TEPHRA ATTRIBUTION

Sample SV 45.40 - Glasses of juvenile fragments extracted from SV 45.40 define two clusters straddling the boundary between trachytes and phonolites. The first groups glasses with a SiO_2 content ca. 61 wt% and a K_2O/Na_2O ratio slightly higher than 1, a composition which is attributable to the Campanian Ignimbrite pyroclastic fall deposits. The second cluster has SiO_2 wt% varying between 61.7 and 57.6 and a K_2O/Na_2O ratio exceeding 2, which is a typical feature of glasses from the Pomici di Base (Somma-Vesuvius) eruption, which constraints this layer as younger than ca. 22 ka (Santacroce et al., 2008).

Samples SV 44.70 and SV 41.10 - The glasses extracted from the juvenile fragments that make up these layers belong to three chemical clusters, two of which are completely identical to those of the previous sample, and the third is phonolitic with SiO_2 around 59 wt% and a K_2O/Na_2O ratio of around 0.9, which are typical characteristics of glasses from the Mercato eruption (Somma-Vesuvius), the presence of which limits the age of the layer to less than 9 ka (Santacroce et al., 2008).

Sample SV 35.40 - The glasses of the juvenile fragments are grouped into three distinct clusters, one belonging to the trachyte fields, another along the boundary between trachyte and phonolite, and a third belonging to the phonolite field. These have been attributed to the Pomici di Base (Somma-Vesuvius; ca. 22 ka), Monte Spina (Campi Flegrei; ca. 4.5 ka, Smith et al., 2011) and Avellino (Somma-Vesuvius; 3870 cal yrs BP, Passariello et al., 2009) eruptions, respectively, which is the age beyond which this layer cannot be older.

Sample SV 33.50 - The glasses of all juvenile fragments extracted from this layer are phonolitic in composition (Fig. $8a_1$,a_2) and well correspond to the composition of the protohistoric AP2 (Somma-Vesuvius) eruption (Rolandi et al., 1998; Santacroce et al., 2008), dated to 3380± 23 y (Passariello et al., 2009), which corresponds to 3615 cal yrs BP.

Sample SV 31.80 - Glasses of juvenile fragments extracted from SV 31.80 define two clusters straddling the boundary between trachyte and phonolite, allowing us to identify the presence of both CI and Pomici di Base fragments (Fig. $8b_1$, b_2). A third smaller cluster straddles the boundary between phonolites and tephriphonolites and can be related to the glasses of the protohistoric AP4 (Somma-Vesuvius) eruption, for which an exact age is not available in the literature. According to Rolandi et al. (1998), it could be younger than 2800 yrs cal BP,

but many marine age models suggest that the AP3 eruption, the protohistoric eruption which precedes AP4 found in the FSV sequence, should have occurred around 3.4 ka (see Totaro et al., 2022 and references therein).

Sample SV 27.70 - Glasses of this layer have the same features of those of sample SV 45.40, and are ascribed to Campanian Ignimbrite (Campi Flegrei) and Pomici di Base (Somma-Vesuvius) eruptions, giving no useful age constraint.

Sample SV 26.10 - The glasses of juvenile fragments making up this layer are very variable in composition, since they define two clusters in the trachyte field, distinguishable on the basis of the K_2O/Na_2O ratio and on the SiO_2 wt% content and corresponding, respectively, to Campanian Ignimbrite and Monte Spina eruptions (both from Campi Flegrei). Other two clusters fall in the phonolite field, distinguishable on the basis of the Na_2O content, which is higher (ca. 9 wt%) for the almost aphyric pumices of the Avellino eruption (Somma-Vesuvius), and lower (ca. 5.5 wt%) for the leucite bearing CE 79 (Somma-Vesuvius) pumice fragments, which, according to our first appearance approach, implies that this level could not be older than CE 79.

Sample SV 25.50 - Two phonolitic clusters group the juvenile fragments of this layer, fully comparable with those of sample SV 26.10.

Sample SV 22.50 - All the juvenile fragments that make up this primary tephra layer are foiditic to phonotephritic in composition and well comparable with the composition of the juvenile fragments of the CE 472 (Pollena) eruption from Somma-Vesuvius (Santacroce et al., 2008; Melluso et al., 2022).

Sample SV 9.50 - The glasses from juvenile fragments of this primary tephra layer are low-silica phonolites (Fig. 8c_1,c_2) and well resemble the composition of the glasses extracted from the Somma- Vesuvius 1631 eruption (Santacroce et al., 2008).

Fig. 1SM - Grain-size cumulative plots of the fraction coarser than 250 micron for the primary samples SV 9.30 and SV 22.10, and for the reworked samples SV 31.80 and SV 35.40

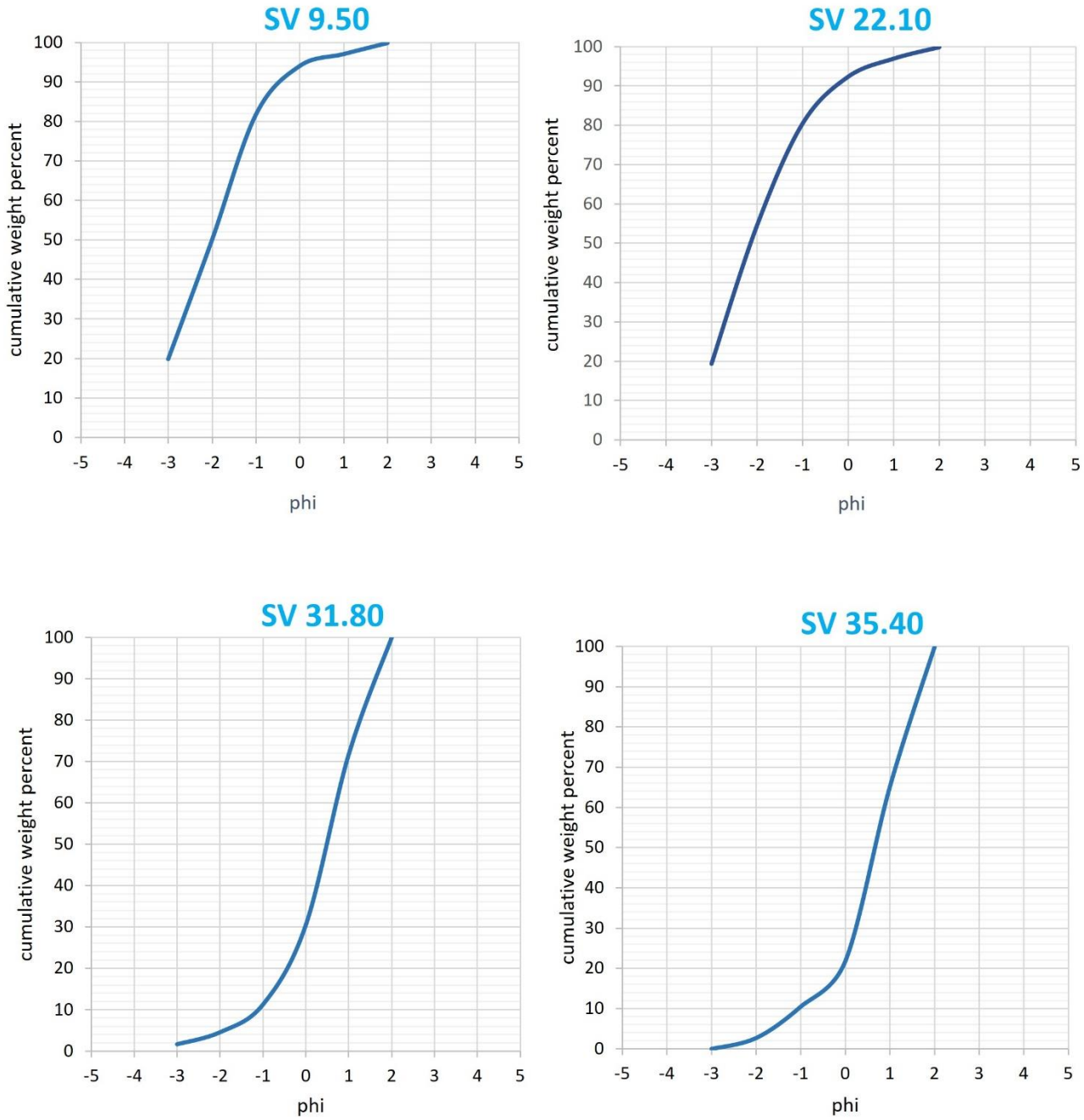
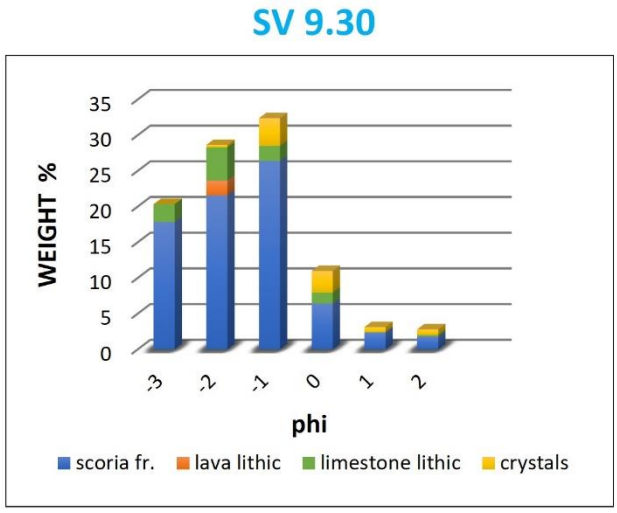
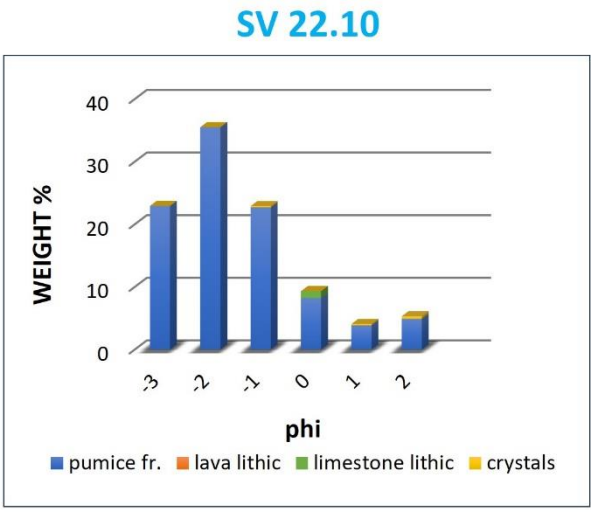
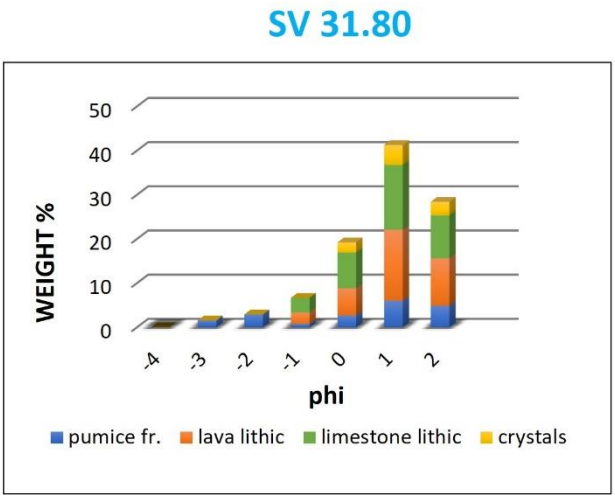


Fig. 2SM - Lithological component analysis of the fraction coarser than 250 micron for the primary samples SV 9.30 and SV 22.10, and for the reworked samples SV 31.80 and SV 35.40







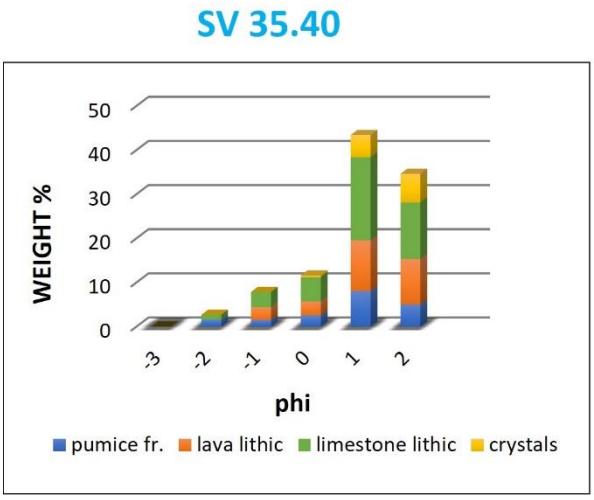
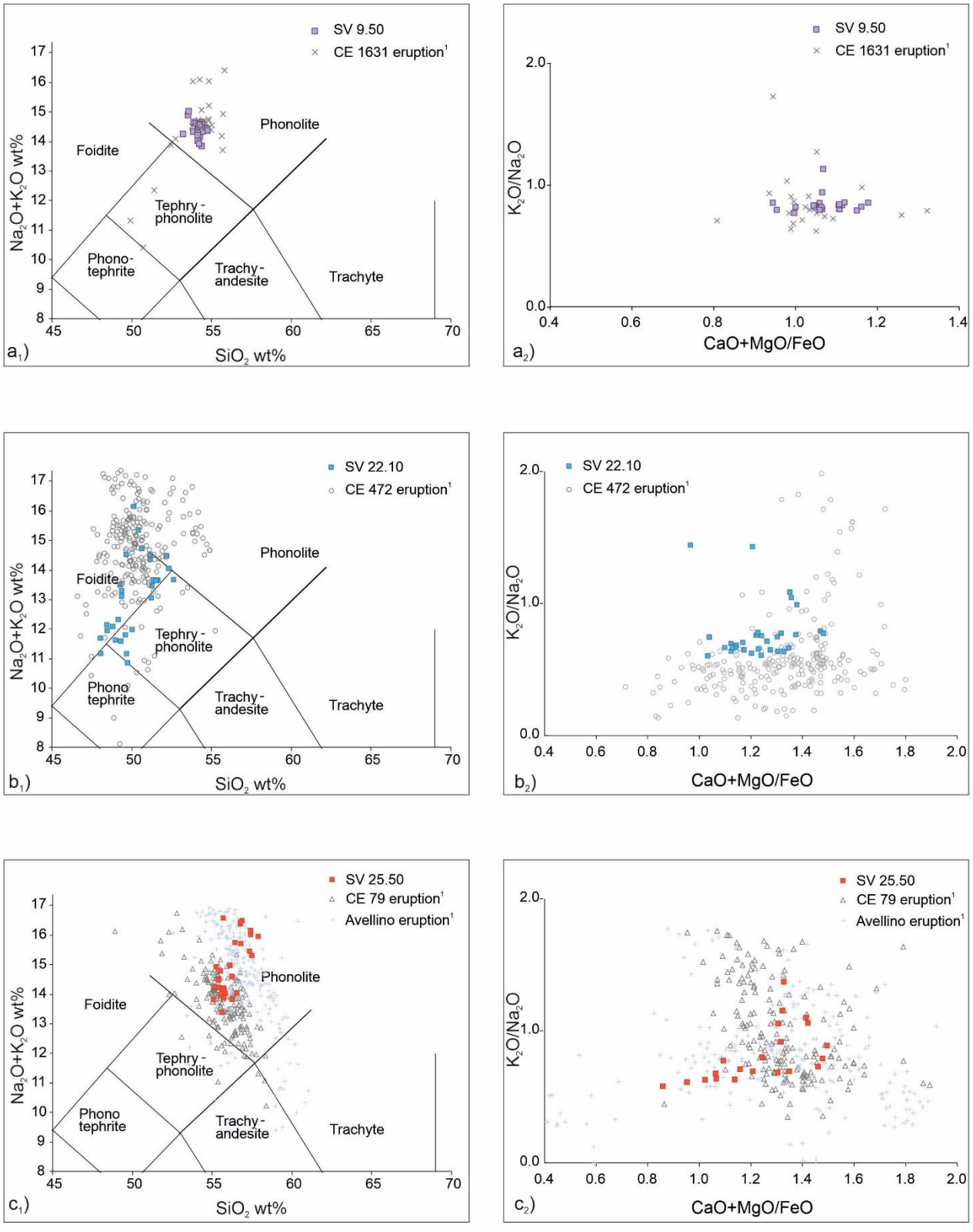
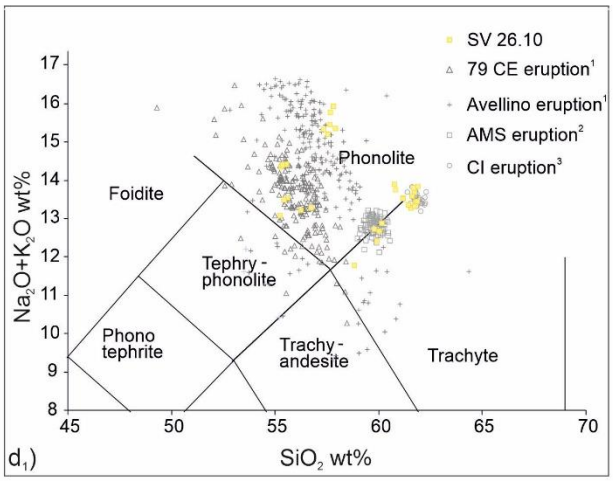
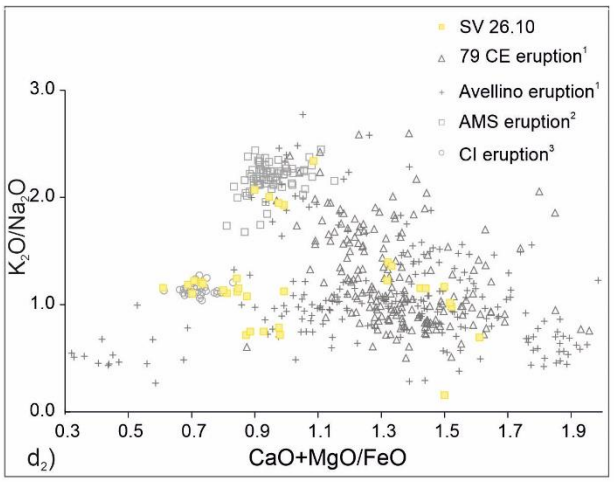
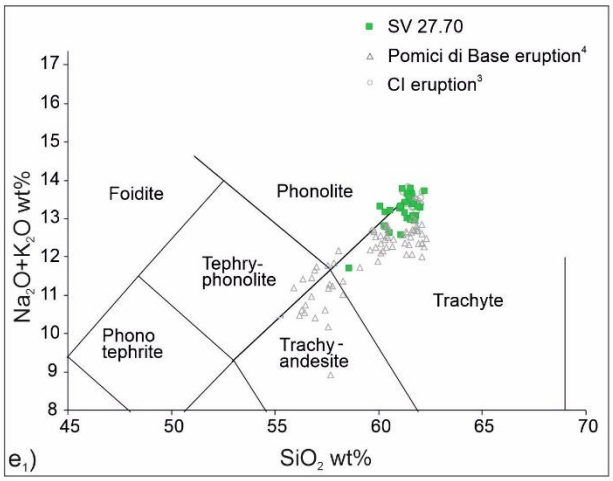


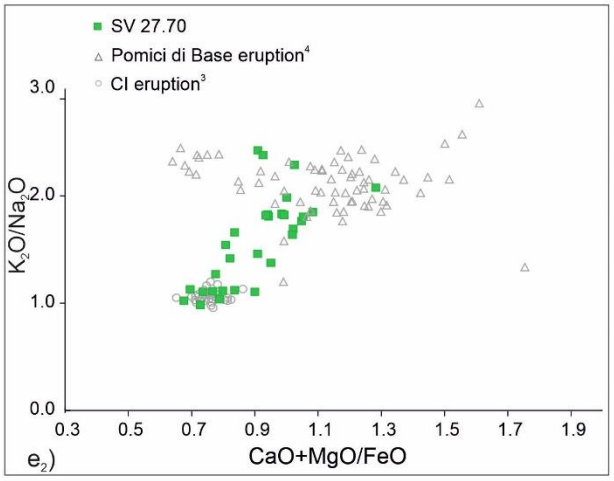
Fig. 3SM – Total Alkali – silica plots (a_1, b_1, c_1, etc.) and CaO+MgO/FeO vs K_2O/Na_2O plots (a_2, b_2, c_2, etc.) for glasses extracted from juvenile fragments of the investigated tephra layers compared to the products of the correlative eruptions. (1) data from Santacroce et al. (2008); (2) data from Smith et al. (20112); (3) data from Tomlinson et al. (2012); (4) data from Pappalardo et al. (2018).

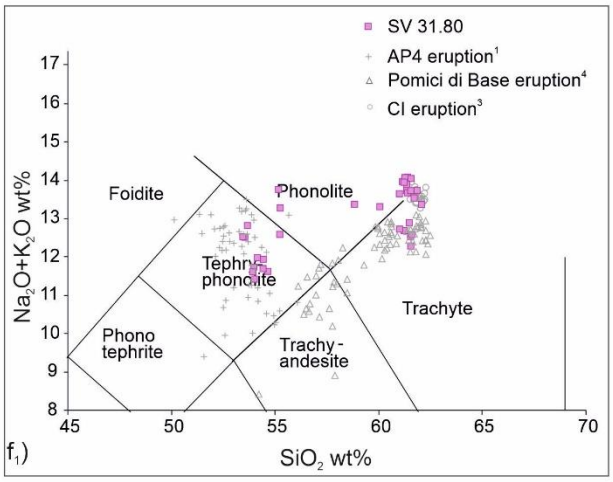


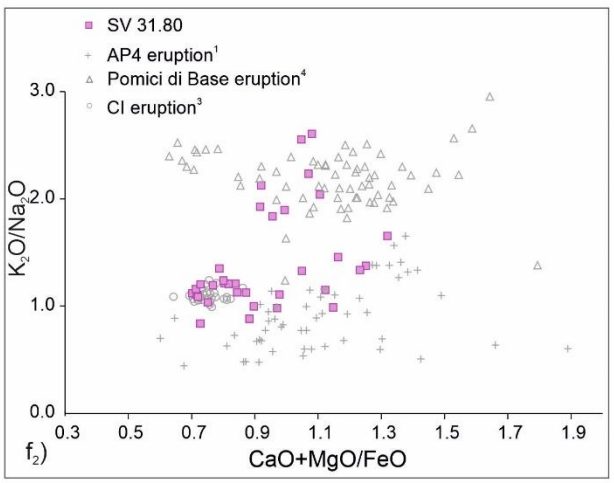

SV 26.10
79 CE eruption[1]
Avellino eruption[1]
AMS eruption[2]
CI eruption[3]
Foidite
Phonolite
Tephry - phonolite
Phono tephrite
Trachy - andesite
Trachyte
Na2O+K2O wt%
SiO2 wt%
d1)

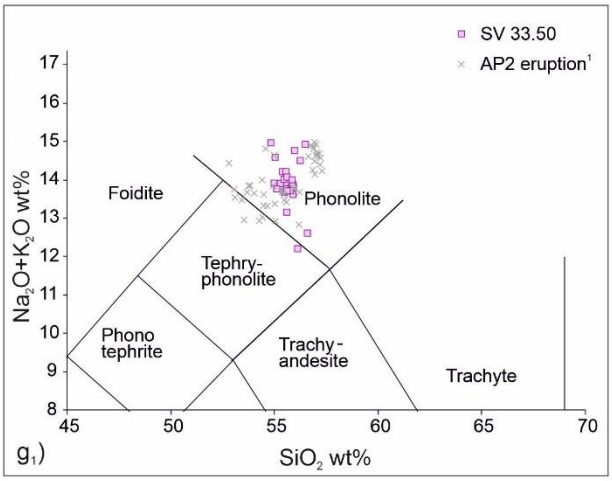

SV 26.10
79 CE eruption[1]
Avellino eruption[1]
AMS eruption[2]
CI eruption[3]
K2O/Na2O
CaO+MgO/FeO
d2)

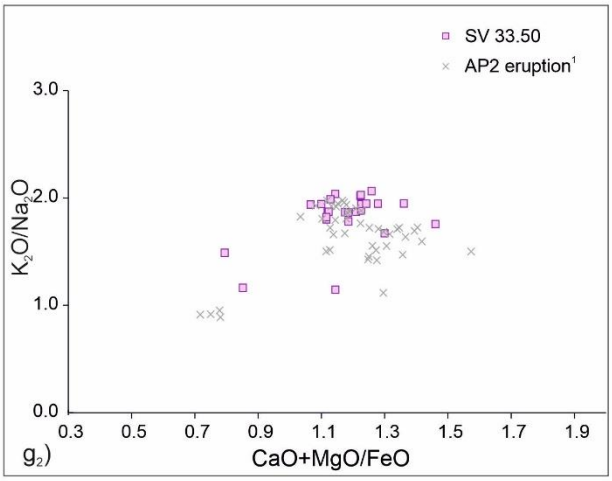

SV 27.70
Pomici di Base eruption[4]
CI eruption[3]
Foidite
Phonolite
Tephry- phonolite
Phono tephrite
Trachy - andesite
Trachyte
Na2O+K2O wt%
SiO2 wt%
e1)

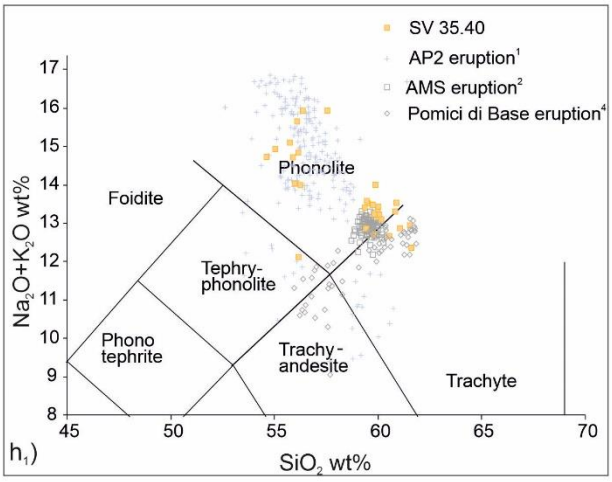

SV 27.70
Pomici di Base eruption[4]
CI eruption[3]
K2O/Na2O
CaO+MgO/FeO
e2)

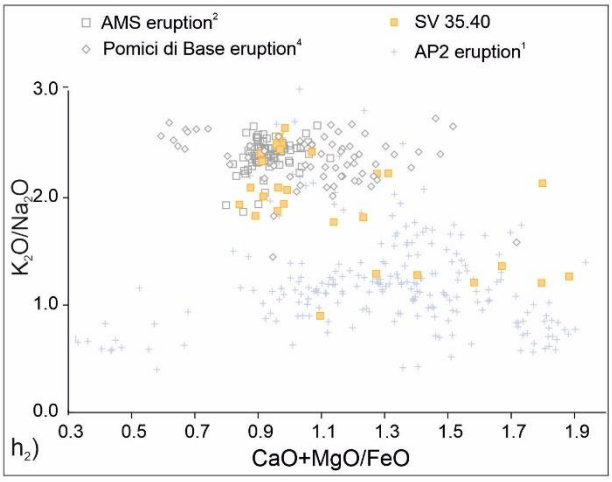

SV 31.80
AP4 eruption[1]
Pomici di Base eruption[4]
CI eruption[3]
Foidite
Phonolite
Tephry- phonolite
Phono tephrite
Trachy - andesite
Trachyte
Na2O+K2O wt%
SiO2 wt%
f1)

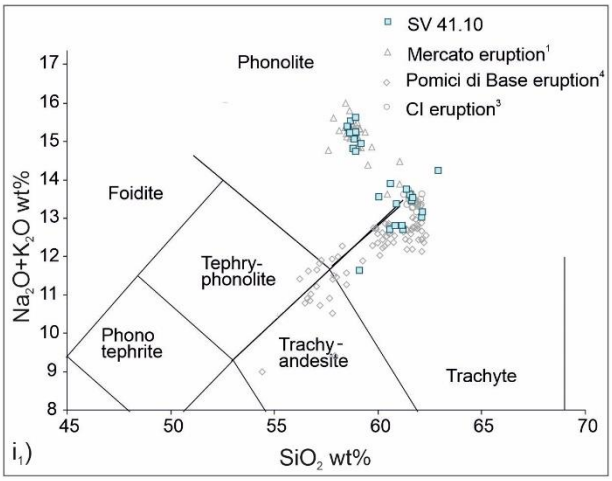

SV 31.80
AP4 eruption[1]
Pomici di Base eruption[4]
CI eruption[3]
K2O/Na2O
CaO+MgO/FeO
f2)

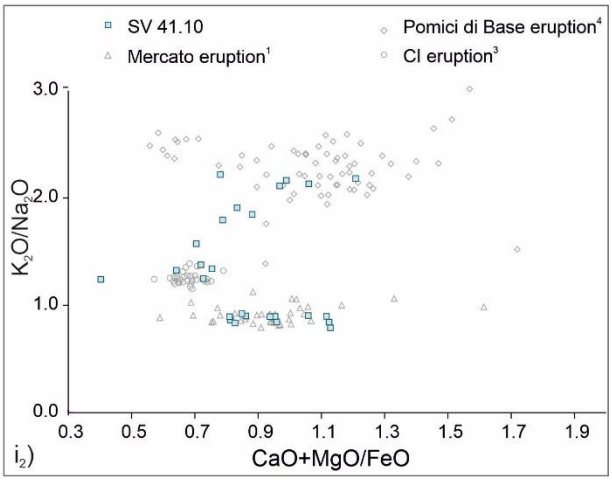

SV 33.50
AP2 eruption[1]
Foidite
Phonolite
Tephry-phonolite
Phono tephrite
Trachy-andesite
Trachyte
Na2O+K2O wt%
SiO2 wt%
g1)

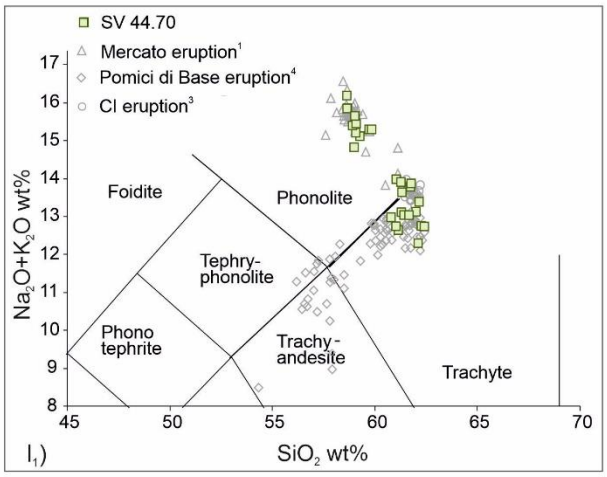

SV 33.50
AP2 eruption[1]
K2O/Na2O
CaO+MgO/FeO
g2)

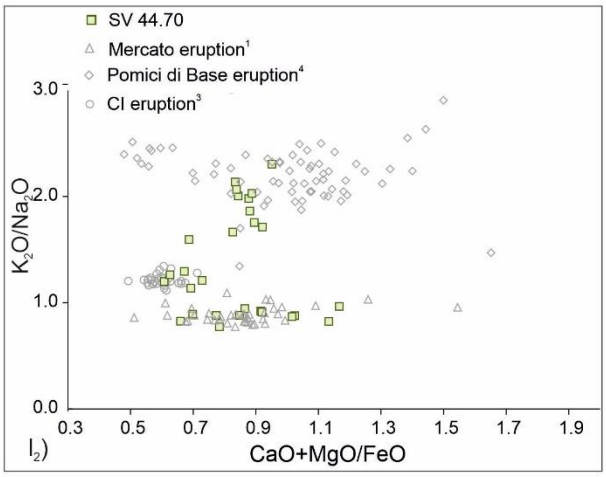

SV 35.40
AP2 eruption[1]
AMS eruption[2]
Pomici di Base eruption[4]
Phonolite
Foidite
Tephry-phonolite
Phono tephrite
Trachy-andesite
Trachyte
Na2O+K2O wt%
SiO2 wt%
h1)

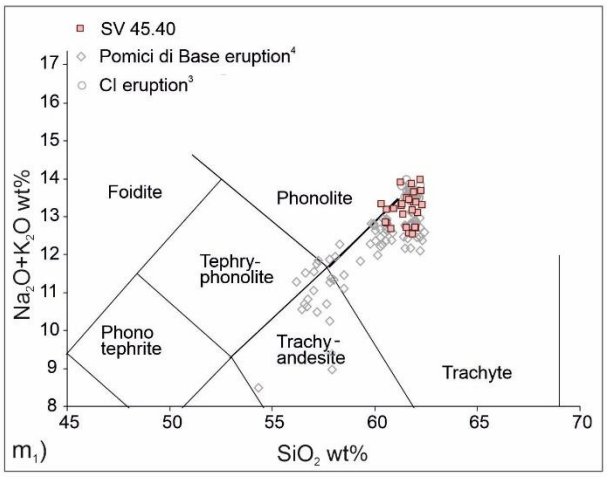

AMS eruption[2]
SV 35.40
Pomici di Base eruption[4]
AP2 eruption[1]
K2O/Na2O
CaO+MgO/FeO
h2)

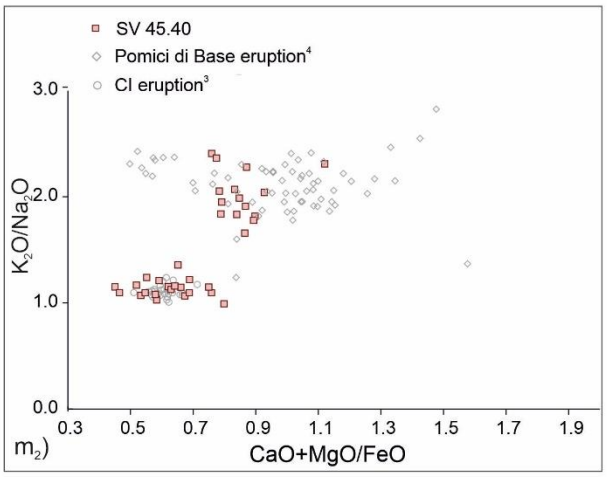

SV 41.10
Mercato eruption[1]
Pomici di Base eruption[4]
CI eruption[3]
Phonolite
Foidite
Tephry-phonolite
Phono tephrite
Trachy-andesite
Trachyte
Na2O+K2O wt%
SiO2 wt%
i1)


SV 41.10
Mercato eruption[1]
Pomici di Base eruption[4]
CI eruption[3]
K2O/Na2O
CaO+MgO/FeO
i2)


SV 44.70
Mercato eruption[1]
Pomici di Base eruption[4]
CI eruption[3]
Foidite
Phonolite
Tephry-phonolite
Phono tephrite
Trachy-andesite
Trachyte
Na2O+K2O wt%
SiO2 wt%
l1)


SV 44.70
Mercato eruption[1]
Pomici di Base eruption[4]
CI eruption[3]
K2O/Na2O
CaO+MgO/FeO
l2)


SV 45.40
Pomici di Base eruption[4]
CI eruption[3]
Foidite
Phonolite
Tephry-phonolite
Phono tephrite
Trachy-andesite
Trachyte
Na2O+K2O wt%
SiO2 wt%
m1)


SV 45.40
Pomici di Base eruption[4]
CI eruption[3]
K2O/Na2O
CaO+MgO/FeO
m2)

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