**SERIE 1**

- Il candidat* descriva quelle che ritenga essere le più rilevanti attività condotte durante la propria esperienza formativa/lavorativa con riferimento alle tematiche del bando.
- Il candidat* traduca il seguente brano tratto dal documento ICOS RI (2020): ICOS Atmosphere Station Specifications V2.0 (editor: O. Laurent). ICOS ERIC. https://doi.org/10.18160/GK28-2188 (1.1. General objectives): “Over the last decade, the ICOS community has evolved from a situation where GHG atmospheric measurements were done by more than fifteen laboratories over Europe with their own procedures, using scientific project funding, to a situation where procedures are harmonized and funding is better secured over the long term due to the establishment of a dedicated international legal structure: the ICOS ERIC whose members are committed member states within Europe. High precision, long term, compatibility and traceability are key aspects of the ICOS atmospheric measurement”

**SERIE 2**

- Il candidat*, facendo riferimento alla sua esperienza formativa e lavorativa, discuta il proprio possibile contributo riguardo le tematiche del bando.
- Il candidat* traduca il seguente brano tratto dal documento ICOS RI (2020): ICOS Atmosphere Station Specifications V2.0 (editor: O. Laurent). ICOS ERIC. https://doi.org/10.18160/GK28-2188 (1.2.2.Data compatibility): “In order to allow for a good interpretation of global or continental scale atmospheric data from different stations and networks, an essential component for atmospheric transport model inversion studies, the WMO sets the compatibility goal for measurement of the major greenhouse gases and related tracers in the GAW report n° 255 (WMO, 2020). These WMO recommendations, updated every two years by a panel of international experts, are summarized in the following table (cf. Table 1). ICOS targets the same compatibility goal within its own monitoring network as well as with ther international networks, however over an extended concentration range.”

**SERIE 3**

- Il candidat* descriva il possibile utilizzo nell’ambito delle tematiche del bando delle principali metodiche (sia sperimentali che riguardante l’analisi dati) che ha potuto utilizzare nell’ambito della sua esperienza formativa e lavorativa.
- Il candidat* traduca il seguente brano tratto dal documento ICOS RI (2020): ICOS Atmosphere Station Specifications V2.0 (editor: O. Laurent). ICOS ERIC. https://doi.org/10.18160/GK28-2188 (1.3. Network design). “In order to achieve the main objective of the atmospheric network, i.e. providing maximum constraints to determine surface-atmosphere exchange fluxes, the ICOS atmospheric network needs to be carefully designed in terms of station locations. When atmospheric station data are used in inverse transport modelling (or data assimilation) to retrieve regional scale GHG budgets, the main aim is to reduce the uncertainty of the surface-atmosphere flux for targeted spatial and temporal scale, e.g. annually integrated fluxes at national scales.”

**SERIE 4**

- Il candidat* descriva quello che, a sua opinione, rappresenta il risultato più importante o rappresentativo ottenuto nel corso della sua esperienza formativa e lavorativa.
- Il candidat* traduca il seguente brano tratto dal documento ICOS RI (2020): ICOS Atmosphere Station Specifications V2.0 (editor: O. Laurent). ICOS ERIC. https://doi.org/10.18160/GK28-2188 (1.4. ICOS standardized network): “In order to get a homogeneous dataset, ICOS aims to standardize the equipment, measurement protocol and the data processing. This is an important aspect for quality assurance but is however not sufficient. Indeed, in order to reduce the risk of a systematic bias within its standardized network, additional periodic measurements with different and independent techniques are performed. This includes a quality control travelling instrument (e.g. Fourier Transform Infrared (FTIR) analyzer as proposed by Hammer et al., 2012) and/or flask sampling, where flasks are analyzed in a central laboratory with independent technique (e.g. Gas Chromatography).”

**SERIE 5**

- Il candidat* descriva quella che ritiene essere la sfida tecnologica o scientifica più impegnativa con la quale ha dovuto confrontarsi durante la propria esperienza formativa/lavorativa.
- Il candidat* traduca il seguente brano tratto dal documento ICOS RI (2020): ICOS Atmosphere Station Specifications V2.0 (editor: O. Laurent). ICOS ERIC. https://doi.org/10.18160/GK28-2188 (2.1.1.Station location). “Based on the initial network design assessment provided by the network development task force, and following from the fact that footprints associated with atmospheric stations are relatively local (on the order of 100 km), the main recommendation is to ensure a homogeneous network that avoids large spatial gaps. In order to improve the estimate of GHG fluxes over land, which display much larger variation than over sea, the majority of the stations should be “continental stations” (see definitions below), while only a small number of stations should be located near the western coast (“coastal station”) to quantify inflow, and a small number of stations should be placed on mountain tops (“mountain station”) as they are more difficult to represent in transport models and in case of high mountains are less directly exposed to air-masses carrying strong surface flux signals
  from the European continent.”

**SERIE 6**

- Il candidat*, facendo riferimento alla sua esperienza formativa e lavorativa, discuta il proprio possibile contributo riguardo le tematiche del bando.
- Il candidat* traduca il seguente brano tratto dal documento ICOS RI (2020): ICOS Atmosphere Station Specifications V2.0 (editor: O. Laurent). ICOS ERIC. https://doi.org/10.18160/GK28-2188 (2.2.1.2. Analyzer selection meeting requirements): “The ICOS ATC Metrology Lab is in charge of evaluation of the continuous gas analyzers available on the market and has made a list of instruments (cf. Table 4) compliant to ICOS requirements (cf. Section 2.2.1.1). This selection is based on the results of lab and field tests discussed during annual ICOS MSA. The update of this ICOS compliant analyzer list will be regularly

discussed and validated during the MSA. ICOS Atmosphere Stations must be equipped with instruments compliant with Section 2.2.1.1. Such
suitable analyzers are listed in the Table 4, which measure the mandatory species required by their ICOS station Class"

**SERIE 7**

- Il candidat* descriva quello che, a sua opinione, rappresenta il risultato più importante o rappresentativo ottenuto nel corso della sua esperienza formativa e lavorativa.
- Il candidat* traduca il seguente brano tratto dal documento ICOS RI (2020): ICOS Atmosphere Station Specifications V2.0 (editor: O. Laurent). ICOS ERIC. https://doi.org/10.18160/GK28-2188 (2.2.1.3. N2O analyzer): "In ICOS, at this stage, N2O is not a required but a recommended parameter for continuous gas measurement (see Table 2). Several different N2O high precision analyzers were tested at the ATC (Lebegue et al., 2016). Based on the results discussed at the ICOS MSA in June 2015 in Dübendorf and in March 2017 in Lund, the following instrumentation recommendation can be made. This recommendation takes into account both absolute performance but also robustness, ease of operation etc".

**SERIE 8**

- Il candidat* descriva quelle che ritenga essere le più rilevanti attività condotte durante la propria esperienza formativa/lavorativa con riferimento alle tematiche del bando.
- Il candidat* traduca il seguente brano tratto dal documento ICOS RI (2020): ICOS Atmosphere Station Specifications V2.0 (editor: O. Laurent). ICOS ERIC. https://doi.org/10.18160/GK28-2188 (2.2.2.Meteorological sensors): "In order to characterize the weather conditions at ICOS atmosphere sites, ICOS requires monitoring of the following meteorological parameters: wind direction, wind speed, air temperature, relative humidity and barometric pressure. The corresponding ICOS meteorological sensor selection is based on the WMO recommendation specified in the WMO Guide N° 8 (Table 5) (WMO, 2008). However, as ICOS does not aspire to be part of a meteorological station network, the ICOS requirements on meteorological parameters is not as stringent as the WMO requirements."

**SERIE 9**

- Il candidat* descriva il possibile utilizzo, nell'ambito delle tematiche del bando, delle principali metodiche (sia sperimentali che riguardante l'analisi dati) che ha potuto utilizzare nell'ambito della sua esperienza formativa e lavorativa.
- Il candidat* traduca il seguente brano tratto dal documento ICOS RI (2020): ICOS Atmosphere Station Specifications V2.0 (editor: O. Laurent). ICOS ERIC. https://doi.org/10.18160/GK28-2188 (2.2.4.Flask sampling). "Measurement of air periodically sampled in flasks at atmosphere stations allows additional parameter measurements (SF6, H2, CO2 stable isotopes …), which are not performed by in-situ continuous analyzers and an independent quality control for continuous in-situ measurements (cf 6.4). Moreover, a subset of the flasks can be analyzed for 14C in CO2 to allow determining the atmospheric fossil fuel CO2 component (ffCO2). Within the ICOS atmosphere network, the air must be sampled by an automatic

flask sampler, which will allow pre-defined sampling during suitable atmospheric conditions (cf. 3.1). Currently, the only
accepted automatic flask sampler meeting the ICOS requirements is the automatic flask sampler
designed and constructed at the Max Planck Institute for Biogeochemistry (MPI-BGC), available
from the CAL FCL."

**SERIE 10**

- Il candidat* descriva quella che ritiene essere la sfida tecnologica o scientifica più impegnativa con la quale ha dovuto confrontarsi durante la propria esperienza formativa/lavorativa.
- Il candidat* traduca il seguente brano tratto dal documento ICOS RI (2020): ICOS Atmosphere Station Specifications V2.0 (editor: O. Laurent). ICOS ERIC. https://doi.org/10.18160/GK28-2188 (2.2.6. Radon monitor): "At the present stage, Radon-222 measurements are not mandatory but recommended in ICOS (see Table 2). Radon-222 is recognized as a very valuable measurement, in particular for trace gas flux estimates. There are three different radon measurement principles in use at European and global atmospheric stations: (1) Measurement of Radon-222 (222Rn) with a two filter system (e.g. ANSTO system (e.g. Williams and Chambers, 2016)), (2) measurement of 222Rn daughters attached to aerosols and accumulated on one filter, and determination of 222Rn from its daughter activity assuming a heightdependent disequilibrium factor (e.g. Heidelberg system, Levin et al., 2002) and (3) direct measurements of 222Rn and 220Rn (thoron) concentrations based on the α spectrometry of 218Po and 216Po, respectively, on a implanted planar silicon detector surface and using a high electrostatic field (e.g. Grossi et al., 2020)."

**SERIE 11**

- Il candidat* descriva il possibile utilizzo, nell'ambito delle tematiche del bando, delle principali metodiche (sia sperimentali che riguardante l'analisi dati) che ha potuto utilizzare nell'ambito della sua esperienza formativa e lavorativa.
- Il candidat* traduca il seguente brano tratto dal documento ICOS RI (2020): ICOS Atmosphere Station Specifications V2.0 (editor: O. Laurent). ICOS ERIC. https://doi.org/10.18160/GK28-2188 (2.3.1. Continuous gas analyzer): "In order to limit the temperature variation around the instruments, it is highly recommended to install them inside a temperature controlled (ideally +/-2°C) room (e.g. air conditioning). The room temperature should be adapted to the site setup and meteorological conditions, neither too low to avoid possible condensation in the tubing in summertime (inside/outside temperature gradient must be limited) nor too high to avoid overheating instrument (reducing Hardware lifetime and instrument temperature regulation performance). A typical room temperature is around 23°C. Moreover, as instruments are mostly sensitive to rapid temperature variation, it should be ideally installed in an enclosed mounting rack to buffer temperature change potentially induced by the air conditioning air flow. This setup additionally limits the amount of dust particles around this instrument."

**SERIE 12**

- Il candidat* descriva quello che, a sua opinione, rappresenta il risultato più importante o rappresentativo ottenuto nel corso della sua esperienza formativa e lavorativa.
- Il candidat* traduca il seguente brano tratto dal documento ICOS RI (2020): ICOS Atmosphere Station Specifications V2.0 (editor: O. Laurent). ICOS ERIC. https://doi.org/10.18160/GK28-2188 (2.3.2. Meteorological sensors): “The sensor installation should be as compliant as possible to the WMO recommendation resumed in the WMO Guide to Instruments and Methods of Observation N°8 (WMO, 2018). The temperature and relative humidity sensor must be installed in a radiation shield (e.g. a Campbell MET 21 or a Vaisala DTR13) in order to provide a protection from the scattered as well as direct solar radiation and rain. The radiation shield must be well ventilated. However, in order to avoid failure and maintenance, ICOS recommends using a naturally ventilated large radiation shield which offers sufficient performance for ICOS purposes, instead of a forced ventilated radiation shield”

**SERIE 13**

- Il candidat* descriva quella che ritiene essere la sfida tecnologica o scientifica più impegnativa con la quale ha dovuto confrontarsi durante la propria esperienza formativa/lavorativa.
- Il candidat* traduca il seguente brano tratto dal documento ICOS RI (2020): ICOS Atmosphere Station Specifications V2.0 (editor: O. Laurent). ICOS ERIC. https://doi.org/10.18160/GK28-2188 (2.3.4. Flask sampling): “The flask sampler must have its own dedicated, independent sampling line. The sampling line must consist of 1300 Synflex tubing. The air must be sampled from the same location as the highest sampling height used for the continuous gas analysis. If O2 analysis will be carried out on any flask samples, then an aspirated radiation shield should be incorporated at the air inlet (Blaine et al., 2006; and see also section 5.2 for more details).”