We teach geoscience in and by means of places: localities given meaning by human experiences in them. People and cultures view and understand places in diverse ways. Geological or other scientific knowledge of a place may be only one component of a spectrum of local meaning that encompasses aesthetics, art, ceremony, economics, history, mythology, recreation, and so on. People also tend to develop emotional attachments to meaningful places.

The set of meanings and attachments to places, held by individuals or groups, is referred to as sense of place. The physical environment influences development of sense of place [1, 2]; if sense of place influences the ways people observe and interpret nature, it must influence geoscience learning, and merits study by educators. Among some students (e.g., American Indians), interest in geoscience may be marginalized by teaching that conflicts directly with sense of place [3].

**Sense of Place (SoP)**

**PM** is a rich set of locally-constructed and culturally-mediated knowledge and skills that may incorporate geoscientific understanding of places.

Active research seeks to characterize PM qualitatively (dimensions of meaning obtained from subject interviews and semiotic analyses of textual and graphic representations of places) and quantitatively (focused surveys and factor analyses); e.g., [4].

**Place-based learning** emphasizes local inquiry, integrates or acknowledges diverse meanings of places, teaches by authentic experiences, promotes ecological and cultural sustainability, and enriches the sense of place of students and teachers; e.g., this Colorado Plateau-based course for Navajo students that integrates indigenous knowledge [3]. Place-based teaching occurs mostly in K-12 schools; the effectiveness of the approach for college geoscience has not been well assessed.

**Characterization and measurement of sense of place** are prerequisite to informed design, implementation, and assessment of place-based geoscience curricula, particularly those intended to serve ethnically-, culturally-, and geographically-diverse student populations.

**References**


**Students' SoP for "home" and Arizona (if not home) are compared. It may also be instructive to compare SoP among geologically-and pedagogically-relevant places that are nested geographically [9], e.g.:**

North American continent
- American Southwest
- Basin and Range
- Colorado Plateau
- Arizona
- Valley of the Sun
- Navajo Nation
- Grand Canyon

**Summary of Definitions**

**Sense of Place (SoP)**

PM is a rich set of locally-constructed and culturally-mediated knowledge and skills that may incorporate geoscientific understanding of places.

**Place Meaning (PM)**

PA has two dimensions [6, 7]: place dependence (capacity of a place to support activities or goals) and place identity (emotional attachment to a place).

**Place Attachment (PA)**

Experimental Place Attachment Inventory [8] used at ASU to compare attachment to different places relevant to geoscience courses, and by race and ethnicity.

**Pilot Place Meaning Survey** (after [4]) adapted for comparative studies of place-based and conventional introductory geology labs at ASU [5].

**Odd-numbered items measure place identity and even-numbered items place dependence. These are positive for subscores above 18; PA is positive for total score above 36.**