

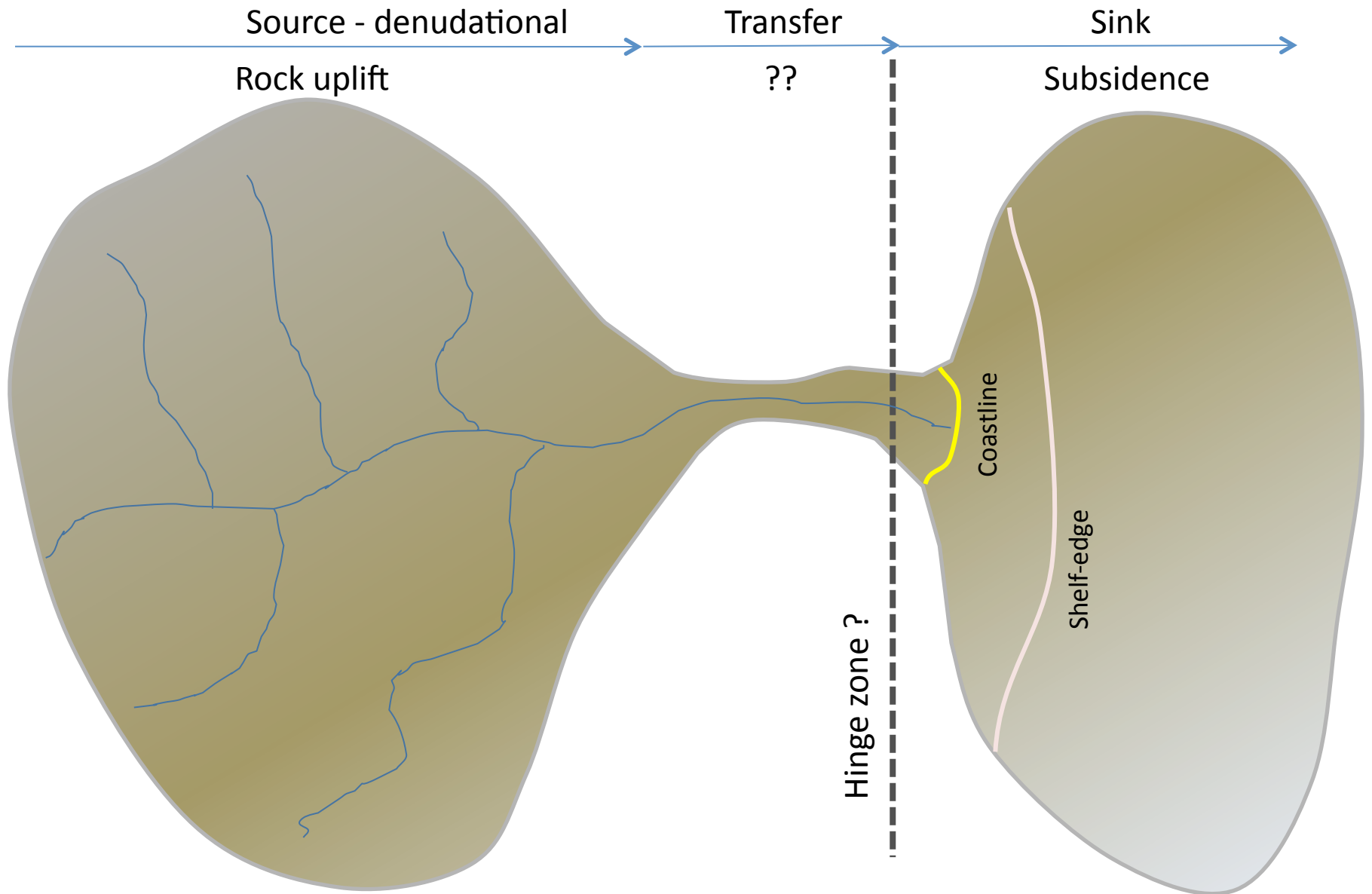
Landscapes Into Rock 5 year Plan

5-Year Plan

- Design and implement a large-scale (100s of km²) basin-scale componentized framework nested model for stratigraphy within a x,y,z,t coordinate system representing source to sink denudation, transport and deposition, calculated at a 100 year time step.
- Nested means multiple temporal and spatial scales of process and preservation represented within the same model
- How to simplify short-term models??
- Should be designed to utilize advances in high performance computing (e.g. new CU HPCC) to minimize run times for multi-million year duration simulations.
- Should be linked to program to develop geoinfrastructure (e.g. 3D seismic data set and results of continental stratigraphic drilling) for purposes of model testing and calibration.

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Terminology



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Specs for the denudation model: Terrestrial Group

- 100 year time step
- Output should be a realistic grain size distribution that is a function of x, y, t
- Mud – “it’s huge”
- Output should be Q_w and Q_{s_i} where i is a grain size index
- Drainage basin should have capacity to calculate sediment storage
- Model should be able to input and account for paleo DEM and paleogeology (e.g. drainage basin substrate lithology that varies in x, y and z)
- Model parameters/processes should include:
 - Substrate lithology
 - Climate
 - Vegetation
 - Crustal deformation with a lateral component
 - Runoff production
- Development of CHILD – ADOLESCENT?

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Specs for the transfer zone model

The transfer zone is the fluvial (and wind blown?) system between the zone of rock uplift and the coast (or the hinge line??)

Requirements:

Non-uniform routing of grain sizes including floodplain exchange

Ability to preserve strata in the transfer zone.

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Specs for the sink/basin fill model

Implementation:

- Coast-to-basin processes
- Use compute and drift to solve reduced set of coastal, ocean and wave field equations each 100 year time step
- Scales – 1-10km cells in outer nest, 100 to 100s m cells in inner nest
- Who will do this – a new LIR FRG??

Requirements:

- Build and preserve stratigraphy
- Nested models incorporating different levels of spatial and temporal detail of process and strata.
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Specs for the downstream/basin fill model

Processes to model:

- Coast to shelf-slope partitioning
- Wave field
- Tides at 3 scales
- Wave supported density driven mud transport
- Wind driven circulation
- Delta and estuarine processes
- Turbidity currents
- Debris flows
- Channelized flow in deep-water
- Shelf bioturbation
- Burial compaction and pore pressure