CSDMS Terrestrial Working Group

Scoping & Knowledge Gaps

Q: Why does the scoping group exist?

A: The processes (terms) necessary to solve a given problem must be identified. More often than not, those terms are the subjects of ongoing research
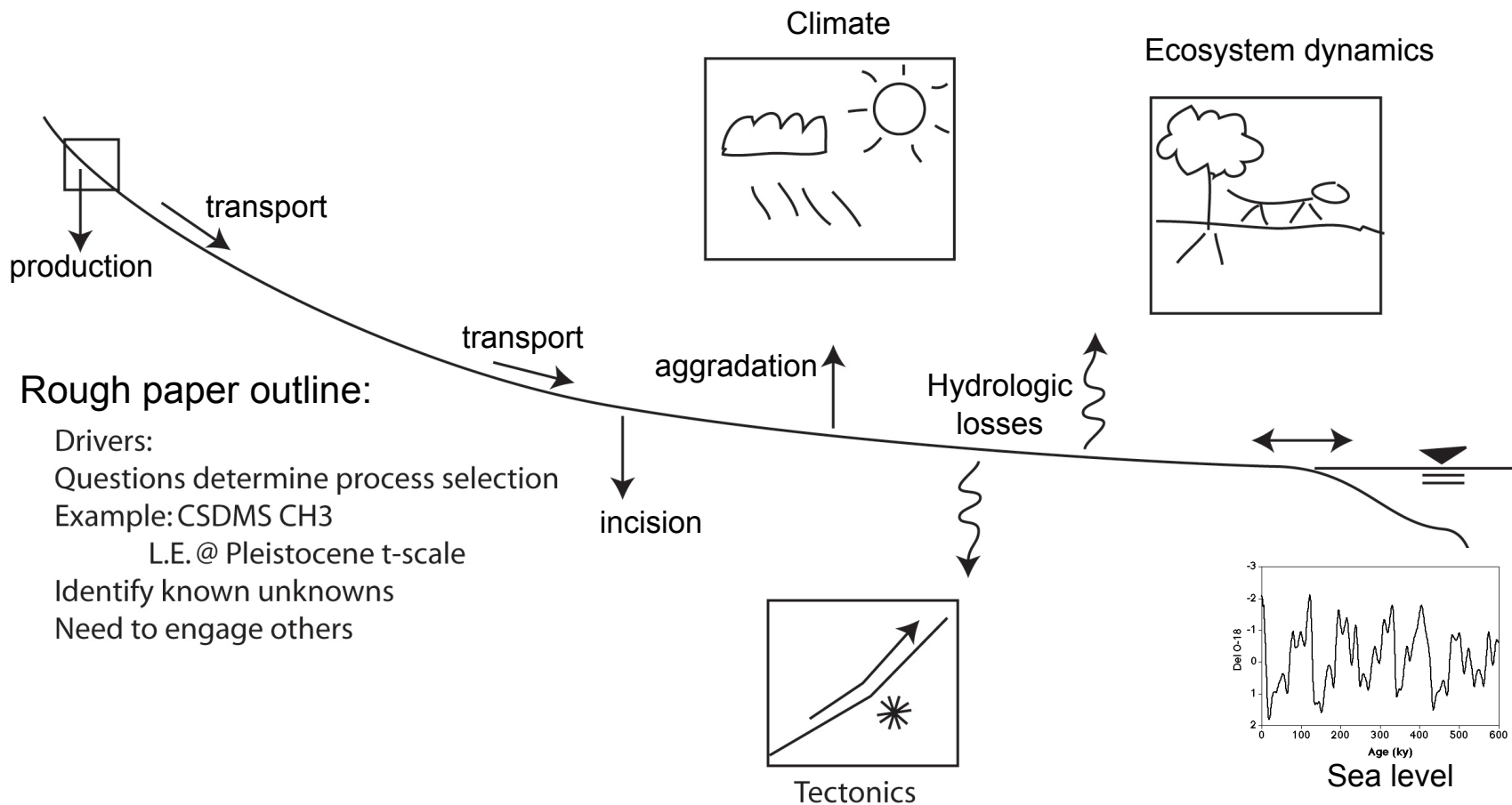
Our role:

- Assess the state of knowledge
- Advise the TWG and the community on strengths, existing resources, needs, priorities

Q: What will the scoping group deliver?

1. Maps of processes required to address a given problem (e.g., CSDMS grand challenges)

2. A scheme for assessing the state of development or readiness of each process

1. Maps of processes required to address a given problem (e.g., CSDMS grand challenges)

Climate

Ecosystem dynamics

transport

production

transport

aggradation

Hydrologic losses

Rough paper outline:

Drivers:
Questions determine process selection
Example: CSDMS CH3
      L.E. @ Pleistocene t-scale
Identify known unknowns
Need to engage others

incision

Tectonics

Sea level

2. Scheme for assessing the readiness of each process

	In the dark	Faint flame	Lighthouse	Sunshine	Enlightenment
Quantitative framework	None	A few expressions based on intuition	Multiple competing hypotheses based on observations and measurements	Widely accepted, mechanistic theory has emerged	Solved problem. Universally accepted physical principles
Calibration/validation efforts	None	Initial efforts to calibrate expressions are underway, but no real tests have been performed.	Several calibration exercises have been performed. Initial efforts to test predictions against field or laboratory data are underway.	Parameters have been calibrated for many scenarios. Predictions have been tested against multiple laboratory and field measurements by independent groups.	Moot, except for efforts to measure parameter values for specific sites
Human effort	It's important, but almost nobody is working on it	A handful of groups are working on it	Many groups working on it	A few groups are working to refine the details	No need to work on it. Everyone uses it.
Existing code	None	A few in-house efforts	Many different in-house versions, a few longer-term development efforts, some distributed packages	Community models, widely available commercial packages	Shipped with textbooks
Examples [and names of existing codes/ developers, if applicable]	> hillslope grain size production & comminution > large-scale development of bedrock landscapes	> debris flow incision and routing > long-term overland flow erosion > deep-seated landsliding > chemical denudation > long-term ice sheet dynamics	> bedload sediment transport [Parker, Wilcock, Cui] > bedrock river incision > structural development of orogens > soil production > local (cm to m-scale) glacial erosion > river meandering [Tucker, Lancaster, others] > landscape-scale glacial erosion > hydraulic geometry: fluvial channel width and	> Catchment-scale groundwater flow [MODFLOW] > free-surface/open-channel flow [Delft3D, MD-SWMS] > suspended sediment transport > short-term (years) ice dynamics	> Lithospheric flexure > small-scale (meters) Darcy flow