scheme of the ICOS Class 1 atmospheric station with three sampling levels (100, 50, 10 m)

REFERENCES

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