

"Let's make butterfly diagram" at geoscience class in senior high school

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At Kwasan Observatory, Kyoto University, we are doing a "butterfly diagram made by everyone" as a content of hands-on participatory experience learning from 2015. For events such as school visits and public events, we distribute cards with the sunspot occurrence date and latitude to the visitors one by one, each person sticking a sticker for more than 11 years using the observation data of Kwasan Observatory (Kamobe et al., JpGU 2015, G03-12). While it is a work by a total of more than 1,000 participants, it takes time to complete it, and ingenuity is needed to show participants the whole picture at a later date. In February 2018, for the second year students a certain High School in Kyoto, Staff and graduate student of Kwasan Observatory, and high school teachers used 2 hours to create butterfly diagrams with commentary on solar research. After lecture of modern solar physics research, we created a collaborative lesson by showing participants the finished butterfly diagram by dividing the page and creating it in a short time by group work. Provide deep learning about the sun by arranging how to arrange according to the curriculum of high school geology and using it as a teaching material of "subjective, interactive and deep learning" (so-called active learning) to be included in the next course of study instruction, It is a future task not to merely work, but to consider what kind of things the students are aware of and think about through class practice.

Keywords: Collaborative Learning, Geoscience in senior high school, butterfly diagram, active learning