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Improved precision in $^{40}\text{Ar}/^{39}\text{Ar}$ dating of young volcanic deposits using a multicollector noble gas mass spectrometer, SERNAGEOMIN, Santiago, Chile

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In 2013, as part of a program to complement the current MAP-based $^{40}\text{Ar}/^{39}\text{Ar}$ facility, SERNAGEOMIN installed a Thermo Scientific Argus VI mass spectrometer, equipped with a Photon Machines CO₂ laser. The most important goal of the new facility is the high-precision dating of young geological materials, bridging the ¹⁴C and $^{40}\text{Ar}/^{39}\text{Ar}$ methods. This goal can be accomplished by Argus' attributes as a low-volume, high-sensitivity, multicollector instrument, which has allowed us to measure the Fish Canyon sanidine standard with uncertainties below 10 ka (0.035%), and the Alder Creek 2 sanidine standard, using two single crystals, at $1,186.4 \pm 2.6$ ka (step-heating, FC 28.201 Ma), in agreement with other laboratories. So far we have successfully dated volcanic samples as young as 17.6 ± 2.1 ka on sanidines, and 24.6 ± 2.5 ka on groundmass, providing considerable overlap with the ¹⁴C method (<50 ka). Nevertheless, the success rate is limited by the dominance of atmospheric argon in the Ar budget of young samples. Consequently, we are introducing changes to the sample preparation procedure, such as reducing the grain size analyzed, improving the cleaning process, and adjusting the irradiation time and the preheating time; all of which will certainly increase our success rate. The new facility yields high-precision and accurate results, which will permit the construction of better constrained volcanic histories and more confident modeling of future volcanic events and their impact on the population.