**Guide to Linking *Uncovering Student Ideas* Earth and Space Science Probes to Disciplinary Core Ideas in the *Framework and the NGSS***

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| **Disciplinary Core Idea** | **Probe and USI Book Code** | **Grade Span Connection** |
| ESS1.A The Universe and Its Stars  | What Lights Up the Moon? (USI K-2, 2013) | Related K-2 |
| When Is the Next Full Moon? (USI K-2, 2013) | Aligned K-2 |
| When Is My Shadow the Longest? (USI K-2, 2013) | Aligned K-2 |
| Gazing at the Moon (USI V1, 2005, 2019) | Aligned 6-8 |
| Going Through a Phase (USI V1, 2005, 2019) | Aligned 6-8 |
| Emmy’s Moon and Stars (USI V2, 2007) | Aligned 3-5; Related 6-8 |
| Objects in the Sky (USI V2, 2007) | Related 3-8 |
| No Shadow (USI A, 2012) | Aligned 6-8 |
| Pizza Sun (USI A, 2012) | Related 3-8 |
| How Far Away Is the Sun? (USI A, 2012) | Related 3-8 |
| Sunspots (USI A, 2012) | Related 6-12 |
| Shorter Days in Winter (USI A, 2012) | Aligned 6-8 |
| Changing Constellations (USI A, 2012) | Aligned 6-8 |
| Earth or Moon Shadow? (USI A, 2012) | Related 6-8 |
| Moon Spin (USI A, 2012) | Related 6-8 |
| How Long Is a Day on the Moon? (USI A, 2012) | Related 6-8 |
| Is It a Planet or a Star? (USI A, 2012) | Related 3-12 |
| Where Do You Find Gravity? (USI A, 2012) | Related 6-12 |
| Shooting Star (USI A, 2012) | Related 6-12 |
| Is the Sun a Star? (USI A, 2012) | Aligned 3-5; Related 6-8 |
| Which Is Bigger? (USI A, 2012) | Related 3-8 |
| Where Are the Stars in Orion? (USI A, 2012) | Aligned 3-5; Related 6-12 |
| What Are Stars Made Of? (USI A, 2012) | Aligned 9-12 |
| What Happens to Stars When They Die? (USI A, 2012)  | Related 9-12 |
| Do Stars Change? (USI A, 2012) | Aligned 9-12 |
| Are We Made of Star Stuff? (USI A, 2012) | Aligned 9-12 |
| Seeing Into the Past (USI A, 2012) | Related 9-12 |
| What Is the Milky Way? (USI A, 2012) | Aligned 6-8; Related 9-12 |
| Expanding Universe (USI A, 2012) | Aligned 9-12 |
| Is the Big Band “Just a Theory”? | Related 9-12 |

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| ESS1.B Earth and the Solar System  | What Lights Up the Moon? (USI K-2 2013) | Related K-2 |
| Going Through a Phase (USI V1, 2005, 2019) | Aligned 3-6 |
| Darkness at Night (USI V2, 2007) | Aligned 3-5 |
| Objects in the Sky (USI V2, 2007) | Related 3-8 |
| Summer Talk (USI V3, 2008) | Aligned 6-8; Related 9-12 |
| Me and My Shadow (USI V3, 2008) | Aligned 3-5 |
| Lunar Eclipse (USI V4, 2009) | Aligned 6-8 |
| Solar Eclipse (USI V4, 2009) | Aligned 6-8 |
| Moonlight (USI V4, 2009) | Related K-5 |
| What Causes Night and Day? (USI A, 2012) | Aligned 3-5 |
| Where Did the Sun Go? (USI A, 2012) | Aligned 3-5; Related 6-8 |
| The Two Rs (USI A, 2012) | Related 3-12 |
| Sunrise to Sunset (USI A, 2012) | Aligned 3-5; Related 6-8 |
| No Shadow (USI A, 2012) | Aligned 3-5 |
| What’s Moving? (USI A, 2012) | Aligned 3-5; Related 6-8 |
| Shorter Days in Winter (USI A, 2012) | Related 3-5 |
| Why Is It Warmer in Summer? | Aligned 6-8; Related 9-12 |
| Seeing the Moon (USI A, 2012) | Related 3-8 |
| Sizing Up the Moon (USI A, 2012) | Related 3-5 |
| Does the Moon Orbit the Earth? (USI A, 2012) | Aligned 3-5; Related 6-8 |
| Earth of Moon Shadow? (USI A, 2012) | Related 3-5; Aligned 6-8 |
| Moon Phase and Solar Eclipse (USI A, 2012) | Aligned 6-8 |
| Comparing Eclipses (USI A, 2012) | Aligned 6-8 |
| Does the Earth Go Through Phases? (USI A, 2012) | Related 6-8 |
| Moon Spin (USI A, 2012) | Related 3-8 |
| Chinese Moon (USI A, 2012) | Related 3-8 |
| Crescent Moon (USI A, 2012) | Aligned 3-5 |
| How Long Is a Day on the Moon? (USI A, 2012) | Related 3-8 |
| Is the Moon Falling? (USI A, 2012) | Aligned 6-8; Related 9-12 |
| What’s Inside Our Solar System? (USI A, 2012) | Aligned 6-8 |
| How Do Planets Orbit the Sun? (USI A, 2012) | Aligned 6-8; Related 9-12 |
| Is It a Planet or a Star? (USI A, 2012) | Related 3-8 |
| Human Space Travel (USI A, 2012) | Related 6-12 |
| Where Do You Find Gravity? (USI A, 2012) | Related 6-12 |
| Gravity in Other Planetary Systems (USI A, 2012) | Related 6-12 |
| Shooting Star (USI A, 2012) | Related 6-8 |
| Which Is Bigger? (USI A, 2012) | Related 3-8 |

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| ESS1.C The History of Planet Earth | Mountain Age (USI V1, 2005, 2019) | Related 3-8 |
| How Old Is Earth? (USI E&ES, 2016) | Related 6-12 |
| Is It a Fossil? (USI E&ES, 2016) | Related 3-8 |
| Sedimentary Rock (USI E&ES, 2016) | Related 3-5; Aligned 6-8 |

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| ESS2.A Earth Materials and Systems | Wet Jeans (USI V1, 2005, 2019) | Related 3-5 |
| Beach Sand (USI V1, 2005, 2019) | Related 3-5 |
| Mountain Age (USI V1, 2005, 2019) | Related 3-8 |
| Is It a Rock- Part 1 (USI V2, 2007) | Related 3-5 |
| Is It a Rock- Part 2 (USI V2, 2007) | Related 3-8 |
| What Are Clouds Made of? (USI V3, 2008) | Related 3-5 |
| Where Did the Water Come From? (USI V3, 2008) | Related 3-5 |
| Rainfall (USI V3, 2008) | Related 3-8 |
| Camping Trip (USI V4, 2009) | Aligned 6-8 |
| What Makes Up A Mountain? (USI K-2, 2013) | Related K-5 |
| Describing Soil (USI K-2, 2013) | Related K-5 |
| Is a Brick a Rock? (USI K-2, 2013) | Related K-5 |
| What’s Beneath Us? (USI E&ES, 2016) | Related 3-8 |
| Why Is the Ocean Salty? (USI E&ES, 2016) | Related 3-8 |
| Is It Erosion? (USI E&ES, 2016) | Aligned 3-5 |
| Can a Plant Break Rocks? (USI E&ES, 2016) | Aligned 3-5 |
| Mountains and Beaches (USI E&ES, 2016) | Related 3-5 |
| How Do Rivers Form? (USI E&ES, 2016) | Related 3-5 |

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| ESS2.B Plate Tectonics and Large-Scale System Interactions  | Mountain Top Fossil (USI V2, 2007) | Aligned 6-8; Related 9-12 |
| Describing Earth’s Plates (USI E&ES, 2016) | Related 6-12 |
| Where Do You Find Earth’s Plates? (USI E&ES, 2016) | Related 6-8; Aligned 9-12 |
| What Do You Know About Earthquakes and Volcanoes? (USI E&ES, 2016) | Related 3-12 |

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| ESS2.C The Role of Water in Earth’s Surface Processes | Wet Jeans (USI V1, 2005, 2019) | Related 3-5; Aligned 6-8 |
| Beach Sand (USI V1, 2005, 2019) | Aligned 6-8 |
| Mountain Age (USI V1, 2005, 2019) | Related 6-8 |
| Where Did the Water Come From? (USI V3, 2008) | Related 3-5; Aligned 6-8 |
| Rainfall (USI V3, 2008) | Related 3-8 |
| Where Would It Fall? (USI V4, 2009) | Aligned 3-5 |
| Land or Water? (USI E&ES, 2016) | Related 3-8 |
| Where Is Most of the Fresh Water (USI E&ES, 2016) | Aligned 3-5; Related 6-8 |
| Groundwater (USI E&ES, 2016) | Related 3-8 |
| Why Is the Ocean Salty? (USI E&ES, 2016) | Aligned 6-8; Related 9-12 |
| Water Cycle Diagram (USI E&ES, 2016) | Related 3-5; Aligned 6-8 |
| Where Did the Water in the Puddle Go? (USI E&ES, 2016) | Related 3-5; Aligned 6-8 |
| In Which Direction Will the Water Swirl? (USI E&ES, 2016) | Related 6-8 |
| Is It Erosion? (USI E&ES, 2016) | Aligned 6-8; Related 9-12 |
| Grand Canyon (USI E&ES, 2016) | Aligned 6-8 |
| Mountains and Beaches (USI E&ES, 2016) | Aligned 6-8 |
| How Do Rivers Form? (USI E&ES, 2016) | Aligned 6-8 |
| What Is the Inside of Earth Like? (USI E&ES, 2016) | Related 6-8; Aligned 9-12 |

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| ESS2.D Weather and Climate | Weather Predictors (USI E&ES, 2016)  | Aligned 3-5; Related 6-8 |
| Coldest Winter Ever! (USI E&ES, 2016) | Aligned 3-5; Related 6-8 |
| Are They Talking About Weather or Climate? (USI E&ES, 2016)  | Related 6-12 |

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| ESS2.E Biogeology | Can a Plant Break Rocks? (USI E&ES, 2016) | Aligned K-2; Related 3-5 |

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| ESS3.A Natural Resources | Where Does Oil Come From? (USI V4, 2009) | Aligned 3-5; Related 6-8 |
| Is a Brick a Rock? (USI K-2 2013) | Related K-2 |
| Renewable of Nonrenewable? (USI E&ES, 2016) | Aligned 3-5; Related 6-8 |

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| ESS3.B Natural Hazards | No probes for this DCI yet.  |  |

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| ESS3.C Human Impacts on Earth Systems  | Global Warming (USI V4, 2009) | Related 6-12 |
| What Are the Signs of Global Warming? (USI E&ES, 2016) | Aligned 6-12 |
| Acid Rain (USI E&ES, 2016) | Aligned 6-8; Related 9-12 |
| What Is a Watershed? (USI E&ES, 2016) | Related 3-12 |
| Is Natural Better? (USI E&ES, 2016) | Related 3-12 |

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| ESS3.D Global Climate Change | Global Warming (USI V4, 2009) | Aligned 6-8; Related 9-12 |
| What Are the Signs of Global Warming? | Aligned 6-12 |

**Key to USI Book Codes:**

USI V1, 2005: Keeley, P. 2019. *Uncovering Student Ideas in Science- Vol. 1, 2nd Edition- 25 Formative Assessment Probes.* Arlington, VA: NSTA Press. (1st edition- 2005)

USI V2, 2007: Keeley, P., F. Eberle, and J. Tugel. 2007. *Uncovering Student Ideas in Science- Vol. 2- 25 More Formative Assessment Probes.* Arlington, VA: NSTA Press

USI V3, 2008: Keeley, P., F. Eberle, and C. Dorsey. 2008. *Uncovering Student Ideas in Science- Vol. 3- 25 Another Formative Assessment Probes.* Arlington, VA: NSTA Press

USI V4, 2009: Keeley, P., and J. Tugel. 2009. *Uncovering Student Ideas in Science- Vol. 4- 25 New Formative Assessment Probes.* Arlington, VA: NSTA Press

USI A 2012: Keeley, P. and C. Sneider. 2012. *Uncovering Student Ideas in Astronomy- 45 New Formative Assessment Probes.* Arlington, VA: NSTA Press

USI K-2, 2013: Keeley, P.2013. *Uncovering Student Ideas in Primary Science- 25 New Formative Assessment Probes for K-2.* Arlington, VA: NSTA Press

USI E&ES 2016: Keeley, P. and L. Tucker. 2016. *Uncovering Student Ideas in Earth and Environmental Science- 32 New Formative Assessment Probes.* Arlington, VA: NSTA Press

**Connections to the Disciplinary Core Ideas (DCIs)- Related or Aligned?**

**Related**- Most formative assessment probes are designed to address related ideas that students need or can use to develop a full understanding of the DCIs. A concept or idea elicited by the probe can be related to a DCI but not an exact match. For example, “Is It a Fossil?” addresses the concept of a fossil; a concept necessary to using fossil-related ideas such as how ancient life forms can be found in layers of sedimentary rock.

**Aligned-** Some formative assessment probes are an exact match to the grade level DCI and can be used for both formative and summative purposes. For example, “Solar Eclipse” is considered aligned to the grades 6-8 ESS1.B DCI as students use a model of the solar system to explain eclipses.