

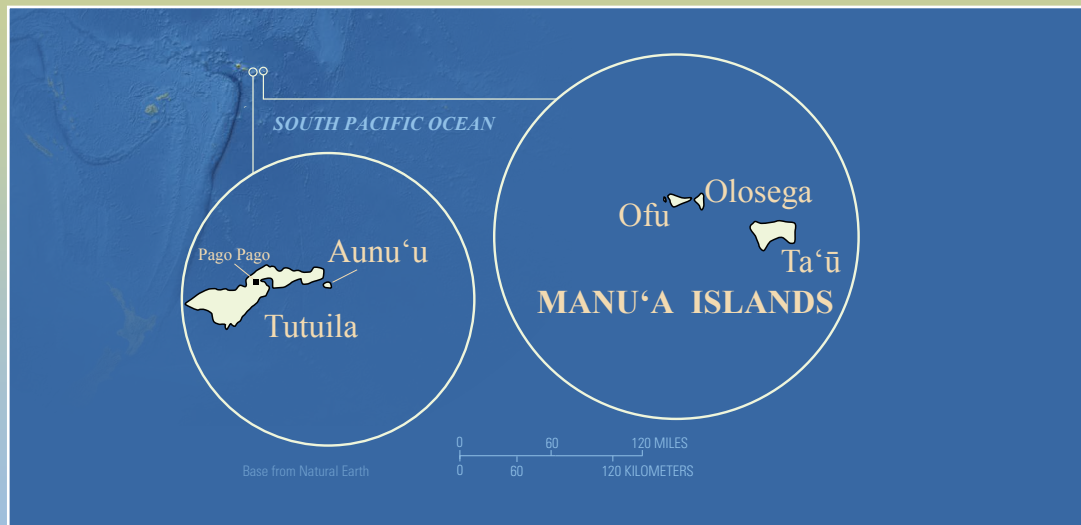


Mauga Mū a Amerika Samoa

Volcanoes of American Samoa

Upu Amata

O le Atu-Samoa o le tasi lenei o fa'asologa motu mauga mu i le Vasa Pasefika i Saute. O motu e pito i sasa'e o nei fa'asologa mauga mu o le Atu-Samoa, o motu ia o Amerika Samoa. E tofu lava mauga mu ta'itasi o Amerika Samoa ma ona talaaga aemaise tulaga e tutupu e ono pa ai i le lumanai. O lo'o galulue fa'atasi le Ofisa o le U.S. Geological Survey (USGS) ma le National Oceanic and Atmospheric Administration Ofisa Va'ai Tau i Pago Pago e faailoa i tagatanu'u ma tagata asiasi o tulaga lamatia e ono tutupu. O lo'o fa'apupula atili atu i'i auala na gaosia ai motu nei fa'apea auala o lo'o fesoasoani ai le vaega e mata'ituina mauga mū e puipui tagata ma mea-totino mai tulaga lamatia o mauga mū.



Introduction

American Samoa comprises the easternmost islands of a volcanic island chain in the South Pacific Ocean. Each island of American Samoa has a unique eruptive history and a possibility for future eruptions. The U.S. Geological Survey (USGS) collaborates with the Pago Pago office of the National Oceanic and Atmospheric Administration National Weather Service to inform residents and travelers of potential hazards. Insights are provided herein on how the islands formed and how volcano monitoring helps protect people and property from volcanic hazards.

Amerika Samoa, O Fa'asologa Mauga Mu

O Amerika Samoa e fā motu e nonofo ai tagata: Tutuila, Aunu'u, Ofu-Olosega, ma Ta'u. O motu ta'itasi ua na o se vaega e pito i luga o se mauga mū telē. O le telē o le vaega o le mauga mū o lo'o lilo i lalo ifo o le sami. O se fa'ata'ita'iga, e silia ma le 12,000 futu (ft; 3,600 mita [m]) le maualuga o le mauga mu o Ta'u mai lona alitaitai o le sami, ae o le motu o Ta'u mai luga o le sami e na'o le 3,179 ft (969 m) le maualuga. O le mauga mu o loo ola ma tupu pea mai le gasologa o mauga mu, o le mauga mu o loo lilo i lalo o le sami o Vailulu'u, o lo'o i sasa'e o le motu o Ta'u. O mauga mū ta'itasi na amata mai ina ua se'e ese le papa o le Pasefika mai sasa'e aga'i i sisifo i luga o se tumutumu mauga mu, e ta'itutusa ma lalata i le fa'avae i le fa'asologa o atumotu o Hawai'i.

O le tala fa'asolopito o le pā mai o mauga mū o Amerika Samoa e faitau miliona tausaga, ma o motu mauga mū ta'itasi na pa mai i le 10,000 tausaga ua mavae. E ui lava ona seāseā pa ni mauga mū i Amerika Samoa, ma mavae atu 'auga tupulaga i le va o mea na tutupu, o le tala fa'asolopito o fa'afanua o atumotu o lo'o ta'u mai ai e ono iai ni pa i le lumana'i i so'o se tasi o nei mauga mū. O le mea lea, ua fausia ai e le USGS se feso'ota'iga e mata'itūina ai gaiōiga i motu uma ina ia fesoasoani i saienisi fua mafui'e ma gaiōiga a le eleele i mauga mū. O nei fa'amatalaga e mafai ona iloilo ai lamatiaga fa'alēnatura e ono tula'i mai ma maua ai e tagata le taimi e sauniuni ai, tali atu ai, ma faia ni fa'ai'uga e fa'asaoina ai ola ma meatotino pe a tupu mai se mea i mauga mū.

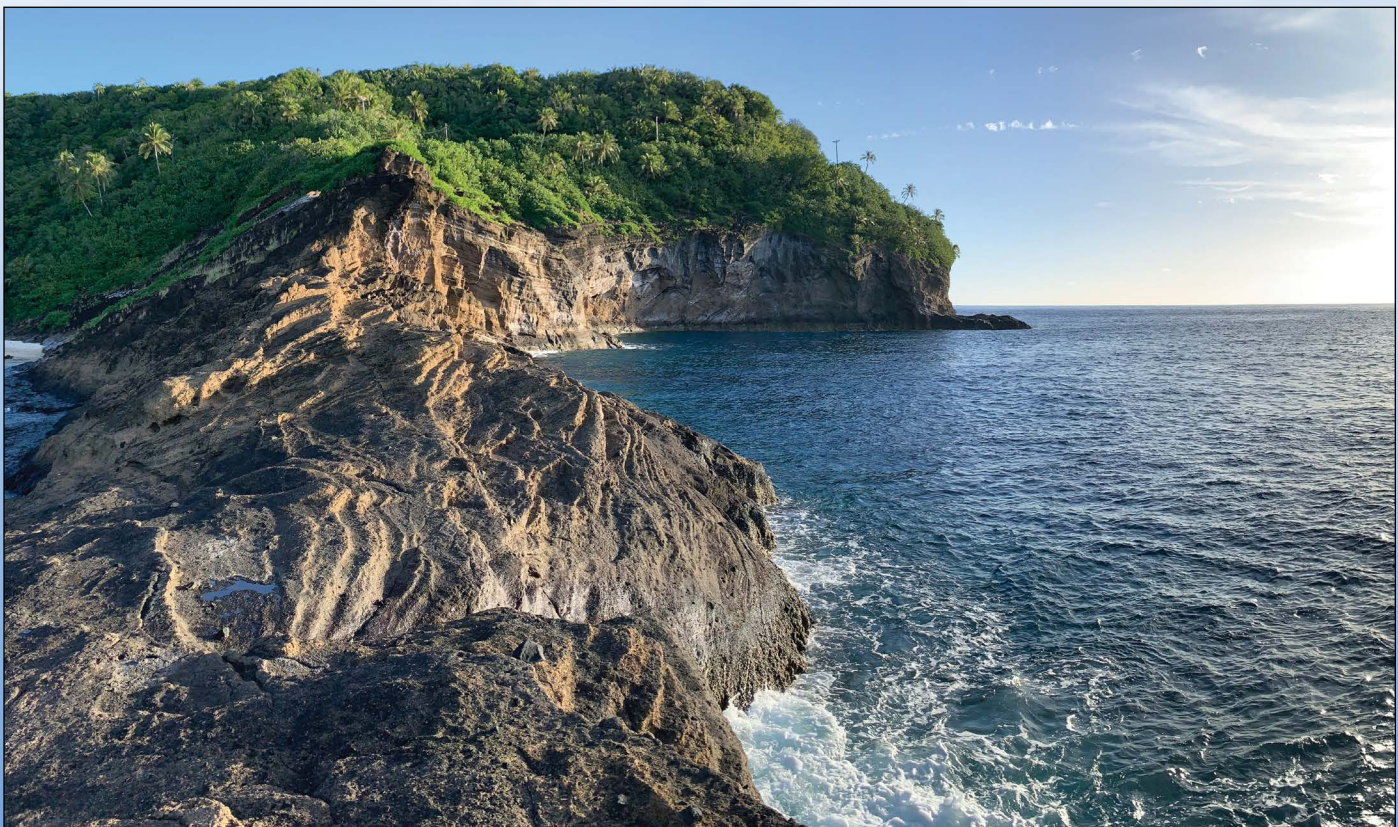
American Samoa, A Volcanic Island Chain

American Samoa comprises four populated islands: Tutuila, Aunu'u, Ofu-Olosega, and Ta'u. Each island is the top part of a larger volcanic structure that extends beneath sea level. For example, Ta'u volcano rises more than 12,000 feet (ft; 3,600 meters [m]) above the seafloor, but Ta'u Island forms the topmost 3,179 ft (969 m) of the volcano above sea level. The most active area of the volcanic island chain is a submarine seamount, Vailulu'u, that has yet to rise above sea level to the east of Ta'u Island. Each volcano was formed in succession as the Pacific tectonic plate moved from east to west over a volcanic hotspot, similar to the formation of the Hawaiian Islands chain.

The eruptive history of American Samoa spans millions of years, and each volcanic island has erupted within the last 10,000 years. Although eruptions in American Samoa are rare, and generations can pass between events, the geologic history of the islands indicates that future eruptions are likely at any of these volcanoes. Therefore, the USGS has installed a monitoring network across the islands to help scientists measure earthquakes and ground movement at the volcanoes. This information can be used to assess potential natural hazards and provide people the time needed to prepare, respond, and make decisions to save life and property in the event of volcanic activity.

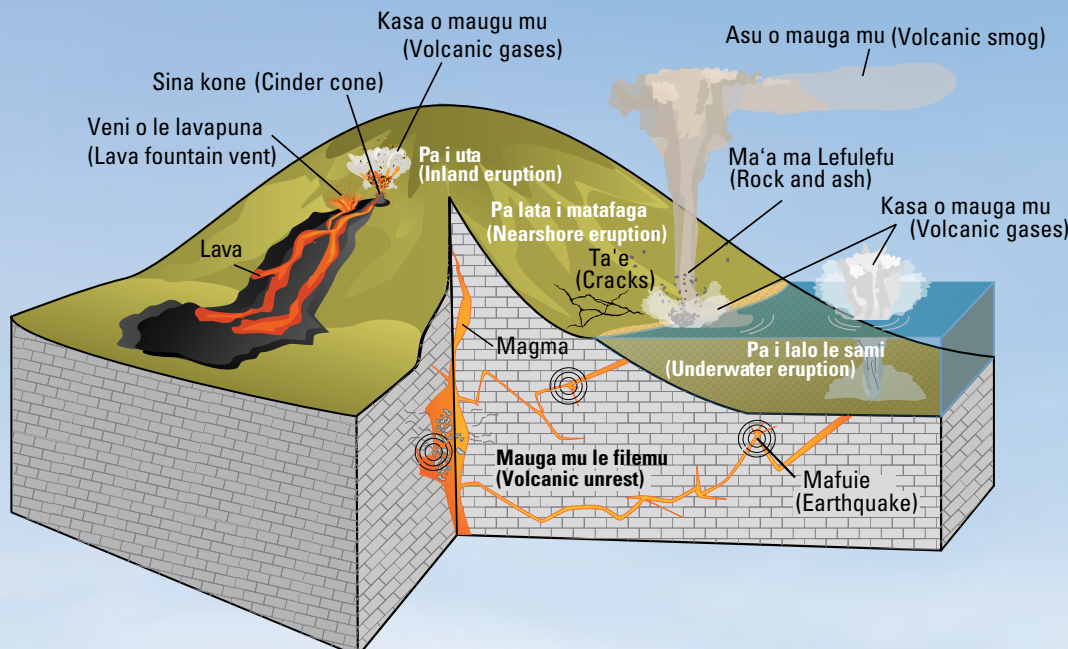
O le gutu o le mauga mū i matū i sisifo o le motu o Ta'u, o lo'o va'aia i le pito i luma ma tanumia i vao i le pito i tua, na fausia ona ua fetaia'i ma filogia ma'a a'asa ma vai eleele po'o ua fetaia'i fo'i ma le suāsami. Ata pu'eina e D. Downs, U.S. Geological Survey.

The tuff cone in the northwest of Ta'u Island, seen in the foreground and beneath vegetation in the background, formed when hot magma interacted either with shallow groundwater or seawater. Photograph by D. Downs, U.S. Geological Survey.



Ituaiga Gaioiga O Mauga Mu i Amerika Samoa

Types of Volcanic Activity in American Samoa



Mauga Mu Ua Lē Filemu.—O le ituaiga o gaioiga o mauga mu e sili ona ta'atele, o le “Mauga Mu Lē Filemu” ae le o'o i se tulaga e pa ai, e pei ona va'aia i le 2022 i le Mauga Mu o Ta'ū. O le mauga mu o lo'o i se tulaga o le “lē filemu” pe a ese lona amio mai lona tulaga masani. O le tulaga lē filemu e aofia ai ma mafui'e, o suiga va'aia po o gaioiga fō'i i le laueleele, fa'apea ma le kasa ua fa'asalalauina i le ea. O ia amioga e feso'ota'i ma tugā e mafua mai i gaioiga o le elelee a'asa i lalo/totonu o le mauga mu ma e ono tumau mo ni aso ma vaiaso. I taimi e lē filemu ai se mauga mu, e ono fa'alogoina e tagata ni mafui'e pe va'aia fō'i le mavaevae o le laueleele. E mafai fō'i ona fa'amateina la'au po'o i'a ona o le kasa o mauga mu. O tulaga lē filemu o mauga mu—e tusa lava pe fa'aumiumi pe malosi—e le o taimi uma e i'u ai i se pa.

Lalo o le Sami.—O nisi o taimi, e tutupu mauga mu i totonu o le loloto o le sami ma e le va'aia ai le lava tatafe po o nisi amioga o mauga mu i luga o le sami. E mafai pea ona lagonaina e tagata le mafui'e, sosogi le manogi o le kasa, va'aia i'a mamate, o otaota opeopea, po o suiga fō'i i le lanu o le sami. I nisi o tulaga, e lē va'aia nei fa'aailoga ona e loloto tele le mea o lo'o pa ai le mauga mu i lalo o le sami.

Uta.—O se mauga mu i luga o le fogaeleele e mafai ona maua mai ai le lava tatafe, o ma'a pā pā ma lefulefu, po o le kasa salalau solo. E mafai ona tatafe le lava i le tele o maila e pei o se vaiatafe lanu moli susulu ma le uliuli pe sosolo fō'i i luga o le laueleele pei se lanu siliva fe'ilafi ma totoga a'e ai isi lava tatafe. I le gutu o le pā, e mafai ona lia'i mai ai ma'a liusuavai a'asa e ta'ua o le cinder cones. E mafai ona iai pā i so'o se pito o le mauga ma mafua mai ai le efuefu ma le kasa e ave e le savili i so'o se mea e agi ai.

Lata i Matafaga.—E ono fetaiia le lava vevela ma le malulu tele o vai o loo i le manava o le elelee poo le suasami o le gataifale. O lenei fetaiiaiga e mafua ai le pupuna vave o le vai e ave ma ausa, i le tele o taimi e liu efuefu ai le pa pa o ma'a ma papa. E tele ma maualuga foi le agai i luga o ma'a ma le lefulefu i le ea ma le afe o futu (selau o mita) le mamao o ma'a mai le veni.

Volcanic unrest.—The most common type of volcanic activity is volcanic unrest that does not escalate to an eruption, as experienced in 2022 at Ta'ū volcano. A volcano is in a state of “unrest” when it behaves differently than its normal state. Unrest can include earthquakes, visible or measurable ground movement, and increased gas release. Such behavior is linked to stresses caused by magma movement beneath the volcano and can last for days to weeks. During volcanic unrest, people may feel earthquakes or see ground cracks. Volcanic gas emissions can also kill vegetation or fish. Volcanic unrest—even prolonged or vigorous—does not always culminate in an eruption.

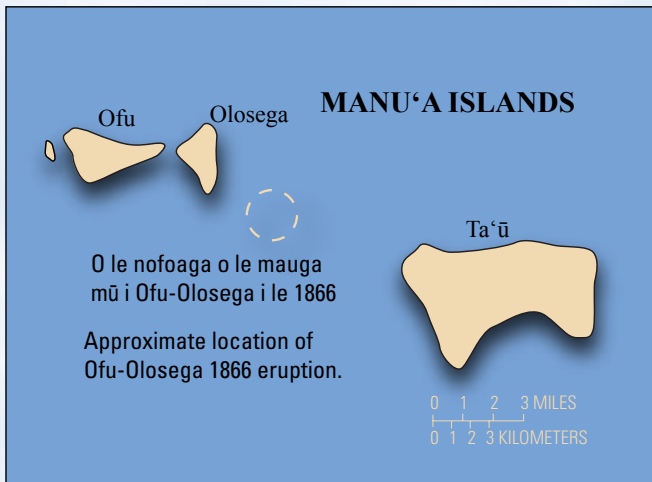
Underwater.—Sometimes, a volcanic eruption occurs deep enough underwater that lava or ejected materials do not breach the ocean surface. Observers may still feel earthquakes, smell gas, and see dead fish, floating debris, or ocean water discoloration. In some instances, the eruption could be so deep that nothing is visible or noticeable at the ocean's surface.

Inland.—An eruption on land can produce lava flows, explosions of rock and ash, and volcanic gases. Fountains of lava can feed lava flows that may travel several miles downhill. They appear as glowing orange and black rivers of molten rock or shimmering silver masses that creep across the landscape and sprout lobes of smaller flows. At the volcanic vent, spatter of molten rock can form into cone-shaped mounds called cinder cones. Vents can open anywhere on the volcano and—if the volcanic activity is explosive enough—produce ash and gas carried downwind.

Nearshore.—Rising hot magma can encounter shallow and much colder groundwater or seawater in coastal areas. This encounter causes the water to boil rapidly into steam, which often results in an explosive reaction that can pulverize bedrock, send an immense column of rock and ash into the air, and deposit rock debris thousands of feet (hundreds of meters) away from the vent.

Pa o le Mauga Mu o Ofu-Olosega (1866)

I le aso 7 o Setema, 1866, e tolu i le fa mafuie i le itula na faalogoina e tagatanuu o Manu'a (motu o Ofu-Olosega ma le motu o Ta'u). I le lima aso mulimuli ane, ua va'aia ai efuefu ma a'usa mai le sami pe tusa o le 2 maila (3 kilomita, km) I sasa'e o le motu o Olosega. I le tolu o aso talu ona pa, sa matua tele le efuefu i le ea ua le mafai ai e tagata o Ta'u ona iloa atu Ofu-Olosega, e itiiti ifo ma le 7 maila (11 km) le mamao. I le taimi a'o pa le mauga mu, o efuefu na o'o atu i le 2,000 ft (600 m) le mamao i luga a'e o le sami le pa, o mafui'e ua luluina ai motu, o nisi fo'i suasami ua liu samasama, o i'a mamate ua tafefea i le matafaga. Pe tusa ma le lua masina na pa ai le mauga mu.



O se ripoti mai le nusipepa i le mauga mu i Ofu-Olosega i le 1866 (ripotia e Manchester Guardian, Aperila 17, 1867).

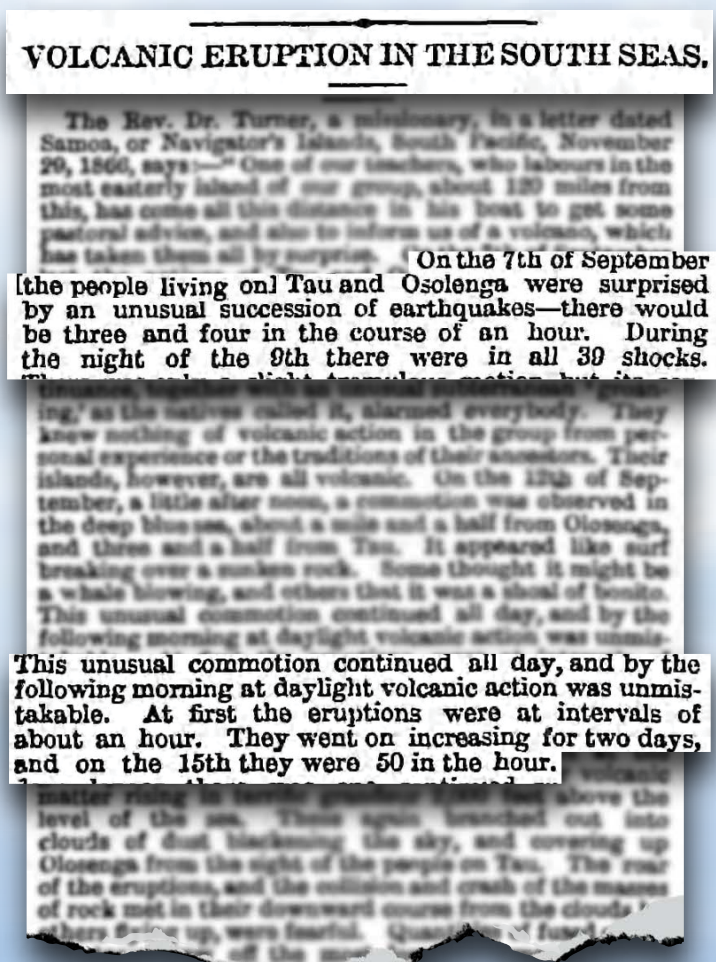
A newspaper clipping reports the Ofu-Olosega 1866 eruption (Manchester Guardian, April 17, 1867).

Mauga Mu Lē Filemu i Ta'u (2022)

Mai le fa'ai'uga o Iulai i le amataga o Seteme 2022, na luluina ai ni fa'aputuga mafia'e laiti i le atu motu o Manu'a a'o fegai le Mauga Mu o Ta'u ma se vaitaimi o le "Le Filemu." I le taimi na luluti ai le tele o mafui'e, pe a ma se 30 mafui'e i le aso sa lagonaina e tagata, ma o le mafui'e e piti sili lona malosi e 4.0. Ina ua amata le gaoiga a le mauga mu, e le i iai se masini e fua ai le malosi o le mafui'e, ma iloa ai gaoiga o le mauga mu i Amerika Samoa. Peita'i, na mafai e le USGS ona maua vave masini fua mafui'e ia iloa ai gaoiga o le mauga mu. I le amataga o Setema, ua va'aia le fa'a'itiitia o le gaoiga o le mauga mu.

Eruption at Ofu-Olosega Volcano (1866)

On September 7, 1866, three to four earthquakes per hour rattled the residents of the Manu'a Islands (Ofu-Olosega Islands and Ta'u Island). Five days later, a column of ash and steam erupted from the ocean about 2 miles (3 kilometers [km]) east of Ofu-Olosega. Three days into the eruption, enough ash was in the air that people on Ta'u Island could not see Ofu-Olosega, less than 7 miles (11 km) away. During the eruption, explosions of volcanic ash reached up to 2,000 ft (600 m) above sea level; earthquakes shook the islands, some ocean water turned a sulfur-yellow hue, and many fish killed in these events washed ashore. The eruption lasted for about two months.



Volcanic Unrest at Ta'u Volcano (2022)

From late July to early September 2022, many small earthquakes shook the Manu'a Islands when Ta'u volcano experienced a period of volcanic unrest. During the peak of unrest, residents felt as many as 30 earthquakes per day, and the largest measured event was around magnitude 4. When the unrest began, there was no monitoring equipment in American Samoa. The USGS Hawaiian Volcano Observatory quickly deployed new instruments to track volcanic activity. By early September, earthquake activity declined to background levels.

Fa'ailo mo Mauga Mu ma Fa'ailoga Lanu mo Va'alele

O le ofisa o le USGS e tu'uina maia fa'ailo o mauga mu fa'apea le fa'ailoga lanu e fa'amatala ai le a'afiaga mo va'alele. O fa'ailo o mauga mu e fa'ailoa atu ai i tagata i luga o le eleele le tulaga ua o'o ai se mauga mu, a o fa'ailoga lanu e ta'u atu ai i le 'au ave va'alele a'afiaga ma tugā mata'utia mo latou. E tu'u atu pea fa'asilasilaga i taimi e fa'atupula'ia ai pe fa'aitiitia fo'i gaoiiga o mauga mu fa'apea ma fa'amatalaga i ona suiga, ona a'afiaga, ma mea tutupu ai.

Volcano Alert Levels and Aviation Color Codes

The USGS issues Volcano Alerts and Aviation Color Codes for the volcanoes of American Samoa. Volcano Alert Levels inform people on the ground about a volcano's status, whereas Aviation Color Codes inform the aviation sector about flight hazards. Notifications are issued for both increasing and decreasing volcanic activity and are accompanied by details about the change in condition, potential volcanic hazards, and likely outcomes.

Fa'ailo mo Mauga Mu Volcano Alert Levels

Tulaga Masani Normal

O lo'o iai le mauga mu i lona tulaga masani, e lē pa, po'o ua suia mai i se fa'ailo maualuga, o gaoiiga ua fa'aitiitia ma ua toe fo'i i le lē pa.

Volcano is in typical background, noneruptive state or—after a change from a higher level—volcanic activity has ceased, and volcano has returned to noneruptive background state.

Fautuaga Advisory

O le mauga mu ua fa'aalia fa'ailoga ua si'isi'i gaoiiga, po'o ua suia mai i se fa'ailo maualuga, po'o gaoiiga ua fa'aitiitia ma o lo'o fa'aaauu pea ona mata'ituina mo ni isi suiga fou.

Volcano is exhibiting signs of elevated unrest above known background level or—after a change from a higher level—volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase.

Nofo Va'ava'aia Watch

Ua si'isi'i le lē filemu o le mauga mu ma ua si'isi'i fo'i le avanoa e ono pa ai, i se taimi le mautinoa, po'o o le a pa fo'i ae fa'aitiitia lona mata'utia.

Volcano is exhibiting heightened or escalating unrest with increased potential of eruption, timeframe uncertain, or eruption is underway but poses limited hazards.

Lapata'iga Warning

Ua masalomia o le a mata'utia le pa o le mauga mu i se taimi lata mai.

Hazardous eruption is imminent, underway, or suspected.

Fa'ailoga Lanu mo Va'alele Aviation Color Codes

Meamata

O lo'o iai le mauga mu i lona tulaga masani, e lē pa, *po'o ua suia mai i se fa'ailo maualuga*, o gaoiiga ua fa'aitiitia ma ua toe fo'i i le lē pa.

Green

Volcano is in typical background, noneruptive state or, *after a change from a higher level*, volcanic activity has ceased, and volcano has returned to noneruptive background state.

Samasama

O le mauga mu ua fa'aalia fa'ailoga ua si'isi'i gaoiiga, *po'o ua suia mai i se fa'ailo maualuga*, po'o gaoiiga ua fa'aitiitia ma o lo'o fa'aaauu pea ona mata'ituina mo ni isi suiga fou.

Yellow

Volcano is experiencing signs of elevated unrest above known background level or, *after a change from a higher level*, volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase.

Lanu Moli

Ua fa'atupula'ia le lē filemu o le mauga mu ma e ono pa, po'o le a pa fo'i le mauga mu e le va'aia pe va'aia fo'i efuefu i le ea [fa'ailoa le maualuga o efuefu, pe a fai o iloa].

Orange

Volcano is exhibiting heightened or escalating unrest with increased potential of eruption, timeframe uncertain, OR eruption is underway with no or minor volcanic-ash emissions [ash-plume height specified, if possible].

Lanu Mūmū

E fuafuaina o le a pa le mauga mu ma o le malosi le pa o efuefu i le ea, po'o ua pa fo'i le mauga mu ua malosi le efuefu i le ea, [fa'aiola le maualuga o le pa o efuefu, pe a fai o iloa].

Red

Eruption is imminent with significant emission of volcanic ash into the atmosphere likely OR eruption is underway or suspected with significant emission of volcanic ash into the atmosphere [ash-plume height specified, if possible].

Ia Nofu Malamalama, Ia Sauniuni

E mafai ona lē taumateina ma mata'utia le pā o mauga. I le taimi muamua e iloa ai le lē filemu e o' o i le taimi e pa ai, e faitaulia i ni minute i le tausaga. O le mea e fa'afetai ai, o masini e mata'ituina gaoiga o mauga mu o le a mafai ona iloa vave ma tu'u atu la'apata'iga. O le porokalama a le USGS Volcano Hazards ma ana pa'aga e galulue e su'esu'e fa'aailoga muamua o gaoiga o mauga mu ma fa'aaoga e lapata'i ai tagata o lo'o nonofo i nofoaga a'afia gofie. O nei su'esu'ega o le a maua ai le taimi mo ofisa a le malo e fa'agaioi ai fuafuaga mo fa'alavelave fa'afuase'i ma auala e fa'aitiitia ai le leaga ma lavea'iina ai ola ma puipui ai meatotino.

O le auala e sili ona e nofo sauniuni ai mo se fa'alavelave fa'afuase'i o lou malamalama ma iloa tulaga o lo'o iai nei. I tulaga o se fa'alavelave fa'afuase'i, e tatau i tagata ona fa'alogo i pulega fa'alotoifale, e o'o fo'i i taimi e lē o iai ni gaoiga fa'aalia, ina ia mautinoa ua nofo sauniuni a'iga ma pisinisi. O lenei auala sili e aofia ai fuafuaga mo fa'alavelave fa'afuase'i pe a tupu se mauga mu fa'apea ma le tu'ufataisia ai o se ato sapalai mo fa'alavelave fa'afuase'i.

Mo nisi Fa'amatalaga

Gaoiga lata mai o Mauga Mū i Amerika Samoa— USGS Hawaiian Volcano Observatory www.usgs.gov/observatories/hvo/volcanoes-american-samoa

Tapenapenaga mo Fa'alavelave Fa'afuase'i— Ofisa o Puipuiiga o le Saogalemu Fa'alotoifale a Amerika Samoa (ASDHS) Itulau: www.americansamoa.gov/dhs

A'oa'o nisi tulaga lamatia o mauga mū—USGS Volcano Hazards Program education Itulau: <https://volcanoes.usgs.gov/vhp/education.html>

Saini loa mo gaoiga a mauga mū i'i—USGS Volcano Notification Service Itulau: <https://volcanoes.usgs.gov/vns2/subscribe>

Stay Informed, Be Prepared

Volcanic eruptions can be unpredictable and deadly. The time between the onset of volcanic unrest and an eruption's start can range from minutes to years. Thankfully, monitoring volcanoes with specialized equipment can often provide early warning of a possible eruption. The USGS Volcano Hazards Program and its monitoring partners work to detect the earliest signals of volcanic activity and use this information to warn communities at risk. Early detection of volcanic activity allows officials to activate emergency response plans and mitigation measures that can save lives and protect property.

The best preparation for an emergency is understanding the potential for, and conditions of, volcanic activity. People living in volcanically active areas should create an emergency plan for what to do during a volcanic event (or any other crisis) and assemble an emergency kit with necessary supplies. In an emergency, heed recommendations from local authorities, even in times of no apparent activity, to ensure households and businesses are safe.

More Information

Current volcanic activity in American Samoa— USGS Hawaiian Volcano Observatory
Website: www.usgs.gov/observatories/hvo/volcanoes-american-samoa

Emergency preparedness— American Samoa Department of Homeland Security
Website: www.americansamoa.gov/dhs

Learn more about volcanic hazards— USGS Volcano Hazards Program education
Website: <https://www.usgs.gov/programs/VHP/education>

Sign up for volcanic activity alerts here— USGS Volcano Notification Service
Website: <https://volcanoes.usgs.gov/vns2/subscribe>

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Edited by Phil Frederick
Layout and design by Kimber Petersen



O lo'o galulue fa'atasi le ofisa o le U.S. Geological Survey, le ofisa o le National Oceanic and Atmospheric Administration (NOAA) Ofisa Va'ai Tau, le ofisa o Puipuiiga o le Saogalemu Fa'alotoifale a Amerika Samoa ma tagata-nu'u e fa'apipi'i masini e mata'ituina gaoiga o mauga mū i le motu o Ta'u ia Aukuso 2022. Ata pu'eina e Elinor Lutu-McMoore, NOAA.

U.S. Geological Survey works with the National Oceanic and Atmospheric Administration (NOAA) National Weather Service, the American Samoa Department of Homeland Security, and residents to install monitoring equipment on Ta'u Island in August 2022. Photograph by Elinor-Lutu-McMoore, NOAA.

Ata i le Fa'ava'a: O le gutu o le mauga mū i matū i sisifo o le motu o Ta'u na fausia ona ua fetaia'i ma filogia ma'a a'asa ma vai eleele po'o ua fetaia'i fo'i ma le suāsami. Ata pu'eina e D. Downs, U.S. Geological Survey.

Cover image: The tuff cone in the northwest of Ta'u Island formed when hot magma interacted either with shallow groundwater or seawater. Photograph by D. Downs, U.S. Geological Survey.