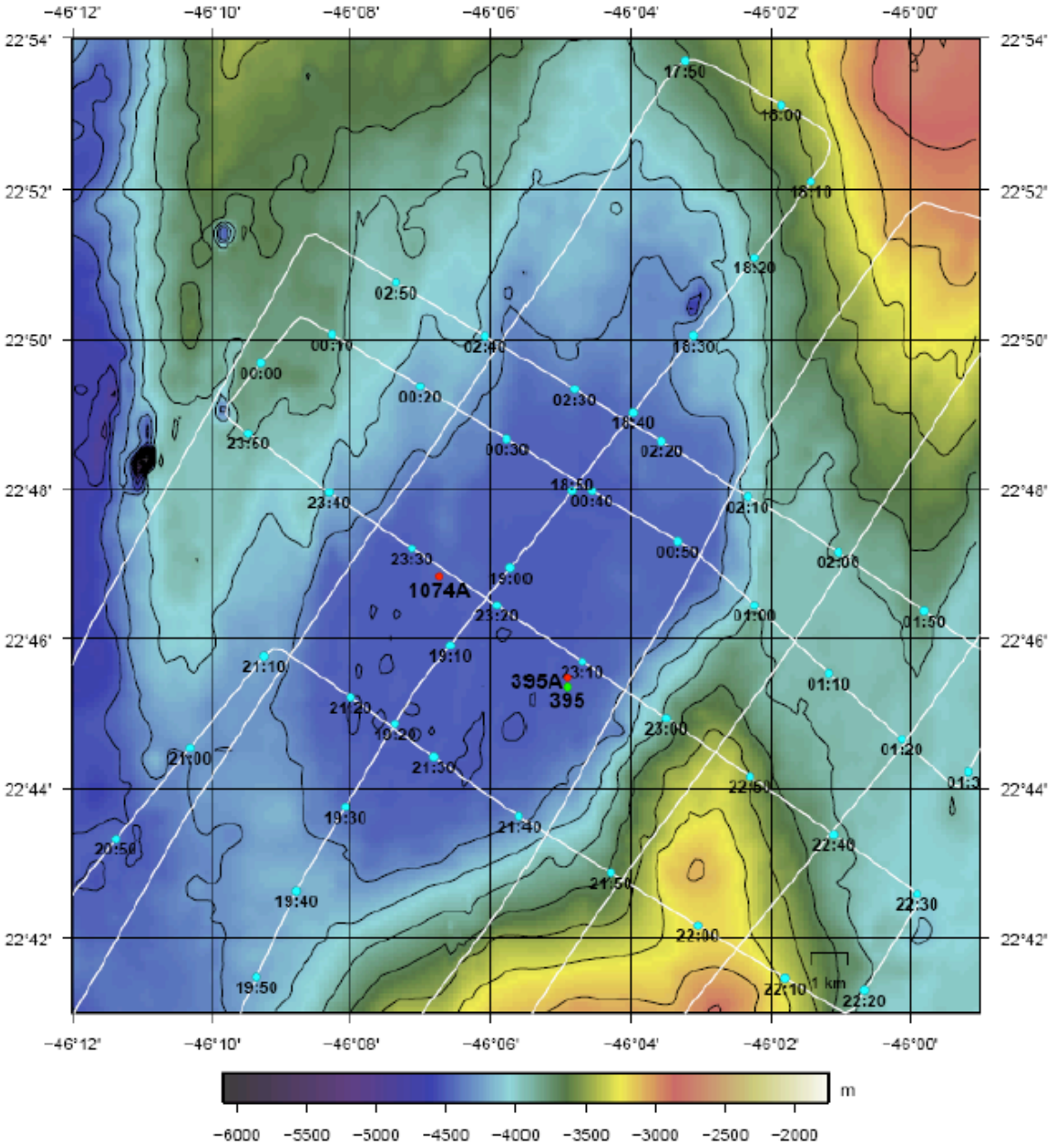

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Bathymetry and existing seismic lines

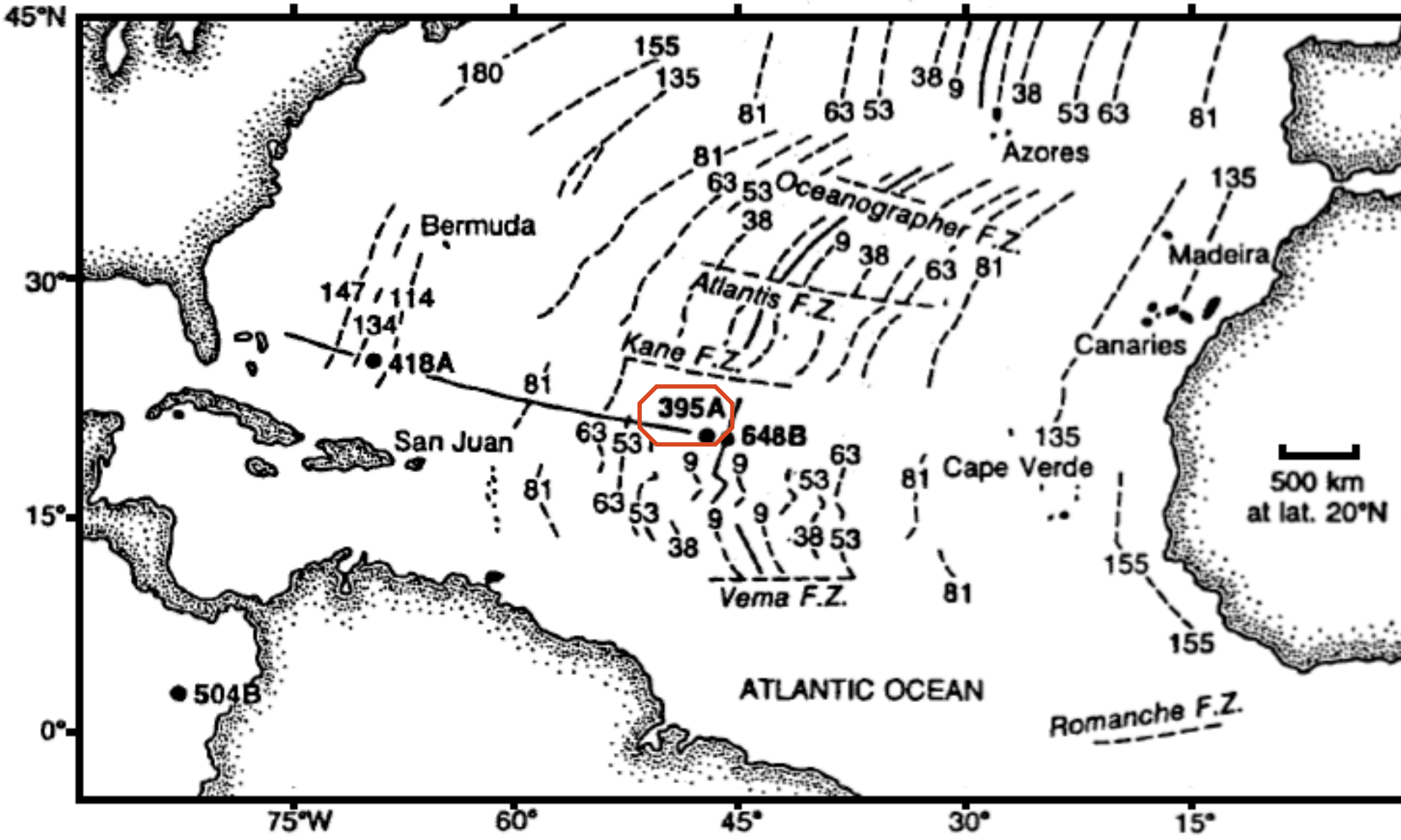
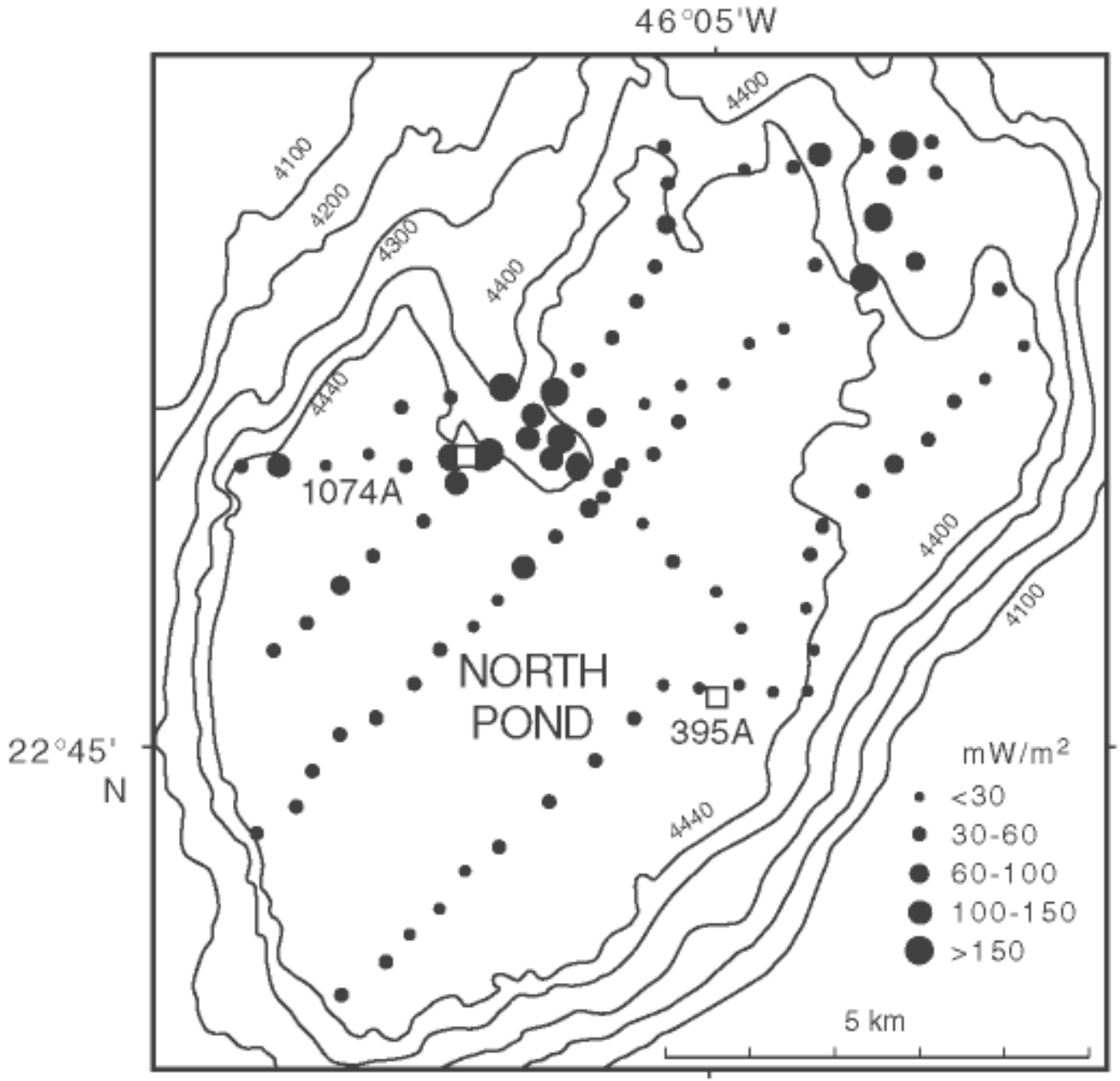
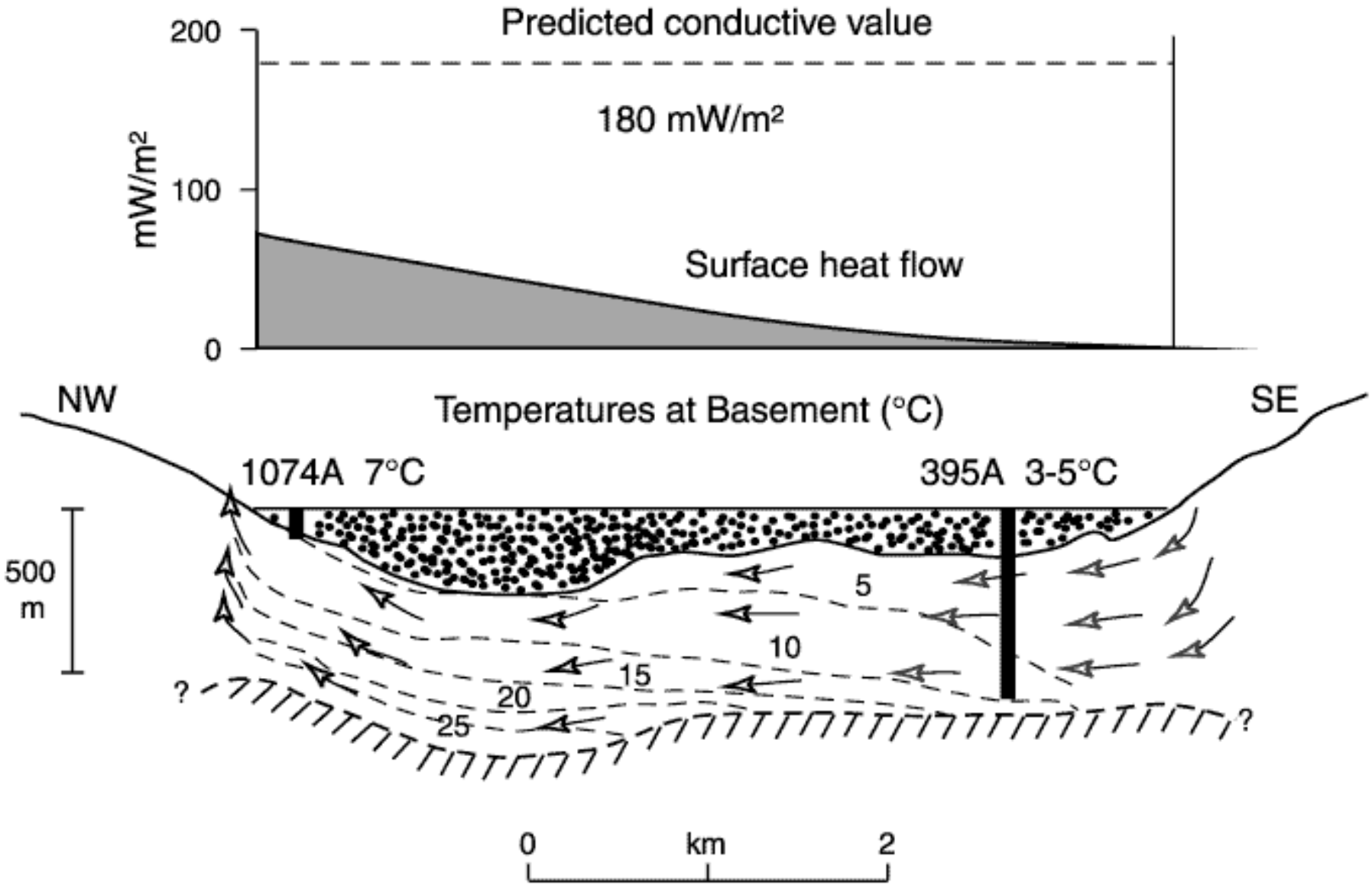


Figure 1. Locations of Holes 395A, 418A, 504B, and 648B. Dashed line
show ages of crust in Ma, deduced from magnetic anomalies (after Hynd
man, Salisbury, et al., 1984).



Location of Hole 395A in North Pond showing the heat flow survey of Langseth et al. (1992). Bathymetry is shown in meters, with contour intervals of 100 m except for the deepest contour at 4440 m



Schematic model of Langseth et al. (1984) for fluid flow in permeable basement beneath North Pond showing approximate relative locations of Holes 395A and 1074A.

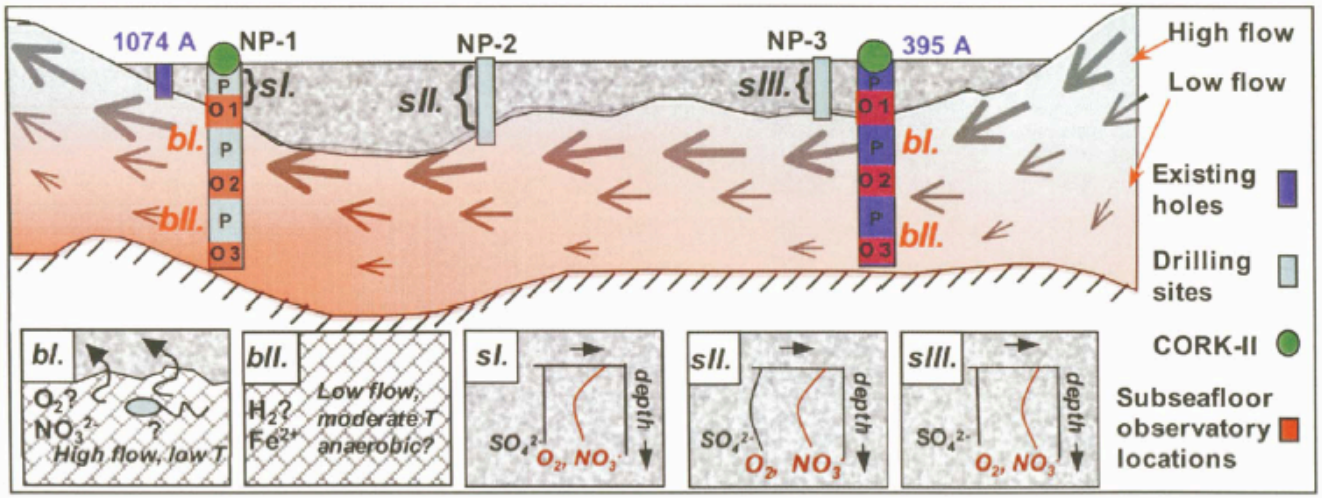


Figure 3. Schematic diagram of North Pond incorporating hydrological inferences discussed above and detailing the 3 proposed drilling (NP-1, -2, -3 [alt. site in Fig. 4]) and CORK sites (NP-1, 395A) relative to existing holes (1074A, 395A). Arrows depicting the basement flow are relative to hydrological conductivity, i.e., higher flow in upper basement. Color is to depict temperature based on heat flow. Cartoons depict possible chemical/ microbiological scenarios for these sites. In the uppermost crust (bI), we predict the most oxidizing chemical conditions to prevail, with the likely presence of NO_3^-. 300 to 500 m subbasement (bII), warmer, more anaerobic conditions may be found, supporting different chemical gradients and metabolic pathways. Previous measurements of SO_4^{2-} in the shallow sedimentary sequences show flat profiles with seawater concentrations (28 µmol/kg) throughout. In the deepest sedimentary unit we propose to drill at NP-2 it is possible that some depletion may occur in the center of the profile. For O_2 and NO_3^-, we anticipate profiles that show depletion patterns that vary along the flow path. At the region closest to discharge (sI) the most O_2/NO_3^- depleted basalt pore waters are anticipated, with less depletion at the center site (sII) and site closest to the recharge zone (sIII), where the base may approach seawater composition. *O1*, *O2*, and *O3* are the proposed subseafloor observatory locations for installation of incubation experimental materials (see below). Packers (*P*) sites will be defined based on existing (395A, see logistics) or to be determined caliper measurements. Sites are defined based on the hydrological data shown in Fig. 2. *O1* represents a cool, high flow regime at the basement/sediment interface. *O2* is a region of still fairly high flow and low temperatures, but is likely more depleted in oxidants such as O_2 and NO_3^-. *O3* is a site below the major hydrological break shown in Fig. 2 and represents a low-flow, warm region that should be the least oxygenated site (possibly anoxic). Our motivation to drill 500 m into basement is to capture these major chemical/physical regimes.

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